THOUGHTS

ON THE

STRUCTURE

OF THIS GLOBE.

The Scriptural History of the EARTH and of MANKIND,

COMPARED WITH

THE COSMOGONIES, CHRONOLOGIES, AND ORIGINAL TRADITIONS OF

ANCIENT NATIONS;

AN

ABSTRACT AND REVIEW OF SEVERAL MODERN SYSTEMS;

WITH

An Attempt to Explain Philosophically,

THE MOSAICAL ACCOUNT

OF THE

CREATION AND DELUGE,

And to deduce from this last Event

The Causes of the Actual Structure of the Earth.

IN A SERIES OF LETTERS.

WITH NOTES AND ILLUSTRATIONS.

By PHILIP HOWARD, Esq.

Nullius addictus jurare in verba magistri
——————— quærere verum.
HORATIUS.

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PREFACE.

THE ſubſtance of the following Work was publiſhed in two Letters in the French language towards the end of the year 1786. It has been ſince reviſed, corrected, and conſiderably enlarged. It was originally occaſioned by a difference of opinion, relative to the cauſes of the Formation and Structure of Mountains, between the Marquis de Montigny, much attached to the ſyſtem of Mr. de Buffon, and the Author, whilſt making together a tour through Switzerland. By minds ſtrongly prejudiced in favour of their moſt celebrated writers, and already agitated by brooding philoſophic theories of government, it could be little attended to. In it the Engliſh reader will be briefly acquainted with the outlines of thoſe ſcientific ſyſtems, which, keeping pace with numerous publications in every path of literature, were calcu-

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lated to tear up in the public mind every remaining attachment to Chriſtianity. Should he not approve of the explication here offered of the Moſaical account of the Creation and Deluge, he will at leaſt perceive that thoſe famous ſyſtems ſo triumphantly ſubſtituted to it are not a little inconſiſtent and fallacious. The author's ideas are not, as will be ſeen, unauthorized by men of high reputation; and if they ſhould in this country of ſober reaſoning excite the attention of perſons of greater abilities to this great ſubject, his utmoſt wiſhes would be accompliſhed.

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THOUGHTS

ON THE

STRUCTURE

OF THIS GLOBE.

LETTER I.

Inſufficiency and Contrariety of various modern Syſtems on the Formation and Structure of the Earth.—Coincidence of antient Traditions with the Scriptural Account of the Creation and Deluge.—Attempt to prove from theſe, and from the Infancy of Population in Times not very remote, the Reality of a general Deluge, and its Antiquity not far removed beyond the Date uſually aſſigned to it.

SIR,

IN the agreeable tour we made together in Switzerland, the aſpect of its mountains ſtretching on all ſides range behind range, pile over pile, in vaſt and rude magnificence; the various and often ſingular diſpoſition of their ſtrata; the frequent marks of ruin and

diſlocation viſible on their ſhattered flanks; the correſpondent angles of the rocks bordering their vallies, apparently excavated by torrents which could bear no proportion to their preſent ſcanty rills, gave occaſion to ruminate on their original formation, and the convulſions which they muſt have ſince experienced. Our reflections on theſe objects frequently led us to converſe on the formation and revolutions of the earth itſelf. As we ſailed along the frequent lakes of this wonderful country, the undoubted marks of wave-worn rocks on their oppoſite ſides, many toiſes above the preſent level of their waters and much above their poſſible reach, ſhewed us plainly that thoſe immenſe cavities had once been filled with them to a much greater height. This circumſtance ſtrongly connected the changes wrought in theſe high regions with thoſe which muſt have conſequently happened on the lower ſurface of adjacent countries. The multiplicity of theſe objects, whilſt it afforded conſtant materials for new reflections, gave us little time for diſcuſſion; and we then mutually promiſed each other to communicate our ideas more at leiſure on theſe intereſting and difficult ſubjects, on which are daily built ſo many different ſyſtems. I am far, I own, from poſſeſſing all the various parts of ſcience which would be requiſite to treat this ſubject as it deſerves; but from the peruſal of antient hiſtory, from the writings of others, and the reflections which their various ſyſtems have ſuggeſted, as well as from my own obſervations, I have framed to myſelf ſome ideas, which in conſequence of my promiſe I ſhall venture to communicate, in hopes

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at leaſt that it may engage you at ſome time to comply with yours.

I muſt confeſs that I have yet met with no ſyſtem amongſt the vaunted philoſophers of your nation which appears to me ſatisfactory. Their ſeveral authors labour to account for the whole order and diſorder which appear in our planet (for both are ſtrongly marked) by one ſingle elementary cauſe operating during an infinity of ages. In conſequence of this predilection for a ſingle agent, whether fire or water, they frequently ſee their ſyſtems expoſed to embarraſſing dilemmas, or overturned by contradictory facts.

I ſhould rather think that it is by admitting ſeveral co-operating or ſucceſſive cauſes, that we may at length form ſome plauſible idea of the original formation of the preſent ſtructure of our globe, and of the revolutions which muſt have occaſioned its actual diſlocated ſtate. I ſay plauſible, becauſe I think natural philoſophy, whatever progreſs it has made, yet too far from that perfection of which it may be capable, to afford any thing very deciſive on the ſubject. That it ever will be able to attain any thing like certainty, is much to be doubted.

Almoſt all the authors of theſe new ſyſtems, to conduct the works of Nature to their preſent ſtate, require an almoſt infinite ſeries of ages. Great alterations operated by a general deluge are

induſtriouſly excluded. Revolutions they admit; but a ſudden and total one would not favour the gradual and ſlow workings of their plaſtic Nature, and might have effaced all traces of thoſe ingenious proceſſes which they have deviſed for her all-efficient power. Yet the moſt authentic records of man, the ſlow population of the earth, and the birth and progreſs of the moſt neceſſary arts clearly ſpecified in the annals of all nations, tell us, with at leaſt equal authority, that this earth, ſince its laſt great revolution, cannot be, as the habitation of the preſent race, much older than the age moſt generally aſſigned to it. I own indeed that the antient ſtory of ſeveral nations furniſhes many with reaſons for giving a much longer duration to the preſent ſtate of things; whilſt others, perceiving nothing but doubt and monſtrous fables in its whole texture, entirely reject the teſtimony of hiſtory. Some perſons, attributing to certain ſtill exiſting monuments an antiquity far beyond the reach of record, perſuade themſelves that on this globe, whoſe origin and great ſucceſſive changes are by length of time enveloped in utter darkneſs, ignorance and knowledge have frequently ſucceeded each other at ſeveral intervals, as has happened between the age of Auguſtus and that wherein we live, and thus preſume an antiquity unaccounted for in the exiſting annals of mankind.

Philoſophers, rejecting every other document, pique themſelves on interrogating Nature only; and from her pretended certain indications pronounce, in ſpite of human annals, her high antiquity indubitable.

dubitable. But if in ſome points that Nature has permitted her ſecrets to be penetrated by their ſagacity, in others ſhe has certainly withheld them; and the reſponſes ſhe is pretended to have made through their channel, on the great aſſemblage of her operations and ſtructure, appear as yet not a little uncertain and confuſed. There is yet ample field for diſquiſition, where the variability of opinions, however authoritatively affirmed, ſhew truth uncertain, if not undiſcovered. The hitherto diſcordant oracles of philoſophy ſeem not therefore of ſufficient weight to overbalance the general traditions of all nations and ages on thoſe points wherein they are found to coincide.

It muſt be allowed that the hiſtory of early times, interrupted *(a)*, broken, diſfigured, and obſcured by abſurd fables, preſents more uncertainties than facts on which we can rely. It is a ſhadow almoſt effaced, but which ſtill proves the exiſtence of a real body. The vanity of nations and of authors has nearly buried it under a heap of apocryphal tales. The phyſical properties of nature and of the ſeaſons, and the hiſtory of the labours appropriated to theſe, blended with the names and actions of the firſt inſtructors of mankind, form allegorical and myſterious fables, which produce to us a chaos ſcarcely to be penetrated. In conſequence, the greateſt part of thoſe facts which they were meant to convey to poſterity, are and will remain covered by a thick veil not to be removed. But, amidſt all this darkneſs, perſevering criticiſm ſtill diſcerns from time to time ſome principal

events.

events, which ever appearing prominent in the hiſtory, the fables and myſteries of all nations indicate the real veſtiges of certain truths of which all had equally preſerved ſome idea.

Almoſt every conſiderable tribe into which mankind has been divided, has been ambitious of that ſort of pre-eminence which higher antiquity, and the honour of having invented or perfectioned the arts, ſeem to beſtow. But notwithſtanding all their efforts, the obſcurity and evident fallacy of their annals beyond a certain age, the thinneſs of population, the tardy birth and ſlow progreſs of the moſt neceſſary arts in thoſe very regions in times not very remote, the ſucceſſive emigrations at much later periods of feeble colonies *(b)* into fertile and in aftertimes celebrated countries, then nearly uninhabited, ſhew the commencement or renovation of the human ſpecies not very far diſtant. If the early perfection of certain arts point out in the minds of ſome perſons a much higher antiquity, we may obſerve to them in one great nation ſeveral of thoſe arts emerging from a ſtate of barbariſm to an aſtoniſhing height of perfection in the ſpace of a century or two. This will clearly prove that the coincidence of fortunate circumſtances, and of a few happy geniuſes which met in thoſe countries, had given them an energetic growth which no number of ages has been able to produce in others. Epic and tragic poetry ſcarcely experienced any infancy. Homer immediately elevated the former, and Sophocles ſhortly raiſed the latter to full maturity. It is certain that the immediate predeceſſors

of Praxiteles and Apelles found ſculpture and painting as rude and deſtitute of grace and nature in Greece, as thoſe of Michael Angelo and Raphael did afterwards in Italy. The ſucceſſors of thoſe ſublime artiſts in either country, far from ſurpaſſing, have not even equalled them. The perfection of the fine arts follows not then the number of years or ages, and it is not from their ſtate we are to deduce the antiquity of nations *(c)*.

Aſtronomy alone ſeems to have a claim to an antiquity beyond the reach of record. In times abſolutely unknown the theoretical part ſeems to have been perfectly underſtood. Its practical rules, preſerved from time immemorial by ſome eaſtern nations without the knowledge of the principles on which they are founded, ſhew it to have been inherited a mere ſkeleton of ſcience from a former race with whom its theory had periſhed. Whilſt ſuch was its fate in the eaſt, the principles of that ſublime ſcience were re-diſcovered in much more recent times by a new nation, till then equally ignorant of practice and of theory.

The foundations on which certain nations have endeavoured to ſupport their pretenſions to unbounded antiquity, fall of themſelves, in the eye of criticiſm, from the moment they are obliged to have recourſe beyond certain epochs to the exiſtence of gods or other imaginary beings. The felicity depicted during the reigns of gods and demigods denotes indeed the remembrance of a once happier

pier ſtate of mankind. The termination of theſe golden ages, nearly coinciding, as if by conſent, in the annals of thoſe nations, with the probable date of the deluge, bears teſtimony to the recency of that great event commemorated in the traditions of almoſt all ages and countries. That its date is really not far removed in antiquity, I think a critical though curſory inveſtigation of hiſtory will evidently confirm.

From a general but rapid review of the traditions, of the chronology, and of the early ſtate of antient nations, I ſhall endeavour to ſelect ſuch facts as by their univerſality bid faireſt to be authentic. Theſe few conſentaneous points, forming the moſt ſtriking features of almoſt every national record, we ſhall find concurring to eſtabliſh the truth of a general deluge, and of the ſubſequent renovation of the human race at no very diſtant period. To what diſtance its date may reaſonably be removed ſhall be fairly diſcuſſed. That, from the partial hiſtories of ſome nations, others have inferred a much higher antiquity than I am willing to allow, will not be diſguiſed. The pretenſions of certain people to very remote origins, I flatter myſelf, I ſhall be able clearly to ſhew deſtitute of every motive of credibility. Founded on national vanity, and on the ſuppoſed ſucceſſion of princes who were either allegorical perſonages miſtaken for real, or, if real mortals, were by the gratitude of poſterity adorned with the longevity and other attributes as well as with the names of their deities *(d)*, they ſcarcely claim a place in hiſtory. The extravagant

travagant dates of ſuch reigns are either reduced to their juſt value, or vaniſh before ſober criticiſm. On a ſubject ſo intricate you will pardon me, Sir, if I attend more to plain diſcuſſion than to elegance of ſtyle.

In ſeeking to penetrate into the chaos of antient hiſtory innumerable difficulties occur, which have at all times ſufficiently exerciſed the critics. To ſay the truth, almoſt impenetrable darkneſs ſurrounds it, and we muſt frequently ſeek our way to truth by the fainteſt glimmerings of light. Such however appear from time to time, and, if kept ſteadily in view, may at length bring us to ſome degree of probability. Wherever theſe happen to concentrate, they will form ſtations which may guide us through ſurrounding darkneſs. The allegorical genius and the exalted imaginations of the orientals, but above all the intereſts of mythology, have enveloped a few real facts in myſterious fables, abſurd if literally underſtood, but frequently concealing natural or moral truths. In their hands, the rude elements of which this world is compoſed were clothed with the characters of parent divinities. The ſucceſſive order in which they appeared or acted at the firſt creation conſtitutes the ſucceſſive generations of theſe ideal beings. With the conſummation of the work finiſhes the very exiſtence of theſe ſymbolical gods. Old Chaos and Erebus totally diſappear, and are no more heard of, to give place to a new ſet of deities. Nature completed furniſhes them abundantly. In every region pa-

ganiſm had deified the ſun, moon, earth, and other known planets: with theſe were joined fire, water, and air, the god of the inferior regions, and the goddeſs of wiſdom, to make up the circle of the twelve greater gods. Theſe, the moſt obvious objects of veneration, were ſucceſſively, as truth wore out, adopted by every nation, and their pretended hiſtories incorporated with its annals *(e)*. According to the qualities under which they were conſidered, or their influence particularly wanted, they were adored in divers countries under different names, and even ſometimes in the ſame country under different appellations. The ſun, as the moſt beautiful, the moſt grand and moſt exalted of beings, was called Bel, Baal, and Adonis in Chaldea: with reference to his ſtrength and power, he took the name of Hercules, at Tyre: as the ſovereign fecundating virtue, Oſiris repreſented him in Egypt: as ripening the vintage, he was ſometimes confounded with Bacchus: as leader of the celeſtial harmony, he took the name of Apollo, in Greece. The moon, as queen of the heavens, was ſtyled Aſtarte, and under her different aſpects or attributes took the names of Iſis, of Diana, or Latona. Each of theſe gods had his genealogy and his hiſtory, and his attributes became at length ſo many ſecondary divinities. Mountains, woods, and rivers peopled the whole earth with demigods. The genii of the ſeaſons, and their various labours allegorized, increaſed the celeſtial court; and their effects and proceſſes, transformed into facts and actions, ſoon furniſhed the detailed hiſtory of theſe imaginary beings. Mr. Court de Gebelin has moſt ingeniouſly ſhewn to a degree

of evidence, that the whole hiſtory of Saturn, given us by Sanconiatho, is no other than an allegory of huſbandry and its labours, repeated under other points of view in the labours of Hercules *(f)*.

Unfortunately for true hiſtory, many nations prodigally beſtowed on their founders and benefactors, or on the inventors of the arts, the titles of their deities. The ſun and moon, from the benefits derived from them, became gods; and for the ſame reaſons the firſt progenitors and ſettlers of nations were at firſt honoured as their repreſentatives on earth, and through lapſe of time became identified in perſons as well as names with their prototypes. In conſequence of this, allegorical actions relative to the ſurnames they had acquired, intermixed with ſuch as were really proper to theſe deified mortals, were attributed not to one only, but to ſeveral true perſonages, who lived in ages and countries very remote. When the genealogies and hiſtories of theſe deities came to be made out and collected, all thoſe ſcattered anecdotes were attributed to one and the ſame god. Thus a multiplicity of Herculeſes of various ages and regions were confounded into one. Herodotus heſitates not to ſay, that the Greeks, in adopting the Egyptian deities, had inveſted with their titles mere mortals of very recent date. This ſtands confirmed by other pagan authors; and it is well known that the ſepulchre of the Cretan Jupiter was ſhewn long after this hiſtorian.

Chronology ſuffered ſtill more from this ſtrange mixture and con-

fuſion of fictive and real perſonages and actions. The dates of true events have become indeterminable; and the vanity of nations, all contending for pre-eminence in antiquity, has rendered them ſtill more embarraſſed and uncertain. In addition to the miſchief, other difficulties of another kind alſo occur. In very early antiquity the meaſure of the year varied extremely in different countries, and has often changed amongſt the ſame people at different times. We find eſtabliſhed years of one and of fifteen days; of one, of three, of four, and of ſix months; years of 360 days, lunar and ſolar years *(g)*. Here, chronology ſeems to determine preciſe dates to events which prove entirely fictive; and there, when the facts appear real, we are reduced to gueſs to what kind of year belong the dates which are aſſigned to them. One thing only moſt generally appears, that the higher we riſe in antiquity, ſo much ſhorter we muſt reckon the duration of the years that are ſpoken of in its annals. Unequal to calculate the ſolar year with preciſion, men had firſt recourſe to the diurnal revolutions of light and darkneſs, and afterwards to the moſt remarkable phaſes of the moon: from theſe, lunar and at laſt ſolar years were inexactly computed. Thoroughly to diſcuſs theſe intricate points would both be above my ſtrength and beyond my purpoſes. I ſhall confine myſelf to the extracting from this confuſed maſs thoſe remarkable events, which appearing every where prominent in the traditions of every nation, thence acquire a real authenticity as fundamental points of univerſal hiſtory; and to the offering a few dates, too high removed perhaps, but which become ſo much the

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leſs objectionable as they will be furniſhed by a hand not to be ſuſpected of partiality to my opinion.

A notion of the exiſtence of certain beings ſuperior and anterior to the human race ſeems to have been common to all people. The Egyptians, the Chaldeans, the Phœnicians ſpeak of the reigns of the gods and demigods, of the children of the ſun and of the moon. The Chineſe pretend that men were preceded by the families of the heavens and of the earth. The Perſians ſay that, before the creation of Adam, God had created the Dives and the Peris. The Indians occupy their two firſt ages by a ſucceſſion of gods and of Pidar devata. Their laſt kings and their ſtill exiſting rajahs call themſelves of the race of the ſun, or of the moon. The creation of theſe ſuperior beings, as well as that of men and of the whole univerſe, ſeems to have been very generally at firſt attributed to one ſupreme God. As embracing all viſible nature, the names of Cœlum, of Uranus, of Tien, were frequently given to him. From thence the tranſition was eaſy, and one cannot be ſurpriſed that nations plunged in corruption and ignorance ſhould at length identify him with nature. The idea of a ſpiritual inviſible divinity was gradually loſt. The firſt philoſophers of Greece endeavoured to account for all things without the interference of an intelligent architect, and the opinion of the exiſtence of ſuch was revived with diffidence by its latter and more ſublime ſages *(b)*. The primary exiſtence of a chaos, or of the confuſed elements of this world—its gradual reduction into order—original darkneſs,

darkneſs, from whence iſſued light—the diviſion of waters, which at firſt covered the whole ſurface of the earth—the ſucceſſive formation of fiſh and birds, of terreſtrial animals, and finally of man, are recorded in the mythologies and traditions of all antient nations. The antient Etruſcans and the Perſians held, and the modern Perſees ſtill profeſs, one ſupreme God, to whom is attributed the creation of all viſible things in ſix diſtinct periods *(i)*. All the moſt eſſential circumſtances related of the creation in Geneſis are to be found diſperſed in ſome one or other of the antient coſmogonies of various nations. Nothing can ſurely more clearly prove a common ſource of belief, variouſly altered or corrupted, but not entirely loſt. A ſtate and age anterior and more happy, from whence man is fallen; the ſuperiority of the firſt men to us, both in vigour and longevity, are ideas preſerved in all nations. The preciſe number of ten generations, reckoned by the Jewiſh legiſlator between the creation and the deluge, is repeated in the annals of the moſt diſtant countries. The Chineſe compute ten generations from Fohi to Yu, who appears at the head of their firſt dynaſty. The Perſians enumerate the ſame number from Soliman Haki to Caicobad, the author of their ſecond race. Sanconiatho, a Phrygian, reckons ten generations of gods or demigods between Uranus and the preſent race of mortals. Beroſus, a Chaldean, counts the ſame number before a general deluge. The Egyptians give the like number to the Atlantides before that epoch. The Tartars and Arabs, nations famed for their ſimplicity and for their attachment to their genealogies and antique traditions,

ditions, preſerve not only the memory of theſe ten generations, but in concert, though ſeparated by immenſe diſtances, give to moſt of the antediluvian patriarchs, as well as to their immediate ſucceſſors, the very names conſecrated to them by Geneſis.

The conformity of this laſt with the traditions of theſe two diſtant nations, and the frequent and ſtrongly marked coincidence which we muſt have already obſerved between the facts announced in it and thoſe which are reported to us by all theſe antique chronicles, cannot but rouſe our curioſity to the particular conſideration of a book certainly the moſt antient that time has preſerved.

In making the review of antient authors we cannot refuſe to Moſes, who precedes them all, a particular attention. Abſtractedly from every idea of inſpiration, no unprejudiced perſon, who has not a partial ſyſtem to ſupport, can diſpenſe himſelf from allowing him a certain deference purely as an hiſtorian relating the tradition of his age (*k*). His writings have been tranſmitted to us in an integrity without example. The ingenuous ſimplicity of his ſtyle gives him an air of candour and of truth. It is not to poſterity alone, nor to a few confidential or learned perſons, theſe writings are conſigned: they are publicly read during the author's life to a whole people; and in them he frequently appeals to monuments well known to and under the eyes of that people. The age in which he lived coincides with times in which, as we ſhall ſoon obſerve, our Europe was as yet

very

very thinly inhabited by a few barbarous and wandering tribes, and in which, even on the ſhores of Aſia ſomewhat removed from the centre, very ſmall ſtates were either yet unſettled, or were in early infancy. That age then approaches to times when mankind was as yet few in number. He carefully enumerates the generations which had preceded him up to the event which muſt have cauſed that paucity. This limited and reſtricted population, which all hiſtory ſhews as extending itſelf very ſlowly in ſeveral ſucceeding ages on the greateſt part of the globe, muſt evidently have been occaſioned either by the revolution he deſcribes, or by ſome ſuch event, the date of which could not in his time be very far removed. All the general facts of which he ſpeaks are confirmed by, or connected with, the conſtant and uncommunicated traditions of every people on earth; and particularly agree with ſuch as, like his accounts, are confined to a ſmall number of ſimple facts. What atteſtation more authentic than that which is given by the general reſult of all antient traditions? The more we examine Geneſis, the more we are forced to allow that it ſeems to be the focus from which proceed, or in which concentrate, all antient truths ſcattered over the face of the earth. If ſome antient people talk to us of certain beings who preceded man, of gods, of demigods, of ſons of the ſun or of the moon, of genii and fairies (imaginary exiſtences which reaſon obliges us to reject), we find in the recital of Moſes the origin, explication, and correction of thoſe fables. Angels of a ſuperior nature created before this earth—a generation of antediluvians, whoſe longevity

gevity and vigour of body far ſurpaſſed thoſe of the preſent race of men—the diſtinction of theſe into good and bad by the allegorical denomination of children of God and children of men—indicate the ſources from whence a love for the marvellous drew theſe extravagant ideas. If almoſt all annals retrace to us ten generations preceding a general deſtruction by the deluge, in his hiſtory we obſerve their exact filiation and the number of their years ; and we remark two ſingular people, as yet exiſting in their primitive ſtate, agreeing with him in the names of many of their chiefs. If the unanimous voice of all nations announces to us an univerſal deluge, it is in his writings that we find its regular hiſtory ; the particulars of which are to be found ſcattered in the mutilated accounts of other hiſtorians. He names the ſmall number of perſons who eſcaped from it; and moſt nations claim them to be their firſt progenitors. He enumerates the chiefs of the principal races who divided the earth amongſt them; and the formal avowal, and the very names, of the moſt antient people who have exiſted, or who yet exiſt in a national body, confirm his veracity on every point which has eſcaped the ravages of time.

In effect, in common with the Jews, who yet exiſt in ſo extraordinary a manner, diſperſed but not mixed, all nations have retained more or leſs the memory of that deluge which terminated thoſe ten generations of which we have ſpoken ; but the Tartars and Arabs have preſerved to thoſe who eſcaped from it, and to ſeveral of their poſterity, the identical names which Moſes gives them. Theſe two

nations certainly deſerve a particular diſtinction. From their boſoms they have ſent out conquerors to invade the reſt of the earth; but they are the only people who, as nations, have kept unvaried poſſeſſion of their antient habitations, and have there ever maintained their independence: theſe, like the Jews, have preſerved their races unmixed, retained their antient manners and traditions, and like them they are ſingularly attached to the preſervation of their genealogies. When theſe traditions, and more particularly thoſe of the Tartars, ſeparated by an immenſe diſtance from, and never having had any communication with, Judea, are found to agree with each other and with the Jewiſh records, it muſt be owned they give a very ſingular ſanction to theſe laſt. The principal Tartars, or more properly Tatars, declare themſelves deſcended from Turk, or Turgoma, ſon of Japhet ſon of Noah, who was ſaved from the deluge in the ark, on mount Ararat, the mountain of Baris, or of the Ark. They more uſually call themſelves Turks, or Turcomans, than Tatars, which belongs to a collateral line: they acknowledge in their country, or its neighbourhood, particular races deſcended from Gog and Magog, names well known to the whole eaſt under the varied pronunciations of Gin and Magin, Tchin and Matchin: from theſe the Chineſe deſcend, and as yet bear their names. It ſhould ſeem that the name of Goth, ſo famed in the weſt, is alſo another variation of the ſame original appellation. All the Celtic nations are derived from Gomer: and the Welch, one of their branches, who as yet ſpeak their language Gomraag, and themſelves Gomerai. All the antient inhabitants of Europe claimed Japhet as their firſt father,

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as is atteſted by the Latin proverb, *Japeto vetuſtior*, and by the *Audax Japeti genus* of Horace. Ethiopian is a ſimple tranſlation of Chuſhite. The capital of Egypt is yet called Meſr, from Meſraim, by its inhabitants; and the name of Egypt is a variation of Ai-caphtor, the iſland of Caphtor, from whence its old inhabitants are yet called Cophts. The Ruſſians and Muſcovites, whoſe frozen climates have never invited conquerors to come and change their names, derive them viſibly from Roſs and Moſoch *(l)*. Conſidering the variation of languages, and the frequent changes of habitation, one cannot hope to find, after ſo many ages elapſed, this ſingular conformity but in nations either very antient or long ſequeſtered from all others. It is ſufficient that this occurs wherever thoſe circumſtances are found, and that ſome traces of it remain in all antient languages ſpoken even by people very far removed from their antient ſtocks and ſeats. But the great event of the deluge, acknowledged effect of the divine wrath, is conſecrated by the traditions of every nation in every corner of the earth, even by thoſe of America, though probably the laſt peopled region. The fact of the reſtorer of mankind, not unknown to profane authors under his Hebrew name, or ſuch as are evidently ſlight deviations from it, ſaved from the waters in a ſhip *(m)*, is repeated by all nations from China to the ſhores of the Mediterranean and Baltic ſeas. The ſacred books and myſteries, and the moſt ſolemn religious ceremonies of antiquity, recalled the memory of that cataſtrophe. In each of the reſpective annals of all antient nations we find ſome circumſtances, and from a review of them all we may collect every article, of the Moſaical account of the

deluge, from the entrance into the ark to the diſperſion of mankind. The minute circumſtance of birds ſent out by Noah whilſt yet in the ark, is not forgotten even in Peruvian ſtory *(n)*. The very variety of fables to which theſe incidents are accommodated ſhews them to be uncommunicated fragments of original tradition. As well as the Hebrews, the Arabs and Tartars land the ark on mount Ararat *(o)*, whatever particular ſpot of the mountains which environ Armenia may be deſigned by that name. In fine, the agreement, by general acclamation, in all ages, of all nations, divided in languages, religion and manners, and ſeparated by immenſe tracts of ſea or land, in the tradition of one ſingular and awful event, which muſt have long remained deeply graven on the minds of men, is ſurely the moſt complete proof that was ever given of an hiſtorical fact.

Here then is one great and important event, which, atteſted by the unanimous conſent of nations, can no longer admit of reaſonable doubt. It remains to determine its date by approximation, not indeed within a few ages, but within limits in which an age or two more or leſs may not be of great conſequence on an object ſo diſtant from us. The combined reſult of the moſt authentic traditions, and the conſequences which may come out from the review and ſtate of nations in times ſomewhat better known, are the ſole means which reaſon points out to attain it.

I ſhall not enter here into a minute diſcuſſion of the firſt era of the exiſtence of man, nor even on that of the deluge: they are too uncertain

certain to pretend to fix them with confidence. It ſuffices for my purpoſe to prove that theſe events, and particularly the laſt, cannot be carried up to an antiquity infinitely remote. The reſult of the opinions moſt generally received amongſt all nations determines the firſt within 6500 years, and the ſecond within 4000 years before the Chriſtian era. If ſome nations, ambitious of very high antiquity, have carried ſtill higher the origin of the world, let us remark, that it is no longer for the habitation of man, but for that of beings unknown to and rejected by reaſon. Even from the duration which they give to the human race much muſt be deducted, on account of years very different from ours. The greateſt difficulty ariſes from the circumſtance that theſe years, varying from 365 days to 24 hours, being no where accurately diſtinguiſhed in profane chronology, can never be applied with certainty to any period. A few words eſcaped from ſeveral authors, alone give room to make now and then the diſtinction. Neither muſt we diſſemble, that in the divers verſions of Geneſis a very conſiderable variation is found in their chronology on the diſtance of time, both before the deluge and after it, to the birth of Abraham: it is not occaſioned, however, by any difference in the computation of the years, nor by any diſcordancy in the facts, but purely reſults from ſome miſtakes of ſome letters or cyphers denoting the ages of certain patriarchs at the birth of their ſons. I ſhall perhaps have occaſion to ſpeak of it hereafter. To eſcape from this labyrinth of difficulties we ſhall ſuffer ourſelves to be implicitly conducted by the judicious and not to be ſuſpected labours of Mr. Bailly,

Bailly, a man of great learning, celebrated for his reſearches into early antiquity *(p)*. Since the publication of his ſyſtem, which I ſhall particularly combat in my ſecond letter, a ſyſtem which requires a ſucceſſion, uninterrupted by any great revolution of the earth, not of 4000, but of at leaſt 30,000 years, he has given to the public another work on the aſtronomy of the Indians. His principal aim in this is to eſtabliſh an epocha of 3102 years before Chriſt, founded upon real obſervations of the heavens. In a preliminary diſcourſe he conſiders the whole ſucceſſion of Indian ages; and to confirm this favourite epoch he reviews and weighs the chronologies of all other antient nations. Whatever may be his ultimate deſign, one cannot refuſe juſt praiſes to an arduous work of real merit and true value, contracted with great ingenuity into a ſmall compaſs. In this the ſagacious author modifies the duration of the four ages of the Bramins *(q)*. Abandoning to fable, or reſerving to future interpretation, the two firſt, he reduces to a very moderate computation the long ſuppoſed duration of the third age. He conjectures, that the years of this age are really to be reſolved into ſo many days; and proves it by a paſſage of the Begavedam itſelf. Thus reduced, this age, including the interval reckoned by the Indians between the third and fourth age, contains about 2400 ſolar years. By ſimilar operations, which he eſteems ſuitable to the divers methods of eſtimating time in this very high antiquity amongſt other nations, he reduces their ſeveral chronologies to a tolerably near conformity with the duration which he has given to this third Indian age. It

was during this period, ſay the Indians, that the firſt men appeared upon earth; and Mr. Bailly decides, that it comprehends the times which, according to us, elapſed between the creation and the deluge. The reſult of theſe learned reſearches is, that the length of this period, according to the corrected ſupputation of theſe ſeveral nations, turns out as follows:

	Years.
According to the ſeventy interpreters of the Old Teſtament it contains *(r)* - - - - -	2256
According to the Chaldeans *(s)* - - -	2222
According to the Egyptians, 30,000 years reign of the ſun taken for days, - - - - -	2342
According to the Perſians, the reigns of the Peris, -	2000
According to the Indians, including the interval between the third and fourth age, - - - -	2400
According to the ſame, calculation of ſeventy-eight generations at thirty years each, - - -	2340

Though the Hebrew text of Geneſis gives only 1656 years for the interval between the creation and the deluge, we here ſee at leaſt the antediluvian times reduced by Mr. Bailly himſelf, from the confrontation and moderate evaluation of the moſt antient chronologies, to a term of between 2000 and 2400 years. Let us now proceed to a period more intereſting to us, the times elapſed between that event and the Chriſtian era. Here follows the reſult of the enquiries of the ſame ingenious author:

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	Y. B. C.
The Perſian empire, from the birth of Caiamurath, comprehends *(t)* - - - -	3547
The reigns of men in Egypt, according to Manetho *(u)*,	3901
The 11340 years of Herodotus from the reign of Menes to that of Sethon, taken for years of Horus, added to the time between this laſt and the Chriſtian era *(w)*, -	3545
From the deluge, according to George of Trebiſond, -	3734
From the Indian epoch of the preſent age, added to the interval of 400 years, by which Mr. Bailly thinks convenient to increaſe its duration *(x)*, - - -	3502
From that epoch, according to the Indians themſelves happening after a deluge, and commencing the preſent age, - - - - -	3102
From the deluge, according to the Septuagint verſion, -	3299
The genealogy of the kings of Dehly, according to Mr. d'Anquetil and father Tieffenthaler *(y)*, - -	3188
The genealogy of the kings of Cachemire *(z)*, -	3215
From the deluge, by the Samaritan calculation, - -	2998
From the firſt commencement of the Chineſe empire by Fohi, and the firſt exiſtence of men *(aa)*, - -	2953
From the foundation of Tyre, according to Herodotus,	2783

I ſhall not diſſemble, that according to my opinion ſeveral centuries muſt ſtill be defalcated from all of theſe ſupputations: but ſhould we even not conteſt calculations ſo apparently uncertain, we have

have here an eſtimation of the times elapſed between the deluge and Jeſus Chriſt, by an author who cannot be ſuſpected of a deſire of ſhortening them, which in no inſtance reaches to 4000 years, and on a medium of all theſe calculations does not produce 3500.

Other means ſtill remain of determining whether, in fact, the epocha of the deluge ſhould be carried higher or brought lower. Theſe are, the examination of the events which are pretended to fill up the ſpaces of this high antiquity, and of the perſonages who appear to occupy the firſt ages of theſe chronologies; but above all the ſtate, progreſs, and eſtabliſhment of nations, and a general review of the ſtate of the world in times more recent and conſequently better known. From theſe we may regulate our judgment on the more or leſs conſiderable antiquity which may reaſonably be allowed to an event which, having reduced the human race to a very ſmall number, muſt have nearly produced the effect of a recent creation. In default of more authentic monuments, the gradual population and the progreſſive occupation of the earth at different epochas will furniſh the moſt probable indications of its date within a few hundred years.

It is evident that the imaginary reigns of the ſun and moon, of the gods and demigods, are either entirely ideal or relate to the antediluvian world. If they ought not to be entirely rejected, at leaſt

by the avowal of Mr. Bailly, and as appears by ſeveral paſſages of antient authors, the calculation of their years muſt be greatly curtailed by reducing them to diurnal revolutions of the earth. Even ſince the commencement of the reigns of mortals, which in general may be ſuppoſed to relate to the times elapſed ſince the deluge, that author agrees that years of twenty-eight days and of three months muſt be ſometimes applied to ſeveral periods of theſe antient chronologies. It appears that years of 60 and of 180 days were alſo in uſe in this high antiquity; and conſequently it is more than poſſible that even in times not quite ſo remote reductions will be ſtill neceſſary to be made, in order to bring their calculations to our preſent ſtandard. To diſtinguiſh with preciſion when theſe different meaſures of time are applicable, is impoſſible. When preſſed by men of learning, the Egyptian prieſts have ſometimes unveiled part of their ſecret; but to the vulgar they ſtill maintained the whole ſeries of years comprehended in their computations to have been really ſolar years. To fill up this long ſucceſſion of ages by a liſt of generations which might anſwer to it, they, as Sir John Marſham and Sir Iſaac Newton wiſely conjecture, placed in ſucceſſion as reigning over all Egypt the catalogue of petty kings, who after the time of Moſes, either from diviſions or partial conqueſts, or from the general uſage of thoſe times, when population became extended, reigned at the ſame time over divers parts of the country, at Coptos, Thebes, This, or Elephantis in the higher Egypt, and over other diſtricts of the lower, until again re-united into one kingdom under Miſphragmutoſis, moſt probably

bably in the thirteenth century before Chriſt *(bb)*. The pretended annals of theſe antient times, compoſed of a liſt of names without facts, or with the ſame facts repeated, ſhew this to evidence. Without even giving themſelves ſo much trouble, they often invented imaginary ſucceſſions of kings. The ſtatues of 330 kings and of 330 high prieſts ſhewn to *(cc)* Herodotus in the temple of Memphis, many of whom muſt have exiſted long before Memphis itſelf was built, clearly prove how anxious they were to perpetuate their falſehoods. The firſt of theſe tricks ſeems alſo to have been exerciſed by the Chineſe chronologers. For ſome time it was the faſhion to expatiate on the high antiquity of that nation. The firſt miſſionaries, willing to exalt the glory and importance of a people whom they firſt brought to the knowledge of Europeans, and who had received them with ſuch diſtinction, contributed, from ſelf-vanity *(dd)*, to give credit to fables rejected by the learned of the country itſelf, who agree that the only part of their hiſtory to which any confidence can be given riſes no higher than ſome ages before Confucius, who lived 550 years before Chriſt; that is to ſay, as late as with us *(ee)*. I will even venture to aſſert, that, excepting what relates to that morality which is engraven in the hearts of all men of all ages, the ſubject matter of the writings of this celebrated philoſopher, as well as his annals, ſhews an age and country very little enlightened. There is even a greater uncertainty in the hiſtory of this than of any other people. All their antient annals, without excepting thoſe of Confucius, doomed to deſtruction by the emperor Chihoangti 213

years before Chriſt, were patched together 73 years after, by order of Vu-ti, from remnants of mutilated and diſperſed copies, or from the memory of the few learned men who could ſurvive that long interval; or rather from the traditions preſerved by their children. For this reaſon the authors of the *Kangmo*, or great annals of the empire, the moſt eſteemed hiſtoriographers of that nation, fix the commencement of their truly authentic hiſtory and certain chronology to three or four centuries before Chriſt. Mr. Sale, one of the moſt learned co-operators in the antient univerſal hiſtory, and, ſince that, Mr. De Guignes, both of them truly learned in the oriental languages, have drawn from the text itſelf of the more antient pretended annals of China the moſt complete proofs of their falſity. In theſe chronicles it is ſaid, that one of their kings firſt drew men from caves and hollow trees to inhabit huts made of reeds, and firſt ſubſtituted corn to wild fruits and acorns. Some of his ſucceſſors are cited as the inventors of the firſt rude arts, gradually perfectioned under a long liſt of kings, without other facts. Several ages after, comes another king who again draws men from caverns, followed by other ſucceſſors who again invent the ſame arts. From hence we may boldly conclude, that, like the Egyptians, the Chineſe have placed in ſucceſſion as reigning over the whole country the ſeveral dynaſties of petty princes reigning independent at the ſame time in different parts of the country, though paying homage, as was the caſe in Ireland, to a chief king, whoſe family, either from ſuppoſed pre-eminence or from election, was looked upon in the ſame light

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as the preſent emperors of Germany are by their co-eſtates. In the time of Confucius the northern parts of that country were ſtill divided into ſeveral ſovereignties, and the ſouth part of it, as it ſhould ſeem, partly as yet under water, and very thinly inhabited *(ff)*. He was himſelf the ſubject of one of theſe petty kings, ſubordinate to the king of northern China. In his chronicle he gives a dry liſt of antient kings, but looks upon hiſtory preceding an epocha which does not reach to the days of Moſes, as uncertain and fabulous *(gg)*. No reliance is therefore to be placed on the chronology of that hiſtory; and it is eaſily to be perceived, that all antient traditions are therein much confuſed and embarraſſed. Fohi is often there taken for the firſt man, and as often ſeems rather to repreſent Noah. That part of the hiſtory which ſeems leſs tainted with fables begins only with the dynaſty, always diſtinguiſhed by the title of The Firſt Dynaſty, which commences with the emperor Yu 2217 years before Chriſt. This indeed may very probably be the era of the firſt eſtabliſhment of a colony in China under ſome of the deſcendants of Noah. Thoſe authors who have been the moſt prone to exalt the antient ſplendour of that nation yet agree, that in the time of this laſt-named emperor the Chineſe occupied only four provinces on the north-weſt of the empire. It was in his reign, ſay they, that ſeveral provinces to the ſouth were diſcovered, into which colonies were ſent. It was under his ſucceſſors of this firſt dynaſty, called Hïa, which laſted 458 years, that the Chineſe became more numerous, extended themſelves to the eaſt, draining and defending ſucceſſively by dikes from the wa-

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ters, which till then overflowed and covered them, the ſeveral provinces of Kian-nan and of Tche-Kiang. Nothing can better prove the very recent origin of that monarchy, thus gradually ſpreading itſelf over ſix only of its moſt northern provinces in the ſufficiently long period of between four and five centuries. It would be faſtidious to dwell on the annals and chronology of other nations, in which would be found reaſons no leſs cogent to reſtrict them within very moderate bounds. I am inclined to think one general circumſtance contributed much to extend the accounts of them all. Every nation is deſcended from the chief of the family which was ſaved from the deluge. Equally ambitious of high antiquity, each has very naturally taken the birth of this common father for the remote date of their origin; and by this means the 600 years of Noah before the flood are every where added to the times elapſed after it. I conjecture even, that this is the origin of the length of years reckoned by the Septuagint before Abraham. One may perceive how eaſily ſuch double entries ſlip into a long account, from Mr. Bailly's having, as already obſerved, given us a flagrant example of it. From all theſe conſiderations it will ſurely appear probable, that, far from extending the antiquity of thoſe chronicles furniſhed us by that gentleman, much on the contrary may be diſcounted from the number of ages he has thought proper to allow them. The ſtate of all nations then known on the earth, at periods more recent and furniſhing ſomewhat more authentic documents, will, I believe, confirm this ſuppoſition.

In this high antiquity the hiſtorical page, full of doubts and contradictions with reſpect to events ſuppoſed to have taken place in Aſia and Egypt, abſolutely ſilent as to thoſe which may have paſſed in other parts of the world, ſhews us very explicitly, even admitting the exactitude of antient chronology, that the fineſt climates of our Europe, as well as the oppoſite fertile coaſts of Aſia and Africa, as yet in the ſtate of wild nature, were either uninhabited, or contained only a few ſcattered families of roving barbarians, 2100 years before Chriſt. The neighbouring coaſts of Greece and Phrygia are the only parts of thoſe immenſe tracts whoſe firſt colonization it ventures to indicate as having taken place at ſeveral diſtant epochs ſubſequent to that period. Of the population of the northern and interior parts of Europe in thoſe times no account is given. From hence we may fairly infer that it either began much later, or from local circumſtances was much more ſlow. From all theſe premiſes nothing appears more evident than that men ſpread themſelves ſlowly and gradually to the weſt from the banks of the Euphrates and Tigris, and from Egypt, already flouriſhing in civil ſociety, to people Europe and weſtern Africa. Accounts much poſterior in point of time diſcover thoſe parts of Europe and Aſia minor, which are not very diſtant from theſe original ſeats of mankind, yet very thinly peopled by a few wandering tribes, the era of whoſe ſettlement is unknown, and who are from thence called ſons of the earth, as if they had been the ſpontaneous produce of the ſoil. For the preceding ſilence of hiſtory it ſeems not very difficult to account.

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The firſt emigrants who travelled up to the ſources of the Euphrates and Tigris found themſelves ſtopped in their progreſs northward by the Euxine ſea, then probably, as we ſhall hereafter ſhew, uniting its waters with thoſe of the Caſpian. Such of them as did not chooſe to ſettle amongſt the lateral branches of the great chain of mount Caucaſus were obliged to turn either to the eaſt or to the weſt. Thoſe who followed this laſt direction naturally ſkirted the borders of the Euxine ſea. Having at laſt gained the Boſphorus of Thrace, through which that ſea had not yet forced a paſſage for the diſcharge of great part of its waters, they ſoon perceived themſelves environed by the mountains of Hæmus. The different families into which mankind was already divided, though obliged to move ſlowly with their herds and flocks, their preſent means of ſubſiſtence, ſtrongly impreſſed with the idea that they were to chooſe the future reſidence of their poſterity, each ſeparately preſſed forward to ſecure ſome region far from contention, which might be its undiſputed inheritance. Part of theſe ſons of Japhet *(bb)* who peopled Europe ſpread themſelves into the valleys of Thrace and Macedonia; but others, more enterpriſing, ventured to climb over thoſe mountains into Bulgaria. The Euxine ſea, much more extenſive than at preſent, yet covered all the lower plains which now border the Danube, and thus forced the travellers to keep along the northern ſkirts of Hæmus. Whole generations paſſed away amidſt the fatigues of this long and toilſome march; and their deſcendants, eager to find more room and milder climates than theſe mountains afforded them,

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puſhed forward; and after many years, in ſmall parties, as occaſions offered to theſe roving tribes, either turned round the head of the Adriatic ſea, or paſſed over the alps of Tirol, and thus gained at ſeveral intervals the happier plains of Italy. Others diſperſed themſelves in the immenſe foreſts of Germany and France, and gained not that country till many ages after, through the alps of Savoy and Switzerland. In the courſe of ſuch unſettled life, thoſe civil arts known to their fathers when they firſt left their native ſeats were neglected, and by theſe forgotten. By a long habit of wandering through countries overgrown with foreſts theſe diſperſed families became ſavages, and even in Italy, where ſome of them arrived at various times and by various ways, remained in that ſtate until ſuch times as more poliſhed adventurers came many ages after by ſea from Phœnicia and Egypt to unite and inſtruct them in the loſt arts of civil life. Thoſe who wandered further into the interior and northern parts of Europe remained much longer in a ſtate of barbariſm. It was not till after the diminution of the waters of the Euxine and Caſpian ſeas that the Scythian paſtors firſt ſettled on the banks of the Danube, and on the intervening tracts between their diminiſhed waters, about 1450 years before Chriſt, as Herodotus informs us. Such of the emigrants of this ſame race of Japhet as turned eaſtward along the ſhores of the Caſpian ſea gained the high and open country of Tartary. The ſoil on this high platform, though prolific of graſs, being unfit for culture, moſt of them became, and have ever ſince remained, nations of ſhepherds. Thoſe

who had more ſtrongly imbibed the taſte for cultivation paſſed forward to the more favourable climate of China, or turned to Indoſtan. Of theſe, united into larger ſocieties, more early traditions yet remain. From Cyrene weſtward the coaſts of Africa were yet deſtitute of inhabitants, or at leaſt the wandering tribes who traverſed theſe tracts are perfectly unknown. Civil ſociety began not there till about the time of the ſiege of Troy.

Greece and Aſia minor, ſo full of civiliſed nations, ſo crowded with celebrated ſtates and cities 500 years before Chriſt, almoſt if not entirely deſert in the times we ſpeak of, evidently prove that men, few in number, had not as yet been able to occupy regions the moſt favoured by nature, not very diſtant from their firſt ſeats, which appear fully cultivated and inhabited a few ages after. Nothing ſurely can more clearly evince the then recent origin or renovation of mankind. The Ionians, deſcended from Ion, probably the ſame as Iavan, ſeem to have been the firſt inhabitants of Greece. The Dorians, Æolians, and ſeveral other little colonies from the Mediterranean iſlands, or from the coaſts of the greater Aſia, mixing with theſe, ſeem to have taken the common name of Pelaſgi. Part of theſe, reſtleſs and unſettled, tranſplant themſelves again to the oppoſite coaſts of Aſia minor. In Homer we find Argian Pelaſgi in Theſſaly, and Pelaſgi of Lariſſa in Phrygia. Others paſſed over into Italy. Thoſe who remained in Greece ſoon ſaw themſelves diſturbed and diſlodged by Egyptian adventurers, and theſe by the Heraclides,

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who ſeem to have paſſed from Crete into that country. Sicyon is ſaid to be the firſt town of Greece or Europe, and is pretended by the Grecian chronologers to have been built 2089 years before Chriſt *(ii)*. The foundation of Argos, the ſecond in antiquity, does not take place, according to them, till 282 years after. The city of Athens, ſo renowned in the bright ages of Greece, is founded by Cecrops in 1556. Thebes is built by Cadmus a Phœnician, who firſt introduced the uſe of letters to its inhabitants, in 1493 *(kk)*. It is not until 1480 that Dardanus, another chief of Egyptian adventurers, plants the firſt civilized colony on thecoaſts of Phrygia, at Dardania. His ſucceſſors extend themſelves inwards, and build Troy. The firſt remarkable event in Grecian hiſtory, the expedition to Colchis, took place in 1263 *(ll)*; an event which has probably ſome foundation in truth, though, like all thoſe that preceded it in Europe, obſcured under a veil of fabulous circumſtances. In conſequence, theſe ages, as well as thoſe that immediately follow them, are, by the Greeks themſelves, very properly denominated Heroic and fabulous. In effect, the confuſion which ariſes from a number of unſteady colonies expelling each other in turns, and frequently changing places, renders the thread of hiſtory difficult to be ſeized, throws doubts on every fact, and makes their dates ſtill more uncertain. The taking of Troy, the great era of Greece, is ſaid to have been in 1184. All theſe dates are ſuch as ſubſequent Grecian chronologers have attributed to theſe events, and are all of them evidentlytoohigh. The very long interval between the foundation of Sicyon and thoſe of

every other city in Greece, makes its date more than ſuſpicious. That great and learned man Sir Iſaac Newton, who ever made himſelf conſummate maſter of whatever he took in hand, has, from the cloſer inveſtigation and the careful collation of Grecian ſtories and genealogies, ſhewn that the founders of that town and of Argos were not only cotemporaries but really brothers; and that Agamemnon was only the ninth king of Sicyon and Argos reunited under his ſway, and conſequently that neither of them could have exiſted 300 years before the ſiege of Troy. He alſo clearly demonſtrates, both from the courſe of nature in ſucceſſions and from the records of aſtronomy, that the expedition of the Argonauts and the taking of Troy *(mm)* muſt have happened about 280 years after their pretended dates. Having taken his rule from the general courſe of long ſucceſſions, and not having ſufficiently attended to the poſſible much longer reigns of a few long-lived kings taken ſeparately, he has probably reduced his dates too low. But making allowance for theſe ſmall errors, it will clearly appear that the firſt civilized colonies could not have landed in Greece more than 350 years, or have founded cities more than 300 years before the ſiege of Troy; and that the Argonautic expedition and the taking of that town muſt have been ante-dated nearly 250 years. From all this it will appear that the civilization of Greece is much more recent than is eſtabliſhed by antient chronology, the truth of which even granted would ſtill prove the infancy of mankind not very far removed. It is not till ſome time after the ſiege of Troy that the firſt dawn, as yet not a little clouded, of hiſtorical truths appears; but we muſt wait to about

about the year 776 preceding Chriſt before chronology merits our confidence. From that era Greece, formed into republics, takes ſome conſiſtency, peoples rapidly, and riſes by haſty ſteps to perfect civilization, and to that height of renown which will probably not periſh, notwithſtanding its preſent abject ſtate, but with the world itſelf.

But long before thoſe celebrated ages, in which all Greece ſhone forth reſplendent in every kind of human glory, it had produced the prince of poets, who may confidently be conſulted on the ſtate of his nation previous to the firſt olympiad. Common opinion makes Homer born 164 years after the taking of Troy. But the interval is apparently too great. Heſiod tells us, that he lived in the ſecond generation after that ſiege; and Homer, though probably younger, was his contemporary, and at moſt of the third generation. Herodotus, who wrote 444 years before Chriſt, and who muſt have had no mean authority for what he advanced in preſence of all Greece aſſembled at the olympic games, ſays, that Heſiod and Homer did not precede him above 400 years. From this teſtimony we may fairly infer, that the time of his writing cannot be carried much *(nn)* higher than 880 or 890 years before Chriſt. Thus we ſee that this great poet, whoſe works, with ſome of thoſe of Heſiod his contemporary, are the firſt which have been handed down to us entire, preceded the firſt known hiſtorian of Greece above 400 years, and

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muſt therefore convey the ſureſt intelligence of the earlier ages of that country.

Several countries have diſputed the honour of giving birth to this ſublime poet, who at once carried epic poetry to the higheſt perfection to which it has ever attained. Model unrivalled, he is the archetype and ſource of the whole poetic art. Smyrna ſeems to have carried away the palm in this diſpute; and it ſhould ſeem that it was very ſoon after its foundation that he was born. Some authors have ſuppoſed him born in Egypt, of a daughter of Orus. This is probably a groundleſs ſuppoſition; but we may by the way remark, that this would ſhew that the demigods of Egypt were not always thought ſo antient as is pretended. Ambitious of every kind of knowledge, he had probably been a great traveller. He is reputed the father of Grecian mythology; and amongſt others Herodotus aſſures us, that he borrowed from Egypt and their twelve gods, or firſt kings, the names and functions of thoſe deities he tranſmitted to his countrymen *(oo)*. He might be thence accuſed of having debaſed the majeſty of religion, if an idolatry ſtill more degrading had not already obtained in Greece. It muſt be owned that his ingenious fictions gave more ſeducing charms to that idolatry. Notwithſtanding the almoſt entire fall of paganiſm, poetry has ſtill retained his perſonified divinities, who, animating all nature, lend it infinite grace and ornament. All the knowledge of his

age he eminently poſſeſſed; the electric fire of his genius excited not only poets, but orators, painters, and ſculptors, to that ſublime which their ſeveral arts afterwards attained in his country. His topographical deſcriptions *(pp)* were acknowledged ſo exact, that his deciſion was looked to as legal proof, many ages after, by ſtates contending for their limits. He is the firſt and ſole author from whom any real knowledge of theſe diſtant times can be drawn. Without giving us a regular hiſtory, he has furniſhed the moſt interesting picture of the ſtate of Greece at the time of the Trojan war, or more probably of its ſituation in his own time. In his two poems he carries us not only into every part of Greece and Aſia minor, but to every coaſt of the Mediterranean then frequented by his countrymen. He makes us acquainted with their inhabitants, with their genealogies and manners. In the Iliad it appears that the continent of Greece, as far as the mountains of Macedonia, the adjacent iſles, whether of the Egean or Adriatic ſeas, with thoſe of Crete and Rhodes, were then divided into about 38 little kingdoms. All of theſe were leagued under their ſeveral kings in this grand expedition againſt Troy. To make his court, no doubt, to their deſcendants, Homer traces with complaiſance the genealogies of many of the heroes, both of Greece, and Aſia minor become Grecian in his days. None of theſe, I think, riſe beyond the ſixth generation, and many ſtop ſhort of that number at ſome god or goddeſs, from whom the deſcent is derived. This is to ſay that the origin is loſt or unknown, and is not reckoned but from thoſe men who

who firſt dared to ſeparate themſelves from the herd of their contemporaries by ſuch bold pretenſions, with which they environed their former obſcurity, in order to ſubjugate to their laws an ignorant and ſavage people. This clearly intimates that the greateſt part of thoſe ſtates, whoſe leaders warred at Troy, were not formed into ſocieties 220 years before its ſiege, and many of them much later. Priam, whoſe power and opulence ſo much ſurpaſſed thoſe of any of theſe petty kings, was only the ſixth deſcendant from the founder of his ſtate. Troy itſelf, which ſeems to have ſo far excelled all the towns of Greece in grandeur and magnificence, was built by his fourth predeceſſor. How unlikely is it then, that any of the kingdoms or towns of Greece ſhould date ſo many centuries before it as their chronologies pretend!

Homer gives us the number of the Grecian army under its divers chiefs. By Mr. Pope's conputation it amounted to 102,000 men *(qq)*. No account is given of the Trojan army and their allies, who comprehended all the nations inhabiting the weſtern coaſt of Aſia minor, of Thrace, and of part of Macedonia. That he may have ſomewhat exaggerated the ſtrength of his countrymen is poſſible. This he ſeems conſcious of, by telling us, that it was from the muſe herſelf, who alone could know it, that he derived the information. But the Grecian army, ſuch as he reckons it, may ſerve as a baſis, though perhaps too high a one, on which to conjecture the probable population of thoſe countries in the times of which he ſpeaks. In an expe-

expedition in which the whole nation concurred with enthuſiaſm, in which every one of their kings without exception headed his troops, and in an age wherein every man was a ſoldier, and when the ſpoils of an opulent city muſt have ſtrongly excited the cupidity of men accuſtomed to depredation and piracy, we may reaſonably ſuppoſe every eighth man capable of bearing arms, or every thirtieth inhabitant, would embark. It appears indeed that Greece long felt the loſs of ſuch numbers. This ſuppoſition would give us about three millions for the whole population at thoſe times; whilſt from hiſtory we may deduce, that thoſe countries, including the great iſlands of Crete and Rhodes, muſt, ſome ages after, have contained fifteen millions of people. Even at this day, after 400 years oppreſſion under the depopulating government of the Ottomans; at this day, when the aſtoniſhing number of cities flouriſhing under their republics, long proſtrate in the duſt, ſhew at moſt by a few ſcattered ruins the grounds on which they formerly ſtood, the population of all theſe parts taken together riſes to ſeven or eight millions. It is ſufficiently known, that the great progreſſes of population commence not but with civil and permanent ſociety; and that of three millions at the time of the Trojan war agrees well with the date of the foundations of the Grecian cities deduced from their corrected chronologies. In nearly the ſame ſpace of time the population of North America, which, like Greece, has received into its boſom ſucceſſive troops of adventurers, riſes not to three millions. But the new Grecian colonies had the advantage which thoſe of America have

not had, of incorporating with the antient ſtraggling tribes of the countries in which they ſettled. Theſe two circumſtances of the foundation of towns, and of the probable population of Greece 250 years after, mutually ſupport and confirm each other; and both together prove the antiquity of civilized Greece much more recent than is pretended by ſubſequent hiſtorians, who, as we have already obſerved, for want of real dates framed to themſelves an erroneous technical chronology, by prolonging the reigns of kings much beyond the courſe of nature. Contrary to all probabilities, the building of Sicyon is by them placed 282 years before that of any other city in the ſame country; 905 years before the taking of Troy; and 1411 after the date which Mr. Bailly thinks proper to give to the deluge. It is ſurely difficult to believe that countries ſo fertile and ſo contiguous to Aſia, ſhould not have been peopled by more than three millions of inhabitants in ſo long a ſpace. From this ſurvey, and theſe preſumptive evidences, certainly as legitimate as thoſe that can be derived from chronologies fraught, as we have ſeen, with ſuch uncertainties and fallacies, I think myſelf entitled to conclude, that ſeveral centuries may probably be diſcounted both from the ordinary evaluation of the antiquity of Grecian cities, and from the date aſſigned by Mr. Bailly for the renovation of mankind.

Let us not haſtily infer, from the picture Homer has traced of ſeveral arts brought to conſiderable perfection, a long career of civilization in Greece, or even that thoſe arts had arrived at that preciſe degree

degree at the time of the Trojan war. We know for certain, that every art of life had been imported into Greece, not long before that epoch, from longer ſettled and more civilized countries: when once known, a ſingle genius or two improve them in a very ſhort ſpace. That ingenious author has endeavoured to give to the manners of his heroes all the ſimplicity of antient times; but he has probably lent to the arts all that perfection they had acquired in his own times, added to all that of which his creative genius conceived them capable. We ſee, in conſequence, heroes buſied in cookery and princeſſes in waſhing linen. Navigators, as yet, directed their courſe by a few of the moſt apparent ſtars; their ſhips carried from 50 to 120 tons: but, arrived at the end of their voyage, they knew no other method of ſecuring them but that of drawing them on ſhore. Works in iron ſeem to be unknown; but ſculpture in gold, in ſilver, in braſs, ivory, and wood, ſeems already to have acquired ſome degree of elegance. The art of dyeing, and of imitative embroidery, or tapeſtry, in coloured worſteds, gold and ſilver, are common; all the trinkets and ornaments of women ſeem complete, and by no means deſpicable. Thus all the arts of luxury appear in a degree of ſplendour little ſuited to the pourtrayed ſimplicity of manners, or the deficiency of many conveniencies. The Greeks had probably in Homer's time imported, from their expedition to Troy, as the Europeans did after the dark ages from the cruſades, theſe beginnings of magnificence and taſte. The ſhield of *(rr)* Achilles is a proof of it. The deſcription which the poet gives of it would not diſ-

parage the maſter-pieces of a Phidias or a Michael Angelo. The compoſition, diſtribution, colours, and perſpective, are all equally worthy of the moſt celebrated artiſts. It is not however neceſſary to ſuppoſe, that any artiſt, even in Homer's time, could have executed it with all that truth and elegance with which the poet conceived it. It was his genius that animated theſe pictures, which had as yet no model, with an ideal perfection, which if his contemporaries could not imitate, we know at leaſt their ſucceſſors did come up to. It was the ſacred fire which glowed in Homer's poems that elevated the happy diſpoſition of the Greeks, not only in poetry, but in painting, and particularly in ſculpture, to that height to which both Romans and moderns have inceſſantly aſpired without ever fully attaining. It is thus that this ſublime author, whilſt he traced the ruſticity of earlier times, yet adorned his works with all the knowledge ſucceſſively acquired to his own age. It is in his writings that we may diſcover the firſt eſſays, perhaps as yet ſomewhat uncouth, of all thoſe arts: but to appretiate them exactly by the ſtandard of his poetical deſcriptions would probably be raſh.

After having profited of the lights which Homer affords us to eſtimate the Grecian hiſtory and the ſtate of that country in his times, let us not neglect the ſketches he gives us of ſurrounding nations. Like his Ulyſſes, he had no doubt ſeen with judicious eyes both their countries and their manners. It is evident from the preciſe and unequivocal deſcription which he gives us of the voyage of that

hero, from the iſle of Pharos to the continent of Egypt, that the Delta, that ſince valuable portion of that kingdom, had not yet emerged from the waters *(ss)*. It formed as yet the baſon of a ſmall interior ſea, or bay, whoſe ſkirts ſeem as yet to have been little inhabited and in a ſtate of wild nature. This particularity of natural hiſtory is confirmed to us by poſterior hiſtorians; but Homer proves the entire formation of this fruitful land to have been much later than is uſually imagined. The deſire of extending the antiquity of nations conſonant to popular prejudices induced thoſe hiſtorians who wrote ſeveral ages after him to remove that change, as well as ſo many other facts, to much more diſtant times. The ſoothſayer Proteus, the god of ſea-calves, whom in after-times the Egyptians adopted as a powerful king of their country *(tt)*, ſeems much better to repreſent a chief of fiſhermen than an opulent monarch. Homer ſpeaks of the wonders of Thebes with its hundred gates; but from his ſilence we may aſſure ourſelves, that Memphis was either not yet built, or was of ſmall importance *(uu)*. The pyramids, thoſe ſumptuous piles, whoſe erection has been by ſome erroneouſly removed beyond the reach of hiſtory, had not yet reared their proud heads around it. Would this ſublime poet, ſo fond of the marvellous and grand, have paſſed by unheeded theſe ſtriking monuments of the induſtry, pride, and folly of man?

We muſt remark, that neither in the Iliad nor Odyſſey is the ſmalleſt notice taken of the kingdoms of Aſſyria or Babylon: we know

know however that they then exiſted. But the ſilence of the poet ſhews us that thoſe powers were ſtill limited to the interior of Aſia, and had not yet extended their influence either to Phrygia or any of the Mediterranean coaſts. In fact, at that period the forces of theſe kingdoms, gigantic indeed for thoſe ages and in compariſon of thoſe of other ſtates, were yet concentred within the walls and circumjacent countries of Nineveh and Babylon. From the circumſtance of theſe cities having got ſo much the ſtart of all others in power and magnificence, we have a right to conclude that they were ſituated nearer to the firſt ſeats of mankind. Thebes in Egypt, which we know to have been very early inhabited, could alone bear any compariſon with them: but its ſplendour, as well as that of thoſe towns, was confined to the interior of the country. In proportion as people advanced towards the coaſts, after the interior ſea of Egypt had been filled up by the change effected in the courſe of the Nile, this laſt loſt its glory and pre-eminence, which paſſed ſucceſſively to more commodious ſituations. The power of Lydia, ſo famous for the opulence of its kings, who 540 years before Chriſt lorded it over the whole extent of Aſia minor, ſeems to have been totally unknown upon its coaſts in the days of Homer.

Thoſe ſuperb cities each of which contained within itſelf the power and riches of a kingdom, whoſe ſhips of war or commerce a few ages after filled every port in the Mediterranean, adorned not as yet the cultivated plains of fertile Sicily. Armies of 2 and 300,000 men

men diſputed not as yet ſome ſmall portion of its envied territory. Almoſt a ſolitary wild, it had no inhabitants, ſave a few bands of robbers, who watched the moment to aſſaſſinate the crew of ſome veſſel which might have the misfortune to be driven on its uncultivated and inhoſpitable ſhores.

From barbarous Sicily, where he had eſcaped theſe dangers, the poet conveys his hero to the iſland of Calypſo, Eoa, iſle or promontory of the ſouthern point of Italy. From thence he departs in ſearch of the mouth of the inferior regions. Mr. Pope, a no leſs enlightened critic than poet worthy to tranſmit the beauties of his original into the Engliſh language, thinks this entrance to have been where Virgil afterwards placed it, in the neighbourhood of lake Avernus. That lake was probably formed in the ſunken crater of a former volcano. Environed with barren and uninhabitable grounds, where at every ſtep ſtill gaped hideous caverns ſending forth flames and deadly vapours, the ſpot might not ill repreſent the mouth of the infernal regions. The direction of the very ſhort voyage of Ulyſſes from Eoa gives weight to this conjecture; and Virgil ſeems to confirm it by adopting it. The Greeks, who before the ſiege of Troy had not ventured further from their coaſts, might ſuppoſe theſe ſhores to approach the limits of the ſea. From this laſt circumſtance I ſhould however be tempted to ſuppoſe, that theſe gates of hell were rather ſituated in the burning iſles of the Cyclades, now called Lipari. The firſt navigators, terrified with the phenomena

which

which ſurrounded them, having from theſe iſlands no other proſpect to the weſtward but that of ſea, in which they ſaw the ſun ſet, may have ſpread the report in Greece, that the extremity of that horizon was the real bounds of the ocean, where that luminary ſunk in the waves, and beyond which they imagined eternal darkneſs muſt reign. This unbounded view of the ſea to the weſt may ſuit ſome of the Cyclades, but could not agree with the ſituation of the Avernian lake. Homer as a poet availed himſelf of the licence to adopt every ancient popular ſtory which might give embelliſhment to his poems by the marvellous, and in conſequence inſerted fables which more recent diſcoveries had already proved to be without foundation.

Though conducting his hero ſo near to Italy, Homer ſays nothing of that country. He ſuppoſed it, no doubt, at leaſt as wild as Sicily, and it is probable that in his time this was no miſtake. Before the Trojan war, that delicious country, which has ſince occupied ſo eminent a place in the annals of the world, was rather wandered over than inhabited by a few barbarian tribes, whoſe names only are come down to poſterity. Theſe ſeem to have been chiefly part of the Celtic nations, who, having roved ſlowly from the borders of the Black ſea, had at laſt penetrated into Italy, either by turning round the Adriatic ſea, or by paſſing through the defiles of the Tirolian alps. A few reſtleſs Pelaſgi had likewiſe poſſibly paſſed over thither from the coaſts of Epirus and Acarnania; for we find that name

given

given to ſome of its antient inhabitants. In general the Umbrians occupied the northweſt of that country, the Sabins and Aborigines poſſeſſed the middle parts, and the ſtill wilder Siculi overran the ſouthern regions. One only civiliſed people ſeems to have been already eſtabliſhed. At what preciſe time the Etruſcans landed in Italy is unknown: but, from the indications to be traced from their religion and more advanced arts of civil life, one may judge them to have been either of Egyptian or Phœnician origin, and to have arrived at the time when thoſe countries ſent out ſo many colonies to Greece and Aſia minor; that is to ſay, between 1300 and 1000 years before Chriſt. By the form of government eſtabliſhed amongſt them I ſhould rather think them to have been Phœnicians. They, as well as the colonies who followed them, gave the name of Indigenes, or of Children of the Earth, to the ſcattered inhabitants who had preceded them. Some time after their arrival, expelled from the plains, the Sabins firſt retired into the Apennine mountains for defence: and, thus forced by neceſſity to reunite, in imitation of their adverſaries formed into ſocieties, and in proceſs of time built cities in the champain country. The civilization of the Latins under their firſt kings, Picus, Faunus, and Janus, ſeems to have taken place about 120 years before the ſiege of Troy. The Aborigines and the Siculi were either overpowered by, or reunited to, their new neighbours, or driven entirely out of the country by the multiplied colonies which, after that epoch, the Greeks and Phrygians eſtabliſhed, from the confines of Etruria to the ſouthernmoſt point of Italy.

It was after that famous ſiege and the conſequent ravages committed by the Greeks along the ſhores both of the Trojans and their allies, of which they took poſſeſſion, that the antient fugitive inhabitants took refuge on the then almoſt unoccupied and deſert coaſts of Italy. Many of the Greeks too, on their return from that expedition, finding their own country either diſtracted by diſſenſions, or a prey to uſurpers who had ſeized on it in their abſence, choſe rather to ſeek their fortune elſewhere, and ſat down peaceably by the Phrygians, in a land where both were equally ſtrangers. The remaining Aborigines and Siculi who ſtill ſtrayed in theſe ſolitudes were incapable of reſiſting theſe new-comers, better united, and more experienced in war. The Siculi, more obſtinate, driven to the extreme point of Italy, paſſed over into Sicily; and there, united and inſtructed by their common misfortunes, began in their turn to build cities. It was not until 540 years after the uſual date of the Trojan ſiege that the Gauls, a part of the Celtic nation, having had to traverſe in their peregrinations all the wild and extenſive foreſts of Germany and Gaul, at length croſſed the alps of Savoy and Switzerland, to eſtabliſh themſelves in Italy, and give their name to the Ciſalpine Gaul. From theſe, 283 years after, a new body of adventurers took and pillaged Rome, as yet feeble, though already projecting the conqueſt of Italy. In Africa, to the weſt of Lybia early peopled by the children of Cham, adored in the temple of Ammon, the moſt fertile coaſts were yet in the time of the ſiege of Troy unpeopled, unleſs by roving tribes. It was ſoon after that era, according to

Virgil

Virgil and Newton, though 300 years later according to the commonly received opinion, that a Phrygian colony under the conduct of Dido, eſcaping from the inteſtine diviſions of Tyre, imported the arts of civil life into theſe countries, and in the year 883 before Chriſt built the city of Carthage, which, ſome ages after, became the competitor of Rome for the empire of the world. It may not be improper to remark, that this era of its foundation is probably juſt, and was in fact very little poſterior to the deſtruction of Troy, which the Greek hiſtorians have from erroneous data removed to too early a period.

It was thus that from the extremities of weſtern Aſia and from Egypt population was ſlowly and progreſſively propagated in Europe, and in the greateſt part of Africa. Civilization was only introduced into them by colonies from Aſia or from Egypt; and upon mature conſideration it will appear that the firſt of theſe arrived not more than 300 years before the ſiege of Troy, and the moſt important of them not till after that event. We ſee by this, that the firſt emigrants, ſetting out from the north of Aſia to penetrate into Europe, having loſt almoſt every notion of the arts of civil life in their long and painful journeys by land, remain diſperſed and roving tribes, and conſequently people very ſlowly; the laſt, leaving much later their native countries, at a time when thoſe arts had made ſtill further progreſs, and not having time to loſe them in ſhort voyages by ſea, immediately ſettle in ſociety, build cities, and either ſubject their rude predeceſſors, or expel them to lay the firſt foundations of population in more diſtant parts.

It would be truly intereſting to trace with ſome degree of probability the origins, and to follow the firſt progreſſes, of the nations inhabiting thoſe interior parts of Aſia and of Egypt, which were, as we have ſeen, the principal ſources of population to all other parts of the globe. To ſettle the dates, even within ſome centuries, of the beginnings of the firſt great empires which aroſe there, would be all that could be reaſonably required. Unfortunately, profane hiſtory furniſhes few materials on which we can rely, and the dates of events are ſtill more uncertain. The only original writings of thoſe countries which have eſcaped the ravage of time are the productions of their prieſts, ſtrongly prepoſſeſſed with the idea of the ſupereminent antiquity of their nations, and bound by duty and intereſt to ſupport the fabric of a monſtrous mythology. In the firſt ages, according to Manetho, the ſun and the gods reigned over Egypt. The long reigns of theſe fictive beings certainly deſerve not to be diſcuſſed. If the names of the gods were attributed to mortal men, their reigns are not to be reckoned by ſolar years; it plainly appearing by theſe ſame authors, that years of one and four months, and even of days, were employed to enhance the antiquity of nations.

The old Egyptian chronicle *(xx)*, to the time of its compilation, reckons 36525 years for the duration of the Egyptian empire: a ſeries of years not founded on hiſtorical records, but calculated on an aſtronomical period. Of theſe, 34201 years are attributed to the reigns of the gods and demigods; after whom follow thirty dynaſ-

ties

ties of men, from the firſt of whom to the Chriſtian era there ſhould appear to have elapſed 2413 years. Manetho *(yy)*, an Egyptian prieſt, who lived in the reign of Ptolemy Philadelphus, aſcribes 10985 years to the reigns of ſeven gods and nine demigods. After theſe he gives an account of thirty dynaſties of mortal kings, from Menes. Theſe he compoſed from the ſcattered remains of the memoirs of Egyptian prieſts, whoſe real records had been deſtroyed by Cambyſes. Such as he could thence compoſe it, it has not even come to us in original. There are very conſiderable variations in the account given us of theſe dynaſties by Africanus and Euſebius. But in both, the amount of the whole ſeries ſeems to be upwards of 5000 years. The moſt antient of theſe dynaſties, compoſed of kings of This, of Memphis, of Elephantis, of Heracleopolis, of Dioſpolis, and Xois, Sir John Marſham and Sir Iſaac Newton *(zz)*, with great probability, ſuppoſe to have reigned at one and the ſame time in different parts of that country. Diodorus Siculus, after giving us the various fabulous accounts of the duration of the Egyptian monarchy related by their prieſts, from 5000 to 23000 years, tells us, that from Menes, the firſt of mortal kings, 52 monarchs reigned to Buſiris, during 1040 years. After theſe, it may be deduced from his account that 65 kings ſucceeded until the conqueſt of that kingdom by Cambyſes, whoſe reigns, by the uſual computation, would amount to 1365 years. Whence the whole duration of that monarchy to the birth of Chriſt would appear to be 2859 years. It muſt be obſerved, that in another place this ſame author ſays,

that,

that, according to other Egyptian prieſts, 1020 years only had elapſed from the reigns of the gods to the expedition of Alexander, which would reduce the whole to 1350 years. According to Eratoſthenes, the number of kings reigning at Thebes between Menes or Mines and Phruron or Nilus is reduced to 36, and the amount of their reigns to 987 years. This Phruron or Nilus *(aaa)* may not improbably be the Phreron ſon of Seſoſtris of Herodotus; and Dicæarchus ſuppoſes him to have reigned about the time of the Trojan war. This, in following the date we have fixed for that event, would place the reign of Menes in about 1922. But Diodorus places Nilus amongſt ſeven ſucceſſors of Proteus, who, both according to him and Herodotus, was king of Egypt during that war; a circumſtance which would leſſen the duration of the Egyptian monarchy. All theſe records, diſagreeing with one another, are bare chronological liſts of ſovereigns, moſtly without facts, or accompanied with ſuch facts as are evidently ſpurious. The building of the pyramids is attributed to princes of the firſt, fourth, and fifth dynaſties of Manetho, preceding, according to his account, by many centuries the age of Abraham; though we have the united teſtimonies of Herodotus and Diodorus Siculus to prove that they were erected by princes reigning ſome generations after the Trojan war. The firſt of theſe authors muſt have been tolerably well informed of the era of their foundation, as the age in which he lived was not more than three centuries after the time he fixes for the building of the firſt of them. Theſe ſingular monuments being unknown

to Homer is no ſmall corroboration of the teſtimonies of theſe laſt mentioned writers. The extenſive conqueſts of Bacchus and Oſiris, and even of Seſoſtris, if we allow to theſe perſonages the high antiquity given them by the Egyptians, are abſolutely unknown to all other nations. Seſac, who flouriſhed during the reigns of Solomon and Jeroboam, appears to be the firſt Egyptian monarch who carried his arms to any diſtance beyond the confines of Egypt on the ſide of Aſia; and Sir Iſaac Newton *(bbb)* with great probability eſtabliſhes him to be the ſame with Seſoſtris, Sethos Egyptus, and Seſonchoſis, who was alſo honoured with the ſurnames of Bacchus and Oſiris.

Profane hiſtory tells us of a firſt Aſſyrian empire founded by Ninus, ſon of Bel or Belus, adored in that country as the ſun. Cteſias gives it a duration of 1360 years, which Herodotus reduces to 520. Of the progreſs and annals of this ſtate no account is given: the ſpace is indeed filled up by a liſt of names of kings, which, Sir Iſaac Newton juſtly obſerves, have, except that of Sardanapalus the laſt king, no reſemblance with the names of Aſſyrian princes, who always compounded theirs from thoſe of their gods Bel or Pul, Adon, Aſſur or Moloch. Of all this long liſt of ſovereigns, a ſecond Ninus and his queen Semiramis, whoſe exiſtence is doubtful, are the only perſonages of whom any thing memorable is related. It appears indeed that Nineveh was built very ſoon after the diſperſion, and that it had its kings, who reigned over that city and probably over conſiderable diſtricts in Aſſyria, at the ſame time that ſome of the

ſucceſſors

ſucceſſors of Nimrod reigned at Babel or Babylon in Chaldea; but other circumſtances prove, that neither of thoſe kingdoms was ſufficiently extenſive in theſe early times to merit the appellation of empires. The conqueſts of Seſoſtris and of Seſac, whether they are two diſtinct princes or one and the ſame perſon, in thoſe very countries, where they met with no oppoſition from potent princes, ſufficiently evince that no formidable empires had then ariſen in any part of Aſia. Even in the time of Homer, the influence either of Nineveh or Babylon ſeems to have been little extended beyond the confines of the provinces wherein they were ſituated. We may deduce from Herodotus a firſt extenſion of the Aſſyrian monarchy in 1212; but the firſt riſe of a great Aſſyrian empire was certainly under Pul, or Bel, 790 years before Chriſt.

The ſame uncertainty and obſcurity obtain in the pretended antient annals of China. The chronicle of Confucius, in whoſe time that country was divided into many ſovereignties, preſents us with a dry liſt of kings; and the remains of that writer are probably no leſs faulty and incomplete than the fragments we have of Beroſus and Manetho. From the deſtruction of the antient records of that country we are aſſured that, for all events preceding three centuries before Chriſt, their hiſtory ſtands merely on the credit of ſcattered and mutilated fragments, or on that of the traditions of the learned men of that period. The chronology of India, carried up to 3102 years before the Chriſtian era, whether that epoch is founded or

not

not on real aſtronomical obſervations (a point we ſhall hereafter diſcuſs), is in its firſt ages filled with monſtrous or allegorical fables, and affords no grounds for real hiſtory.

From this curſory review of things it evidently appears, that no reliance can be had on the events of any part of profane hiſtory previous to 800 years before Chriſt, which is nearly the era of the firſt olympiads and of Nabonaſſar. If before that period ſome events recorded in the annals of Aſiatic nations appear to be founded in truth, they are ſtill ſurrounded with obſcurity, and their dates very uncertain. It is no leſs true for that whole region than for Greece, that beyond that time hiſtory contains more of fable than reality. If we carry our views beyond 1500 years, even that medley of truth and fable diſappears, and nothing remains but a very few general traditions, which ſeem to have been more or leſs preſerved amongſt all nations.

From the time of Moſes to the era of Nabonaſſar, we muſt have recourſe to holy writ to guide us through the labyrinth of profane hiſtory. Before that time, towards forming any reaſonable idea of the ſtate of nations inhabiting Aſia or Egypt, whence all other parts of the world have viſibly derived their population and civilization, Moſes, the moſt antient of hiſtorians, muſt alone be our guide. We have already remarked that all the details he gives us of the deluge are to be found diſperſed in the traditions of almoſt every

nation which has preſerved any memory of things paſt. We have alſo obſerved that the liſt he has given us of the fathers and chiefs of all nations is very generally confirmed by their antient records and traditions, and further verified by the antient, and in ſeveral caſes ſtill retained, names of many of them. No greater or more indiſputable teſtimony can be given to the general authority of an hiſtorian. But before we take from him an intereſting view of the ſituation of mankind in thoſe early times, it will be neceſſary to ſay a few words on the different chronologies affixed to the facts which he records; and we muſt not diſſemble that there are three verſions ſufficiently diſcordant as to the ſpace of time elapſed between the creation and the birth of Abraham. Theſe differences ariſe not however from any variation in facts, but merely from the ages diverſely attributed to the firſt patriarchs at the birth of the ſons who form his genealogies, ariſing either from the miſtakes or prejudices of copiers. Moſes himſelf is in no wiſe reſponſible for theſe contradictory chronologies.

That the reader may be enabled to form a judgment on the cauſes from whence theſe differences ariſe, it will be neceſſary to lay before him a ſtatement of the moſaical genealogies, according to the three verſions; to which I ſhall ſubjoin remarks on the more or leſs ſuperior credibility which, it appears to me, belongs to one or the other, as they relate to different eras of the world.

Hebrew

	Hebrew chronology.		*Samaritan chronology.*		*Septuagint chronology.*	
	Begat at the age of	Lived in all	Begat at the age of	Lived	Begat at the age of	Lived
Sem	102	600	102	600	102	600
Arphaxad	35	438	135	433	135	435
Kainan	-	-	-	-	130	460
Selah	30	433	130	433	130	460
Heber	34	464	134	404	134	404
Phaleg	30	239	130	239	150	339
Rehu	32	239	132	339	132	339
Sarug	30	230	130	230	130	330
Nachor	29	148	79	148	179	304
Terah	70	205	70	145	70	205
Abraham born	292	after deluge	942		1192	*(ccc)*

The reſpectable Abbé Girard, in the learned work which he has given us under the title of Leſſons on Hiſtory, gives the preference to the Samaritan chronology, on the rule, certainly in general juſt, of giving credit to two witneſſes wherever they agree againſt one. This reaſon would undoubtedly be deciſive, if it was abſolutely requiſite to chooſe one of the three verſions in all its parts without reſerve. But as there are neceſſarily errors in one copy, ſome miſtakes may have alſo crept into all three; and in ſome points ſuch ſeem apparent in all. It thence becomes neceſſary, critically to examine the ſeveral parts of each verſion, and bring them to the teſt of that probability which various circumſtances ſeem to indicate. In all that ſpace of time which elapſed between the cre-

ation and the birth of Abraham three diſtinct eras preſent themſelves. The firſt ends with the deluge, the ſecond with the diſperſion of mankind, and the laſt comes down to the birth of the father of the Jewiſh nation.

For many reaſons *(ddd)* it ſeems pretty generally agreed, that the Samaritan chronology is too ſhort, and therefore erroneous in the firſt mentioned period. I agree with the above mentioned author, that every circumſtance ſeems to point out that the Hebrew is equally too ſhort in the ſecond; but, for reaſons which I ſhall hereafter deduce, I am inclined to believe it more exact than either the Samaritan or Septuagint in the third era. The examination of the two laſt periods belongs properly to our preſent purpoſe.

Noah lived 350 years after the flood. Is it probable that his children, living under the eyes of this common father of mankind, natural lord of the whole earth, ſhould determine to divide it amongſt them in his life-time, without apparently appropriating any part of it to him, or without its being even ſignified what part of it he choſe for his own habitation, whilſt the different quarters of the world are portioned out to his ſons and their deſcendants? Yet, according to the Hebrew chronology, this incongruity muſt have taken place. Would the pious Abraham in his various travels have never viſited, or even ſpoken of any relation with this common father of mankind, who, according to that chronology, muſt have lived 58 years after

after his birth?—Would he never have paid homage to Sem, father of his own particular race, whoſe reſidence muſt have been in weſtern Aſia, appropriated to him and to his deſcendants, and who was not only living during his time, but, if credit is given to this chronology, ſurvived him 53 years? Neither is it probable, that idolatry would be ſo fully and ſo generally eſtabliſhed in the very life-time of the perſon who had ſeen the whole world deſtroyed by the vengeance of the Almighty, and to whom all the nations of Aſia muſt have yet looked up with filial reverence. It is ſurely more natural to ſuppoſe that it was not till after the death of Noah that the diviſion of the whole earth amongſt his three ſons could have been thought of. But the ſtrongeſt, and I think deciſive, argument againſt the very ſhort time allowed by the Hebrew text between the flood and the diſperſion, is the inſufficiency of numbers to which mankind could in that ſpace have ariſen to induce them to this laſt meaſure. By the faireſt calculations the number of ſouls from three ſtocks, in the courſe of one hundred years, comprehending at moſt five generations, could ſcarcely amount to 3000; and of theſe the laſt generation and the moſt numerous part muſt yet have been in the cradle. Thoſe who have given the largeſt ſcope to the quick propagation of the ſpecies cannot extend it to above 37000 *(eee)*. Granting even the poſſibility of this laſt exaggerated number, Armenia could not be inſufficient either for the abode, cultivation, or ſubſiſtence of this yet ſmall tribe. Still leſs could they find themſelves ſtraitened in the fertile and extenſive plains of Meſopotamia. Even ſuch a

ſmall

ſmall nation of hunters could not have been at a loſs for ſubſiſtence: but we know that they had learnt from their ſtill exiſting fathers all the arts of cultivation known in the former world, to which Noah had added that of the culture of the vine. The numbers of mankind, yet inſufficient to cultivate a ſmall province, could not ſurely dream of ſeparating into very ſmall parties to take poſſeſſion of extenſive diſtant countries *(fff)*. From a fertile country, where all might yet live in eaſe and plenty, colonies would not be induced to depart in ſearch of unknown diſtant regions, unleſs in ſuch numbers, and with ſuch concomitant flocks and cattle, as might render their long journey both ſafe and eaſy. But if with the Samaritan copy we compute 400 years between the flood and the diſperſion, all theſe difficulties vaniſh. Upon a fair computation, mankind might in that ſpace have riſen to two millions of ſouls *(ggg)*, and the families of the firſt leaders of nations would be ſufficiently numerous to undertake, without hazard, ſuch long marches, and to ſettle new regions with a proſpect of comfort and ſucceſs. In this period, therefore, the addition of 300 years to the Hebrew chronology ſeems conſonant to reaſon and the nature of things.

From all the above conſiderations it ſeems evident, that the Samaritan copy has rightly reſtored 300 years wanting in the Hebrew chronology, in the foregoing period between the flood and the diſperſion; but on very ſimilar grounds it appears to me, that it has unwarrantably continued to add a like number of years to the

ſpace

ſpace elapſed between the deluge and the birth of Abraham. The authors of that copy ſeeing that Phaleg and his predeceſſors were born about the 130th year of their fathers, probably deemed it neceſſary to continue for ſome time to give the like age to that patriarch and his immediate ſucceſſors; at the birth of their ſons; and the Septuagint has, on the ſame reaſoning, continued it a generation longer. The authors of both theſe chronologies certainly imagined that, during the great longevity of men, the age of puberty did not begin till about that period of life; and this opinion ſtill ſeems to prevail amongſt many moderns, though I am perſuaded, without real grounds *(hhh)*. The Samaritan copiers did not advert, that the age of man, from Heber, was already reduced 200 years. On this account the Septuagint ſeems alſo to have added 100 years to the term of the lives of theſe patriarchs; and Euſebius and ſome copies have carried this addition quite down to Abraham. The Samaritan tranſcribers had probably forgot that, according to their own account, ſeveral of the predeceſſors of Noah had been born when their fathers were under 70 years old, at a time when the age of man was double to that of the oldeſt poſtdiluvian patriarchs. But the deſign of Moſes was not to enumerate all the children, or to particularize the firſt born of any of theſe patriarchs, but merely to give the genealogies of Noah and Abraham, without pretending to ſettle the rank, in point of birth, of any of their progenitors. Phaleg, whoſe birth happened preciſely at the time of the diſperſion, from whence he took his name, was evidently not only the younger,

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but much the younger brother of Joctan, the only one of his brethren mentioned by the hiſtorian: Joctan and his 13 ſons are already mentioned at that time as leaders and heads of nations *(iii)*. Though Phaleg was not an eldeſt ſon, Rehu and Sarug probably were ſo. Nachor and Terah might not any more than Abraham be the firſt born of their fathers; for, following here the juſt rule of abbé Girard, I think it probable that 29, the age of Nachor at the birth of Terah, is a miſtake in the Hebrew, as we find 79 in the Samaritan, and 179 in the Septuagint, which laſt ſtill continues to add 100 years. Theſe obſervations do not indeed totally invalidate the Samaritan chronology, but only ſhew that there is no neceſſity in the nature of things for the addition of years given by it to this era. But there is an argument to be drawn from the apparent ſtate of population in the days of Abraham, which appears to me to mi-litate as ſtrongly againſt the addition of 300 years made by the Samaritan copy in the period we are now ſpeaking of, as it did for the apparently neceſſary like addition to the Hebrew chronology in the former.

From the ſtate of population, at any period, of a country occupied by roving tribes of hunters, or even by ſhepherd nations unpractiſed in, or little addicted to, the arts of agriculture, no real inference can be drawn as to the duration of political ſociety. In a ſavage and iſolated ſtate, where man neither enjoys perſonal ſecurity, nor has the foreſight of providing againſt future exigencies, the

propagation of the ſpecies is extremely ſlow, and is frequently entirely dried up by numberleſs accidents. A fortunate family, become in two or three centuries a little tribe, is often totally exterminated by its neighbours, without any advantage accruing to theſe from the unoccupied territory. From the ſtate of a people ſubject to ſuch extreme viciſſitudes, and often prompted to total emigration, no conjecture can be drawn as to the date of the firſt population of a country. But this is not the caſe amongſt civilized and cultivating nations: though certainly expoſed to a ſufficient number of evils, war, peſtilence, and famine, theſe tranſitory diſaſters are in a fertile country ſoon repaired by an accelerated propagation, which, in a few generations, fills up the void. If then any reaſonable gueſs can be framed of the number of inhabitants in ſuch a civilized ſtate at any period not too far removed from its firſt eſtabliſhment, at a time when, by the yet plenty of uncultivated lands, the means of ſubſiſtence are ſtill eaſy; one might from the apparent face of things judge, with no ſmall probability of truth, of the number of years neceſſary to form it into that ſituation. After a certain lapſe of time, indeed, when all the lands are fully occupied, and cultivation is carried to its uſual extent by the induſtry of a ſufficient number of hands, this mean of calculation becomes uncertain, becauſe population then becomes nearly ſtationary; emigration diſburthens the country of the overplus; or peculiar circumſtances of commerce, or ſome forced induſtry, provide extraordinary funds of increaſe. On the other hand, the unceaſing ſcourges of improvident deſpotiſm, ravaging

wide-extended empires, render all calculations illuſory; and it is on the contrary the date of ſuch tyranny which can alone be conjectured from depopulation progreſſively accelerated *(kkk)*. On theſe principles let us examine the ſituation of weſtern Aſia in the days of Abraham. It is the only part of the world the ſtate of whoſe inhabitants can furniſh us with the neceſſary objects on which our conjectures may be formed; and in his time it certainly has all the requiſites neceſſary to form them on reaſonable grounds.

We have already obſerved, that the numbers of mankind at the diſperſion muſt have moſt probably amounted to about two millions. Of theſe the race of Shem, with the addition of the deſcendants of Chanaan and of Nimrod of the line of Cham, occupied the whole tract of country now under conſideration. We may then with probability allot about 700,000 for the number of the original planters of theſe extended regions. And we muſt now confront the natural increaſe from ſuch a ſtock in a given number of years with the apparent face of population in the days of Abraham. We are aſſured that theſe original founders of the nations then exiſting in thoſe parts had not loſt in too long and diſaſtrous emigrations the arts of civil life, which they inherited from their anceſtors. They appear, immediately after the diſperſion, to have eſtabliſhed themſelves in all parts of the country, in ſmall civil ſocieties, and to have every where founded a great number of ſmall towns. This race of men, becoming almoſt generally ſedentary and addicted to cultivation,

tion, have all the qualities required to form a judgment on the duration of their eſtabliſhment from the ſtate of population at that early period of time.

Abraham, as yet childleſs, but deſtined by Providence to be in time the father of a numerous race, who are ſtill to be wanderers and ſtrangers on the earth for 400 years, when the hand of God is to lead them to their already promiſed ſettlement, ſeems to be the only unfixed perſonage of conſequence. Accompanied by the family of his nephew, and ſurrounded by numerous domeſtics, he roves at will. Great tracts of land, yet unoccupied and unclaimed, allow free liberty for this large family with its numerous flocks to move from place to place. Divers families had already ſeated themſelves in every country of Aſia; but they formed not as yet numerous nations, but tribes, already pretty conſiderable, ſettled in ſociety at certain diſtances. The hoſpitable patriarchal life of Abraham, uniting freedom, ſecurity, and abundance, in the midſt of numerous attendants, who ſerve him more from reſpect and love than from neceſſity, preſents us with that enchanting picture of true happineſs which, in our times, can only be found in the dreams of poetry. Men not rejected for crimes or penury from ſociety, but independent and reſpected ſo long as they deſerved reſpect, without renouncing the true conveniences of life, might undiſturbed enjoy this enviable ſituation in countries yet unclaimed, though highly favoured by nature and by climate. But to this life of ſimplicity and tranquillity the greateſt number of

mankind, in theſe ſame regions, preferred civil community diverſified by more extenſive ſociety, by more active life and buſtle, in which each, by the ceſſion of a ſmall part of his perſonal liberty, purchaſed general protection, and in which mutual aſſiſtances and various modes of induſtry rendered the exchange of conveniences and enjoyments more eaſy and abundant. In conſequence of this more general predilection, ſmall towns aroſe in the moſt convenient ſituations, whoſe inhabitants cultivated their environs, or procured eaſy ſubſiſtence by other labours uſeful to their fellow-citizens. Landed property was already eſtabliſhed, ſince we find Abraham purchaſing a field for the burial-place of his family. From the ſame tranſaction we perceive, that coined ſilver in circulation already furniſhed the means of an eaſy and common exchange. The arts of weaving and embroidery, the forging of metals, iron perhaps excepted, were already known; works of pure ornament and luxury were already carried to ſome degree of elegance. At this we muſt not be ſurpriſed, ſince this part of the deſcendants of Noah had not loſt in the courſe of long emigrations any of the arts known before the deluge. But theſe towns had not yet extended their claims beyond thoſe lands which their inhabitants were able to cultivate. There was ample ſpace in vaſt tracts which as yet acknowledged no maſters, even on the banks of the Jordan, in the midſt of the numerous towns ſituated in the valleys of Chanaan, for Abraham and Lot, their great train of domeſtics, and their numerous flocks. On theſe they ranged or encamped at pleaſure, ſignifying merely from mo-

tives of decorum their intended reſidence to the neareſt towns, who, far from taking umbrage, ſtrove to engage them to fix their abode in their neighbourhood. When, to avoid quarrels amongſt their ſervants, Abraham and Lot reſolve to ſeparate, the one takes to the right, the other to the left, agreeing only that the point of ſeparation ſhall in future be the limits of their future perambulations. We ſoon after find Lot, who no doubt began to be tired of the monotony of this wandering life, retiring to Sodom, whoſe inhabitants had engaged him to fix his abode with them. In that already diſſolute town profligacy is carried to exceſs. The invaſion of the Elamites, from which it is delivered by Abraham, reforms not its inhabitants, whoſe crimes at length bring down the moſt ſignal vengeance of heaven on their heads. It appears, that in that age each town had its chief or king, but it was a paternal government, in which a council of elders ſhared the ſway, and in which the people were yet reſpected. Egypt, or at leaſt that part of it, the Thebaid, then inhabited, was already famous for its riches in corn; it was governed by kings who had the common name of Pharaoh or Lord; but the monarch appears not yet ſecluded from his ſubjects by that forbidding pomp which ſoon environed the courts of ſovereigns. The arrival of a travelling ſtranger is immediately known to him. He cauſes indeed the beautiful Sara, whom he deemed unmarried, to be taken from Abraham; but hearing ſhe was his wife, he reſpects the ſanctity of marriage, and endeavours to appeaſe her offended huſband. The ſame thing happens at the petty court

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of Abimelech, king of Gerar. Some warlike and enterprifing princes ſeem indeed to have already overleaped the bounds of limited authority. Not content with ſubjecting their ſubjects to arbitrary will, the paſſion of domineering had prompted them to exact ſubmiſſion and tribute from their neighbours. Human blood already polluted the altars of ambition. Thus we ſee a king of Elam (part of weſtern Perſia) with three other chiefs, his allies and probably tributaries, making war on five petty kings of Chanaan, who had refuſed the tribute he had before impoſed on them *(lll)*. The means of the conquerors of this age were not however equal to their thirſt of dominion: a Cyrus, a Xerxes, an Alexander, or a Cæſar, had not yet ſacrificed millions of men to their ſenſeleſs glory *(mmm)*. But theſe petty leaders of rapine laid waſte ſmall diſtricts beginning to be fertilized, and carried off the bloody ſpoils of the vanquiſhed. The monarchs then attacked were certainly not formidable, ſince it appears that the whole territories of the five kings could not have an extent of more than 40 leagues ſquare; though Abraham and his friends unmoleſted fed their numerous flocks within that ſame ſpace. The four victorious chiefs who were carrying off their treaſures and their flocks, unexpectedly attacked, are defeated by leſs than 400 followers of Abraham. Melchiſedec, another king in Chanaan, ſeems to have come to their relief; but though come too late to participate in the victory, Abraham adjudges to him, as high prieſt, a tenth of the ſpoils. Who he was is not ſaid; but I conjecture him, from this great reſpect ſhewn to him, to have been a ſon of Shem,

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perhaps his laſt ſurviving offspring. The prieſthood not being yet a diſtinct function, the ſovereign pontificate ſeems naturally to have devolved on him, as repreſenting the father of the whole race. Let us obſerve, that only the moſt fertile plains of Chanaan were yet peopled, though not fully. The neighbouring countries were ſtill void of inhabitants. It is long after the time we are now ſpeaking of, that the Moabites and Ammonites, deſcendants of Lot, take poſſeſſion of the bordering tracts to the ſouthward of Paleſtine, which yet ſeem entirely uninhabited.

After the death of Abraham, whilſt new families of Chanaan found new nations in the interior of the country, the offspring of Iſmael his ſon by Agar, with the children of the ſame patriarch by Sethura, take poſſeſſion of Arabia petrea. More than a century later, the Edomites, ſprung from his grandſon Eſau, in conjunction with the Horites made ſettlements to the eaſt of theſe in Arabia deſerta. From this aſpect of things in the days of Abraham, when men had not yet ſpread themſelves beyond the moſt fertile vales of Paleſtine, it is not poſſible to ſuppoſe that this whole part of ſouthern Aſia could poſſeſs more than a million of inhabitants; or that in the ſame proportion Babylonia and the whole extent of countries occupied by the deſcendants of Shem were yet peopled by more than 10 or 11 millions *(nnn)*. Such a population may well accord with the natural increaſe of men, from 700,000, which we have reaſonably ſuppoſed might have been the number of thoſe who firſt took poſ-

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ſeſſion of all theſe ſeveral countries at the diſperſion, in the ſpace of 316 years from that time to the call of Abraham; but can in no wiſe ſuit with the neceſſary progreſs of increaſe, which, in ſuch fertile countries and favourable climates, under the circumſtance of longevity ſtill double to that of the preſent times, muſt have taken place in 616 years, which is the ſpace the Samaritan chronology ſuppoſes to have elapſed between thoſe two events. The population of that part of Aſia ſhould at leaſt within that time have amounted to 50 millions *(000)*. To ſhew that this ſuppoſition is not gratuitous, let us compare the aſpect of the ſouthern part of Aſia which we have already obſerved in Abraham's time, with the ſituation of the ſame countries when invaded by the Iſraelites under Moſes and Joſhua, agreed by both verſions to have happened 430 years after the call of that patriarch. The Moabites, the Ammonites, the Edomites, with new nations ſprung from the Chanaanites, whoſe founders were yet unborn in the firſt period, and inhabiting countries bordering on Paleſtine unpoſſeſſed in Abraham's life-time, oppoſe with courage, and often with ſucceſs, an army of 600,000 combatants led by the Jewiſh legiſlator. Paleſtine itſelf ſwarms with numberleſs inhabitants, and is defended by numerous fortified towns, which yield not to the ſtrength of Iſrael, but to the powerful hand of God. When poſſeſſed of theſe frontier barriers, this formidable army is yet unable totally to ſubdue the inhabitants, nor are they fully ſubjected till the reign of David. There is equal proof of the yet feeble population of Egypt when viſited by Abraham,

ham, ſince it appears by evident indications that the natives could not exceed three *(ppp)* millions when the children of Iſrael left that country. A few centuries after, all Aſia trembles, and is ſubdued by the conquering arms of that multiplied people. In fine, every circumſtance concurs to prove, that in the age of Abraham, which does not carry us to 2000 years before Chriſt, mankind was yet in feeble infancy, and very thinly diſperſed even in the moſt fertile countries. The founders of many nations, which afterwards became powerful, were yet unborn; and even thoſe empires which firſt appeared with the greateſt ſplendour in the annals of hiſtory, were then weak, and confined within very limited diſtricts. Such very reſtricted population in the days of Abraham could not be the natural produce of more than 600 years in a favourable climate; and therefore the time elapſed between the diſperſion and the call of that patriarch muſt have been ſhorter than that given by the Samaritan copy.

Such are the deductions which may be fairly made from the repreſentations of that hiſtorian who lived nearer by many centuries to the times of which we are now ſpeaking than any other writer whoſe works have eſcaped the ravages of time. But to invalidate that preference ſo juſtly due to the moſaical narrations, it has been obſerved, that in the age of authentic profane hiſtory we no longer find in the Greek and Roman authors the ſame names of towns, provinces, or nations, which are given to them by Moſes and

the ſacred writers. Such an objection can only proceed from thoſe who are but ſuperficially informed, or from thoſe who purpoſely wiſh to miſlead. A ſufficient number of theſe which occur without any ſenſible alteration, or which in different languages are expreſſed by ſynonymous terms, notwithſtanding the lapſe of time and frequent changes of domination, ſtill do homage to the veracity of thoſe writings. The Greeks, very naturally attached to the harmoniſing ſounds of their own language, ſoftened to its tone thoſe barbarous names which offended their ears; or, more anciently, tranſlated into their own tongue names which generally bore a meaning. The Romans, through pride, in ſending colonies into thoſe countries, endeavoured to efface their antient appellations, by impoſing Latin names entirely different. In ſpite of theſe maſters of the world, great part of the nations, provinces and cities of Aſia have preſerved their antient names, modified ſolely by the different pronunciations or terminations of the victorious languages. Damaſcus and Sidon have, from time immemorial, retained thoſe names without other variation than ſuch as theſe occaſioned. Aiguptos and Ægyptus are only varied pronunciations of Ai-coptos, or Ai-caphtor. The ſound of ſome names indeed totally diſappears in tranſlations. But it is no leſs ſingular than worthy of remark, that the Tartars and Arabs, unſubdued by the arms or uſages of thoſe various conquerors, have reſtored to many towns and provinces of Aſia their antient denominations, forgotten for many ages in the country itſelf. They are the ſame as were given them by the Jewiſh writers. In the time of

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the Greek ſovereigns, or of the Roman emperors, one might have in vain ſearched for Balbec or Tadmor, diſguiſed under the more harmonious titles of Heliopolis and Palmyra, which are however mere tranſlations of the former. At this time we might as fruitleſsly addreſs ourſelves to the Arabs to find them under thoſe ſofter names. Byblos ſtill exiſts at preſent under its oriental name of Gebel or Gybele, as the Hebrew hiſtorians call it. Tyre, called in ſcripture Sor, is denominated Sur by the Arabs: to Suſiana, Chus has again given his name of Chuſiſtan. Grand Cairo, as the capital of Egypt, is called Meſr, from Miſraim grandſon of Cham, by the Cophts, who have reſumed their antient title derived from Caphtor. Turgoma has again given his to the Turcomans and their country. It is probable that the name of the province of Irac is a ſmall variation of Erech or Arach, one of thoſe towns built by Nimrod in that country. Tchin, which is the true name of that country we call China, is a varied pronunciation of the Gog or Gin of the weſtern or eaſtern Tartars, whom thoſe nations acknowledge as their founder. In the 13th century the ſouthern part of that kingdom ſtill bore the name of Matchin, the Chineſe pronunciation of Magog *(qqq)*. Hence the Chineſe are evidently proved to be the deſcendants of thoſe two patriarchs. Thus we ſee the Tartars and Arabs, the moſt antient and unmixed nations of the earth, who had for ages kept aloof and ever independent of the various maſters who by turns poſſeſſed themſelves of weſtern Aſia, deſcending from their antient retreats to pay new homage, after ſo many ages, to the veracity of the Moſaical hiſtory.

It is thus we find a nation known to Europe within four centuries, and of which the Perſians, Greeks, and Romans were totally ignorant, ſituated at more than 1500 leagues diſtance from Judea, ſtill bearing the name of thoſe firſt fathers of the north and eaſt indicated by the Jewiſh writer. This ſurely is a ſtriking proof of the valuable exactneſs of his narration, even with reſpect to facts abſolutely foreign to the Iſraelites. This reſtoration or preſervation of antique names by nations ſo diſtinct in religion, and ſo ſeparated by ſituations, is without doubt a fact no leſs ſingular than ſtriking, which invincibly proves that 3300 years have ſerved only to illuſtrate and confirm what Moſes had ſo long ago advanced on the firſt origin of nations.

From this general review and critical examination of antient hiſtory, both ſacred and profane, it will finally reſult that a general deluge is a fact aſcertained and confirmed by the conſtant tradition of almoſt all nations. A learned and celebrated author, not to be ſuſpected on this point, owns that that event cannot be placed higher than 3500 years before the Chriſtian era. Far from allowing us to remove higher that extreme date, many circumſtances ſeem to prove that it would be much more reaſonable to bring it conſiderably lower. Thoſe profane hiſtories which attempt to riſe higher than 2000 years before Chriſt, preſent us with no other than dry and jarring liſts of kings without facts. The pretenſions of ſome nations to carry back their annals to an antiquity greatly exceeding thoſe bounds,

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are evidently founded on pure vanity, and fupported by allegorical fictions transformed into hiftories. Even fo high as the age of Moſes their accounts are mutilated and uncertain; and beyond that time are ſo tinctured with fable as to render the few real facts they may contain dubious. As we aſcend in antiquity, they become the hiſtory of allegorical or imaginary beings; that of men appears every where circumſcribed within very narrow bounds. Their pretended chronologies, interſperſed with long interruptions and voids, are in early times indeterminable for want of a conſtant meaſure of time, and can only be brought by conjecture to any thing like a regular ſyſtem. Weſtern Aſia and Egypt are the only civilized countries of whom any thing can be ſaid with a certain degree of authenticity 1500 years before Chriſt. If the Greeks carry back the pretended foundation of ſome of their cities to above 2000 years, they at the ſame time own all the events of thoſe times, and of ſeveral ages after them, uncertain and mixed with fable; and Heſiod and Homer, their firſt known writers, furniſh us with evident indications, that the civilization of Greece did not really take place 300 years before the Trojan war. This becomes the more probable, as we perceive the neareſt and moſt fertile countries of Europe and weſtern Africa, where a few barbarians roved alone before, receiving after that ſiege feeble colonies, which firſt carry to them the arts of civil life. The writings of Moſes alone furniſh us with a ſuccinct, clear, and regularly followed view of the ſtate of weſtern Aſia about 2000 years before Chriſt. In theſe, we deſcry in thoſe

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fertile tracts, in the days of Abraham, a yet thin population, divided into families and tribes, or ſmall nations in early infancy. He points out, not only at that period, but in the following ages, the firſt fathers of ſeveral tribes already become numerous in his own times. Before that period, this conſiſtent author aſcends by a few generations to that great event which was the cauſe of this then very limited number of men; and the principal incidents which he relates of that revolution on our globe are confirmed by the general traditions of all nations. He traces the diviſion of the earth amongſt the deſcendants of the firſt families eſcaped from the general wreck —he names the leaders of theſe emigrations, and they are acknowledged by the moſt antient, and eſpecially by the moſt unmixed, nations for their founders. In the age of the firſt progenitor of his own nation every thing indicates the infancy or the late renewal of mankind. Aſia, evidently the firſt cradle of man, is yet only half occupied; but in his own times, 430 years after, every appearance is changed in that country. The progreſſive increaſe of population had in that ſpace filled every corner of it with a number of growing ſtates. Nineveh and Babylon had taken the lead, and become great and potent cities; but their dominion was yet reſtricted to very limited territories; and we muſt wait three or four centuries later before we ſee them extending their ſway to more diſtant countries. Even in the days of David king of Iſrael, Syria is yet divided into ſeveral petty kingdoms. His ſucceſſor, Solomon, is apparently the greateſt power in Aſia, and it is not till after his death

that Aſſyria, Babylon, and Egypt, become truly formidable to their neighbours. At that late period, or very little earlier, countries no leſs favoured by nature, in near proximity to Aſia, are yet barbarous, or in the very infant ſtate of ſociety. The coaſts of Aſia minor itſelf, as well as thoſe of Greece, are not two centuries before receiving their firſt civilization from Paleſtine or Egypt. The arts of civil life are yet to extend themſelves ſlowly to contiguous parts of the world. It is not till after the ſiege of Troy that Sicily, the greateſt part of Italy and north-weſtern Africa, hitherto the receptacles of a few wandering ſavages, receive ſucceſſively, and at ſeveral intervals, ſmall colonies from their more enlightened neighbours, to found their firſt connected ſtates. From the vocation of Abraham, when the beſt peopled parts of Aſia were foſtering numerous indeed, but ſtill infant ſtates, and when the fathers of many afterwards powerful nations were yet unborn; whilſt, during ſeveral ſubſequent centuries, men were yet ſeeking ſettlements to their taſte; it required the lapſe of 1100 years to form the firſt great empire under the Aſſyrian Pul. But in ſucceeding ages, when population became more accelerated in countries which had already received ſome wandering tribes, from the daily diminiſhing inclination to diſtant emigration, and from the poſſibility of reuniting to civil ſociety a greater number of ſcattered inhabitants, five hundred years were ſufficient to raiſe Greece, Sicily, and Carthage, from a ſavage ſtate to grandeur not unequal, and to a much higher degree of poliſh. From equally ſmall beginnings the Roman republic, within a like period, roſe to a ſtill more aſtoniſhing height. Can

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we then with any ſhadow of reaſon pretend that thouſands of years were neceſſary to produce the feeble population and weak ſtate of Aſia in the time of Abraham? Seven hundred years from the deluge to his vocation is ſurely a ſpace of time amply ſufficient to create the degree of population which appears to have then obtained in it; and, every circumſtance conſidered, it ſeems difficult to ſuppoſe it greater. Such having been the very ſlow progreſs of population in countries where civilization appears to have been coeval with the firſt appearance of the renovated human race; and ſuch being its natural rapid riſe in others contiguous to them, from the moment they, many ages after, became civilized; it appears evident that the ſtate of mankind 2000 years before Chriſt cannot warrant a much higher antiquity than I have aſſigned to the deluge, and certainly combats the extenſion to 3500 years, contended for by Mr. Bailly. The ſons of Japhet furniſh us with very little towards the antient hiſtory of mankind. With reſpect to their annals, ſacred and claſſic hiſtory are equally ſilent. The greateſt part, roving over the wilds of northern Europe and Aſia, appear not as ſettled or at all known nations till many ages after the time of Moſes. But to his account the better united oriental nations pay homage to this day, by acknowledging themſelves the deſcendants of Gog or Gin, the ſon of Japhet. Some perſons have eagerly ſeized on the fabulous hiſtory of China, as corroborating the cauſe of high antiquity. Like the Egyptians, the Chineſe have had the vanity to imagine they were the firſt of men, and that their origin is to be traced through endleſs generations till it is loſt amongſt

amongſt the gods: but the beſt informed hiſtorians of that nation avow all annals beyond three centuries before the Chriſtian era uncertain and mixed with fable. The name they yet bear ſhews that people to be deſcended, as well as their northern neighbours and preſent conquerors, from Gog. It is probable that their firſt ſettlements in the north-weſtern parts of that empire were made in the firſt or ſecond century after the diſperſion, which, as a continued civilized ſtate, will certainly prove it to be the oldeſt in the world. Thoſe nations who immediately coaleſced in civil ſociety, and applied themſelves to cultivation, wanted not the inſtructions of a more antient, unknown, and long loſt people, as Mr. Bailly has pretended in his firſt, I may ſay, wild ſyſtem, which you will give me leave more amply to diſcuſs with you in my next letter. The firſt fathers of the preſent race of men had learned from their anceſtors born before the flood all the arts of civil life known before that event, and had continued to practiſe them for 400 years, during which all mankind lived together in Armenia, or in the plains of Meſopotamia; and thoſe who preferred not an independent roving life, more congruous to the inclinations of no inconſiderable part of men, had nothing to do but to preſerve, in whatever part of the globe they fixed, thoſe arts of which they were already poſſeſſed. In every fixed and permanent ſtate of ſociety this could not fail. The 3100 years of aſtronomical obſervations in Indoſtan, brought forward by Mr. Bailly in his ſecond ſyſtem, as a proof of the preſent world being

much more antient than is generally allowed, I ſhall have an opportunity of diſcuſſing in another place.

After all, it muſt be allowed that the preciſe date of the deluge cannot be determined with *abſolute* certainty. The preference which may be given to one or other of the three verſions of Geneſis, or to parts of each of them; the more or leſs credit which may be given to certain antique chronicles; different lights in which the ſtate of nations and the progreſs of population at this or that period may be viewed; may furniſh to ſeveral minds reſults ſufficiently diſcordant on the duration of time elapſed between the flood and the birth of Chriſt. The ſhorteſt poſſible ſeems to be that adopted by the Hebrew chronology. Above, ſir, I have given you my reaſons for fixing it to about 350 years more, to be inſerted between the deluge and the vocation of Abraham. It ſeems that no ſuppoſition, unleſs founded on fables evidently too abſurd to merit a ſerious refutation, can carry that interval beyond 3500 years. That extreme duration, which I think I have demonſtrated too great for probability, ſtill remains infinitely too ſhort for the juſtification of thoſe who, in deſpite of all fair reaſoning and evidence, are determined to give the preſent world, ſince a revolution which muſt have almoſt annihilated the human race, an antiquity at leaſt double, if not indefinite.

Before I conclude this diſquiſition, you will give me leave, ſir, to

lay before you a ſhort chronological liſt of facts occurring in antient hiſtory, to which I have affixed dates according to the ſyſtem I have adopted, and the ſeveral obſervations which I have made in the foregoing ſheets. To theſe I have alſo added the dates according to Uſher's chronology, the moſt generally in uſe. By adding 300 or 600 years to the interval between the flood and Abraham, you will eaſily compare my dates with thoſe of the Samaritan or Septuagint verſions. But I truſt, in the duration I have allowed before the birth of Chriſt you will find ample ſpace for the gradual increaſe of mankind and the ſucceſſive ſettlements and progreſs of nations, as they appear in hiſtory.

Firſt Period.

Origin of nations, foundations of the firſt towns and monarchies known; containing a ſpace of 1383 years after the deluge.

	Years before Chriſt. According to the author	According to Uſher and Mr. Blair
General deluge - - -	2698 —	2348
Death of Noah, the reſtorer of mankind,	2348 —	1998
Building of Babel, followed by the diſperſion of mankind - - - -	2297 —	2247

Death of Arphaxad, 38 years before that of his father Shem; and, probably nearly at the ſame time, of Chus, ſon of Cham, the father of the weſtern and oriental Ethiopians;

	Years before Chriſt. According to the author	According to Uſher and Mr. Blair
pians; and alſo of Iavan, or Ion, ſon of Japhet, father of the antient Greeks	2258 —	1908
Death of Shem. One may alſo conjecture, that towards the ſame time Cham, father of the nations of ſouthern Aſia and of the Africans, finiſhed his courſe. It ſhould appear probable that this patriarch finiſhed his days in Libya, where he was in after ages adored in the celebrated temple called Ammon-No, or the Abode of Ham. Japhet alſo, the general father of the Europeans and of the northern and oriental Aſiatics, probably alſo paid the debt of nature about the ſame time - - -	2196 —	1846
Death of Phaleg, born in the year of the diſperſion, 65 years before that of his father Heber. With him, probably owing to ſome further changes operated on the face of the earth, the life of man begins to be ſhortened 200 years, and from him gradually decreaſes - - -	2058 —	2008
Death of Selah, ſon of Arphaxad; and towards the ſame time of Chanaan, who firſt peopled		

Years before Chriſt.

	According to the author	According to Uſher and Blair
peopled Paleſtine; of Meſraim, ſon of Chus, who deſcended from Ethiopia into Egypt, whoſe capital always bore his name. He is moſt likely the ſame as Menes, and with him we date the firſt beginning of an Egyptian monarchy - - -	1998 —	1878
Death of Heber, father of the Hebrews, and it is thought of the Iberians, or the inhabitants of the preſent Georgia. We may give the ſame date to the death of Nimrod, who built Babylon; of Sidon, who founded the city of that name, mother of the ſtill more famous Tyre; of Caphtor, ſon of Meſraim, whoſe name is inherited in our days by the antient natives of Egypt; of Gog or Gin, father of the oriental Tartars and of the Chineſe, who are ſtill called by his name, ſoftened into Tchin; of Gomer, father of the Celtic nations, who ſpread themſelves in all the north-weſt of our continent. In this ſpace of time from the diſperſion, the moſt antiently celebrated cities of Babylon, Nineveh, Damaſcus, Thebes in Egypt, and Sidon in Paleſtine, were founded -	1993 —	1817

Vocation

Years before Chriſt.

	According to the author	According to Uſher and Mr. Blair
Vocation of Abraham, father of the Iſraelites and of the inhabitants of Arabia petrea and deſerta. Before this time, in my opinion, all thoſe who had been witneſſes to the deluge and to the diſperſion had already diſappeared from the face of the earth. The Hebrew chronology very improbably makes even Shem ſurvive this era 135 years: I imagine his death to have preceded it 215 years *(qqq)* - - - -	1981 —	1921
Iſmael, ſon of Abraham by Agar, eſtabliſhes his family with thoſe of that patriarch's children by Ketura, in Arabia petrea, leaving his brother Iſaac ſtill in Chanaan. The poſterity of Lot, the Moabites and Ammonites, ſettle themſelves on the ſouthern borders of that country - - - -	1881 —	1821
Eſau, ſon of Iſaac, father of the Edomites, in conjunction with the Horites takes poſſeſſion of Arabia deſerta to the mouth of the Euphrates - - - - -	1776 —	1716
Jacob and his children remove from Chanaan into Egypt, where they are ſettled in the land of Goſhen, in the north-eaſtern part of that kingdom - - - -	1766 —	1706

	Years before Chriſt. According to the author	According to Uſher and Mr. Blair
The Iſraelites leave Egypt under the conduct of Moſes. The ſeveral nations whom he routed in his paſſage to Paleſtine began to take refuge in the deſerted land of Goſhen in Egypt; and the Amalekites flying from Joſhua were, as the oriental hiſtorians teſtify, the ſecond ſhepherds who invaded and got poſſeſſion of great part of Egypt -	1551 —	1491
Origin of the Scythians according to Herodotus. It is probably nearly the date of the firſt appearance of a part of the deſcendants of Japhet in a national body on the banks of the Danube and on the borders of the Euxine and Caſpian ſeas - - -	1444 —	

Second Period, containing 984 *years.*

Progreſs and extenſion of population—civilization of Greece and Italy—riſe of the firſt great empires; and, towards the end of it, flouriſhing ſtate of Greece, and as yet feeble beginnings of Rome.

	Years before Chriſt. According to the author	According to Uſher and Mr. Blair
Mephres reigns, and unites all Egypt from Syene to Heliopolis *(rrr)* - -	1315 —	1665

Miſphrag-

Years before Chriſt.

	According to the author		According to Uſher and Mr. Blair
Miſphragmutoſis, his ſon, purſuing the war againſt the ſhepherds, obliges moſt of them to depart the land, and ſhuts up the reſt of them in Abaris or Peluſium. In his or in the ſucceeding reign, part of theſe, under Lelex, Pelaſgus and others, carry with them the firſt dawn of civilization into Greece	1285	—	1653
About the time theſe ſtrangers landed in Greece lived Ogyges, an old inhabitant, of Scythian or Japhetian race, in whoſe days happened the deluge called by his name - -	1280	—	1796
Thetmoſis, having taken Peluſium, finally expels the ſhepherds. Here ends, in my conjecture, the 511 years reign of the ſhepherds in Egypt, according to Herodotus. The Iſraelites occupied part of the country during 215 years, and during the remaining 296 years the Amalekites had nearly poſſeſſed themſelves of the whole *(sss)*	1255	—	1627
After the failure of the ſons of Lydus or Ludim, a new race, whom Herodotus ſtyles Heraclidæ, poſſeſs the kingdom of Lydia; the firſt of whom was Agron, grandſon of Belus *(ttt)* - - - -	1223		

The

Years before Chriſt.

	According to the author	According to Uſher and Blair
The Aſſyrian monarchy extends itſelf by the ſubjection of part of upper Aſia, according to Herodotus. Cteſias dates this dominion 851 years earlier. If it is meant to recur to the firſt foundation of that kingdom under Aſſur, it muſt be carried ſtill higher; but probably many ages paſſed before its limits exceeded thoſe of Aſſyria proper *(uuu)*		1206
Firſt foundation of Sicyon by Ægialaus, brother of Phoroneus who about the ſame time founded Argos, both of them ſons of Inachus. The Greeks place the building of the former 889 years earlier, and 282 before that of Argos - - - - -	1200	— 2089
Oenotrus, younger ſon of Lycaon, leads the firſt colony from Greece into Italy. He is the Janus of the Latins - - -	1148	
Dardanus ſettles on the coaſt of Phrygia *(xxx)*	1115	— 1480
Flood of Deucalion, which, according to Heſiod, happened about four generations before the Trojan war - .. -	1075	— 1503
Tros, grandſon of Dardanus, poſſibly forced by the effects of this flood to retire from the ſea coaſts, builds Troy - - -	1055	— 1374

Years before Chriſt.

	According to the author		According to Uſher and Mr. Blair
The Edomites and other nations conquered by David, king of Iſrael. By his ſucceſſes the Jewiſh monarchy becomes very conſiderable in ſouthern Aſia, and its ſplendour laſts till the death of Solomon. Sir Iſaac Newton with probability ſuppoſes Cadmus, who firſt introduced the uſe of letters into Greece, to have been one of thoſe Phœnicians who fled from David - -	1048	—	1493
Ammenemes, Amenophis, or Ammon, reigns in Egypt, and conquers Ethiopia and Libya (*yyy*)	1034	—	1416
Minos reigns, and gives laws to Crete. Though only grandfather to Idomeneus, who warred at Troy, he is by the Grecian chronologers made to reign 222 years before the date they aſſign to that ſiege. In his time, according to Herodotus, the Carians and Lycians paſſed from that iſland to ſettle in Aſia minor. Soon after, Hercules might come into Greece; and Tyrrhenus, the Lydian, ſettle at Tyrrhene, in ſouthern Italy (*zzz*) -	1015	—	1406
Seſac, or Sethos, or Seſenchoſis, the ſame as Seſoſtris, to whom the names of Dionyſius and Bacchus were alſo given by the Greeks.			

Years before Chriſt.

	According to the author	According to Uſher and Mr. Blair
Phlyas and Eumedon, his ſons by Ariadne the daughter of Minos, were Argonauts.		
He overruns all weſtern Aſia, and penetrates into Thrace. His brother Danaus, who at his father's death had uſurped Egypt during his abſence in Libya, flies into Greece *(aaaa)* - - -	1002 —	978
Theſeus reigns, and ſoon after unites the twelve cities of Attica under one government eſtabliſhed at Athens *(bbbb)* - -	991 —	1234
Argonautic expedition - - -	971 —	1263
Troy taken *(cccc)* - - -	935 —	1184
Several of the fugitive inhabitants of Phrygia, as alſo ſome Greeks, ſettle colonies in Italy, and introduce a greater degree of civilization on the coaſts of that country. Burſa, the citadel of Carthage, might be, as Virgila ſſerts, built about this time - - -	933 —	1182
Heſiod writes, as he himſelf tells us, in the age or generation next after that which ſaw the ſieges of Thebes and Troy, about 35 years after the latter - - - -	900 —	913
Homer was contemporary with Heſiod, and flouriſhed ſoon after him. In his days Si-		

	Years before Chriſt. According to the author	According to Uſher and Mr. Blair
cily, yet uncultivated, was peopled by roving barbarians; but the ſpirit of adventure continuing from the coaſts of Aſia and from Greece, it is probable it would ſoon after receive more poliſhed inhabitants -	890 —	907
The city of Carthage built - -	883 —	869
Cheops, according to Herodotus the fourth ſucceſſor of Seſoſtris, reigns in Egypt, and during his long reign builds the firſt great pyramid *(dddd)* - - -	880 —	
The Heraclidæ return into Greece -	859 —	1104
Pul, by the conqueſts of Media, Perſia, Syria, and Babylonia, founds the great Aſſyrian empire, according to Sir Iſaac Newton *(ceee)*,	790 —	777
Sanconiatho writes, according to Sir Iſaac Newton, - - - - -	760	
Pul is ſucceeded at Nineveh by Tiglathpilaſſar, and at Babylon by Nabonaſſar. The era of Nabonaſſar begins - - -	747 —	747
Archias of Corinth builds Syracuſe, according to Sir Iſaac Newton, - -	719 —	732
Semiramis flouriſhes. She is fabulouſly placed in very early antiquity; but, according to Herodotus, Labynitus, in whoſe reign Babylon		

	Years before Chriſt. According to the author	According to Uſher and Mr. Blair
bylon was taken, was only her ſixth deſcendant *(ffff)*	718	1215 or 2007
Lycurgus gives laws to Sparta, as ſhewn by Sir Iſaac Newton, in	708	— 884
The Medes, under Dejoces, revolt from Aſſyria *(gggg)*	686	— 700
Rome built *(hhhh)*	669	— 752
Nabopolaſſar revolts from Aſſyria, and reigns over Babylon, which henceforth becomes very powerful	625	— 625
Cyaxares king of Media, and Nabuchadnezzar king of Babylon, deſtroy Nineveh, and ſhare the Aſſyrian empire. The Scythians invade Media *(iiii)*	609	— 606
Babylon taken by Cyrus and Darius the Mede (the ſame as Aſtyages). They had taken Sardis ſix years before	538	— 538
Cyrus, overcoming Darius, transfers the empire from the Medes to the Perſians	536	— 536
Cambyſes reigns, and ſubdues Egypt	529	— 529
The kings of the Romans expelled, and conſuls created	508	— 508
Xerxes invades Greece; battles of Thermopylæ and Salamis	480	— 480

Death

	Years before Chriſt. According to the author	According to Uſher and Mr. Blair
Death of the Chineſe philoſopher Confucius. In his time northern China was ſtill divided into ſeveral ſovereignties, paying homage to a chief king of that part. It is not known whether the ſouthern parts of that country were yet inhabited: more than 1800 years after it was a diſtinct monarchy, under the name of Matchin - - -	479 —	479
Herodotus, at the age of 36, writes his hiſtory	444 —	444
Rome taken and pillaged by the Gauls, who near three centuries before had ſettled in the north-weſtern parts of Italy - -	390 —	390
Darius, the laſt Perſian king, conquered by Alexander, and ſlain. Riſe of the Grecian empire in Aſia and Egypt - -	331 —	331

The firſt period contains, according to my ſupputation, 1383 years from the deluge, but only 1033 according to the Hebrew chronology. Dating from the diſperſion, it comprehends according to me 982 years, and 932 according to the Hebrew. If 101 years, allowed by the latter from the deluge to the diſperſion, apparently give not ſufficient room for the multiplication of the human ſpecies to enable men to occupy countries very diſtant from the point of ſeparation, the natural progreſſion during 300 years more, whilſt men

men lived above 400 years, will ſurely furniſh a ſufficient increaſe to make that occupation eaſy. By families and tribes, become in this additional term of years, and by theſe peculiar circumſtances, far from inconſiderable, diſtant emigrations might be undertaken with ſafety; and in the leſs diſtant countries a ſufficient ſtock is provided for the foundation and tolerably quick riſe of future nations. Three hundred and ſixteen years from that era to the call of Abraham appear from ſuch not inconſiderable beginnings amply ſufficient for the population repreſented to us in the writings of Moſes, in the age of that patriarch; eſpecially if we take into the account the life of man yet more than double to that of the preſent times. In his days the moſt fertile valleys only are peopled, and that not fully; great tracts even after his death are unoccupied. If we already perceive petty ſtates, kings and conquerors, they would certainly appear inſignificant in a more advanced ſtage of the world. The appearance of things neither requires nor would juſtify thoſe numbers to which 300 years more, given by the Samaritan chronology to this ſecond part of the period, would have neceſſarily increaſed mankind, and much leſs that abundant population which 600 years beſtowed on it by the Septuagint verſion muſt have produced. By the very different face of the ſame countries repreſented to us by Moſes in his own times, that author, ever conſiſtent becauſe ever true, ſhews us what an aſtoniſhing difference the progreſſion of a few centuries makes in the numbers of mankind. From colonies originally compoſed of ſome thouſands, and who from the beginning

ning ſettled in civil life, a ſeries of 982 years ſeems fully adequate to a numerous population, and ſufficient for the entire formation of a great number of ſmall ſtates, arrived in that ſpace to conſiderable maturity. None of theſe however appear as yet ſo overgrown, or ſo ſuperior to their neighbours, as to be enabled to exert very extenſive ſway. In thoſe more diſtant and leſs favourable regions where the firſt colonies during their tedious emigrations diſperſed in very ſmall bodies, and from habit acquired a taſte for a paſtoral or roving life, the arts of civil life are loſt, and the increaſe is conſequently very ſlow. Theſe countries remain almoſt deſolate, and are not heard of till the next epoch, after which they are ſucceſſively viſited and civilized by more poliſhed nations.

During the enſuing period, comprehending 984 years, from the conflicts of nations beginning to preſs on each other in Aſia, or from the ſpirit of adventure, Europe, till then rather overrun than inhabited by wandering barbarians, receives at various intervals its firſt civilized colonies from Aſia or Egypt. Theſe are multiplied and extended to more diſtant parts during the courſe of three or four centuries. In the beginning of this period we muſt again recur to holy writ to diſpel the obſcurity and confuſion of the incoherent and mutilated annals of the moſt learned nations. The miſtaken principles of the firſt Grecian chronologers, when corrected, help to ſhew how much the correſponding events of Egypt and Aſia have been antedated by their prieſts and hiſtorians. In the firſt two centuries

we

we ſee indeed ſeveral kingdoms arrived to a great degree of power; their capitals, Nineveh, Babylon, and Thebes, are become objects of admiration by their magnitude and riches. Barriers to each other, the riſing power of Lydia bounded their influence on the ſide of Aſia minor: the two firſt were almoſt unknown on the weſtern coaſts of that country in the days of Homer. Independent of them all, the induſtrious and opulent Tyre covered the eaſtern as well as mediterranean ſeas with its commercial fleets, and ſcattered colonies on every coaſt, to enrich itſelf and civilize mankind. It is not till after the tranſitory glory of the Jewiſh nation, that theſe powers begin by turns to ravage Aſia. Sir Iſaac Newton has clearly ſhewn that Seſac muſt be the Seſoſtris and Bacchus mentioned by the Egyptian and Grecian hiſtorians. Under the laſt title his age coincides with that of the Grecian heroes, with whom he is ſaid to be contemporary; and it is evident that no very extenſive conqueſts in Aſia are owned by any other people before his time. Although his are not durable, Egypt becomes potent from that era. The ſame learned author has, by a minute examination of the genealogies compared with the facts announced in Grecian hiſtory, and by a reduction of the reigns of the ſeveral kings of that country to the ſtandard of nature, invincibly proved that its firſt chronologers had antedated between two and three centuries both the foundations of its cities and the events recorded as part of its early annals.

Though antedated by the Greeks, it appears that the two deluges

of Ogyges and Deucalion ſhould be placed towards the commencement of this ſecond epoch. The laſt of theſe ſeems in Grecian ſtory to have been the moſt diſaſtrous, and has conſequently been confounded by their poets and mythologiſts with the univerſal deluge: which only ſhews how prone they were, like the Egyptians from whom they in great part deſcended, to confound the comparatively recent events of their own country with the much more antient ones of the world itſelf. If it really correſponds with the age of their laſt hero of that name, I ſhould apprehend it not to have been occaſioned by the opening of the ſtraits of the Dardanelles, but by the irruption either of the lake which, according to Herodotus, antiently covered the plains of Theſſaly, or that of other lakes which he ſuppoſes, from the indications of nature in his time, to have exiſted in ſome of the oppoſite valleys of Aſia minor. Some ſuch diſaſter on that coaſt probably occaſioned the deſerted ſtate in whichD ardanus found it on his arrival. The ſtill more conſiderable deluge which muſt have been occaſioned by the irruption of great part of the waters of the Euxine ſea, I ſhould conjecture to have happened much earlier, and towards the era of Jacob. Theſe remarkable events I ſhall perhaps diſcuſs more amply under another head.

The firſt conqueſts of Aſſyria are, according to Herodotus, to be dated in 1206 before Chriſt; but from concomitant facts it is evident that the great Aſſyrian empire aroſe not before the eighth century preceding the Chriſtian era. Had it been very conſiderably

ſooner, Seſac could not have ſo rapidly conquered the greateſt part of Aſia. The foundation of Rome, antedated by the Romans, could not take place till near a century after. To the very end of this period, remaining an inconſiderable ſtate, ſtruggling with no leſs inconſiderable neighbours, it as yet ſhewed no ſigns, except by the unconquerable firmneſs and courage of its inhabitants, of becoming, two centuries after, the miſtreſs of the weſtern world. She was inferior both in point of antiquity and early growth to her rival Carthage. Syracuſe too, which outſtripped them both by its rapid progreſs to ſplendour and magnificence, and which was, in about a century after the termination of this period, the great bone of contention between theſe two mighty contenders for univerſal empire, preceded her in point of date, and very greatly in point of early importance. Greece, though it had already produced a Homer, was yet preparing itſelf ſlowly for that career of every glory which it attained before the end of this period. That Sicily which appears to have been almoſt deſert in the time of Homer, ſeems, towards the latter end of this time, to have been the moſt populous and the moſt envied ſpot on earth. It ſucceſsfully emulated Greece in elegance and in ſcience, and ſurpaſſed it in opulence. China, whoſe early ſuperiority to all other nations has been erroneouſly boaſted, had certainly not yet attained the proſperity of Aſia or Greece. Confucius, its greateſt genius and philoſopher, was born about 550 years before Chriſt. In his time its ſouthern parts ſeem little known, and its northern divided into petty ſtates: but at that time Aſia and Egypt were covered with

magnificent cities and the nobleſt monuments of art and induſtry. Greece had not only produced the moſt ſublime poets and much more eminent philoſophers and legiſlators before his time, but in the ſucceeding age a crowd of worthies and great men, whoſe talents in every kind have never been ſurpaſſed. One hundred and fifty years before the concluſion of this period, the ſmall but vigorous ſtates of that heroic land, combined by danger, had reſiſted by unequalled courage and ſuperior ſkill the mighty efforts of the greateſt power which had yet been ſeen in the world. Elevated by this ſucceſsful exertion, that country, the favourite child of nature, roſe to a height of glory in arms, in arts, and literature, unparalleled yet in any age or nation. Its haughty ſpirit of independence at length ſubdued by the crafty politics of Philip of Macedon, who had taken advantage of its internal jealouſies and contentions; theſe very Greeks are led as ſubjects by his ſucceſſor to avenge the common cauſe, and to overthrow, almoſt in an inſtant, that overgrown empire which had formerly threatened them with abject ſlavery.

From the rapidity of Alexander's conqueſts he is handed down to poſterity as the model of conquering heroes. To judge from the few greatly conceived eſtabliſhments time allowed him to make, he would perhaps, had not an exceſs of vanity and intemperance clouded and ſhortened his days, have been tranſmitted as the much more enviable pattern of beneficent monarchs. Irritated by deſperate reſiſtance, he had finally deſtroyed Tyre, who transferred the greateſt

greateſt part of her commerce, and her eſtabliſhments in Spain, to her daughter Carthage, who thenceforward roſe with aſtoniſhing rapidity. The whole period ends with the riſe of the Grecian empire in Aſia and Egypt, which, from that era to this day, became ſubject to foreign rulers. Fifty-nine years before the fall of Perſia, Rome had narrowly eſcaped annihilation from an army of Gallic barbarians, who, about three centuries before, had begun to paſs the Alps of Savoy and Tirol, and by degrees poſſeſs themſelves of northern Italy. Debarraſſed, by the ſacrifice of the little gold ſhe poſſeſſed, of theſe dangerous invaders, Rome in a very few years after, by the ſteady purſuit of a ſettled plan of ambition, had nearly made herſelf miſtreſs of ſouthern Italy, and firſt began to attempt a footing beyond it, in Sicily. This had like to have embroiled her with a more dangerous foe, the ſucceſſor of Alexander in the kingdom of Macedon; but from this danger too ſhe was happily relieved by the verſatile purſuits of this wild adventurer. Leſs than two centuries more carried her to the full zenith of power and glory.

To ſhew that the lapſe of time, 1936 years, here allowed, between the firſt ſettlement of nations conſequent to the diſperſion, and the conqueſts of Alexander, is amply ſufficient for the vaſt population and the great progreſs of culture, arts, and opulence obſervable in Aſia at the cloſe of theſe two periods, it may not be amiſs to obſerve, that the alterations in all theſe reſpects effected in northern and weſtern Europe, and particularly in our own country,

within

within a ſpace ſhorter by near a century, from Julius Cæſar to the preſent times, are almoſt as great. Were the climates and fertility of theſe parts of the world as propitious to the increaſe of mankind as thoſe of weſtern Aſia, and had not the natural progreſs of civilization and cultivation been retarded ſeveral centuries by the irruptions and ravages of barbarians after the downfall of the Roman empire, there is little doubt but that the advances theſe parts of Europe might have made, would have been fully equal to thoſe of Aſia in the ſpace I have aſſigned. Fully to prove the rapid progreſs occaſioned by a greater degree of civilization in any country, let us notice that Ruſſia ſince 1717 has more than doubled the number of its inhabitants, and much more than doubled its importance ſince the beginning of the preſent century; and, ſhould no great calamity intervene, muſt riſe ſtill more rapidly in the next.

From theſe obſervations, and this, I flatter myſelf not ill founded, critical review of hiſtory and chronology, I am perſuaded that it will appear that 2698 years between the deluge and the Chriſtian era form a ſufficient ſpace of time for the full population of all the parts of the weſtern world of which any tolerable knowledge was acquired at the birth of Chriſt. Germany and all the northern parts of Europe were even then ſtill covered with foreſts, and of courſe thinly inhabited. In this chronology ample time is allowed before the diſperſion for ſuch an increaſe as would enable men, who ſettled in Aſia in civil ſociety, to build numerous towns and cultivate their environs.

environs. In the remainder of the firſt period, the firſt progreſſes of population are ſufficiently ſlow and gradual, till at length all the habitable parts of weſtern Aſia are fully occupied. A greater length of time is not only not requiſite, but would be ſuperabundant for this ſituation. It is not till the ſecond period that ſome overgrown nations begin to preſs upon their neighbours, and that population in thoſe parts begins to exonerate itſelf by ſeeking ſettlements in neighbouring, but as yet almoſt unoccupied, countries. From all theſe conſiderations I will boldly conclude, that any further extenſion of time is totally unneceſſary, and that a much greater would be abſolutely incompatible, not only with authentic hiſtory, but with the courſe of nature.

NOTES

NOTES AND ILLUSTRATIONS

TO

LETTER I.

(a) Page 5.

I SHOULD be apt to compare the difficulties which occur in unravelling the hiſtory of antient nations, to thoſe we find in arranging into order the ruinous remains of ſome antient Greek or Roman monument of architecture. A heap of ſtones, mutilated columns confuſedly diſperſed or encumbering each other, interrupted traces of foundations, bewilder the ideas of an impatient or unlearned traveller, and give him but a faint idea of the magnificent whole. But ſhould it happen to be examined by a real connoiſſeur in the art, this confuſed chaos reſumes, if not its firſt beauty, at leaſt a part of that noble deſign which was once the admiration of the world. A few broken ſhafts long fallen from their mouldering pedeſtals, half-buried fragments of frizes and architraves, indicate to him the different orders which once adorned it: here and there traces of foundations point out the extent and form of the edifice; what is wanting on one ſide is happily re-diſcovered on another; and the grand whole ariſes anew under the pencil of the expert architect. It was thus that Michael Angelo reſtored with probable truth the plan of the famous temple erected by Sylla, on the mountain of Præneſte, to that Fortune which had always favoured him. The ſlope of the hill, of more than a mile, cut into terraces, formed the grand ſteps to that awful

edifice. Each terrace was decorated in its peculiar ſtyle of architecture; had its pavilions, its gardens, pieces of water, and fountains; and upon the ſummit roſe the temple itſelf, adorned by its portico and colonnade forming a ſemicircle. Michael Angelo has given deſigns which repreſent the whole, and has conſtructed upon the foundations of the temple a villa which re-calls its idea. There he fortunately diſcovered and preſerved entire, without derangement, the teſſelated pavement which was brought by Sylla from Corinth. It repreſents, as is generally ſuppoſed, the expedition of Alexander into Egypt and to the temple of Jupiter Ammon; but I ſhould rather think, ſome event of more antient date. What is perhaps the moſt remarkable in it, is the ſimilarity of the landſcapes, of the buildings, of the boats, and of the habiliments of men and women to thoſe we now ſee on Chineſe papers. I infer not from thence, with Mr. Needham, that the old Egyptians and Chineſe were ſiſter colonies, or directly ſprung the one from the other; but that they alike, as well as the Indians, were ſingularly tenacious of their antient manners, cuſtoms, and even modes of dreſſing. I think, with him, though the idea was ſtrongly combated by the philoſophers of the time, that the characters of the tables of Iſis preſerved at Turin are, as he attempted to ſhew, very ſimilar to thoſe of China, and, perhaps it might be found, no leſs ſo to thoſe of the Sanſcrit language. A ſpecies of hieroglyphic writing, ſuch as the old Egyptian and preſent Chineſe characters, I am apt to believe an antediluvian art. Notwithſtanding the variations in language, wherever it was preſerved, I think it likely to have been continued with very ſlight alterations. It was ſuperſeded and thrown out of general uſe in thoſe countries where a more commodious alphabet was invented, but in many was ſtill appropriated to monuments and ſacred writings.

(b) Page 6.

The antient hiſtory of Greece abundantly ſhews us the weakneſs as well as frequency of theſe firſt colonies, generally compoſed of bands of adventurers from the different coaſts of Aſia and Egypt, of unſettled pirates frequently tranſplanting themſelves from one iſland or country to another.

Before the ſiege of Troy eight ſuch different crews had, at divers times, ſeized ſome parts of the ſole iſland of Eubœa. Nearly the ſame may be ſaid of all the other iſlands of the Archipelago, and of all the coaſts of Greece and Aſia minor. From Phœnicia a ſet of men called Curetes, ſkilled in the arts of that country, ſettled, ſome in Phrygia, where they were called Corybantes; ſome in Crete, where they were called Idæi Dactyli; ſome in Rhodes, where they were called Telchynes; ſome in Samothrace, where they were named Cabyri; others in Eubœa, in Lemnos, in Imbrus, and many in Ætolia, from thence called the country of the Curetes. No ſooner was a regular government formed in Crete by Minos, than, impatient of controul, part of theſe adventurers paſſed over into Caria and Lycia. The Dorians, Ionians, the Æolians, originally from Phœnicia, under the more general name of Pelaſgians, ſeized on various parts of Greece; but part of theſe ſoon after re tranſplanted themſelves into Aſia minor, whilſt others tried their fortunes in Italy. The Cypriots were partly derived from Phœnicia and Egypt, and partly from Arcadia, from Salamine and Athens. We ſhall hereafter ſhew, that theſe frequent firſt emigrations of adventurers from Aſia and Egypt, who firſt brought culture, arts and letters into Greece, compoſed of 50 or 100 men at a time, the crews of one or two ſmall veſſels, were occaſioned either by the expulſion of thoſe ſhepherds from Egypt, who, on the retreat of the Iſraelites, had ſeized on Abaris or Peluſium, or by the conqueſts of David king of Judea; and that they date not beyond the 13th century before Chriſt.

(c) Page 7.

The minuteſt circumſtances equally ſerve as matter of even contradictory cavil to thoſe who, in conſequence of their doctrines, think themſelves obliged to keep the date of the world out of ſight. Voltaire impeaches the veracity of Moſes, becauſe he deſcribes ſome arts pretty far advanced amongſt a people whom he ſtyles barbarians. He doubts whether the golden calf, however rudely caſt, could have been executed within the ſame time even by the experteſt artiſt of Paris. He forgets that this ſame Moſes, the law-

giver as well as hiſtorian of theſe ſavages, had given them a code of laws, both moral and political, infinitely ſuperior to thoſe of Lycurgus, Solon, or Plato, the boaſted ſages of Greece in her moſt enlightened periods. Others from this early perfection of ſome arts infer the antiquity of the world. But, as I have remarked, in ſettled ſedentary nations in happy climates the arts may make haſty ſtrides. Accidents frequently give birth to them, and a few great geniuſes carry them at once from the very cradle to full maturity. Noah lived 350 years after the deluge; and from him and his ſons mankind, yet living together at no great diſtance from the place of his deſcent, muſt have learnt, and might eaſily preſerve, all the arts invented during ſixteen ages before the deluge. In thoſe former happy times, had they not been ſhortened by the crimes of man, the ſame perſons might have purſued and perfectioned their diſcoveries during ſeveral centuries. What gigantic ſtrides in the career of ſcience would not an Euclid, an Archimedes, a Deſcartes, a Leibnitz, a Newton, have made, had their lives been prolonged to 800 or 900 years?

(d) Page 8.

Diodorus Siculus ſays, that the Egyptians taught, that birds and fiſhes were firſt generated from the waters, animals and laſtly man from the ſlime, of the Nile; men having, according to them, firſt exiſted in Egypt. Theſe men, ſtruck with and admiring the beauty of this world, imagined the ſun and moon to be the two only eternal gods of univerſal nature, whom they afterwards denominated Oſiris and Iſis. By theſe all things were generated, and are nouriſhed. All nature conſiſts of five parts; vital ſpirit, which they called Ammon, or Jupiter; fire, called Vulcan; the earth, or aridity, the vaſe which receives, Rhea; humidity, called Typhon, or Oceanus; and finally air, called Glaucopis, and by the Greeks, Pallas. From theſe gods the Egyptians pretend others were begot, who were however mortals, but for their wiſdom and benefactions to mankind adopted into immortality. Theſe reigned in Egypt, ſome aſſuming the names of the gods, and others preſerving their own proper names. Theſe were the Sun,

Saturn,

Saturn, Rhea, Jupiter or Ammon, Juno, Vulcan, Veſta, and laſtly Mercury. The firſt king in Egypt was called The Sun, from the name of that divinity; but other prieſts affirmed that Vulcan, the inventor of fire, was their firſt king; then Saturn, who took to wife his ſiſter Rhea; from whom, according to ſome, Oſiris and Iſis, and in the opinion of others, Jupiter and Juno, who, on account of their virtues, reigned over the whole world. Theſe produced five gods, Oſiris, Iſis or Ceres, Typhon, Apollo, and Venus, whoſe names were given to the five intercalary days of the Egyptians. Typhon, Hermes or Apollo, and Mercury, were by Oſiris ſet over parts of his extenſive dominions and conqueſts. His other generals and miniſters were Hercules, Antæus, Buſiris, Prometheus, his two ſons Anubis and Macedon, Chemnim or Pan expert in huſbandry, Maro in planting of the vine, and Triptolemus who firſt ſowed wheat. Chemnim ſeems to be the ſame as Cham. Oſiris, ſlain by his brother Typhon, probably adverting to the firſt men being drowned in the waters, was ſucceeded by his wife Iſis, and after her by his ſon Orus, to whom alſo, Diodorus ſays, belongs the name of Apollo. The confuſion of names is worthy of notice, and no leſs ſo that of times; for it is evident that many of the companions of Sethos or Bacchus, who lived not long before the Argonautic expedition, are here given to Oſiris. The latter Egyptians, to gain credit, had jumbled their fables with thoſe of the Grecians, as theſe had more antiently adopted to themſelves thoſe of Egypt. The ſame author aſſures us, that the Egyptian Orpheus, to gain more eaſy admittance to his doctrines and myſteries amongſt the Greeks, had transferred the Egyptian Hercules to their country, by making him born of Semele, the daughter of Cadmus, by Jupiter. This ſurname was afterwards given to the ſon of Alcæus. The ſame author teſtifies, that many gods were afterwards made out of one. For Iſis was called Ceres, Theſmophoras, Luna, Juno, &c. Oſiris was by ſome called Serapis, by others Pluto, Dionyſius, Ammon, Jupiter, and Pan.

(e) Page 10.

It is very poſſible that the true origin of the name of Oſiris may have been derived, as hinted by Diodorus, rather from the ſtar Sirius, or Syris, whoſe riſing preceded the inundations of the Nile which annually fecundated Egypt, than from the ſun; but it appears, that in later times he was taken for the ſun, as was his wife Iſis for the moon.

(f) Page 11.

The learned world is much indebted to Mr. Court de Gebelin for one of the moſt aſtoniſhing works which has perhaps appeared. His primitive world is not only fraught with an immenſe ſtore of learning, embracing the whole circle of human knowledge; but, what is ſtill more rare in the writings of men of erudition, is no leſs remarkable for elegance and literary taſte. He has thrown a light upon the mythology, the fables, manners, and cuſtoms, of high antiquity, which we could have ſcarcely dared to hope for. He has penetrated and unveiled the allegorical genius of the orientals. By profound and methodical ſtudy he has ſeized with admirable ſagacity the key of all languages, antient and modern, and ſeems to have fully proved that they have all one common ſource, and the ſame primitive roots ſlightly varied by accent and pronunciation; and from thence has deduced a new univerſal grammar applicable to all. But, as it generally happens to thoſe who have diſcovered a happy ſecret, I am perſuaded he has frequently extended his allegorical ſyſtem beyond its due bounds. I believe with him that the gods, pretended by ſeveral nations to have firſt reigned over them, were in the origin mere allegorical beings; but I think that they frequently alſo gave to their true chiefs and founders thoſe names which denoted theſe imaginary beings, confounded and identified with them in ſucceeding ages. We yet obſerve ſavages giving to their chiefs the ſurnames of the ſun, the lion, the wolf. The antients moreover repreſented them to poſterity under ſhapes belonging to ſuch allegorical names. If Mr. Court does not entirely eraſe from hiſtory, he at leaſt renders doubtful, the exiſtence of the acknowledged fathers of nations. The reaſon which he aſſigns is, that

their

their names are ſignificative of the progreſſes of ſociety; but they alſo denote the neceſſarily progreſſive labours of their ſucceſſive inſtitutors, which muſt needs be the ſame in all infant ſocieties. Every where there muſt have been a chief who firſt gathered together, or conducted, the new colony; another who provided for its ſecurity in its new ſettlement; a third who endeavoured to protect its proſperity by laws: and theſe different cares, in colonies as yet iſolated and feeble, require the whole life of more than one chief. We perceive in ſcripture that it was not always their contemporaries, but their poſterity, who conferred on men names characteriſtic of the principal events or traits which diſtinguiſhed their lives. It is thus that the Phrygians gave to the perſon who firſt led the colony into the country the name of Dardanus, by Mr. Court interpreted, baſe or foundation; to him who gave it laws, that of Eric-ton or legiſlation; to thoſe chiefs who built and fortified its capital, thoſe of Tros and Ilus; to the ſage who regulated the labours of agriculture, &c. the appellation of Lao-medon; and to Priam, who ſaw in his life-time his kingdom both flouriſh and come to an end, the name of Priam, indicative of both theſe events. Every where the firſt chiefs received ſurnames relative to the progreſſes made under their auſpices, and theſe muſt have been nearly the ſame in all beginning ſettlements. It is for times preceding the eras of theſe true founders, that nations, to hide the weakneſs and recency of their origins, deviſed the idea of making themſelves deſcended from imaginary beings, and to have had the ſun and moon, and other great objects and powers of nature, for their ſovereigns.

(g) Page 12.

According to the opinion of Mr. Bailly, formed on a formal paſſage of the Begavedam, the years of the firſt Indian ages are to be reckoned as ſo many days. As is judiciouſly remarked by the ſame author, the ſame computation muſt have taken place amongſt the Chaldeans. Their aſtronomical obſervations, which according to Epigenes comprehend 720,000 years, are by Caliſthenes reduced to 1903 ſolar years. The chronicle of Alexandria ſhews, that the Egyptians computed the reigns of their gods by

by years of 24 hours. Diodorus of Sicily tells us, that the gods of that country, who ſucceeded Vulcan and the Sun, reigned more than 1200 years, and their deified ſucceſſors 300 years; but that the years of the firſt are probably ſo many moons, and the ſecond are to be reckoned by the three Egyptian ſeaſons, ſpring, ſummer, and winter; the real duration of all theſe reigns equally making about 100 ſolar years. Pliny and Plutarch atteſt the ſame thing. Theſe different years alſo obtained amongſt the Chaldeans, Perſians, and Phœnicians. The Egyptians as well as the Chineſe ſometimes alſo computed by years of 60 days; the Arcananians by years of ſix months, which are yet in uſe in Kamchatzka. I owe to the learned reſearches of Mr. Bailly this general view of different years employed by early antiquity, at different periods, which however it is impoſſible to fix. Thus confounded in antient chronologies, how is it poſſible to reduce their pretended dates to one common meaſure? We ought not to forget that the year of 360 preciſe days, which not only was the antediluvian year, but I am perſuaded was the then true computation, at one time prevailed univerſally. As I ſhall hereafter endeavour to ſhew, men, ſoon perceiving that it no longer belonged to the renewed earth, ſtrove at various times to find other computations which might bring it nearer to the real duration of its preſent revolution round the ſun.

(b) Page 13.

Nothing, one would think, could ſo efficaciouſly humble the preſumption of ſelf-conceited philoſophers as the reflection, that there is no abſurdity ſo great as not to have been ſeriouſly maintained by ſome one perſon of uncommon talents. When the memory of the works of the Creator was gradually obſcured or obliterated, or rather when the crimes of men made it convenient to eſcape from the idea of one perfect, inviſible, and omniſcient witneſs, it is not to be wondered that they ſhould ſubſtitute in his room ſome of the moſt obvious objects of nature, ſuch as the ſun, whoſe beneficent influence was certain, but whoſe diſtinguiſhing and remunerating powers were dependent on the momentary imaginations of their adorers.

The

The hopes and fears of man ſoon multiplied theſe fancied deities, and adulation admitted mortals into their partnerſhip. The firſt philoſophers of Greece were too ſagacious not to perceive the abſurdity and inconſiſtency of Pagan mythology; but the pride of reaſoning prompted them to ſeek the explanation and means of creation, not in the exiſting powers of nature, viſibly calculated merely to preſerve, totally inadequate to the production either of old or new matter, but in their own exalted imaginations. Some few ſaw, but through a cloud, the neceſſity of an intelligent ſuperintending architect for the conſtruction of ſo many complicated machines equally admirable in their particular ſtructure and minute perfection, and in their general end for the ſupport of one great ſtupendous whole; but vulgar prejudices and philoſophical pride were too powerful for them alone openly to withſtand the torrent. More culpable than the firſt, in the midſt of irrefragable light thrown both on the great cauſe and the works of the creation, the philoſophers of this age ſeem to wiſh to plunge us again into the abyſs of ſenſeleſs plaſtic nature, of concatenating atoms, and fortuitous generations. Great have been the modern diſcoveries in natural hiſtory. To a certain extent we have learned to decompoſe and amalgamate ſome of the compounded ſubſtances of nature; on ſome of the properties of theſe we can reaſon right or wrong: but no one has or will be able to ſubtract, or add, or even to define, one particle of primordial matter. The original impulſion of motion, which varies or renews its form within ſtated and impaſſable limits, cannot be found in nature alone.

(*i*) Page 14.

The Etrurians, according to Suidas, held that God, the author of the univerſe, employed 12000 years in all his creations: that in the firſt chiliad, or 1000 years, he made heaven and earth; in the next, the firmament which appears to us, calling it heaven; in the third, the ſea and all the waters that are in the earth; in the fourth, the ſun, moon, and ſtars; in the fifth, every volatile, reptile, and four-footed animal in the air, earth, and water; in the ſixth, man. It is impoſſible not to remark how exactly this coincides with the Moſaical account. According to the Perſees, God created the world

in ſix times, called Gâhanbârba, making in all 365 days. The firſt time is called Mîd-yû-zeram, and contains 65 days, in which the heavens were created: the ſecond Mîd-yû-ſhahem, of 60 days; in this the waters were created: the third, Petî-ſhahim, conſiſts of 75 days, wherein the earth was created: the fourth is Iyâſeram, of 30 days, in which the trees and plants were produced: the fifth is Mide-yârin, containing 80 days, in which ſpace the animals were created: the ſixth, Hames-pîta-mîdîm, of 75 days, wherein man was made. Vide Univ. Hiſtory. The antient Brachmans and modern Bramins deſcribe the ſucceſſive creation of all things in the ſame order. Ovid's deſcription of the creation differs but little in eſſential points from that of Moſes; and, though taken from the Pagan myſteries, ſeems, like the foregoing, moulded on the ſame baſe of no doubt univerſal tradition in the firſt ages. The allegorical mythology of the Pagans has only obſcured and disfigured the truth.

(j) Page 14. line 18.

Beſides theſe ten generations, the Chineſe chronicles talk of ten families or Ki of Gin-hoangs, kings of the earth, who reigned together, and furniſh a long liſt of generations. Who are theſe kings of the earth? Are they not the antediluvian patriarchs, who, on account of the length of their lives, may almoſt be ſaid to have lived at the ſame time, and muſt have ſeen in that ſpace numerous generations, their own progeny? In that caſe, the ſecond ten generations between Fohi and Yu muſt repreſent not the antediluvians, but thoſe from Noah to the founder of their monarchy, who by this means becomes contemporary with Abraham. With the Chineſe, as with other nations, antient hiſtory is buried in a confuſion from which we cannot extricate ourſelves but by conjecture. I am apt to think that Fohi is ſometimes taken for Adam, and ſometimes confounded with Noah the reſtorer of mankind. They pretend him born after the 10 Ki Gin-hoangs, kings of the earth, and at the very commencement of the preſent age, preceded by a deluge; and yet they ſpeak of him as the firſt of men. It appears to me, that Adam is more generally meant by this Chineſe Fohi. They repre-

ſent him with the body of a ſerpent, becauſe, ſay they, he was formed from the duſt of the earth. This characteriſtic belongs to none but Adam. The Chineſe chronicle called Siao-ul-lun places Fohi at the head of the nine Gin or nine Min of the auguſt family of men. This family begins immediately after thoſe of the heavens and of the earth; which families appeared immediately after the liquid maſs, whoſe birth terminated the Tayku, or the higheſt antiquity. Here again he may be Noah ſucceeding the antediluvian kings of the earth; or elſe this whole paſſage may indicate the creation of man ſucceeding that of animals, which was preceded by the creation of the ſtars or celeſtial bodies, after the formation of the abyſs or chaos, which terminated anterior eternity. Whichever explication we follow, the analogy of this coſmogony with that of Geneſis is ſtriking. Let us alſo obſerve, that the name of Kua, given by this chronicle to the wife of Fohi, has a near reſemblance to that of Chaua, the Hebrew name of Eve, and has, as it is ſaid, the ſame ſignification. The Perſians fall into the ſame confuſion between Adam and Noah. Soliman-Haki ſeems to repreſent the firſt. They pretend Caiamurath to have been the ſon of Adam, and place him amongſt the nine generations who followed him, to the deluge; but ſtill they make him the founder of their monarchy after that event. The traditions of the Tartars place him without confuſion as contemporary with Turk, grandſon of Japhet. In appretiating theſe Chineſe and Perſian chronicles, it ſhould ſeem that Fohi, whom the former claim as firſt monarch of China, which they ever confound with the whole world, is Adam; and that Caiamurath, ſtyled by the Perſians their firſt king, is Seth. Yu and Caicobad ſeem to be the ſame with Noah: though poſſibly Yao, whom the Chineſe look upon as the ſecond founder of their empire, and whoſe name has much reſemblance with the Hebrew Noach, may be that patriarch; or, notwithſtanding this ſimilitude in name, he may be the real perſonage who firſt ſettled in China, a deſcendant of that reſtorer of mankind nearly in the ſame degree as Caiamurath and Turk. It appears to me that the Chineſe, having loſt the true thread, though not the entire memory, of their traditions, have often confounded the hiſtories of Adam

and Noah, and have arrogated them to themſelves as monarchs of China. Senſible however that theſe did not belong to them excluſively, they have, like the Perſians, preſerved a diſtinction between theſe fathers of mankind and thoſe kings who really reigned in their country, of whoſe dynaſties that beginning with Yu is invariably ſtyled the firſt dynaſty; and dates, according to their beſt chronologers, 2217 years before Chriſt, 161 years before Abraham, and 80 years after the diſperſion. It may without improbability be the date of the firſt occupation of China.

(k) Page 15.

In appretiating Moſes merely as an hiſtorian, he muſt ſurely be ranked in the firſt claſs. His ſtyle, often ſublime, is ever clear and ſimple. His candour has few or no example. His own faults, thoſe of his brother, or of his people, are not diſguiſed; but ſpite or ill humour never appears in his writings. As the work of a philoſopher and legiſlator, it cannot be denied but that his decalogue is the moſt able, clear, and complete abſtract of all the duties of man. The government he eſtabliſhed is a model of liberty and wiſe foreſight; his laws of police admirable; his legal ceremonies well calculated to unite the citizens of the ſame family, to inſpire them with the love of their country, to guard the adoration of one God amidſt ſurrounding idolatry, and to preſerve the people from diſtempers incident to the climate and their peculiar habits of body. But he called himſelf inſpired, he pretended to work miracles, ſay philoſophers, which we cannot admit poſſible; by extraordinary prodigies, which we call tricks, he deluded a whole people during 40 years; and he has the inſolence to conſign them to poſterity! It muſt be owned at leaſt, that theſe daily wondrous deluſions during that long ſpace required a knowledge, an art, a dexterity not very common. The queſtion of their truth or falſehood is, I believe, oftener decided by the heart than by the head. What perhaps is the moſt extraordinary in all this, is, that all theſe prodigies had little laſting effect on this ſtiff-necked, or, it might be ſaid perhaps from their incredulity, philoſophical people; and that Moſes, regardleſs of his own honour or juſtification, does not in the leaſt diſſemble it.

Without

(l) Page 19.

Without recurring to forced etymologies, the names of almoſt all antient nations ſhew their deſcent from the fathers aſſigned to them by Moſes. The Aſſyrians owe theirs to Aſſur, long deified as a god, and aſſumed as a title by their kings not ſeven ages before Chriſt. Perſia was long called Elam in the Eaſt, and Elymæ and Elymais are often mentioned by the antients. Syria in the country itſelf long retained the name of Aram, from whence Aramea. Media ſtill preſerves that of Madai; Chuſiſtan has retaken that of Chuſh; Iavan (Iovan in the Greek tranſlation) ſeems the ſame as Ion the father of the antient Greeks. The Thracians derive their name from Thyras; the Lydians, from Lud; the Mæſians and Getes, from Mes and Gether; and from their union ſprang the nation of Meſſagetes. The name of Riphath is preſerved by the Rhyphean mountains. Dodanim, or Rhodanim, as the Greek verſion teſtifies, was the father of the Rhodians, and poſſibly of the Dodonians emigrated from thence. Heber was the father of the Hebrews, and, as it is thought, of the Iberians. Sydon gave his name to the very antient city of Sydon, mother of the famous Tyre. Hadramuth, part of Arabia Felix, derives its name either from Hatſarmaveth, or as I ſhould rather think from Hadar, ſon of Iſhmael: and in the ſame country an antient town was called Baiſat-Jocktan, or Houſe of Joctan. Arachoſia, mentioned by Strabo, near Indoſtan, probably derived the name from Jarach. Ludiim, or Lehabim, has left his name to Libya; and Phut gave his to a part of Mauritania antiently called Regio Phutenſis. Tobolſk, or Tubalſk, ſtill retains the memory of Tubal, from whom alſo probably formerly the Tiballians.

(m) Page 19.

Medals certainly convey a more authentic proof to poſterity of the general and moſt approved opinion of the times wherein they were ſtruck, than can be derived from the writings of hiſtorians. A coin ſtruck at Apamea (formerly Cibotus, a name expreſſive of the event) in honour of Philip the elder, has on the reverſe the repreſentation of a kind of ark or box upon the

waters, containing two perſons, man and woman, and two others already landed from it. On the top of the ark ſits a dove, and above it another dove holding a ſmall branch in its beak. On the ark itſelf is engraven very diſtinctly NΩE. This medal is in the collection of the duke of Tuſcany. Anaxagoras ſays, that Nous was eſteemed by the Egyptians the renewer of mankind; by Suidas he is called Nannacus; in the Eaſt, Noas, Noaſis, Nuſus, and Nus; and by the Greeks compounded Dio-nuſus, the god Nuſus. Philo Judæus ſays, the Grecians call the perſon Deucalion, but the Chaldeans ſtile him Noë, in whoſe time happened the great eruption of water; they alſo call him Xiſouthros. By Abydenus, quoted by Euſebius, writing from the authority of the archives of the Medes and Babylonians, Noah is called Sciſithrus. He ſays, that the flood began the 15th day of the month Deſius, the ſecond month; that during the prevalence of the waters Sciſithrus ſent out birds that he might know if the flood had ſubſided; but that the birds, not finding any reſting-place, returned to him again. This was repeated three times. On the third trial the birds were found to return with their feet ſtained with ſoil. Upon this he quitted the ark, and was never more ſeen by men, being taken away from the earth by the gods. The place of deſcent is by him ſaid to be in Armenia. This Sciſithrus of Abydenus is called Xixithrus by Beroſus and Apollodorus. Plutarch de Solertia Animalium mentions the Noachic dove. Lucian de Dea Syria ſays, that the preſent race of men are different from thoſe who firſt exiſted; for thoſe of the antediluvian world were all deſtroyed and doomed to deſtruction on account of their crimes. For this purpoſe there was a mighty eruption of waters from the earth, attended with ſhowers from above. The whole earth was covered, and all fleſh drowned. Deucalion alone was preſerved in a vaſt box; animals of every ſpecies followed him in pairs, and were received into it. He ſuppoſes the ſcene Hierapolis. The rainbow which appeared to Noah as a ſign or covenant, is mentioned as a myſterious and laſting ſign to deſponding man by Homer; and according to him and Heſiod the gods ſwore by Iris, or the rainbow. Vide Bryant's Mythology. Plutarch has preſerved to us an anecdote very ſimilar to one of the above-

mentioned

mentioned circumſtances. He ſays, that the Egyptians celebrated the 17th day of the 2d month as the anniverſary of that in which Oſiris was forced by Typhon, or the ſea, to take refuge in a boat. Alexander Polyhiſtor, Abydenus, Eupolemus, relate the reunion of mankind after the deluge in the plains of Sennaar, the building of Babel, the confuſion of languages, and the diſperſion of men. The latter ſays, that the city Babel was firſt built, and afterwards the celebrated tower; both which were built by ſome of thoſe people who had eſcaped the deluge: they were the ſame who, in after times, were recorded under the character of giants. The tower was at length ruined by the hand of the deity, and theſe giants were ſcattered over the whole earth. Mr. Bailly informs us, that the Chineſe talk of a certain Peirun, and the Swedes of a Belgemer, who ſaved themſelves in a boat from a general inundation.

The ſhip of Iſis was called Baris, which, according to Nicolaus Damaſcenus, is the name of the mountain (the ſame as Ararat) on which the ark reſted. His words are—There is a large mountain in Armenia, called Baris; to this it was ſaid that many people betook themſelves in the time of the deluge, and were ſaved; and there is a tradition of one perſon in particular floating in an ark, and arriving at the ſummit of the mountain. Seſoſtris is ſaid to have dedicated a magnificent ſhip, of 280 cubits in length, to Oſiris in the temple of Thebes. It is remarkable that the Hebrew name of the ark is Theba, whence probably both the Thebes derived their names. The ſacred Ogdoas, carried at certain times in proceſſion by the Egyptian prieſts, was a boat containing eight perſons, the moſt antient gods of the country. The Chineſe character denoting a boat, is compoſed of the repreſentation of a ſhip, of a mouth, and of the cypher 8. Vide Bryant's Mythology.

In the diſſertations relating to Aſiatic antiquities we find, that the ſeventh Menu of the Hindus, ſurnamed Vaivaſwata, was ſaved with ſeven Riſhi's and their wives from an univerſal deluge, which is the ſubject of the firſt Puráne

Puráná or ſacred poem. In the ſtory, as told in the Bhâgawata, it is related with many abſurd and marvellous circumſtances, that the god Viſhnu ſent to Satyavrata a capacious veſſel miraculouſly formed, in which he with the ſeven pious Riſhi's and their wives, with pairs of all animals, were preſerved from the general flood. The god himſelf, in the ſhape of a vaſt fiſh, ſuffered the veſſel to be tied with a great ſea ſerpent to his horn. Viſhnu afterwards appointed him the ſeventh Menu, by the name of Vaivaſwata. In the ſame diſſertations it is aſſerted to appear from works of undiſputed authority, that the Chineſe, as well as the Hindus, believe this earth to have been wholly covered with water juſt before the appearance of Fo-hi on the mountains of Chin, but that the great inundation in the reign of Yao was confined to the low lands. From circumſtances which I have already noticed, I rather think Adam to be meant by Fo-hi; that the firſt inundation here ſpoken of is relative to the waters covering the earth on its firſt creation, and that the deluge is pointed out by the ſecond under the reign of Yao, who probably repreſents the Noah of the ſcriptures.

(n) Page 20.

At the time of the conqueſt of South America, the inhabitants of Mechſacan, of Thlaſcala, and the people called Achagna, yet preſerved the tradition of an univerſal deluge in puniſhment of the crimes of men. The firſt of theſe held, that a prieſt called Tezpi was ſaved from it by retiring with his wife and children into a great box of wood, in which he had alſo gathered together a great many animals and excellent ſeeds of all ſorts; and that after the retreat of the waters he let fly a bird, called Aura, which returned not back, and ſucceſſively ſeveral others which alſo came not back; but that the leaſt of theſe birds, that which theſe Indians eſteemed the moſt, ſoon appeared again with the branch of a tree in its mouth. Hiſtoire Générale des Voyages. A native of Cuba ſaid to Gabriel of Cabzera, Why doſt thou abuſe me, ſince we are brothers? Doſt not thou deſcend from one of the ſons

ſons of him who built the great box to ſave himſelf from the waters: and are not we deſcended from the other? Vide Herrera.

(o) Page 20.

Ararat ſignifies Mountain of deſcent. It was alſo called Baris or Barit; Luban or Mountain of the Moon; likewiſe, Harmin or Har-men, or Har-minah, ſignifying the ſame. From thence the people round it were named Mimmi, or Minyæ; and the region, Armenia, or Armeni, from the mountain. Gogarene, a part of Armenia, ſignifies The place of the ark. The principal cities of Armenia were Arene or Carina, Area Comana, Ararathia, Cucouſus, the place of Chus. See Hierocles. The mountain was likewiſe called Thamanim: compounded of the Hebrew words Theba, boat, and Shaman, denoting the number 8. According to Ebn-Patricius, the diſtrict below the mount was called Terra Thamanim, or the Region of the eight. William de Rubruquis, who travelled in 1253, mentions a town called Cemainim, by interpretation eight; and they call the mountain near it Maſis, or the mother of the world. Moſes Choronenſis ſays, that the true name of the town of Naxuan (the Naxuana of Ptolemy) is Nachidſhevan, by which is ſignified the place of the deſcent of the eight.

(p) Page 22.

Mr. Bailly was not only an aſtronomer of great celebrity, but a very elegant writer. He was the diſtinguiſhed diſciple of Mr. de Buffon, who in conjunction with Voltaire, D'Alembert, Condorcet, and others, was at the head of the whole philoſophic ſect and men of wit in France, by whom a real plot had been formed, and was carried on for forty years, to root out Chriſtianity. Religion of any kind, it ſeems, ſhackled both their inclinations and their genius. Each agreed in his ſeparate department to contribute to the glorious work. For many years, in France, to be a man of ſcience or of letters was a diſtinct profeſſion and a diſtinguiſhed title, which introduced the aſſumer to the faſhionable circles of profligate nobility, and to the tables of ignorant and ſtill more profligate publicans, fattened on the

ſpoils of the people. The luxurious repaſts of the rich were not complete without the preſence of ſome of theſe ſons of Epicurus. There, amidſt their admiring auditors and a crowd of gaping valets, they expounded in ſallies of wit and ſarcaſms on religion their pernicious doctrines, interlarding them with ſentimental phraſes of philanthropy and humanity. How much of theſe was in their hearts they have ſince fully ſhewn during the fatal reign of their philoſophy. At the houſes of every lady, young or old, whoſe ambition it was to be celebrated for wit, they held their conventicles, where they ſtill more freely diſcuſſed their philoſophical principles, and expatiated on the abuſes of religion and governments. Whoever coincided not with them was, by univerſal acclamation, held up as a man devoid of ſenſe or wit. The effect of this general cry is ſcarcely to be conceived; with youth it was all-powerful, and with the more advanced in age it required very ſolid principles to be withſtood. They had actually by degrees excluded from all the academies whoever dared not to be of their opinion. Though co-operating with theſe conſpirators againſt religion, Mr. Bailly was diſtinguiſhed as a man of benevolence, of modeſt and placid manners. He has been lately ſtill better known to all Europe as the firſt mayor of Paris, in 1789. The ſpirit of party probably carried him beyond his natural bent; but he became a fellow-labourer with the heads of the conſtituent aſſembly, who, under a ſhadow of monarchy, called in the mob, whom they acknowledged the ſole ſovereign; and enforced the ſucceſs of their revolution by calumny, terror, and partial murders, by the demolition of property and the confiſcation of church-lands. At laſt, with every other chief of that faction who ſaved not himſelf by timely flight, Mr. Bailly fell a victim to more atrocious villains who had made uſe of theſe as tools, and to the ungovernable fury of that populace whoſe bloody reign they had eſtabliſhed, in order to pull down regal authority, and level with the duſt the religion and morality of their country. Many were, no doubt, ſurpriſed to hear of Pagan feſtivals and rites inſtituted by the convention, in honour of the ſuppoſed goddeſs of nature, repreſented by a female: but the ſurpriſe will ceaſe when they are informed, that theſe rites were, 30 years ago, ſecretly practiſed by a ſociety

ſociety of philoſophers, to whom France owes what they have been pleaſed to ſtyle its regeneration.

Warned by the fatal effects theſe ſeducers have produced in one great kingdom, it is to be hoped that thoſe who ſhall hereafter aſpire to the reſpectable name of philoſophers will henceforth abjure theſe inſidious attacks on the principles of religion; and that governments will be cautious how they countenance or patroniſe thoſe who ſhall thus aim to poiſon the trueſt ſource of public and private happineſs. Without religion, that virtue which ſophiſts wiſh to iſolate from it is a mere abſtract idea which has neither baſe nor real end: without it, no curb on vice remains, either over ſovereigns, or over the headſtrong multitude. Wiſdom itſelf, without it, is only egotiſm well underſtood, and for the underſtanding of it the paſſions are the judges. Religion will ever be the ſole ſolid ſupport and ſtrength of laws and public order; counterpoiſe to the inevitable inequalities amongſt men, conſolation of the poor and weak; it can alone dignify poverty, and ſubdue the pride of riches and of grandeur. Ever ready to pour its healing balm on the wounds of the body or of the mind, it is the ſureſt ſolace of the afflicted, and the laſt refuge of the culpable. In vain would ſophiſts ſeek to ſap foundations rooted in the very inmoſt receſſes of human nature; the intimate ſenſe of every man of rectitude, and the heart of every man of ſenſibility, will, at times at leaſt, triumph over their acuteſt reaſonings.

Fulminate, ye philoſophers (we will applaud you), religious perſecution and reſtraint of conſciences; with you, true religion reprobates them. If every predominant ſect of Chriſtians has at ſome period invoked their aid either under the pretext of danger to the ſtate, or on the ſpecious pretence of guarding from corruption the weaker part of the flock, none has dared to approve them in direct terms, becauſe they are clearly repugnant to the ſpirit and to the doctrines of their divine legiſlator. As the judicious Dr. Paley obſerves, the erroneous judgments of intemperate zeal, almoſt ever originating in human paſſions, have too often produced intolerance

and perſecution, nowiſe chargeable on Chriſtianity: but the unbelieving rulers of France have proved that, in order to be a perſecutor, it is not neceſſary to be a bigot—that, in rage and cruelty, in miſchief and deſtruction, fanaticiſm itſelf can be outdone by infidelity. Amidſt equal horrors, one eſſential difference is alſo to be remarked between theſe two kinds of perſecutors. By the one, all the connections which bind mankind together are not diſſolved: the ties of blood are ſometimes trodden under foot; but againſt adverſe tenets all his rage is directed; towards the brethren of his creed the bonds of amity, fidelity, and benevolence are ſtrengthened. The other knows no brother, and every man who ſtands in the way of his idol paſſions is alike ſacrificed with ſtoical indifference.

If philoſophers wiſh to combat the moſt fatal and deſtructive error of mankind, it is againſt warlike phrenſy that it becomes them to employ their ſtrongeſt arguments, and their moſt touching eloquence to eradicate from the minds both of princes and of the people that rage of mutual deſtruction for ſenſeleſs jealouſies and miſtaken intereſts. It was the Chriſtian religion which firſt taught man to love man without diſtinction of race or country, by ſhewing all men to be the equally cheriſhed children of one common father. Simple but ſublime doctrine! which if antient philoſophers ever felt, they never durſt produce. Let philoſophy unite to its mild voice the force of reaſon, to make the whole world liſten to the leſſons of true philanthropy. Whilſt religion reveals to each individual eternal felicity attached to the accompliſhment of this great precept of love, let it demonſtrate to nations temporal happineſs and proſperity dependent on univerſal concord.

(q) Page 22.

That we may be able to form ſome eſtimation of the intrinſic real merit of this Indian Chronology, which Mr. Bailly here holds up to us as a correction of ours, it will not be amiſs to examine the foundation of the whole edifice of theſe Indian ages. I ſhall briefly extract it from the Tra-

vels of Mr. Sonnerat. The firſt age, called Creday-ougam, or of innocence, laſted 1,728,000 years; the ſecond, Troday-ougam, 1,296,000; the third, Touvaberay-ougam, 864,000; and the fourth, Caly-ougam, or the age of miſery, the preſent age, is to laſt 432,000 years. Intervals of 800, 600, 400, and 200 years follow each of the ages. The firſt baſe of all theſe terms is one inſtant of time diverſely multiplied to 100 years, the full duration of human life; theſe 100 years are multiplied by 360, the number of days in the year, making 36,000 years, again multiplied by ſeveral myſterious or ſuperſtitious numbers to form the total duration of each age. Theſe numbers are alſo calculated upon aſtronomical periods. According to the Bramins, the preceſſion of the equinoxes is of 54 ſeconds *per annum*; whence they framed a cycle of 60 years, during which the fixed ſtars advance their longitude 54 minutes. They therefore advance 54 degrees in 3600 years, and will perform an entire revolution in 24,000 years. Nine of theſe revolutions make 216,000, which is alſo the produce of the period of 600 years multiplied by 360, according to the number of the days of the year: and that number multiplied by two, makes up the 432,000 years of the preſent age. The multiplication of that term by other myſterious numbers gives the ſeveral durations of the preceding ages. The year 1783 of our era anſwers to the year 4884 of this fourth age, and to the year which the Indians call Soupragedou, the 36th of the preſent cycle, which is the 80th of this age. Here either Mr. Sonnerat or the Indians ſeem to have made a ſmall miſtake, as the year 1783 ſhould, according to this, be only the 4776th of the Indian age. Such being its foundations, can we ſeriouſly lay any ſtreſs on a ſtructure framed upon a combination of arbitrary or ſuperſtitious numbers; one of whoſe numbers, that of 360 as the number of days in a year, is evidently erroneous with reſpect to the actual revolution of the earth? It will be well however to keep in view, that this number of 360 days forms in every antient nation the firſt and earlieſt calculation of the year. However erroneous or uncertain our chronologies may be, can we ſeriouſly dream of rectifying them from ſuch calculations?

(r) Page 23.

The three chronologies of the Bible differ conſiderably as to the length of the antediluvian age. The Hebrew, which I think the moſt probable, eſteems it 1656 years; the Samaritan reduces this period to 1307 years, a term which appears evidently too ſhort. It ſhortens the lives of the 6th, 8th, and 9th deſcendants from Adam nearly 100 years each; and though the age of Methuſelah has always been proverbial, it gives him near 200 years leſs than many of his predeceſſors. As to the Septuagint verſion, it allows exactly 600 years more to it than is given by the Hebrew. Theſe are preciſely the years of Noah at the deluge. I ſuſpect that theſe interpreters having found ſome copy wherein, by miſtake, the 600 years of that patriarch were added to the ſum-total of the lives of his predeceſſors, had adopted it; and, in order to find the whole amount in the ſum of all the generations before the flood, added 100 years to the age of the five firſt and of the ſeventh generation at the birth of their reſpective ſons. They have in like manner added the ſame preciſe number of 600 years, the age of Noah, to the time elapſed between the deluge and Abraham, beyond what I ſhall hereafter ſhew ought to be the real calculation of Geneſis. By theſe additions to the age of the world, they approached nearer to the Grecian and Egyptian chronologies. That ſuch double entries are far from impoſſible, we ſhall preſently ſee by the example of an author whoſe profeſſion it was to be exact in numbers.

(s) Page 23.

The Chaldeans, according to Beroſus, reckoned 120 ſari of years from Alorus to Xixuthrus, comprehending the reigns of ten kings to the flood. Theſe ſari Mr. Bailly thinks proper to take for lunar cycles of ſomething more than 18 years and a half each: but they were certainly decades of years; and Africanus proves it by more nicely calculating this period at 110 ſari and 99 years; the 6th king, Daonus, being ſaid to have reigned only 99 years, or one leſs than 10 ſari; Apollodorus and Abydenus giving him in rounder numbers 10 ſari.

(t) Page

(t) Page 24.

To make out this date, Mr. Bailly adds 46 years to the 30 years reign attributed by Ferduſſi to this Caiamurath. Some antient Perſian chronicles pretend he lived 1000 years, and reigned 560. The learned author reduces theſe into lunar revolutions, and conſequently into 76 years. It may be aſked, why theſe ſame lunar years might not be extended perhaps to ſome further period of this chronology beyond his reign? The Perſians make him an antediluvian monarch, the ſon of Adam and brother of Seth; and in that caſe he may be nearly entitled to the whole 1000 years of life. But the Tartars, as we have before obſerved, call him the grandſon of Japhet, contemporary with Turk. What real credit can be given to hiſtories ſo confuſed, or to dates on which there is ſuch diſagreement? Facts and dates are every where in theſe remote ages adulterated and confounded; but the eſſential ground-work, that which belongs to the whole human race, is ſtill to be diſcerned through the chaos of fictions invented, or of truths perverted, by the vanity of particular nations.

(u) Page 24.

Mr. Bailly has here very conſiderably leſſened, on what grounds I know not, the total amount of years which muſt reſult from the ſeveral durations of Manetho's dynaſties, as given us by any of his original tranſcribers. Let us remark, however, that according to the great Egyptian chronicle this whole ſpace, from the reigns of the gods, ſhould only conſiſt of 2887 years, comprehending the 217 years of the reigns of eight demigods. But in this account who ſhall aſſure us that all theſe are ſolar years? They immediately ſucceed to years of days: and ſince that time, years of 28 days, of three, of four, and ſix months, and lunar years of 354 days were alſo in uſe in Egypt.

(w) Page 24.

Our author reduces theſe 11340 years from Menes to Sethon to 2815 years,

years, by taking them for years of Horus of three months. It is ſurely protracting the uſe of theſe ſhort years very long, to bring them down ſo low as the 8th century before Chriſt. It muſt be obſerved, that out of the ſeveral years which at different times obtained in Egypt, he makes ſuch an arbitrary ſelection as may beſt ſuit his purpoſe of accommodating all theſe chronologies, as nearly as poſſible, to his favourite Indian era.

(x) Page 24.

Mr. Bailly had eſtimated the length of the preceding age by years of days. Why give ſolar years to this interval, which belongs not more to the 4th than to the 3d age? If by theſe imaginary intervals between theſe ages, progreſſive from 800 to 200 years, any thing is really meant, this laſt might as well repreſent the time taken up between the commencement and the end of the deluge itſelf. Reckoned as days, theſe 400 years would nearly be the time Noah was ſhut up in the ark. Our author had already given theſe 400 years to the 3d, or antediluvian age: here he makes a double employ of them to increaſe the duration of the preſent. If I have ſuſpected the ſeventy interpreters to have made a like double entry of the 600 antediluvian years of Noah, we here perceive how eaſy it is to make ſuch miſtakes when any favourite object is in view. Mr. Bailly judged theſe 400 years neceſſary to perfect his Indians in the ſtudy of aſtronomy.

(y) Page 24.

The genealogy of the kings of Dehly, deſcended from the race of the moon, preſents an evidently exaggerated calculation. The reigns of 70 kings take up 3145 years, which would be reckoning them at more than 44 years each. By computing them at 30 years each, as Mr. Bailly generally does, this term will be reduced to 2100 years: but if reckoned, as reigns ſhould be, at 21 years, this ſucceſſion of kings will only give us 1470 years.

(z) Page 24.

The two liſts of kings of Galeor and of Oude ſprang from the family of the

the Sun, carrying us no higher than 278 years before Chriſt, are uſeleſs to Mr. Bailly. The genealogy of the kings of Cachemire begins by a blank ſpace of 653 years, followed by the reigns of 50 kings; the length of whoſe reigns not being ſet down, our author, according to cuſtom, chooſes to value at 30 years a piece. The reigns of which an account is given take up only 1062 years, which, with the 653 blank years, and the 50 reigns eſtimated fairly at 21 years each, would, on the whole, give us 2765 years.

(aa) Page 24.

The authority on which Mr. Bailly gives this date to the commencement of the Chineſe empire is unknown to me. The Chineſe at this day compute time by cycles of 60 ſolar years each: The firſt of theſe carries us to the year 2697 before Chriſt. This date accidentally coincides with that which I have given to the deluge; but I have not ſufficient confidence in Chineſe chronology to lay any ſtreſs upon this conformity. It will however ſhew, that their moſt generally avowed computation of time does not extend beyond what may reaſonably be warranted by ſcripture chronology. Notwithſtanding this national date, which may naturally be ſuppoſed to correſpond with the firſt eſtabliſhment of the empire, which in fact is ſaid to begin with the reign of Hoam-ti, this nation is not behind hand with the Egyptians in fabulous accounts. The popular ſtory is, that Fohi and his 21 ſucceſſors reigned 18000 years before Hoam-ti. But as neither the Chou-king nor any of their reſpectable annals take notice of this long period, Mr. Deguignes very juſtly remarks it to be unworthy of any attention. Their beſt authors place only eight monarchs before the reign of Yu, the founder of the dynaſty of Hia. The three firſt of theſe are called the San-hoam, or the three auguſt emperors, and the others, ſimply the five emperors. It is not agreed who were the three firſt, but ſome ſuppoſe Fohi, Chin-nong, and Hoam-ti; neither is it clear whether Yu is or is not comprehended in the five laſt. None however pretend to any ſettled chronology before the time of Yao, father of Chun, the immediate predeceſſor

of Yu. According to the authors followed by Mr. Deguignes, this laſt emperor began his reign in 2207 before Chriſt, and Hoam-ti in 2707. But if from the commencement of the third dynaſty, called Tche-ou, in 1122 before Chriſt, a period at which chronology may reaſonably be ſuppoſed ſomewhat more correct, we adopt the computations of the Tſou-chou, or book of bamboo, the only chronicle ſaid to have eſcaped the general deſtruction of Chineſe annals under Chi hoam-ti, the beginning of the reign of Hoam ti will be placed in 2651 before Chriſt. In times poſterior to that monarch there are ſtill great variations amongſt their chronologers. The duration of the dynaſty of Hia, by all their beſt hiſtorians invariably ſtyled the firſt dynaſty reigning in China, is by ſome called 432, and by others 471 years, whilſt that of the ſucceeding dynaſty of Cham is by ſome computed at 496, and by others at 645 years. In much later times, whilſt the empire was for many centuries ſplit into ſeveral kingdoms, the chiefs of which often aſſumed at the ſame time the title of emperors, there is great reaſon to believe that the chronological ſucceſſion of thoſe, who are now acknowledged as ſuch, is loſt, or at leaſt very uncertain. From all this it appears, that the popular chronology of China is no leſs mixed with fable than that of Egypt, and that there reigns much uncertainty amongſt their beſt hiſtorians as to dates in times when their annals begin to aſſume a more regular form. If their account of things preceding the dynaſty of Hia has any foundation, it is probably no other than that of the general traditions of mankind. Hoam-ti, whoſe name ſignifies Lord of the Earth, poſſibly denotes Noah; and his predeceſſors, at the head of whom is Fohi, ſtyled by them the firſt of men, muſt be the antediluvian patriarchs. It is worthy of remark, that the moſt antient dates to which the Chineſe authors affix any degree of authenticity, as well as the commencement of their firſt cycle, are not anterior to the very probable era of the deluge. From a review of their hiſtory it is evident that we are to abate much of our high ideas of the Chineſe empire, not only in its early beginnings, but for many ages after the firſt population of the country. The firſt ſettlers were poſſeſſed of a very ſmall portion of its preſentextent in the north-weſtern province of Chen-ſi. Dur-

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ing the whole of the firſt dynaſty of Hia, comprehending between 400 and 500 years, the inhabitants were extending themſelves ſlowly into four only of its northern provinces, ſome of which they were employed in draining from the waters. Of their very firſt poſſeſſions in the provinces of Chen-ſi, Chan-ſi, and Pe-tche-li, no inconſiderable diſtricts were at that period held by their inimical Tartar neighbours. There, as in every other part of the world on its firſt occupation, the chiefs of thoſe colonies, who progreſſively ſettled themſelves at ſome diſtance from their firſt habitations, ſet up for themſelves, and either owned a ſlight homage to the original chief and his deſcendants, or became entirely independent. Hence, during their ſecond dynaſty of Cham we ſee many petty, at firſt tributary, and at laſt independent, kingdoms ariſe. Under the dynaſty of Tche-ou, which began in the year 1122 before Chriſt, the whole Chineſe dominions compriſed only the five provinces of Chen-ſi, Chan-ſi, Pe-tche-li, Chan-tong, and Ho-nan, parts of all which were ſtill poſſeſſed by the Tartars. Comparatively inconſiderable as this empire then really was, it was divided, in the reign of Ven-vam, who began this dynaſty, into many petty ſovereignties, the number of which was ſucceſſively increaſed to fifty-five. Theſe were not reunited under one dominion until the reign of Chi-hoam-ti, in the year 247 before Chriſt. The great wall of China has been alleged as a proof both of the great antiquity and of the early power of the Chineſe empire: but Mr. Deguignes remarks, that a very great part of that now aſtoniſhingly extenſive work was raiſed in a ſucceſſion of ages by ſeveral independent princes, on the frontiers of their ſeparate territories, as a barrier againſt their troubleſome Tartar neighbours, and was only ſtrengthened and connected by new additions, and particularly by ſimilar fortifications on the borders of his former kingdom of Tſin, by Chi-hoam-ti, when he became maſter of the whole empire at a period very far from claiming high antiquity. To purſue this abſtract of Chineſe hiſtory—the empire was again divided in the year 207 before Chriſt into ſix kingdoms, and ſhortly after reunited under the Hans. In the year 220 after Chriſt it was again ſplit into three diſtinct kingdoms, over which the Tſins obtained pre-eminence for a very few years. In 420 a.

race of Tartar princes ſeized on the north-weſtern parts, whilſt the dynaſty of Sum, of Chineſe origin, reigned at Nanking over the eaſtern and ſouthern provinces. By theſe ſouthern provinces we are not however to underſtand the whole of what is now called Southern China, which hiſtory informs us was yet in a ſavage ſtate under barbarian chiefs in 586. It was not probably till 1162, when the Niu-tche Tartars poſſeſſed themſelves of all northern China, and the Chineſe dynaſty of Sum took refuge in ſouthern China, then diſtinguiſhed by the name of Ma-tchin, that this laſt was reclaimed from barbariſm by their preſence. In 1303 both the Tartars and the Sums were conquered by Kublai-Khan, and he and his ſucceſſors were the firſt monarchs who reigned over all China. After a dominion of 93 years, the Moguls were expelled by a new Chineſe dynaſty called Mim. Theſe were again ſubdued in 1644 by the Niu-tche, now denominated Man-tcheou Tartars, who are ſtill in poſſeſſion of that empire reunited to their native country, and great part of weſtern Tartary.

Such is the conciſe abſtract of Chineſe hiſtory gathered from their beſt annals by Mr. Deguignes, in which we ſee that the firſt population of that country, the progreſs of which was no leſs ſlow than that of other parts of the world, dates not beyond the probable era of the deluge, and that that nation was in a ſtate of infancy and mediocrity much later than ſeveral others of the weſtern world. In this ſeveral great and opulent empires had ſucceeded each other, whilſt 300 years before Chriſt the moſt flouriſhing part of China was divided into petty kingdoms, and the ſouthern parts of it were not emerged from the ſavage ſtate many centuries after that period. With reſpect to the Indians, that other ſtill exiſting antient people of Aſia, whoſe chronology has been of late ſtill more ſtrenuouſly oppoſed to that of Scripture, it has been already obſerved in a former note, that, according to Mr. Sonnerat, they, in 1783, reckoned 4884 years from the commencement of their fourth or preſent age, which followed a general deluge, which conſequently dates 3101 years before Chriſt; but Sir William Jones, whoſe labours have lately thrown ſo much light on the antiquities of that nation,

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is perſuaded, from the confrontation of their oldeſt records, that the commencement of that age really dates no higher than 2000 years before the Chriſtian era. This would prove a very groſs miſtake in their computation: but I ſhould rather imagine that their antient aſtronomical chronologers, inſtructed by tradition that the date of the deluge was not far removed, fixed the preciſe date, according to their ideas of judicial aſtronomy, to a year not very far diſtant from the real epoch, in which they found by their retrogade calculation an extraordinary conjunction of the ſun, moon, and planets; in the ſame manner as they have evidently determined the commencement of their preceding third age, in which they ſay man was firſt created. Thus the undoubted general tradition of the deſtruction of this earth by a deluge, the creation of mankind in a prior-age, preceded by that of the earth and of the angels, has been by them determined not by hiſtorical epochs but by fictitious aſtronomical periods.

(bb) Page 27.

The antient chronology of Egypt is a labyrinth from which it is impoſſible for us at this day to extricate ourſelves. The tables of Manetho, over and above their original faults, have been tranſmitted to us by their tranſcribers Africanus, Euſebius, and Joſephus with very great variations. Sir John Marſham, Sir Iſaac Newton, and father Pezron have, with great probability, conjectured that the 15 firſt dynaſties are chiefly compoſed of monarchs not reigning ſucceſſively over all Egypt, but of petty kings reigning contemporarily at This, Elephantis, Hieracleopolis, Dioſpolis, Memphis or Xois, towns from which theſe dynaſties receive their names. Sir Iſaac Newton notices another ſource from whence the liſt of kings has probably been augmented, the repetition of the ſame, or nearly the ſame names appearing more than once in the ſame order. Beſides thoſe pointed out by him, I will alſo obſerve that in the 18th dynaſty, which relates to the time above ſpoken of, ſeveral ſuch repetitions occur. In the liſts of Africanus and Euſebius, Amoſis is alſo called Thethmoſis, and after the 6th from him, Miſphragmuthoſis, a king called Thutmoſis reigns; Archencherres, Chencherres,

Chencherres, Acherres, Cherres, look much like the ſame name differently written, and denote probably the ſame man. In Joſephus, Haliſphragmuthoſis is ſucceeded by Tethmoſis; and, after four intervening kings, Miſphragmuthoſis is again ſucceeded by a Thmoſis or Tethmoſis. There are alſo ſeveral opinions both as to who the firſt and ſecond ſhepherds were, and as to the time of their final expulſion. The learned Mr. Bryant, intent on his favourite ſyſtem of making the lawleſs and daring ſons of Chus, who, from their firſt invaſion on the property of Shem under Nimrod and Chanaan, are not improbably, as he contends, denoted by the giants and Titans of antiquity, the conquerors of half the earth, aſſerts, that the firſt ſhepherds were Chuſhites, and the ſecond the Iſraelites inhabiting but not reigning over Egypt. He maintains the Oſarſiph of Manetho to be Joſeph; that Sethos Ægyptus was that king of another race who knew not Joſeph; and that it was in his grandſon's time, the third Amenophis, that the Iſraelites deſerted Egypt. In anſwer to this it muſt be obſerved, that the Pharaohs of Abraham and Moſes ſeem to have reigned over all Egypt, and that the diviſion of the kingdom appears to have taken place after the days of the latter, as in the times of the judges of Iſrael, and even during the reigns of its firſt kings, mention is always made in Scripture of the kings of Egypt in the plural number. Sir Iſaac Newton obſerves, that the Pharaohs who reigned in the times of Joſeph and of Moſes were not ſhepherds, but Egyptians obſerving all the Egyptian rites. Oſarſiph is by Manetho himſelf ſaid to be the ſame as Moſes. Ægyptus the brother of Danaus is, as we ſhall hereafter ſhew, of too recent a date to be contemporary with Joſeph. Sir Iſaac Newton thinks, as appears to me, with much greater probability, that the ſhepherds expelled by Miſphragmuthoſis and his ſucceſſors were the Amalekites and others fleeing from Joſuah, who had ſeized on that vacant part of Egypt quitted by the Iſraelites, at a time when the Egyptians were not only weakened by that deſertion, but by the loſs of their army and of their king. The diſorders thence following might probably occaſion at the ſame time the erection of ſeveral kingdoms in the remaining part of Egypt. The oriental hiſtorians tell us that Maſar and his ſon

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Coptim were the two firſt kings of Egypt after the flood. Khondemir and all of them agree, that the Amalekites were the ſhepherds who invaded and conquered Egypt, though they differ as to the time. Some place this invaſion as high as the time of Coptaim, third king of Egypt, and others as low or lower than the days of Abraham; either of which would well coincide with Mr. Bryant. But the impoſſibility is ſelf-evident, as Amalek, the founder of the Amalekites, was great grandſon to Abraham; and the nation ſprung from him, ſeated near Chanaan in the days of Moſes, could not be conſiderable enough to make conqueſts much before his time; but defeated by him and Joſhua, it is very probable that they might have ſought refuge in the deſerted land of Goſhen, and gradually poſſeſs themſelves of great part of Egypt, from whence they were expelled three centuries after. With the oriental as well as weſtern writers there are great chaſms in the hiſtory of Egypt, which neceſſarily confound all chronology. For want of Egyptian dates, the correſponding events of that country have been accommodated both by antients and moderns to the Grecian chronology, which, from the ſiege of Troy upwards, Sir Iſaac Newton has fully proved to be erroneous, and antedated by more than two centuries, and in ſome inſtances much more.

(cc) Page 27.

Theſe ſo exactly coinciding numbers of kings and prieſts, whoſe images the Egyptians ſhewed to Herodotus, juſtly appeared to him ſuſpicious. The city of Memphis itſelf, where theſe pretended monuments were preſerved, was either not built or of little note in the time of Homer. Herodotus tells us, that their prieſts aſſured him that the gods had never viſibly dwelt upon the earth, though at other times they pretended that the ſun and other gods had governed Egypt during ſo many ages. We thence perceive how many contradictory tales theſe prieſts, anxious to maintain the veneration and ſuperſtition of their votaries, were capable of inventing and accommodating to the capacity of their hearers. In this ſame paſſage this hiſtorian gives it as his opinion, that the Greeks had borrowed from the Egyptians the names of the twelve great gods, which they

had afterwards applied to mere mortals, whoſe origin was very far from antient.

(dd) Page 27.

On the above motives the firſt Jeſuit miſſionaries exaggerated beyond meaſure whatever related to China. Its antiquity, government, manners, ſciences, arts, and population, were held up to the admiration of the world. For other reaſons modern philoſophers have wiſhed to perpetuate the prevention. The fabulous tales of their antient chronicles, rejected by their own learned men, have been treated as deſerving more reſpect and credit than thoſe of other countries. Their government has been aſſimilated to the adminiſtration of a tender and beneficent father, whilſt in fact it is no other than the deſpotiſm of one without control over ſlaves inured from infancy to ſubmiſſion. Like other ſlaves, the Chineſe have had their Neros and Heliogabaluſes. Abbé Raynal is tranſported with the idea, that in China there is no other diſtinction than that which follows ſtate employments, which he is willing to confound in that country with real merit. But this in an arbitrary monarchy is well known to be the ſtrongeſt proof of complete ſlavery. We are told with enthuſiaſm, if the people murmur in any province, the mandarin is certainly puniſhed, becauſe he has diſpleaſed the children of the common father. In Turkey we ſee viſirs and pachas ſtrangled to appeaſe the fury of the ſoldiery or of the mob. Why ſhould we ſuppoſe paternal care the ſole motive there, whilſt we know that nearer to us it is the effect of that terror which every where environs the throne of deſpotiſm? It is repeated with affected admiration, that their conquerors have ever ſubmitted to the laws of the vanquiſhed; but thoſe invaders have always been half ſavages; and, as Mr. Raynal himſelf obſerves, what conqueror ever rejected laws which give him abſolute power? Deſtitute of courage or energy, the Chineſe, notwithſtanding the ſuperiority which their numbers ſhould give them, have ever been the eaſy prey of thoſe little hords of Tartars who hover on their borders. Forty thouſand men effected the laſt conqueſt of that immenſe country. If

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any thing can ſhield them from the like in future, it would be the policy of the preſent Tartar race who rule them. They people their antient country with Chineſe; but in a few ages theſe will become real Tartars, and thoſe will be debaſed into Chineſe. One may ſafely predict it from analogy, ſince ſuch has been the conſtant revolution of their hiſtory. Never had the thirſt of gold more power upon the moſt corrupt nation than upon the Chineſe; they never poſſeſſed more than the outlines of the fine arts or of ſcience; their patience alone triumphs in ſome mechanical arts. Invention and improvement are unknown and uncoveted by them. Father du Halde gives a million of inhabitants to the city of Canton, and Father le Comte increaſes them to 1,500,000. Mr. Sonnerat however aſſerts, that with the help of ſeveral Chineſe he verified the population of the Chineſe and Tartar towns, and of that of boats, and that he could not find them all to contain more than 75,000. He pretends, that if Pekin is built on the ſame model, it would require 50 leagues in circumference, inſtead of ſix, to contain the two millions of inhabitants which are allotted to it. He has probably undervalued its population; for Captain King reckons that of the Chineſe and Tartar towns at 150,000, and ſuppoſes that the ſampans or boats may contain 200,000 more. But there is yet a wide diſtance between 350,000 and a million or a million and a half, given to it above 100 years ago, notwithſtanding the probable great increaſe of population in thoſe parts from the greatly increaſed trade with Europe. The laborious induſtry and the ſobriety of the people greatly favour population; but the difficulty of ſubſiſting cauſes an incredible number of children to be annually and openly thrown into the rivers, without drawing either the attention or oppoſition of government, whilſt avarice and luxury are unbridled, and with thoſe in office ſurpaſs perhaps the exceſſes of any other country.

(ff) Page 29.

In the time of Confucius, 550 years before Chriſt, northern China was divided into ſeveral petty kingdoms, acknowledging a degree of ſupremacy in a chief monarch. This philoſopher was a ſubject of the king of Lou.

By his talents and virtues he roſe to be prime miniſter of that ſtate, which the diſorders of a new reign forced him to abandon. He then viſited the ſeveral little courts of China in hopes of gaining proſelytes to his maxims and doctrines, and was favourably received by the reigning chief monarch of the dynaſty of Song. China, like many other countries in the firſt ages, was then governed by ſeveral chiefs or kings, who yielded a kind of homage to the moſt antient or the moſt powerful royal family. It is thus we find Chordolahamer paramount of ſeveral kings. Sometimes alſo in extraordinary caſes allied kings elected from amongſt themſelves a ſupreme chief. In this manner the Greeks choſe Agamemnon to command all their princes at the ſiege of Troy under the pompous title of King of Kings—a title affected long after by the kings of Perſia. This conſtitution is to be remarked amongſt all infant nations, or thoſe where antient ſimplicity ſtill prevails. In Tartary there is always a grand khan whom the other khans acknowledge as chief, particularly in any great expedition. The emperors of China and of Turkey aſſume that title at this day in order to preſerve a ſway over eaſtern or weſtern Tartary. In Ireland the petty ſovereigns of its ſeveral kingdoms owned homage to a chief king. Very lately in the Highlands of Scotland the individuals of each clan looked upon themſelves as vaſſals and children of the chief and common father of the family, whoſe name they all bore. If they thought ſome ſubmiſſion was owing to the kings of Scotland, it was as to the ſupreme head of all theſe chieftains. The Arabs and Tartars are ſtill divided into diſtinct tribes or families having each their ſeparate chief. In Tartary, as in the Highlands, theſe tribes, when reunited in an army, preſerve certain ranks and pre-eminences, not at all regulated by the numbers or power of the hord or clan, and have a fixed order of battle regulated from high antiquity. In Tartary the hord of Niron ſucceeded to the pre-eminence of that of Cayat extinguiſhed: and it was in virtue of that ſucceſſion that Gengis Khan, as their chief, claimed the title of Grand Khan. Theſe prerogatives certainly are derived from ſome antient order of primogeniture acknowledged amongſt the branches of the ſame primitive family. It is the remnant of patriarchal

government, in which all the younger branches yielded a certain deference to the eldeſt. It has ever obtained amongſt all thoſe unmixed nations who have preſerved ſome relics of their antient cuſtoms; it is probably the origin of feudal lords and tenures introduced into Europe by the barbarous nations of the north. In their own countries the preeminence was perſonal; by their conqueſts it came to be confounded with and finally annexed to territorial poſſeſſions.

(gg) Page 29.

In the learned diſſertations relating to the hiſtory and antiquities of Aſia, we find the words of Confucius literally tranſlated from the Sanſcrit:—*viz.* "Although, like other men, I could relate, as mere leſſons of morality, the hiſtories of the firſt and ſecond imperial houſes; yet, for want of evidence, I can give no certain account of them." It is to be obſerved, that the third dynaſty commenced only about 1100 years before the Chriſtian epoch; and it is aſſerted that even of that third dynaſty no unſuſpected memorial now remains. In fact, the deſtruction of all hiſtorical records in the third century before Chriſt muſt caſt a doubt upon all events ſaid to have happened any length of time before that period.

(hh) Page 32.

The Perſian hiſtorians give Japhet 11 ſons: 1. Gin, Tchin, or Sin; 2. Seclab; 3. Manſhui, called by Mr. Deguignes, Manſchouge; 4. Gomari, or Camari; 5. Turk; 6. Khalai; 7. Khozar; 8. Rus, or Rouſs; 9. Suſſan, or Souſſan; 10. Ghaz; 11. Taraj, or, according to Mr. Deguignes, Tarage. Vide Herbelot. The Tartarian authors name only eight ſons: 1. Turk; 2. Khars or Chars; 3. Saklab; 4. Ruſs; 5. Maninach; 6. Zwin; 7. Kamori; 8. Tarikh, or, according to the above author, Taridge. Vide Abulghazi-Khan. Amongſt theſe it is eaſy to diſtinguiſh, in both liſts, ſuch as are ſo nearly ſimilar as to be evidently the ſame as the ſons of that patriarch named in Scripture, as Turk or Turgoma, from whom the Turcomans; Gin or Gog; Gomari or Gomer; Ruſs or Roſs. Taraj, or Tarikh, appears to me the ſame as Thiras. Maninach in one liſt Mr. De-

guignes takes to be the ſame as Magiouge in the other, and to be the father of the Mameluks; but as Magiouge in the Perſian liſt is alſo called Manſhui, it ſeems to me that he is moſt probably the anceſtor of the Man-tcheou Tartars. He ſuppoſes Suſſan, Ghaz, and Taraj to be the fathers of the Turcomans, but the laſt of theſe I think repreſents, as before ſaid, Thiras, the father of the Thracians. Saklab in both liſts he imagines to be the father of the Sclavonians. Khozar ſeems to be the ſame as Khars, from whom the Georgians and neighbouring nations of Khoraſan are probably deſcended. From Khalaj it is not unlikely that the Kalmoucks may be derived.

(ii) Page 35.

The building of Sicyon in particular ſeems beyond meaſure antedated by the Greek hiſtorians. If one people had already united in Greece in ſocial life, it is not natural that contiguous parts and all the reſt of the whole country ſhould remain unſettled, and wait the arrival of ſtrangers centuries after to follow the example. To fill up the ſpace, twelve kings after Ægialeus have been interpolated, of whom nothing is recorded; but Sir Iſaac Newton clearly proves from other concurrent parts of Grecian hiſtory, that Ægialeus founder of Sicyon, and Phoroneus who built Argos in its neighbourhood, were brothers, both of them ſons of Inachus, called the ſon of Oceanus, probably becauſe he came to Greece by ſea. That learned man alſo ſhews, that there were only eight kings of Sicyon before Agamemnon, in whom, after the ruin of that town, were reunited the territories of Sicyon and Argos. Theſe reigns he reckons at 20 years apiece, and thus places the foundation of both only 160 years before the reign of Agamemnon. Though this may be a medium of the ſeveral computations he has produced, I muſt obſerve that there is in general a wide difference to be made between a long ſucceſſion of kings, in which are united all the various incidents which can attend human life, and a ſhort ſeries wherein one ſingle long reign may greatly raiſe the general rate. In this view I have examined the reigns of the laſt eight kings of Europe. From Ruſſia, Sweden, and England we cannot draw any fair inference, becauſe, during this period, the uſual order of ſucceſſion has been repeatedly interrupted,

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and princes of an advanced age have ſucceeded to the throne. But the ſucceſſions of France, Spain, and Denmark will be a fair criterion. In France indeed the two laſt reigns are of a length perhaps unparalleled in hiſtory as immediately ſucceeding each other; but in Spain and Denmark there has been no reign of immoderate length, and yet in both theſe countries the duration of the laſt eight reigns exceeds that of the kings of France. Taking them all together, theſe 24 kings will have reigned more than 33 years apiece: and I muſt notice, that had the Stuart line continued in England, their reigns would have given us above 31 years on an average, though Charles the firſt came to an untimely end, and two brothers ſucceeded each other. I thence infer, that it will be in no wiſe contradictory to the frequent courſe of nature to allow the eight kings of Argos and Sicyon 30 years reign each, which, with 25 years which Agamemnon had reigned when Troy was taken, will place the foundation of theſe cities 265 years before that event.

(kk) Page 35.

Heſiod ſays, that the flood of Deucalion and the arrival of Cadmus into Greece happened only four generations, or at moſt 140 years, before the ſiege of Troy. The chronologers, in ſpite of this authority, place it 319 years before.

(ll) Page 35.

The expedition of the Argonauts to Colchis has alſo been much antedated by the Greeks. Sir Iſaac Newton juſtly obſerves, that Eratoſthenes and the firſt Greek chronologers, finding no certain dates for the antique events of their country, formed to themſelves a technical chronology by computing the ſucceſſions of the kings and of the prieſteſſes of Argos, in which they erroneouſly took theſe ſucceſſions for ages or generations, and reckoned 100 years, and ſometimes 120, to three generations, inſtead of allowing, as Sir Iſaac contends, 18 or 20, or, as I apprehend, in a long ſeries almoſt 22, years for each reign or ſucceſſion. Æſculapius and Hercules.

cules were Argonauts, and Hippocrates was the 18th, by the father's ſide, from Æſculapius, and the 19th from Hercules, by the mother's ſide; which Sir Iſaac computes, by reckoning only 28 years to a generation, as theſe were moſtly by eldeſt ſons, at 504 years, and fixes the event at 506 years before Hippocrates wrote, *anno* 431 before Chriſt. But as I think we may even in this kind of generation by eldeſt ſons allow two years more to each, I ſhould be inclined to ſettle it towards 971 years before the Chriſtian era. According to Meton, who made his obſervations in the 316th year of Nabonaſſar, alſo anſwering to 431 years before Chriſt, the ſolſtices and equinoxes had retrograded ſeven degrees from the time of Chiron, who, juſt before the Argonautic expedition, had fixed them in the 15th degree of Cancer, Chelæ, Capricorn, and Aries; which, at the rate of 72 years for a degree, makes 504 years. But as both Chiron and Meton may probably have failed in minute exactneſs of obſervation, and, diſregarding minutes and ſeconds, have fixed theſe points of the heavens in round numbers of degrees, we may reaſonably allow half a degree more, which Sir Iſaac has not done, and ſo fix the time of the Argonautic expedition, as before, towards the year 971 before Chriſt. The great Hipparchus, comparing his own obſervations with thoſe of former aſtronomers, concluded, firſt of any man, that the equinoxes had a motion backwards with reſpect to the fixed ſtars. By his obſervations, made ſomewhere between the 586th and 618th year of Nabonaſſar, it appears that they retrograded about eleven degrees ſince the days of Chiron. Prejudiced in favour of the chronology eſtabliſhed in his time, that philoſopher concluded, that the equinoxes went backwards one degree in 99 years, whereas their real retrogradation is one degree in 72 years. This is a further and unanſwerable proof, that the Grecian chronologers had antedated the Argonautic expedition ſomewhere between 250 and 300 years, which, from want of minuteneſs in the aſtronomical obſervations, cannot be fixed with preciſion, but on a medium will nearly coincide with the time above mentioned. Conſequently the ſiege of Troy, the great era of antient Greece, and that from which many of the events of Egyptian hiſtory have alſo been fixed, which undoubtedly, as

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many of the Grecian captains engaged in it were ſons of Argonauts, happened in the next enſuing generation, has been alſo antedated about the ſame number of years.

(mm) Page 36.

Having nearly fixed the date of the Argonautic expedition, we cannot be much at a loſs with reſpect to that of the taking of Troy. Sir Iſaac Newton places it in the 904th year before Chriſt, for the following additional reaſons. From the return of the Heraclidæ to the 6th year of Xerxes in 479, ſeventeen kings of both races had reigned at Sparta. Theſe reigns he computes at 20 years a-piece, to which adding two years for the duration of the war and reign of Ariſtodemus, the ſum will be 342; and Thucydides aſſerts, that the Trojan war did not precede that return more than 75 or 80 years. As I think it right to allow 22 years to each reign, to which I am ſufficiently authoriſed by the retroſpection of the average reigns of the laſt ſeventeen kings in the above-mentioned ſtates of Europe, I am inclined to ſuppoſe that Troy was taken in about the 935th year before Chriſt. There will ſtill be a difference of about 250 years between this and the Grecian chronology. That nearly ſuch a difference exiſts between the real and commonly ſuppoſed dates of events in antient Greece, and in ſeveral much more, Sir Iſaac Newton has adduced ſuch various and corroborating proofs, from every part of its hiſtory, as makes it a matter of aſtoniſhment that ſucceeding chronologers ſhould ſtill continue in the old beaten track.

(nn) Page 37.

Heſiod informs us, that he wrote in the age next after the wars of Thebes and Troy, and that that age would finiſh when men grew grey and dropped into the grave; and therefore we cannot place much more than the length of one whole generation between the laſt war and the time wherein he writes, which will bring us to the year 900. Homer, though younger, was his contemporary. Herodotus, born in 480, aſſerts that Heſiod

ſiod and Homer did not precede him more than 400 years, and therefore we may place Homer in about 890 before Chriſt.

(*oo*) Page 38.

The idea of the banquet of the great gods during 12 days in Ethiopia, which Homer mentions, ſeems borrowed from the cuſtom we are told the antient Egyptians had of ſending their idols thither during that time, in memory, no doubt, of their being originally deſcended from that country. That of the nine muſes is taken from the nine women muſicians who accompanied Oſiris, a pomp renewed by Seſac, or the Grecian Bacchus, in his Aſiatic expedition. The Styx, Charon, the infernal regions and the elyſian fields repreſent the ceremonies of embarking dead bodies in a boat to croſs a lake, on the oppoſite ſide of which judgment was pronounced on the life of the deceaſed—a moſt antient cuſtom in Egypt.

(*pp*) Page 39.

The picture which this poet draws of Greece in his time has inconteſtable right to our confidence. His topographical deſcriptions were eſteemed ſo exact, that a verſe of Homer's more than once decided the diſputes of its ſeveral ſtates with reſpect to their limits. It was thus that the town of Calydon was adjudged to the Ætolians againſt the Æolians, and that of Seſtos to the Abydonians. A verſe of this poet gave the Mileſians poſſeſſion of Mycole, and another determined the right of the Athenians to Salamis. His poems are the depoſitory of all Grecian knowledge in his days. The Argonautic and Trojan expeditions, by making them ſailors, had much extended its ſphere. Diodorus Siculus aſſures us that Homer himſelf had travelled into Egypt, and had from thence imported its fables and its ſciences.

(*qq*) Page 40.

Plutarch makes the Grecian army 120,000 men, becauſe he ſuppoſes each of the 1200 ſhips carried an equal number. But, as Thucydides remarks in his firſt book, Homer indicates the number of men ſerving equally

equally as mariners and ſoldiers, which the leaſt and the largeſt of thoſe ſhips contained. Thoſe of Bœotia had crews of 120, but thoſe of Philoctetes and Achilles were compoſed of no more than 50 men. By taking the medium number, as Mr. Pope juſtly obſerves, the moſt probable amount of the whole army will be 102,000.

(rr) Page 43.

This admirable ſhield is deſcribed to be covered by five diſtinct plates of metal, in which are blended braſs, gold, ſilver, and tin. It appears by it, that the art of intimately mixing and uniting metals in ſuch manner as to give various ſhades to the picture was already known in Homer's time; and it ſhould ſeem that even the means of diverſifying by fire the natural colour of each metal were found out. It is not eaſy to decide whether Homer ſuppoſes the art of emboſſing, of engraving, or of ſome kind of enameling to have been employed: poſſibly all three might be in uſe, and, in their then ſtate, neceſſary to complete ſuch landſcapes. A repreſentation of the earth formed the centre or boſs of the ſhield. In the next circular plate were ſeen the ſilver Moon, the Pleiades, the Hyades, the conſtellations of Orion and of the Bear. In the third, the Sun running round the twelve ſigns of the zodiac, or the ſtarry heaven. The next and largeſt plate was divided into 12 compartments anſwering to the months of the year, forming 12 diſtinct pictures of human life. Thoſe of the three firſt months repreſented the peaceful walks of civil life. In the firſt, the celebration and feſtivity of a marriage; in the ſecond, a cauſe pleaded before the aſſembled people; in the third, the ſame cauſe finally judged by the ſenate of elders. The three following pictures give the complete image of war—a town beſieged; an ambuſcade; and ſubſequent battle. In thoſe antient times a campaign could ſeldom laſt above three months. The ſoldiers on both ſides, citizens and huſbandmen, were equally obliged to abandon hoſtile projects to provide for the ſubſiſtence of their families, and the neceſſary cultivation of their country. The three following pictures repreſent tillage, harveſt, and the vintage. The produce of the year gathered in, the fields are given up to grazing, and in conſequence the firſt of the laſt three pictures is a ſcene of herdſmen and their

herds, which Homer has animated by repreſenting the ſudden inroad of lions, who, having watched the morning-egreſs from the fold, had already ſeized a bull, and, undiſmayed by the clamours of the herdſmen and their dogs, tear it to pieces. The ſecond is a calm and cheerful landſcape, where we ſee in perſpective a pleaſing valley interſperſed with cots and covered with ſheep. The laſt compartment, the labours and duties of the year completed, gives a view of the rural amuſements and games of labourers, ſhepherds, and citizens. Women and men dreſſed in their beſt attire form together the dance of Gnoſſus, or of Ariadne, which, by its quick and mazy movements in complicated circles, repreſents the labyrinth of Crete. In the midſt are tumblers, who by their tricks of agility add to the amuſement of the ſpectators. It is thus that in the circle of this fourth plate each compartment forms a complete and diſtinct picture, in which the ſubject is one, but the reunion of all, connected and contraſted in the moſt pleaſing variety, forms one great deſign—repreſentative of the whole tiſſue of human life. The ocean, in the fifth plate, raiſed in ſilver waves, rolls round the whole, and forms the outmoſt border. In this admirable piece of work, as repreſented by this prince of poets, we cannot ſufficiently admire the whole and every part of the deſign. Compoſition, diſpoſition, and expreſſion, all are worthy of the greateſt artiſt. From one picture to another the mind is agreeably relieved by variety, and by a ſucceſſion of emotions. In each ſeparate piece the unities of time, of action and of ſcene, are ſtrictly obſerved; very unlike the diſcordant works of many ſubſequent, but yet ſufficiently eſteemed painters. In each grouped without confuſion, the attitudes of every figure are finely varied, and ſtrongly expreſſive. The art of leſſening objects in perſpective was either known in his time, or the premature genius of the poet had conceived it. In the ſixth tablet the prominent figure of Deſtiny ſtalking through the field of carnage, already ſeiſed of the dead and of the wounded, and impelling the yet unhurt into the thick of danger, is a ſublime idea, worthy, as Mr. Pope juſtly obſerves, of the allegorical genius of a Rubens. Were a great painter, ſufficiently eminent in every part of the art which the whole would,

would require, to undertake it; by clofely following Homer, from whofe fhort but animated defcription his genius might be roufed to the higheft exertions, he might furely form the moft intereſting gallery of pictures ever yet exhibited. It is to be hoped ſome daring genius will one day attempt it. The ſubject is not ſome antiquated and frequently little known ſtory, it is the animated and ever intereſting hiſtory of every age and country. Let us notice, that in the ſecond picture the ſubject is a pleading before the people, in which the diſpute is between two men, one of whom pretends to have paid the compenſation for murder, and the other denies the receipt. This teaches us the cuſtom then exiſting of fining for murder: perhaps too Homer meant to inſinuate, that the man who is capable of aſſaſſinating is little to be truſted in any thing. In the third picture he informs us, that the herald placed a ſceptre in the hands of each of the judges when about to deliver his ſentence, and that a public recompenſe was allotted to the ſenator who was eſteemed to give the beſt judgment. The cauſe appears to be the ſame, removed to the ſenate of elders on appeal from or on the indeciſion of the popular aſſembly. In the fourth and ſubſequent pictures this great poet, ever moral, and ever the moſt faithful painter of thoſe paſſions which miſlead mankind, repreſents the beſiegers diſputing amongſt themſelves on the diſpoſition of the booty already graſped in imagination, whilſt the beſieged profit of their contentions to lay an ambuſcade and thus deceive their ill-founded and miſtaken hopes. In the ſeventh and eighth tablets, kings are repreſented encouraging the ploughmen and the reapers. In thoſe yet ſimple ages, ſovereigns watched themſelves over rural labours, ſole ſources of their power and riches.

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The antient iſland of Pharos, which in the time of the Greeks and Romans covered the road of Alexandria, is at preſent joined to the continent by a neck of land, formed by the accumulation of ſands. By the negligence of the Turks the harbour itſelf is daily filling up. In the days of Homer, that former iſland was at a conſiderable diſtance from the main land,

as this poet clearly aſſerts in the fourth book of the Odyſſey. He aſſures us that it was at the diſtance of a day's navigation with favourable winds from the Egyptian ſhores, and he calls that diſtance a great and ſtormy ſea. I am aware that Mr. Volney, author of a voyage into Egypt and Syria, combats the opinion of Mr. Savary, who had lately remarked thoſe expreſſions of Homer as a proof of the extenſion and gradual elevation of the Delta ſince that poet's age. He pretends, that the latter is wrong in bringing Homer to ſupport the opinion he had adopted: and as a proof of it, he cites the tranſlation of Madam Dacier, which gives a different ſenſe to this paſſage. But if Mr. Volney had taken the pains of conſulting Homer either in the original or in ſome faithful tranſlation, he would have ſeen that Mr. Savary truly cites the expreſs and nonequivocal words of Homer. Madam Dacier's enthuſiaſm for that great poet is well known. Not to expoſe him to criticiſm at a time when the diſpute concerning the antients and moderns was very warm, ſhe ſometimes took the liberty of correcting him in her tranſlation. On this occaſion, not having herſelf a ſuſpicion of ſo great a change in the Delta, ſhe thought right, in order to cover, as ſhe imagined, the poet's ignorance, to give a different and more probable turn to this paſſage. But the text of Homer clearly imports an extent of ſea, and not of river, which may be reckoned about 12 leagues between the iſle of Pharos and the oppoſite ſhores of Egypt. The navigation of thoſe parts was ſufficiently known to the Greeks in his time, and the poet himſelf had made the voyage, and ſpoke from his own full knowledge of the then ſituation of that country. According to him then the whole of the Delta did not yet exiſt. Other antient teſtimonies atteſt too, that this fertile part of Egypt owes its exiſtence to the gradual depoſits of the Nile, which, in former times, took its courſe to the weſt above Memphis and the Pyramids, and loſt itſelf in the ſands of Libya. The induſtry of the Egyptians diverted, ſays Herodotus, in the time of Menes the courſe of the river, great part at leaſt of which ran on the further ſide of mount Pſammus, 100 ſtadia to the ſouth of Memphis; and he aſſerts, that this change of channel contributed to raiſe by degrees the land of Delta and add it to the valley of

Egypt. The ſea, according to the tradition of the antients, ſay Herodotus, Strabo, and Diodorus of Sicily, once waſhed the foot of the hills on which the pyramids are built. Ariſtotle alſo tells us, that excepting the diſtrict of Thebes, the moſt elevated part of the valley, all the reſt of Egypt both above and below that town was in the earlieſt times covered with waters, and was in proceſs of time only raiſed by the depoſits of the Nile, and drained by the induſtry of its inhabitants. This opinion is confirmed by the ſignification of the antient name of the Thebais (afterwards communicated to the whole country, and even to the river), which deſcribed it as an iſland, the iſland of Caphtor or of Coptos. If later authors referred theſe changes to higher antiquity, it was becauſe the Egyptians gave falſe dates to the towns built on the Delta. But Homer could not ſpeak either of lands or towns which exiſted not in his time. Here then is a conſtant ſeries of traditions, which ſhews us the firſt origin of the filling up of a bay or arm of the ſea, formerly exiſting in thoſe parts, and the ſucceſſive progreſs of the extenſion of land to our days. In early times, by reaſon of ſome bar or ledge of ſand in the courſe of the river, all lower and even great part of the higher Egypt, the diſtrict of Thebes excepted, were overflowed and marſhy, and the middle part of the Delta was yet full ſea. The bar removed, the whole valley was relieved from ſtagnant waters, and the inundations of the Nile depoſiting its ſlime gradually raiſed it. As yet the accumulating and often ſhifting ſands of Libya afforded it a ſlow paſſage to the ſea, and often obſtructing it forced its waters backwards, and rendered vain the progreſs of draining. The Egyptians wiſely at length determined to change the channel, and to turn it into a much ſhorter courſe through their own territories into the neareſt ſea. The mounds which effected this were ſtill guarded with anxious care by the Perſians in the time of Herodotus. That part of Libya deprived of its river became totally barren, and the Nile, through its new channel flowing more eaſily, gradually filled up by its ſlime the ſhallow bay, and thus in time raiſed the Delta. In the time of Homer the prolongation of the land was yet inconſiderable; and we ſee by his deſcription that it conſiſted of uncultivated ſands frequented by ſea-calves and fiſhermen.

men. In after times the increaſing numbers of the inhabitants of the valley eagerly ſeized on theſe ſands, and their induſtry haſtened the conqueſt which the Nile had begun. Soon the bay diſappeared, to make place for a land more fertile than any of the antient domains of Egypt. The lake of Mœris was dug to a vaſt depth, as a reſervoir of water and fertility in caſe of need. Herodotus informs us, that the vaſt quantity of earth dug from thence was thrown into the Nile. This earth, with that taken from ſeveral cuts and branches through which the river empties itſelf into the ſea, two of which are avowedly the works of induſtry, and from numerous other canals which interſect the country in all directions, would not a little help to raiſe both the general face of the country and the bed of the river itſelf. The Greeks, and Romans after them, took ſpecial care to keep theſe channels open; but the Mahometans having more and more neglected them, the port and road of Alexandria have been greatly filled up, and ſands collecting have at length joined the iſle of Pharos to the continent. Should that neglect be continued, they will in ſome centuries more add a new but deſert and inacceſſible coaſt to Egypt. Such is the conſtant progreſs of unaſſiſted nature, wherever great rivers, ſubject to periodical inundations, carry conſiderable annual depoſits. It is thus that the Ganges and Barampooter have formed, and daily form, ſo many iſlands at their united mouths, and leave not a ſingle port to ſhelter ſhips of burden. Should the number of their wandering channels be reduced, and the remaining ones kept open, theſe now marſhy and uninhabitable iſlands would become the moſt fertile parts of Bengal, and afford commodious harbours. Such a work would be worthy of its preſent enlightened maſters, and extend and ſecure their dominion much better than conqueſt. Even rivers which have only accidental riſes form new lands at their mouths, which in time become conſiderable; ſuch as thoſe the Rhone has produced ſince the time of Lewis the ninth. It is thus that the Rhine has filled up and conſolidated the antient lakes and marſhes of Batavia, and, were it not for the aſſiduous care of the Dutch, would ſoon fill up the Zuiderſee, which, notwithſtanding all their induſtry and the diverſion of the greateſt part of its waters into the Waal

and

and Meuſe, is growing daily ſhallower; and, ſhould any of theſe precautions be neglected, would be ſoon filled up, and the coaſt of North Holland rendered unnavigable, and in time perhaps joined to Doggers bank. Such have been, and would farther be if not prevented, the effects of the maigre and accidental floods of the Rhine, which bear no proportion with the annual muddy inundations of the Nile. Such are the conſtant operations of unaſſiſted nature, which may be greatly accelerated, or formed to human purpoſes, by judicious induſtry; and they render not only poſſible but probable the former exiſtence of an arm of the ſea or bay in the ſpot now occupied by the Delta, ſo clearly announced by Homer and confirmed by old traditions. Mr. Volney, and ſince, Mr. Bruce, have ſtrongly combated the opinion of Herodotus and Mr. Savary, who adduce, as proofs of the new exiſtence of the Delta, ſome antient accounts which ſeem to ſtate, that in days of yore a much leſs quantity of water ſufficed to fecundate Egypt than was neceſſary in his days or at preſent. I will readily agree with them, that theſe various accounts were moſt probably owing to different meaſures made uſe of in thoſe times in the Nilometer. But though the ſame identical quantity and meaſure of water may be now as ſufficient to inundate as in the moſt early days, it is on the other hand no proof that the Delta and the whole valley of Egypt have not gradually riſen. Along with the ſurrounding lands which have annually received ſome increaſe from the ſlime of that great river, the bed itſelf of the river has alſo been proportionably raiſed; and its waters will conſequently equally overflow the adjacent countries, and, if human induſtry was added, extend its fecundating powers to parts formerly inacceſſible to its higheſt inundations. Of this I will produce, amongſt many, one convincing example.—The Loire receiving the waters of the Allier, which deſcend from the high and mountainous countries of Givaudan and Auvergne, has, when arrived into the plain country, conſiderably raiſed its bed within ſome centuries by the depoſits which are brought down with its waters in every flood. Theſe are torn from the mountains and rocks towards the ſource of the Allier, where its courſe is boiſterous and rapid; and I have ſeen all its ſands, at Tours, after a flood,

covered

covered with mica not to be found nearer than Auvergne. The mounds which were thrown up in Lewis the eleventh's time to confine its courſe, and preſerve the adjacent plains, have, ſince that time, been often raiſed, and are conſtantly required to be heightened. Much raiſed within this century, they are ſtill at times inſufficient. To ſhew that theſe works have been neceſſary, proofs are at hand. The preſent church of St. Martin, the oldeſt fabric at Tours, was built in the eighth or ninth century: in 1788 the deſcent into it was by ten ſteps, and yet the then pavement was not its antient level. The police having prudently required, that if its canons were continued to be buried in the church, they ſhould build vaults at a very conſiderable depth; they determined to effect this partly by excavation and partly by raiſing the pavement of the church to the level of the preſent entrances; a meaſure which the height of the church rendered very practicable. In digging they found two former pavements, the loweſt of which was at leaſt eight feet below the preſent, and is certainly as low, if not lower, than the actual bed of the Loire. In it were found ſeveral tomb-ſtones, and amongſt others, one with an inſcription importing, that under it was buried a former canon, brother to one of the antient dukes of Britanny. Another church of Benedictins nearer the river is ſo much below it, that were it not for the preſent mounds it would be conſtantly under water. Theſe antient edifices, which could not have been there built had they at that time been ſo expoſed, evidently prove, that not only the level of the town has been much raiſed, but that the bed of the river has been alſo ſince thoſe times proportionably elevated by annual depoſits from the mountainous countries from which great part of its waters are derived. Such in fact is the conſtant progreſs of nature; mountains are imperceptibly waſhed down and diminiſhed; the plains are very ſlowly raiſed by their ſpoils; and new ſhores are extended into the ſea. Partial accidents break not into the uſual and general courſe of nature. Thus are thoſe antient traditions, confirmed by the expreſs deſcription of Homer, importing that an arm of the ſea extended into that part of Egypt which is now the Delta, rendered not only poſſible but highly probable, from the invariable courſe of nature in the

the like caſes. We need not go beyond our own iſland, to ſee new ſands added to the ſhore, and gained by induſtry to agriculture. In Briſtol channel, ſands and iſlands are riſing above the waters oppoſite to the mouth of the Severn. Had ſuch a river as the Nile flowed into it, we may eaſily conceive that it would have been already in part filled up, and have formed fertile plains through which the courſes of the rivers would have been prolonged, as has happened in Egypt.

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Sir Iſaac Newton thinks that this Proteus, whoſe name ſignifies Preſident, was not king of Egypt during the Trojan war, but lieutenant of the ſea-coaſts to Amenophis Memnon, who, according to Pliny, was at that time the real ſovereign of that country. Herodotus makes him king; but ſays, that this was not his Egyptian but his Greek name, which, if he was the ſovereign, was probably Memnon, or Amenophis Memnon.

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Mœris, by whoſe orders the lake of his name was dug, is by both Herodotus and Diodorus placed before Seſoſtris; but Sir Iſaac Newton contends that he was the ſon of Rhampſinitus. But whenever the lake was made, it appears that the ſeat of government, under whatever king, was not tranſported from Thebes to Memphis till after the time of Homer. If Memphis had been then conſiderable enough to have been the reſidence of kings, and the depoſit of the archives, as the prieſts pretended in after times, that poet would ſurely not have paſſed it in ſilence. Though he talks of the wonders of Thebes, he ſpeaks not of that city, which, according to his own deſcription, could not have been far from the coaſt, and muſt have been the key of the kingdom. On the contrary, on that coaſt he repreſents nothing but inhoſpitable ſands, the retreat of ſea-calves and of fiſhermen. Memphis probably roſe to eminence about the time of the building of the pyramids, the firſt of which was, according to Herodotus, built by Cheops, and from him we eaſily deduce nearly the time of its foundation. From

Cheops that hiſtorian reckons eleven kings to Amaſis, both incluſive, who are ſucceſſively named, as well as the length of the reigns of all, except two, Phreron and Aſychis. The reigns of ſeven of theſe princes take up 208 years. To Cheops and Cephrenes, brothers, he attributes, in following the Egyptians, a duration beyond the courſe of nature, 106 years. But if on account of ſeveral long reigns we allow 30 years a-piece, one with another, to theſe eleven reigns, we ſhall have 330 years before the death of Amaſis and the beginning of Cambyſes in 529; and thus the reign of Cheops and the building of the pyramids will be placed in about 859 before Chriſt. Diodorus, it is true, adds two more kings to this ſucceſſion; but four of theſe immediately preceding the predeceſſor of Amaſis are nameleſs: and therefore the account of Herodotus, born not more than 50 years after that king, is more to be credited.

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This Egyptian chronicle ſeems to have been compiled about 90 years before Chriſt. To Vulcan, or fire, it aſcribes an indefinite term, and it is his ſon Helios, or the ſun, who firſt reigns over Egypt. To the firſt race of its kings it gives the name of Auritæ, or ſons of light; to the ſecond, of Mæſtræi, ſons of Meſr or Meſraim; and to the third, of Egyptians, or deſcendants of Caphtor. Mr. de Buffon, by attributing for an indefinite ſpace the ſole dominion of the earth to fire, ſeems to have revived this ſyſtem.

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Manetho attributes 9985 years to the reigns of the gods and demigods, of which 9000 are allotted to Hepheſtus or Vulcan. He is ſucceeded by his ſon Helios, or the ſun; and the laſt of the ſeven gods is Typhon, whoſe name, ſignifying the ſea or a deluge, poſſibly denotes, that in his time the whole world was drowned. Of the ſixteen demigods Orus is the firſt, and Zeus or Jupiter Ammon, the laſt. After theſe follow Menes the firſt of mortal kings, and thirty dynaſties who reigned over Egypt to the time of

of Alexander. The variations and diſcordances in theſe tables, as given us by Africanus and Euſebius, are ſo great, both with reſpect to the number of kings and duration of each dynaſty, that it is impoſſible at preſent to aſcertain the real text. By ſome the total duration of all theſe dynaſties is made out to be 5300 years; by Syncellus it is reduced to 3555, and by Mr. Bailly to 3901.

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Sir John Marſham ſuppoſes that Egypt, after the death of Menes, was divided into four diſtinct kingdoms—Thebes, This, Memphis, and lower Egypt—beſides others of leſſer note. He imagines Manetho's firſt 15 dynaſties to conſiſt of the monarchs of theſe ſeveral diſtinct ſtates, reigning at one and the ſame time in that country. He contends, that Egypt continued ſo divided for almoſt ſeven centuries, till the paſtor kings made themſelves maſters of all except Thebes. After their expulſion, all Egypt became ſubject to one prince. He thus reduces the duration of the whole empire, from Menes to the end of the reign of Amaſis, to 1819 years. The learned Mr. Bryant thinks that the lawleſs and enterpriſing ſons of Chus, who had already invaded much of the property of the ſons of Shem, early alſo ſeized on the eaſtern parts of Egypt, and from thence ſubjected their brethren the deſcendants of Meſraim and Caphtor who had previouſly ſettled in that land; and that they fortified themſelves in the diſtrict of Avaris or Aur, the ſame as Cuſh-aur and Cer-chuſh-aur, and the Cercoſora of Mela and Herodotus. Theſe he thinks to have been the firſt ſhepherds who reigned over the greateſt part of Egypt, but who were finally expelled by Amoſis, of the race of the antient proprietors of the land, deſcendants of Meſraim. His ſon Amenophis granted the province of Avaris to the ſons of Jacob, who are, according to him, the ſecond ſhepherds inhabiting, but not reigning over Egypt. This author, as has been already obſerved, thinks the Oſarſiph of Manetho, called alſo Hermes and Triſmegiſtus, to be Joſeph the ſon of Jacob. Manetho however expreſſly ſays, that Oſarſiph took the name of Moſes after his retreat with the Phœnician ſhepherds from Egypt.

After the wonders he had wrought in that country, it is not ſurpriſing that the Egyptians ſhould have given him the name of the ſecond Hermes or Triſmegiſtus. There ſeems no adequate reaſon to ſuppoſe him miſtaken in this point. In purſuance of his idea, Mr. Bryant thinks that Sethos Ægyptus (or the Cophtite) was that king of another race, who knew not Joſeph; and that it was in his grandſon's time, the third Amenophis, that the Iſraelites left Egypt; and in this manner endeavours to account for the three races of kings mentioned in the Egyptian chronicle, the Auritæ, Mæſtræi, and Egyptians. The firſt may probably mean Ham himſelf, from whom the land is frequently called in ſcripture; the ſecond, Meſraim and his ſons, who might reign there in the time of Joſeph; and the king of another race might be a deſcendant of Caphtor, from whom the nation was afterwards called Egyptians. Theſe were ſtill reigning in the days of Moſes, after whoſe retreat the kingdom was ſplit into many ſovereignties, and, as Sir Iſaac Newton I think more juſtly aſſerts, was ſoon after invaded by the ſecond ſhepherds, the Canaanites and Amalekites, who gradually uſurped the greateſt part of it, till finally expelled by Amoſis or Thetmoſis; the whole time in which the Iſraelites and the Amalekites dwelt in Egypt making up the 511 years during which the two races of ſhepherds ruled over that country, according to Manetho and Herodotus.

(aaa) Page 54.

Herodotus mentions not Nilus; but Phreron is ſo very like Phruron, that they are probably meant for the ſame perſon, to whom Nilus might be given as a ſurname. Indeed in all the hiſtorians of Egypt the names of kings perpetually diſagree, which may be owing to their having had various titles. The only objections to this Phreron ſon of Seſoſtris being the ſame as Nilus, are, that the river of Egypt, which from him is ſuppoſed to have changed its name, is ſtill called Egyptus by Homer after the Trojan war, and that Diodorus poſitively places him ſeveral generations after it. Indeed that hiſtorian adds many nameleſs generations to the liſt of Herodotus, between Seſoſtris and Amaſis. In his time the Egyptian prieſts found it neceſſary

neceſſary to increaſe the number of generations, to maintain the pretended antiquity of that prince; and the Greeks found it no leſs neceſſary to adopt them in order to make Proteus coincide with their date of the ſiege of Troy, which we have ſufficiently ſhewn to have been removed by them more than two centuries beyond the truth. The name of the river might alſo not have been changed till long after the death of Phreron or Phruron, ſurnamed Nilus, and that by ſome of his ſucceſſors, in honour of that monarch.

(bbb) Page 55.

This great and learned man contends that Seſac, who began his reign according to him 1002 years before Chriſt, and who firſt carried the Egyptian arms into Aſia and as far as Thrace, is one and the ſame with Seſoſtris, Sethos, and Seſonchoſis. He was alſo honoured with the names of Bacchus, Dionyſius, and even of Oſiris; not however, in my opinion, as being the ſame with thoſe more antient divinities of Egypt, as Sir Iſaac contends; but as being better known to the Greeks under theſe titles of honour. In thoſe days we find it cuſtomary in moſt countries for kings to aſſume the names of one or more of the gods of the country. That Seſac was Seſoſtris, Sir Iſaac proves by the concurrent circumſtances related of them, and by the certainty derived from the records of all other nations, that there happened no great Egyptian conqueſts in Aſia before his time. He alſo no leſs clearly ſhews that he is the ſame with the Grecian Bacchus, who deſerted Ariadne, and depoſed Lycurgus king of Thrace, perſonages who lived only one generation before the Argonautic expedition. He remarks, that Joſephus poſitively affirms that Herodotus had attributed the actions of Seſac to Seſoſtris. The ſame author, as he obſerves, alſo tells us from Manetho, that Danaus was the brother of Sethos Egyptus; and Sir Iſaac therefore juſtly places his arrival in Greece in the reign of Seſac, called Sethos by the Greeks.

(ccc) Page 59.

We ſee that the Samaritan verſion gives 100 years more than the Hebrew to Arphaxad at the birth of his ſon, and thus continues to add 100 years to

to the ages of each of the patriarchs at the birth of their ſucceſſors, as far as Nackor. The difference in the age of this laſt when Terah came into the world, is only 50 years; and this I am apt to think a miſtake in the Hebrew. They both agree as to the age of Terah at the birth of Abraham. Small variations only are perceived with reſpect to the whole length of the lives of all theſe patriarchs, excepting 100 years which the Samaritan verſion adds to the life of Rehu; but Morinus pretends that this is only a miſtake of a copy, not followed by all. On the other hand, this verſion ſubtracts 60 years from the ages of Heber and of Terah.

The Septuagint verſion differs from the two others by the inſertion of another generation, that of Kainan. It agrees with the Samaritan in giving 100 years more to the ages of Arphaxad and of his five ſucceſſors; and moreover adds the like number of years to the age of Nachor at the birth of Terah. It alſo prolongs by 100 years the lives of Phaleg and Sarug, and by 156 that of Nachor. Euſebius, Affranius, the Plantinian and Baſil editions, add alſo 100 years to the ages of Arphaxad and Selah. With regard to the interpolated generation of Kainan, Mr. Count de Gebelin thinks it owing to the name and ſurname of Arphaxad, who might be called Arphaxad-Kainan, of which ſome copies may have made two diſtinct perſonages. As all the points of the life of this Kainan agree exactly with thoſe of Selah; I ſhould be more apt to believe that this ſurname belonged to him, who would then be denominated Kainan-Selah. This appears the more likely, as Arphaxad ſeems to be a name already compoſed of two words. It ſhould ſeem that the Septuagint, having with the Samaritan added 100 years to the ages of Phaleg, Rehu, and Sarug at the birth of their ſons, thought it neceſſary alſo to add the ſame to the whole term of their lives, which in both the Samaritan and Hebrew had ſo remarkably fallen off in duration from that of their predeceſſors. Thus in all the three verſions theſe ages ſeem to have been varied according to the ideas and conjectures of the copiers, and are all equally ſubject to criticiſm, calling other circumſtances to its aid.

(ddd) Page 60.

St. Jerom ſays, that ſeveral copies of the Samaritan verſion extant in his time extended the ſpace between the creation and the deluge to 1556 years, differing only from the Hebrew computation 100 years in the age of Jared at the birth of Enoch; and he thinks this laſt difference imputable to the miſtake of ſome tranſcriber. This is another inſtance of the alterations in theſe ages made by the miſtakes or ideas of copiers.

(eee) Page 61.

Mr. Whiſton's computation of the increaſe of mankind makes the number of ſouls in the 100th year after the flood to amount to 2048. Biſhop Cumberland extends it to 3330, and father Petau to 37,448. Mr. Whiſton's ſeems to me the moſt probable calculation; thoſe of the other two, at leaſt in their final numbers in about three centuries, are evidently exaggerated to an exceſs. But whichever of theſe calculations we ſhould adopt for the firſt 100 years, the number of mankind at the expiration of that time ſeems evidently inſufficient for the purpoſe of ſending numerous colonies to plant extenſive and remote regions.

(fff) Page 62.

Moſes does not formally tell us, but it evidently appears from the ſites which we find occupied by the diſtinct deſcendants of the three ſons of Noah, that the brothers had agreed to allot to their ſeveral races the then known or furmiſed three parts of the earth. To the poſterity of Shem, Aſia proper from the Arabian to the Euxine ſeas, with Aſia minor, ſeems to have been allotted. The rapacious ſons of Chus, in violation of this contract, ſeem however ſoon to have poſſeſſed themſelves by force of arms of the territory of Babylon and of the land of Chanaan. To Cham and his progeny ſeem to have been originally appropriated Suſiana (formerly called The Land of Chus, and now again called Chuſiſtan by the original natives of thoſe parts), Aſiatic and African Æthiopia, and Egypt invariably called in Scripture The Land of Ham, with whatever lands might lie eaſt, ſouth and weſt of

thoſe countries. Japhet's ſhare was Media, the borders of the Caſpian ſea, and all the lands lying eaſt or north of theſe, together with Europe at that time called the Iſles of the Nations. The ſons and grandſons of theſe three ſtocks, enumerated by the hiſtorian as fathers and leaders of nations as yet exiſting or known in his time, are 71. If we ſuppoſe the numbers of mankind to have been, as we have already ſhewn probable, about 2,000,000 at the time of the diſperſion, the numbers under each of theſe ſeveral leaders will, one with another, amount to about 28,000. In theſe will be found a ſufficiency of men in the prime of life capable of providing for the ſubſiſtence and of protecting the women and their numerous infant families, their flocks and cattle, during the long and dangerous marches the greater part were to make into unknown and very diſtant regions. Some ſuch numbers were certainly requiſite to colonize with eaſe and without evident diſtreſs countries as yet totally uninhabited. Nor can we ſuppoſe that men would have been induced to leave a country where all might yet live in affluence, had they not deemed that they might undertake the enterpriſe with ſafety, and already perceived by their rapid increaſe that the meaſure would ſhortly become neceſſary. Some perſons have ſedulouſly ſought to ſpare theſe long and dangerous marches, by ſettling all mankind in the firſt inſtance within the precincts of Aſia proper. We ſoon indeed find part of the race of Chus inhabiting diſtricts of this, but we are given to underſtand that they were intruders on the property of Shem: we hear nothing of any of the ſons of Japhet being ſettled in its confines, except in Media, alone originally attributed to Madai; all the reſt of his poſterity are diſperſed, and are only to be traced in Europe, or in the north or north-eaſt of Aſia.

(ggg) Page 62.

Mr. Whiſton computes only 262,000 ſouls in the 410th year after the flood. Biſhop Cumberland raiſes them to the incredible number of 3,333,333,330 in the 340th year; and father Petau to the ſtill more exaggerated calculation of 1,247,224,717,456 in the 285th year. Though the very exceſs obliges us to reject theſe laſt abſurd computations, we muſt obſerve, that Mr. Whiſton's

Whiſton's ſeems evidently below all probability in the natural increaſe of population at any period amongſt men not entirely ignorant of cultivation, in a fertile country and favourable climate. How much more inſufficient will it appear when the peculiar circumſtances of the times are taken into the account! All the predeceſſors of Phaleg lived upwards of 400 years, and, as well as the three ſons of Noah, were ſtill alive in the 400th year after the deluge. By this it may fairly be ſuppoſed general longevity, mankind muſt have propagated four or five times as faſt as at preſent. In ſome parts of North America population is ſuppoſed to have doubled in 25 years. It is true this quick increaſe is in ſome degree owing to the annual acceſſion of European emigrants; but as we know theſe external recruits do not in fact bear any great proportion to the whole numbers of inhabitants, it muſt ſtill be ſuppoſed that the natives themſelves muſt have doubled in 40 years. In the year 1717 the Ruſſian ſubjects were not computed at more than 10,000,000, and in the year 1763, a ſpace of 46 years, with ſome acceſſion of territory but very little of new inhabitants, their numbers (the conquered provinces not included) were proved on good grounds, the rates of head money, to exceed 20,000,000. This is doubling, in no favourable climate and in a deſpotic country, notwithſtanding the devaſtation of ſeveral bloody wars, in the above-mentioned ſpace of 46 years. How much faſter muſt men have multiplied in the period we are ſpeaking of, in the moſt favourable climate! Even if we ſuppoſe with ſome, which is neither neceſſary nor probable, that the age of puberty in thoſe times did not ariſe till after the age of 100, there will be yet left near 300 years in the lives of men for propagation. To this we muſt add, that the original fathers were in general ſtill living with their numerous deſcendants. At preſent a whole generation is ſwept away from the face of the earth in leſs than 80 years; but if the generality of thoſe who compoſed the generations now paſt for 400 years were ſtill living, and, inſtead of procreating to the age of 60, had continued to have children to the age of 350, which is leſs than proportionable to the longevity of men before the diſperſion, the Engliſh nation would now be compoſed of 80,000,000 inſtead of 8,000,000. On all theſe conſiderations

I think, that taking Mr. Whiſton's calculation of 2048 for the probable number of ſouls in the 100th year after the flood, it will appear reaſonable to double their numbers every 25th year for the next century, which will raiſe them to 32,768; and in the ſucceeding centuries to double them every 30th year, which will give us 2,097,152 for the 380th year after the deluge. Mr. Whiſton ſuppoſes this ſame number in the ſpace of 420 years, from a ſingle ſtock, in his calculations of the increaſe of mankind from the creation to the flood: and I can ſee no reaſon why after that time men ſhould not at leaſt have ariſen to the number of 2,000,000 in the firſt 400 years from three ſtocks.

(bbb) Page 63.

We certainly are not to reſtrict the age of manhood to the period in which we find the predeceſſors of Noah or Abraham born. Thus, becauſe Seth is given to Eve to replace in duty and piety her loſt Abel, it would be abſurd to conclude that the mother of mankind had lain barren near 128 years. No induction is to be drawn, from ſome of the firſt progenitors of Abraham being born about the 130th year of their fathers, that ſuch was at that time the uſual age of puberty. Before the flood, when the age of men was double to that of thoſe who were born after it, we find, both according to the Hebrew and Samaritan verſions, Mahalaleel and Enoch born in the 65th year of their fathers, and, according to the latter, Lamech in the 53d year of his. An analogy is pretended from ſhort-lived animals, who in proportion arrive ſo much ſooner to maturity than man. Naturaliſts agree that parrots, ravens, and eagles live beyond the preſent age of man, and yet we do not perceive that they attain their full vigour much later than other birds of the ſame ſize. Man, when he lived above 400 years, might be ſtronger in body as well as conſtitution; but we cannot reaſonably ſuppoſe that the age of manhood was more than 25 in climates where it is now at 15. Neither are we to conclude, becauſe Abraham, Iſaac, and Jacob were childleſs at an advanced age, that ſuch was the common caſe. It was not from the uſual courſe of nature, but from the divine Providence, that theſe

patriarchs

patriarchs were to expect the numerous offspring finally promised to them. The faith of Abraham was tried by such dispensation, and so was probably that of his immediate successors.

(iii) Page 64.

To avoid this, some have supposed a second migration for Joctan and his sons, as well as the establishment of kingdoms prior to the general dispersion. It has been also contended, that the erection of the tower of Babel is to be attributed only to the revolted sons of Chus; but all these suppositions are in direct opposition to the text and plain meaning of Scripture, and calculated merely to support particular hypotheses.

(kkk) Page 66.

Overgrown empires have ever been the chief cause of the devastation of the earth. Provinces lying beyond the immediate reach of government are delivered over to the rapacity of governors, who destroy the very seeds and dry up the sources of population.

In a fertile kingdom of moderate extent, should sudden pestilence sweep off at once a fourth of the inhabitants, the loss, however grievous, under a mild and attentive government would disappear in less than 100 years. But where a barbarous, ignorant, and indolent despot reigns over far extended provinces by a succession of delegates, whose extortions fear obliges him to dissemble till excesses render them odious, and their treasures are become worthy of the royal coffers—in such a government population will be reduced to one half in the same space, never to be replaced. Of this sad devastation we have a striking example before our eyes in the present Ottoman empire. Mahometism, in the torrent of its sanguinary conquests, laid waste countries formerly the most fertile and the most populous of the earth. The ferocious successors of Mahomet, in dismembering this first empire, continued the desolation during some centuries. But no sooner were sovereignties of moderate extent established, than these losses were in some degree

repaired. A new ſwarm of Tartars ſoon again overran a part of theſe; and the more ſavage Turcomans, ſeizing theſe half-ruined kingdoms, and extending their ravages over the whole of the enfeebled Grecian empire, completed the general ruin by a mode of government whoſe internal vices render it daily more deſtructive. Where are now, alas! thoſe flouriſhing cities which, 1600 years ago, covered the populous face of Greece, of Aſia minor, of Syria and Meſopotamia, of Perſia, Paleſtine and Egypt, and of the northern coaſts of Africa? In the midſt of deſerts, traverſed only by roving Tartars and Arabs, a few mouldering ruins mark the ſeats of antient wealth and magnificence, once the boaſted capitals of mighty kingdoms. Of how many are even theſe feeble traces totally obliterated, leaving the puzzled antiquarian in doubt where to place their antient ſites! Paltry towns ſcarce deſerving the name of villages, whoſe miſerable houſes, ſcattered amongſt heaps of ruins, are upheld by remnants of the nobleſt monuments of architecture, are yet dignified by the names of Athens, or of Alexandria. The trade of Europe, for a ſcanty part of thoſe valuable products which the neighbouring countries might produce, ſtill upholds the population of a few maritime towns; but even theſe remaining ſigns of proſperity would long ago have diſappeared, were not their rapacious tyrants ſenſible, that in loſing that commerce they would for ever dry up their only remaining ſource of peculation. Mr. de Volney aſſerts, that in the pachalic of Aleppo, out of 3200 villages entered in the regiſters of taxation two centuries ago, 400 only remained charged with the payment of the whole tribute. Should this deſtroying power continue to exert the ſame fatal influence a century longer, it is probable that the whole of that fine part of the world, once the nurſery of mankind, will become a frightful ſolitude abandoned to a few wandering Tartars and Arabs. Though nominally yet part of the Turkiſh dominion, the greateſt part of interior Aſia is already at the diſcretion of theſe robbers. Let us in Europe give thanks to Providence, who from folly knows how to draw forth bleſſings. The cruſades were abſurd expeditions ſtill more abſurdly conducted; but they were the cauſe of delivering our towns from the miſeries of feudal bondage,

dage, of overturning petty tyranny, and of diffeminating the firſt rudiments of arts amongſt our barbarous anceſtors. By timely diverſion they reſcued Europe from that impending deſolation which has annihilated the neighbouring countries.

Why did not, it may be ſaid, the Perſian empire, as extenſive as the Ottoman, produce the ſame devaſtation? Population certainly ſuffered much from the diſtant expeditions of Cyrus and of Xerxes, and millions of men were ſacrificed to their inordinate ambition. But thoſe evils were tranſitory: theſe deſpots were neither ſo barbarous nor ſo ignorant as the Sultans: oppreſſion had ſome bounds. It appears that the Grecian cities in Aſia minor, and in many diſtant provinces of that empire, ſtill preſerved their natural chiefs and laws, and were only ſubjected to certain tributes, and to furniſh a certain number of ſoldiers in time of war. The ſatraps carried not into the provinces powers entirely unlimited. The empire itſelf laſted only 210 years. Had it laſted longer, it is probable that the ſame abuſes finally introduced would have brought on the ſame general devaſtation which now conſumes the Ottoman dominions. The conqueſts of Alexander, ſcarcely finiſhed, were divided into ſeparate kingdoms; thoſe of Syria, of Egypt, and Macedonia, became flouriſhing monarchies, till the power of Rome ſwallowed them up with almoſt the whole then known world. It is well known that under theſe new maſters the diſtant provinces were grievouſly pillaged; but a policy peculiar to them guarded them from total deſtruction. That people every where eſtabliſhed military colonies, who enjoyed great freedom and privileges: and the rights of Roman citizens, granted to towns and to whole provinces, protected great numbers from the indiſcriminate depredations of its proconſuls. The Romans, ſolely intent on the military profeſſion, abandoned to the natives a free and uninterrupted commerce; internal peace repaired the ravages of partial depredations, till the moment when the more frequent quarrels of competitors for the empire ſhook and undermined that coloſſus, which finally ſunk under its own weight. I am apt to think that the age of Alexander, or that which

immediately followed, was the era of the fulleſt population in weſtern Aſia. Excepting Greece and part of Italy, which laſt then began to riſe from a ſtate of mediocrity, the reſt of Europe was yet as thinly inhabited as Aſia had been 15 centuries before. One might perhaps fix upon the reign of Trajan as the time of the greateſt population in all that part of the world then ſubject to Rome. Since two or three hundred years the gradual decline of feudal anarchy, the rapid progreſs of agriculture, arts, and manufactures, under more mild and poliſhed governments, have probably increaſed the general population of Europe, eſpecially in its northern parts, 50,000,000 of ſouls; but ſince 15 centuries, that of Greece, of weſtern Aſia, and Africa, fallen under the moſt deſtructive yokes, has probably loſt four times as much. Lately Spain alone has fallen in its population, by extending beyond meaſure its dominion over America, whoſe antient inhabitants it barbarouſly deſtroyed. It is thus that proſperity and decline, population and depopulation, ſucceed each other on this earth in proportion to the moderate or exceſſive extent of empires; in proportion as governments are wiſe or corrupted, as the happineſs and liberty of man are more or leſs regarded and reſpected. To what extent are the rulers of nations accountable to the juſtice of the great Creator, who, ever bounteous, ſtill equally ſpreads his bleſſings for the happineſs, enjoyment, and increaſe of mankind!

I have ſaid, that Europe upon the whole contains 50,000,000 of inhabitants more than it did in the time of Julius Cæſar. It may be curious to exhibit a table of the moſt approved calculation of population in this part of the world in the preſent times, compared with the utmoſt probable calculation which the ſtate of the ſame countries in the time of that Roman emperor will admit.

At

	At preſent.		In the time of Cæſar.
	Millions.		Millions.
Britiſh iſlands - - - -	11	—	3
France, Low Countries, and Holland - -	30	—	10
Germany, Switzerland, and Hungary - -	38	—	10
Sweden and Denmark - - -	6	—	1
Poland, Pruſſia, and Ruſſia - - -	35	—	6
Spain and Portugal - - - -	13	—	10
Greece, Archipelago iſles, and Turkey in Europe	9	—	30
Italy, Sicily, Corſica, and Sardinia - -	18	—	35
	160		105

Cæſar informs us that in England, except the ſomewhat better peopled country of Kent, great part of the iſland was overrun with woods, and that the inhabitants had rather paliſadoed camps than towns. Gaul ſeems to have been more completely inhabited, and, in an age when every man able to bear arms was a ſoldier, frequently oppoſed numerous armies to his progreſs. Germany was in a much more rude ſtate, half covered with immenſe foreſts. The inhabitants of the more northern parts of Europe, known only by irruptions from time to time on their more advanced neighbours, were yet nations of hunters or ſhepherds. Every one who conſiders the great progreſs of population within this century muſt be convinced of the immenſe difference between the ſtate of all theſe countries in his time and in the preſent. The vaſt increaſe of our towns, of our agriculture and commerce in England, notwithſtanding the boding calculations of ſome authors, muſt point out a great increaſe of population within theſe laſt hundred years. In Lewis the fourteenth's reign the inhabitants of France were never eſteemed to exceed 18,000,000, and at preſent they are computed at 25,000,000. The ſtate of Germany, particularly of its northern parts, is ſtill more improved in proportion. Towards the end of the reign of czar Peter there could only 5,000,000 of males be found ſubject to head-money; in 1783 there appeared above 12,000,000 paying it in the ſame provinces.

provinces. Spain and Portugal have gained little, and by their emigrations to the Eaſt and Weſt Indies have loſt much within the laſt two centuries. On the other hand, Italy, though ſtill on ſo large a ſurface the beſt peopled country in Europe, has certainly, eſpecially in its ſouthern parts, loſt more than half its inhabitants ſince that age, in which it was miſtreſs of the weſtern world. Savoy and all its northern parts have probably rather increaſed than diminiſhed their population. But Rome, which, when the capital of the world, might probably contain between one and two millions of ſouls, is now reduced to 160,000. Campagnia Felix, and the country from Tivoli to Naples, have probably loſt two-thirds of their inhabitants; and the ſame may be ſaid of Sicily. But many erroneouſly attribute to the papal government the whole of the deſolate ſtate in which we ſee great part of the country in the neighbourhood of Rome. Much, no doubt, is owing to the inefficacious rule of a ſucceſſion of old men governed by nepotiſm or artful courtiers, to the ignorance and ſupineneſs of the great proprietors, and to a conſtitution where induſtry is not the ſureſt way to riches and honours. But I will boldly affirm, that the moſt ſtriking parts, the whole plain between Rome and Tivoli, and the Pontine marſhes, never were or could be in a much better ſtate than at preſent. I have walked over in ſhooting great part of the plain between Rome and Tivoli; and the ſoil, which conſiſts of a deep white cryſtallized ſand generally covered with a coat of black ſand not half an inch and oftener not a quarter of an inch deep, evidently proves that it never could be in a ſtate of ordinary cultivation. Immenſe expence may have carried ſoil to ſome ſpots to make gardens; but even that adventitious fertility could not be of long duration: it would ſoon diſappear and vaniſh through the hungry unconnected ſand beneath. Accordingly we find theſe parts covered for a mile or two with tomb-ſtones, a uſe for which it was more proper than for cultivation. Horace's journey to Brunduſium ſufficiently indicates the poor ſtate of great part of the country, and of the Pontine marſhes, in the Auguſtan age. Virgil extols as one of the glories of the reign of Auguſtus, his having drained thoſe Pontine marſhes, which he effected by deepening at great expence the port and road of Oſtia, in order

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to receive the waters of the drains. But hiſtory ſoon ſhews us of how little avail this was. In the very beginning of the reign of Tiberius we find that emperor laying before the ſenate as a queſtion of great magnitude, whether this port and theſe drains, already choaked up, were worth the expence of repairing. It was unanimouſly decided, that the firſt and conſtant neceſſary expences would far exceed the advantage. The preſent Pope Pius the ſixth has again attempted to drain theſe unprofitable and unwholeſome marſhes. Whether any improved inventions in the art will be able to effect it, time muſt ſhew. Theſe lands are very little above the uſual level of the Mediterranean: every winter ſtorm conſtantly overflows them with its waters, and the fall is ſo very ſmall that there is never time for the waters to run off. If that ſea had conſiderable tides like the ocean, there would be no difficulty by means of ſluices to let them off at the ebb, and exclude them in the flow. But in this ſtate of things any permanent ſucceſs muſt be doubtful. Marſhes of the ſame kind in Tuſcany were endeavoured to be drained in this century by 6000 Lorrainers, who followed their ſovereign; but in the courſe of 30 years not more than 40 families of theſe remained; the reſt periſhed in the unwholeſome taſk, much more deſtructive in hot than cold countries. The tyranny of the Ottoman government accounts for the great fall in population I have ſuppoſed in the territories under its dominion.

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War, that ſcourge which man muſt impute to himſelf alone, waited not long after the death of Noah eſcaped from the flood to break out amongſt his children ſtill ſtruggling againſt the diſaſters of degraded, diſlocated, and yet unſettled nature. In the antediluvian world we are told indeed of private murders; but whilſt the earth continued ſuch as it came out of the hands of the Creator, and every where afforded plenteous ſubſiſtence to its inhabitants, that public crime, occaſioned by the contention for ſome happier ſpot, is not at leaſt recorded. The vanity and falſe glory of princes are accuſed of giving it birth. But why throw the fault on them alone? The deſire of celebrity and of captivating general eſteem is natural to man.

Let a ſovereign aſk, I ſay, not of a courtier or a warrior by profeſſion, but of a peaceable citizen, of a philoſopher, who are the kings the moſt celebrated in hiſtory, he will hear a Cyrus, an Alexander, or a Cæſar inſtantly named. When flattery aims to dazzle him, it equals him to this laſt, who boaſted to have been the murderer of a million of men in pitched battle, and to have, no doubt, cauſed as many more to periſh in the diſaſtrous conſequences of war. This calamity is often immediately due to the folly of princes; but that is originally excited by the ſenſeleſs prejudices of the people, who exalt the conqueror above the juſt and peaceful ſovereign. It is not then kings who muſt in the firſt inſtance be cured of this warlike madneſs; the words of wiſdom itſelf will be unavailing againſt the torrent of general opinion, ſtrengthened by the particular intereſts of thoſe who ſurround them: it is in the people themſelves that that prejudice which attaches fame to the ſovereign covered with the blood of his ſubjects and of his neighbours, muſt be rooted out. Republics, Rome, Carthage, Sparta, Athens, have been no leſs guilty of this crime. I wiſh I could except my own free country. Alas, popular cry has more than once forced adminiſtrations into unneceſſary wars, and h s puniſhed thoſe who dared to put an end to them. Will neither princes nor people be at laſt convinced, that a province added to their ſway can add nothing to their real happineſs; but that the efforts made to acquire it will infallibly, in theſe days particularly, when war is become ſo expenſive, dry up the reſources and proſperity of the conquerors? I know but one king, and for that alone he might be juſtly ſainted, who had fortitude enough to yield up whole intereſting provinces rather than contend for them without ſtrict right. The fame of his juſtice made him, without acquiſition, the venerated umpire of Europe. Had he violently ſeized or retained the property of others, he would have been the object of its jealouſy and terror: and this conſequence of haughty injuſtice is not ſufficiently attended to. I have all my life been aſtoniſhed at the elogiums enthuſiaſtically heaped upon the Spartans and their government, by almoſt all authors of hiſtory and even of morality. Is it then ſo difficult not to be carried away by the number and authority of ſuffrages; or are martial valour

lour and the contempt of death with all men the ſublime of virtue? Without being ſwayed by authorities, or dazzled with theſe ſingle qualities, how can we extol beyond all others a legiſlation which, to concentrate every paſſion in zeal for the country, dared to break aſunder the deareſt ties of nature, parental and filial love, by making them ſtrangers to each other; as if on theſe firſt ties of nature, and their multiplied links, all love for our country was not originally founded? Under the pretext of rooting up ſhameful inclinations, it ordained the public neglect of that modeſty which conſtitutes the firſt charm of the fair ſex. Can we conciliate with morality or virtue laws which encouraged theft, provided it was ſubtle; which authoriſed murder in cold blood on the perſons of diſarmed ſlaves, rendered ſtill more defenceleſs by intoxication? For it was thus that the horrid policy of Sparta hardened her youth to blood, and guarded herſelf againſt the dangerous increaſe and deſpair of thoſe beings, rendered tenfold more unhappy there than in any other ſtate. It was thus that ſhe for ages treated the miſerable Ilots, literally there the hewers of wood and drawers of water. Neither can I give the Lacedemonians credit for that boaſted frugality which had not virtue or moderation, but military diſcipline alone in view. The Athenians, who made it not a law, knew how to be as ſober when occaſion required, and their military exploits are not inferior to thoſe of the Spartans. The diſdain for riches, more pretended than real, of that people touches me not more. An indolent life ſuited them better than the labour to acquire them. Their ſlaves ſufficed without any exertion of their own to procure them plenteous though ſimple ſubſiſtence. How many ſavage hordes have the ſame frugality, and on the ſame motives! Their legiſlator, whoſe hard and ſtoic heart was not acceſſible to the real charms of virtue, had calculated that it was eaſier to bear the total privation of what is called riches, than to have the courage to loſe them. Shall we prove how little this republic was truly diſintereſted? Notwithſtanding the glory which 300 of its citizens acquired in dying at Thermopylæ, that paſſage once forced, the Spartans, abandoning all the reſt of Greece, retire home to defend their miſerable huts; whilſt the Athenians, ſacrificing themſelves entirely to the

general ſafety, devote their palaces and their ſumptuous furniture to certain depredation. Ever ready to withdraw their ſhips in order to cover their own poſſeſſions, it was Themiſtocles who by ſtratagem forced them to fight at Salamine. How narrow and how ſelfiſh was that patriotiſm to which every other virtue was thus ſacrificed! The city of Sparta began by annihilating by force the rights of every other city of Laconia, in order to concentrate all authority within its walls. It invaded the Meſſenians, not to increaſe the ſubjects of its dominion, but to oppreſs under its galling yoke ſlaves treated, not only in the firſt moment of conqueſt, but for ages, with an indignity and a cruelty elſewhere without example. Baſely jealous of their privileges, the Spartans preferred to ſee their republic gradually decline for want of citizens, to ſtrengthening it by the communication of equal rights to other men. With that ſtrict military diſcipline and that contempt of death (ſole education of their youth) they naturally ſhould have ſubdued not only all Greece but the whole earth; but notwithſtanding their thirſt of dominion, they never could extend their rule beyond the narrow limits of the Peloponneſus, becauſe they never had the generoſity to incorporate either allied or conquered people to increaſe the number or repair the loſs of citizens. If their noble rivals, the Athenians, had not been counteracted by their jealouſy, they would alone have overturned the Perſian empire, not ſo much by arms as by communicating their ſocial virtues, their talents, and their glory, to the extremities of Aſia. Had Sparta known how to conquer nations, ſhe would have trodden them under foot and ſunk them into abject ſlavery: had Athens ſubjected them to its power, it would have ennobled them by liberty, ſcience, and the fine arts; and the world would have been civilized ſome ages ſooner. Through mean ſelfiſhneſs the Lacedemonians miſſed the end of that ambition which was their only paſſion: the more magnanimous Romans attained it by aſſociating ſucceſſively to their privileges every province they found worthy of them.

We are tempted to deſpiſe thoſe petty conquerors who ravaged petty territories

territories in the days of Abraham; we are ſurpriſed to find in Homer's Odyſſey, that the old heroes of Greece placed their glory in plundering indiſcriminately the ſhips and coaſts of every nation. The names of the buccaneers of the Antilla iſlands, who renewed theſe ſcenes 200 years ago, are forgotten or devoted to execration. We diſdain the chiefs of a ſmall number of plunderers, and yet we perſiſt in ranking amongſt men of a ſuperior order thoſe ſceptred conquerors whom chance had enabled to lead vaſt armies to more extenſive carnage, to depredations more fatal but not leſs iniquitous. It is by dint of brilliant injuſtices that free nations themſelves have aſpired to celebrity and to the reſpect of mortals. Their glory riſes in hiſtory in proportion to the number of their warlike crimes. And it is thus that yet thinks the boaſtedly enlightened 18th century! The dawn has only yet ſhone upon it; but ſounder reflections often repeated, and above all ſome late events, may bring the next to fuller light.

The wild theories of infidel philoſophers have been eſſayed in practice in a neighbouring country; and ſuch have been their baleful conſequences, that it is to be hoped they will deter all future ages from a repetition. Theſe upſtart rulers, of whom pride, the true foundation of the ſect, formed the leading characteriſtic, began their reign by tearing up all former eſtabliſhments, violently breaking down all the rooted prejudices and habits of men, and by rejecting all the knowledge and experience of paſt ages. All theſe were to yield to ſuch conſummate wiſdom; even to its future dictates they required beforehand the aſſent of the preſent age; and they had the further folly to proclaim them binding on poſterity. Unpremeditated laws, paſſed without diſcuſſion in the midſt of tumult and clamour, and often forced upon the majority by the menaces and vociferation of an attendant mob, were even to be looked upon by themſelves as infallible and irrevocable. To this point of honour, or rather of vanity, they heſitated not frequently to ſacrifice the tranquillity and the deareſt intereſts of the kingdom, and to endanger that very intended conſtitution which they held ſo ſacred. To this ſet of ſages it devolved to give the firſt example of ſuch abſurd and determined

phrenſy. More enthuſiaſtic and more ſanguinary devotees of infidelity than the moſt furious zealots had ever been of any creed, their firſt batteries, as ſoon as they were firmly ſeated, were aimed at all religion. Its rich ſpoils held up to a bankrupt nation and to the needy, and every ſpecies of corruption practiſed on unthinking mobs, were to ſap it to its foundations. And they ſucceeded beyond all expectation. They dared not indeed yet openly to renounce all religion; but they hoped by an inſidious oath to vilify the miniſters of the eſtabliſhed church, or to ſeclude them from their functions. They evidently flattered themſelves to be able to rule a mighty kingdom without religion and without morality. To delude the unthinking multitude to their purpoſe, the rights, not of ſocial but of independent iſolated man, unbalanced by any correſponding duties, were declared to be the foundation of all law, the true catechiſm of ſociety. It needed not the ſagacity of a Burke to propheſy the effects of ſuch a doctrine on a corrupted nation. That a conſtitution, whoſe baſis was thus founded on the principles of anarchy, ſhould obtain the ſmalleſt credit with the thinking part of mankind, ſeems incredible; but the means of making it palatable to the mob were not unpromiſing. Perfect adepts in the knowledge of vulgar inclinations, no leſs expert in directing than in rouſing the accelerating force of unbridled paſſions, theſe philoſophical politicians had in a few months fitted the mob to every horrid purpoſe. No lure that could gain proſelytes was omitted. To vanity, that firſt ſeducer of the human heart, and perhaps peculiarly ſo of every French one, large application was made. The ſovereignty of the people was ſo loudly ſounded and ſo frequently repeated, that every beggar dreamt himſelf a king. Some petty ſhare of power and conſequence was diſtributed, not to thouſands but to hundreds of thouſands *. In all theſe multiplied offices every one might hope

* The kingdom was divided into 83 departments having each 11 adminiſtrators, theſe into about 3000 diſtricts having ſeven, and theſe again into 44,000 municipalities having five each. Add to theſe 6000 juſtices of peace, and near as many judges: in all about 260,000. The qualifications for primary electors were ſuch as to extend the right to every man not an abſolute mendicant.

hope to ſtrut by turns his day, and the man without a ſhilling might aſpire to become a ſupreme and well-paid legiſlator. That no old prejudices of rank might impede the progreſs of equality, nobility was proſcribed. In this the monied men, whoſe vanity was wounded by every other diſtinction, heartily concurred. They were not aware that ſoon the ariſtocracy of riches would be deemed as dangerous as that of birth. Theſe were ſelf-ſeduced, but it was to the loweſt claſſes that theſe leaders of ſedition chiefly attended. To corrupt them, they borrowed the purſes of theſe deluded men of wealth, and of an ambitious and flagitious prince of the blood. The army was debauched by licentiouſneſs, and the ſoldiers were encouraged to expel their old, and to elect new officers. To obtain entire ſway over all the lower orders of men, every remnant of gratitude

mendicant. Their delegates had not only the nomination of national repreſentatives and of all theſe numerous annual adminiſtrators, but of ſexennial judges, of biſhops, curates, and vicars, the two laſt amounting to 80,000. To theſe preferments muſt be added thoſe of the numerous officers of every rank of innumerable national guards elected amongſt themſelves, and that of officers in the army choſen by the ſoldiery. Thus the patronage of the mob was indeed immenſe. Multiplied ſelf-conſtituted clubs ſhould not be forgotten. And ſome of theſe are well known to have dictated to the national aſſembly itſelf. To ſuppreſs their rival power thoſe arrogating ſenates were unequal. To theſe rulers the republican government ſoon added a ſtill more formidable ſet, conſiſting, as at firſt obſerved in the convention, of 90,000 members of revolutionary tribunals; but, as it has ſince appeared, together with their attendant revolutionary armies, amounting to 250,000. It alſo appeared, that theſe had coſt the nation in the year 1794 no leſs than the enormous ſum of 600,000,000 French, or 26,000,000l. ſterling, over and above depredations, which are ſuppoſed to have amounted to the value of at leaſt an equal ſum. Under their former government, not only the petty clerks of office, but the footman and ſcullion of every man in power, were anxious to diſplay their ſhare of influence. Not only the bailiffs but the annual collectors of villages were no leſs intent to exerciſe their day of authority; and the farmers of revenues made ample uſe of this propenſity for the purpoſe of ſqueezing the whole peaſantry by turns. As every traveller muſt have experienced, every poſt-boy was eager to exert his power of control over the man who paid him, even at the hazard of that recompenſe, which he never thought ſufficient for his ſervices. Judge then what muſt have been the inſolence of office ſo diffuſed, of patronage ſo univerſal. It is worthy of remark, that formerly every ſmatterer in literature looked upon himſelf as belonging to a diſtinct and moſt exalted profeſſion. In the new order of things, they deemed themſelves the gods and real rulers of the nation: but the mob of ſovereigns diſappointed theſe as well as the ſages of the conſtituent aſſembly.

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was from the very firſt induſtriouſly proſcribed. To this end the fury of the mob was by hirelings, poſted for the purpoſe, peculiarly directed againſt all thoſe who had been moſt conſpicuous for the benevolent uſe of power or riches. The indecent flagellation of nuns, devoted to the moſt humble and charitable offices of humanity, was prompted to thoſe very perſons whom they had attended on the bed of ſickneſs. The popular mind was to be weaned from gratitude, and gratified by the expoſure of modeſty to public ſhame. The multitude was daily plunged into new crimes, to prevent return or remorſe. The moſt audacious lies, bribery, rapine and plunder, proſtitution in defiance of all decency, maſſacres attended with circumſtances the moſt ſhocking to humanity, were the ready auxiliaries of theſe reformers of government—of theſe teachers of morals unadulterated by ſuperſtition—of theſe eſtabliſhers of toleration, of national concord and proſperity! As a remedy to the abuſes of monarchy, they conſecrated the barbarous and ſpeedy juſtice of the mob by unqualified applauſe. It was neceſſary to terrify their adverſaries and bear down all oppoſition. Called together under the antient form of three eſtates by a virtuous king who heſitated not to circumſcribe his own power for the welfare of his people, theſe reformers had immediately reunited all three into one deſpotic aſſembly under the empty ſhadow of monarchy, and called in the needy, the turbulent and licentious of all deſcriptions to ſtrengthen their uſurpation. The remedying the finances of the ſtate, the firſt object of their miſſion, ſerved only for a pretext to plunder the clergy and nobility, and was never more attended to. The deſtructive expedient of baſe coin and forced paper money renewed with a profuſion hitherto unknown, pretended free gifts to the amount of one fourth of the income of all property productive or unproductive, were the ſole teſtimonies of their financiering abilities. The deſtination of theſe ſpoils was not, to redeem the ſtate, but to bribe and corrupt the loweſt claſſes. Though the credit, the commerce, and manufactories of a mighty kingdom were beyond all example completely ruined in the ſpace of 18 months, that numerous part of it which they had declared the real ſovereign, and by which they hoped to rule, was to be gratified.

gratified. Theſe firſt artificers of anarchy were not aware that ſuch a mob let looſe from every tie would never more be bridled, and that they themſelves, as they ſoon after experienced, would be the firſt victims to the tyranny of its temporary favourites. Each leader hoped indeed to be that favourite; but thoſe who now appeared at the head perceived not that more determined and more artful villains, whom they had deemed ſubordinate, but whoſe tools they really were, would riſe upon their ſhoulders, and finally ſubject to the axe ſuch of them who ſhould not eſcape by flight. Such were the ſteps by which philoſophy mounted to the throne; and its votaries finiſhed their career of government, by concluding a conſtitution they fondly deemed a maſter-piece of human wiſdom, and each article of which in the vanity of their hearts they fooliſhly decreed ſhould remain unalterable for 30 years. Theſe were ſucceeded by an aſſembly called Legiſlative, compoſed, as might well be imagined from the preſcribed mode of election, almoſt entirely of members without property, of ſhallow abilities, but not leſs devoid of religion and of every principle of honeſty. They without heſitation ſwore to maintain that conſtitution they were predetermined to overturn. The real conſpirators againſt all property and order ſtood behind the ſcenes to direct theſe puppets at will. The firſt aſſembly had with philoſophic hypocriſy declared, that France renounced for ever all extenſion of territory, though its laſt act belied the aſſertion by the forcible ſeizure of Avignon and the Comptat, by means the moſt horrid and flagitious. This publicly announced, that it was ready to abet, ſupport, and unite to it all who ſhould in any part of Europe rebel againſt their whatever form of government; every country was filled with emiſſaries to foment ſedition. Needy ſets of fugitives from the Netherlands, from Holland, from Savoy and Nice, offered the union of their native lands; and the offer of theſe mock delegates was ſufficient ground to ſend their armies to ſubdue or rather to plunder thoſe countries. In ſpite of the ſolemnly decreed inviolability of the king's perſon, the ſucceeding convention impriſoned, and, after a mock trial before theſe predetermined judges, brought to public execution their innocent king, who had patiently ſuffered every

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inſult and humiliation, rather than be the occaſion of ſpilling one drop of his ſubjects' blood. His conſort was to follow him to the ſame ſcaffold ſome months after in a ſtill more ignominious manner. To prepare the nation for this laſt cataſtrophe, without the ſanction of this mock aſſembly, the royal guards were maſſacred within its hearing and within its precincts, by the orders of an unknown band of ruffians, who, in fact, had already reſumed out of its hands that ſovereign juſtice which it had declared ultimately to belong to the rabble. Encouraged by ſucceſs, the proſcriptions of obſcure attornies or tradeſmen, of a Petion, a Danton, a Robeſpierre or a Santerre, were as extenſive, and as regularly, though much more barbarouſly, executed by a few hundred banditti, as were thoſe of a Sylla, an Anthony or an Auguſtus, at the head of conquering armies. All the virtuous miniſters of religion who could be laid hold of had been previouſly impriſoned, and were inhumanly butchered. At the ſame time all the crowded priſons of the capital were eaſed, by unheard of barbarities, of all their wretched inhabitants, from a princeſs of blood royal to real malefactors. The number of perſons murdered in Paris alone amounted to ſeveral thouſands. To enumerate the unheard of cruelties, exerciſed in all parts of the kingdom ſucceſſively during the remainder of this anarchy, would ſully the page of hiſtory. All this was executed without any known authority, in the midſt of numerous armed citizens, who quietly looked on to ſee their relatives and friends butchered before their eyes. Such a ſeries of crimes is a diſguſting ſpecimen of the enormities to which the doctrines of modern freethinkers can lead, and is a proof of that entire degradation to which egotiſm and the loſs of principle can ſink what is called an enlightened nation; that is to ſay, a nation in which every one has a ſmattering of knowledge ſufficient to make him vain and preſumptuous, and a deſpiſer of thoſe old prejudices, religion, probity, and honour. May it be an eternal and laſt warning to poſterity! May nations yet unborn ſhudder at the relation of crimes which are the natural and certain conſequences of principles releaſing man from every duty! This third aſſembly, compoſed of the moſt able and determined ruffians, after having declared France a

republic, in which every individual ſhould be perfectly equal, exhibited to affrighted Europe the bloodieſt ſcene of tyranny and oppreſſion the world had yet beheld. This too framed a new conſtitutional code, which, with the ſame breath, they for the preſent, as in time of danger, ſet aſide to give way to what they called revolutionary laws. It ſoon appeared to be ſplit into two factions, who agreed in nothing but in the luſt of plundering, in the open denial of a Godhead, and the utter deteſtation of all religious reſtraints. One of theſe was called the Mountain, aptly aſſimilating the faction to a volcano vomiting forth flames, ruin and deſolation. This party ſoon became abſolute, by proſcribing and cutting off the heads of its rivals; and in this ſlaughter Providence ſeems particularly to have involved many of thoſe who had firſt determined, and all the miniſters who had ſigned, the death warrant of their king. Amongſt theſe too fell the deteſtable duke of Orleans, who had nearly exhauſted the nobleſt fortune ever poſſeſſed by a ſubject, in exciting the mob to deeds of horror. Under the iron rod of theſe monſters, in the ſpace of a few months as many hundreds were impriſoned or butchered in cold blood, as the bittereſt Tacitus could have counted individuals in as many reigns of the moſt bloody tyrants. The former aſſemblies had only confiſcated the property of the clergy, and of thoſe nobles they had driven into exile: this at once declared both the perſons and the property of every kind, of the whole nation, in a ſtate of requiſition; that is to ſay, at their immediate diſpoſal. By forcing, by the terrors of inſtant death, all who were capable of bearing arms into their armies whenever called upon, and by ſeizing all property to defray the expences, they were enabled by ſuperiority of numbers to make head againſt the beſt diſciplined troops in Europe. Even thoſe who were driven into them the moſt reluctantly were ſoon corrupted by the contagion of licentiouſneſs; and either in deſpair, or imbibing the induſtriouſly propagated doctrine of no future life, and further intoxicated by phrenſy-working liquors, they ruſhed on with almoſt irreſiſtible fury to death or victory. Robeſpierre, that moſt atrocious of recorded tyrants, has met with his deſerved fate, and a milder ſyſtem of government has ſince obtained. Still it may be feared, that the neceſſity of raiſing money will

again bring forward the reign of terror. A third conſtitution has been adopted, by which the pretended ſovereignty of the people has been much abridged. It has been excluded from the free choice of two thirds of the members of the councils. This was not effected but by the maſſacre of more than 2000 perſons at Paris. By this bold meaſure the preſent rulers have ſecured to themſelves and their friends deſpotic power. The directors, under various pretences, have at the ſame time diſcharged in moſt of the provinces the magiſtrates elected by the people, to fill their places at their own nomination. Regardleſs of the unexampled miſeries of the country, theſe chiefs will at all hazards ſtrain every nerve to retain their conqueſts in Belgium. So dangerous to the tranquillity of all Europe, and ſo utterly incompatible with the ſafety of Great Britain, their real aim is not ſo much to exalt the power of France, as to prevent the return of their armies into its boſom. By preſerving theſe conqueſts, they might diſperſe in theſe diſtant provinces the greateſt part of thoſe lawleſs banditti, by dividing amongſt them the rich ſpoils of their clergy and nobility, or by detaining them there as neceſſary garriſons. On the approaching campaign probably hangs the fate of Europe, and of Great Britain in particular. The God of peace and of armies, who holds in his hands the hearts of men, can alone decide the conteſt, and, by diſpoſing to order and tranquillity the great body of the French nation, put an end to the calamities of Europe. In the mean time, the utter deſolation of the not five years ago moſt flouriſhing kingdom affords the moſt ſtriking example of that direful vengeance, which God has ſo often in ſcripture denounced againſt thoſe nations who ſhall collectively dare to abjure his name. May the Almighty, in his mercy and juſtice, efficaciouſly ſcreen Great Britain, whoſe conduct has been in every reſpect magnanimous, from the hands of barbariſm! We may ſurely hope that the divine Author of Chriſtianity will grant his peculiar protection to a nation which has ſo conſpicuouſly practiſed his ſublimeſt precepts, by receiving and relieving with unbounded liberality and generoſity thouſands of perſecuted miniſters of religion, though of a perſuaſion different from its own eſtabliſhed church. God will have pity at length too on thoſe whom he has hitherto

hitherto abandoned to the folly and perverſeneſs of their own hearts; and this diſaſtrous philoſophical attempt, to frame a government without religion, will afford a ſalutary leſſon to all governments, and to mankind in general.

The leſs viſible, though not leſs efficient, cauſe of ſuch diſorders was the dereliction of all religious principles. Originating in the corruption of a diſſolute court, it had been thence gradually diffuſed into all ranks of ſociety, and had been long ſedulouſly promoted by writings of every kind, addreſſed to every degree of underſtanding, all equally tending to ſcout the idea of divine interference in this world of chance and hazard. Such had before been the effects of ſceptic philoſophy in Rome. Such notions once pervading the great maſs of the people, it ſtood prepared to throw off indiſcriminately, as equal prejudices, every remaining tie which united it in confraternity or bound it to authority. Hence that egotiſm, regardleſs of family, friends or poſterity, long juſtly complained of in France: hence that want of principle of any kind, of ſteadineſs and fortitude ſo conſpicuous during theſe commotions throughout all claſſes, even in that in which honour was a religion. The philoſophic ſect, ſecure in the principles of its ſatellites, alone remained firm, undaunted, and prepared to meet all obſtacles. It met but few indeed in the ſpirit and courage of its opponents. The ſuperior clergy had been, not without cauſe, though with many exceptions, accuſed of morals very diſcordant with its doctrines. But though practice had been greatly neglected, ſome principles either of religion or of honour ſtill remained in that order; and from it, haſtily attacked in this laſt entrenchment, the aſſembly met with a check which it had not expected. On the contrary, the inferior claſs, who had been generally better thought of, inveigled by the lure of vanity and petty intereſt, had early ſeemed to deſert its banners, and imprudently given its weight to the common enemy. In juſtice to it, it muſt however be remarked, that as ſoon as an oath was tendered, which was deemed incompatible with duty and principle, the great majority of its members, as well as of thoſe of higher

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ranks, nobly rejected it, at the hazard of losing that bread which many of them afterwards became day-labourers to obtain; and many who had at first been surprised into it, notwithstanding the now manifest consequences, as nobly retracted. From the loss of property, of honours and respect, amidst want, insult, and unexampled persecution, the great body of the clergy rose superior to dangers and unsubdued by its all-powerful enemies. Its submission when interest alone was concerned, its resolute resistance when principle was attacked, its patient sufferings prove the force of religious principles once imbibed when put to the test, and the security they alone can give to lawful government.

The more immediate and more prominent cause of this great explosion which at once levelled all respect and authority, of this astonishing revolution as well in the minds as in the manners of men, was the misery and despair of the people at large; to which was added the illiberal treatment of the soldiery. The finances were deranged beyond the power of temporary expedients, by a load of debt accumulating for more than a century from the expences of ambitious wars. In the midst of public and it was thought irretrievable distress, the profusions of a dissipated court were flagrant and increasing, and seemed to laugh at misery. The most oppressive taxes, from which the most opulent were in many cases exempt, levied in the most oppressive manner, ground the face of the people, whilst the increasing luxury of courtiers and men in office rendered more bitter the cup of squalid poverty. The higher clergy, ever taken from the nobility, deserted their flocks to follow the unsuitable pleasures of the capital, or loiter in the antichambers of power, and in their short residence in their dioceses exhibited the ostentation and sumptuosity of courtiers. Even the poor nobility made themselves some amends for want of fortune, by haughtiness and insolence towards their inferiors. The courts of justice, still more proud in their demeanour, were suspected of prevarication in favour of power, opulence or rank. Such were the heavy grievances which called for redress. A constitution planned upon the experienced one of England, but

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in many inſtances improved, was the unanimous wiſh of all orders, and would have been carried without a diſſenting voice; but it ſuited not the views of philoſophers and lawyers, whom the tiers état on account of talents and habits of ſpeaking in public had unwarily deputed. They violently wreſted the whole uncontrolled power into their hands, contemned the free and moderate wiſhes of the nation, aſſumed ungiven powers, and pulled down all authority to raiſe a fabric of their own. Whilſt the tiers état was yet trembling in abject ſubmiſſion, the nobility and parliaments alone had raiſed the ſtandard of liberty, and reſiſted at their ſole hazard arbitrary power: the king benevolently conſented to have his authority, abuſed by miniſters and courtiers, limited. The return to all was annihilation: the throne, the clergy, the nobility and parliaments were at once, as by a ſudden hurricane, overturned by thoſe who had hitherto appeared ſo daſtardly.

Hence governments may learn, that when all appearance of reſpect to religion is thrown off at court, or amongſt the rulers of a nation, the like contempt will at laſt deſcend to every rank of ſociety; and that, religion once effaced from the conſciences or minds of men, no tie remains which can bind them to authority, order, or ſubordination; that the religion adopted by the ſtate ſhould be upheld and maintained with ſacred veneration, and made reſpectable by the choice of its paſtors; but that to bend the private conſciences of men to civil authority is to foment unconquerable diſcontent, which will ſooner or later break out in acts of violence; that perſonal liberty and property, whatever be the mode of government, ſhould be ſacred and inviolable; and finally, that wars of ambition, whether undertaken in the view of extenſion of territory or of commerce, the profuſion of courts and licenſed rapine of courtiers, or of thoſe entruſted with the public treaſure, by laying inſupportable burthens on the people, muſt at length occaſion ſuch general revolt, as will overturn government and throw the whole ſtate into deſpair and anarchy. Let kings at laſt be convinced, that not numerous armies, but the good will and happineſs of all their ſubjects,

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can ſupport their thrones. Warned by the convulſions of one kingdom, and the eminent hazard of a like fate throughout all Europe, let ſovereigns, at laſt content with the dominions which Providence has ſubjected to their rule, unite in concord, and diſmiſs thoſe ſupernumerary troops which ruin and dry up the finances of the ſtate, and lay upon the poor an intolerable load of miſery. They have ſeen that numerous armies, ill treated and ill paid, may be turned againſt their chiefs, whilſt a moderate number of troops, regulated but not haraſſed by diſcipline, and maintained with comfort and decency, will be a faithful and invincible ſhield againſt every unprovoked revolt. By this great example, to which may be added that of Joſeph the Second of Auſtria, reformers may learn, that however pure their intentions, the whole forms of governments and the habits of men ſhould never, however vicious and defective, be violently overturned; much leſs all exiſting laws at once annihilated, and the many-headed multitude called upon to ſupport the change. When men's minds are totally unhinged, they will always be carried to extremes more dangerous and more inimical to public felicity than were the abuſes, however flagrant, meant to be reformed: nor will the moderate or well meaning ever be able to guide or ſtem the torrent. Whilſt the ſober citizen waits with unavailing patience the promiſed good, the profligate and the deſperate will be active, and their deſigning leaders will mount the ſtorm and direct it to their purpoſe. No vices of the ſtate are ſo inveterate as not to be cured by temperate and lenient meaſures. Convulſions, if they laſt beyond a moment, tear up the virtues with them.

Should the Almighty, in his mercy, avert calamities and ruin ſimilar to thoſe which have overtaken France, and reſtore peace and tranquillity to it and to Europe, the conſequent debility of that ſtill rival country, which half a century could ſcarcely recruit, will ſecure Great Britain for ſome time from its enterpriſes. May ſhe in that interval of quiet ſedulouſly attend to the gradual alleviation of that load of debt which preſſes ſo heavily on every ſource of proſperity! The wars in which it has been incurred have been as frequently excited by popular clamour and the intereſted views of monopolizing commerce,

commerce, as by the ambition of courts. If to force that commerce beyond its natural bounds, which are thoſe that induſtry can fairly gain, or under the pretence of balancing the powers of Europe, ſufficiently able, during this ſecond infancy of France, to counterpoiſe each other, ſhe engages in wars which muſt be unneceſſary, ſhe will undoubtedly bring upon her head a ruin as complete, and much leſs remediable from inherent reſources, than that which has overwhelmed her neighbour. When relieved from thoſe oppreſſive taxes which cramp her induſtry and her commerce, let her hold up to all mankind that confraternity and intercourſe of benefits, which the providence of Heaven, allotting to each clime peculiar productions, and to each nation peculiar genius and habits of induſtry, certainly intended. Let her propoſe to every nation treaties of commerce on that equitable plan ſketched out, but not perfectioned, in her late treaty with France. In theſe let all her colonies, no longer a forced and unjuſtifiable monopoly, be included. Why ſhould they, under reaſonable reſtrictions, be ſecluded from general intercourſe and a participation of the wide-ſpread bleſſings of the Creator? Freedom of commerce, ſubject to ſuch impoſts only as are due for protection, is the undoubted right of all mankind. The loſs of America ſhould teach us this eternal truth, and ſupported by that continent the iſlands will one day claim it. Such freedom of commerce would only ſerve to increaſe rapidly the value and induſtry of thoſe colonies; but, as that conſummate politician Mr. Smith obſerves, the monopolizing ſpirit of trade is ever militating againſt the national as well as general good. The devaſtation of the moſt important colony of France affords an opportunity of effecting this juſt reform, without even exciting the cries of jealouſy from a ſuppoſed advantage to our neighbours. With them it will probably be a neceſſary meaſure. From a final conviction of the ſoundneſs of that policy, ſhould Spain alſo be induced to relax, the firſt advantage would be to the moſt active and induſtrious people having the greateſt capital in commerce, and conſequently, in the preſent ſituation of Europe, to Great Britain.

The ſlave trade and the ſlave laws in the Weſt India iſlands, under what-

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ever pretext attempted to be juſtified, are certainly in their preſent form immoral, inhuman, and unchriſtian. What has happened in the French iſlands, and even now threatens our own, ſhews that their continuance is a mine big with deſtruction, a naked ſword hanging by a thread over the heads of the proprietors. General and ſudden emancipation is on all hands allowed to be a meaſure equally impolitic for the ſlaves themſelves as for their owners. The ſeverer fate which might have awaited many of thoſe who are thus carried into diſtant captivity may, if ſtrictly and generally true, perhaps excuſe the continuance of the trade, and the neceſſities of the colonies render the total prohibition of it inexpedient in the eyes of the politician; but there are regulations long adopted in ſeveral Spaniſh colonies, which would go far to juſtify the practice, and, by reſtoring a conſiderable portion of happineſs to thoſe men of miſery, would train them by gentle means to induſtry, and in return make their labours much more beneficial to their purchaſers. By theſe, in the firſt place, the great principles of Chriſtianity are taught to all, and in conſequence the Sabbath day is religiouſly dedicated to that great purpoſe, and to relaxation from labour. Over and above this day of reſt, each ſlave is entitled to one day in the week, on which his labour is for his own emolument, and he is free to hire himſelf either to his own or any other maſter. When by his induſtry on this day he has amaſſed a ſufficient ſum, he is entitled to purchaſe at a fixed price the freedom of a ſecond day, and ſo on ſucceſſively till he is totally emancipated. There can be little doubt but that by ſimilar regulations, at leaſt for all who ſhould be hereafter imported into our colonies, the rigours of ſlavery would be gradually ſoftened, and that real happineſs may ultimately reſult to thoſe who ſhall hereafter exchange deſpotiſm, ſlavery or death in their own country, for a truly milder fate in a chriſtian one. To extend the bleſſing, let all born in ſlavery be entitled to the ſame privilege at the age of 21; and let this great nation generouſly purchaſe one day of freedom for all adults. Under ſuch a ſyſtem, ſtrengthened by a reviſed code of ſlave laws, which ſhould no longer look upon negroes as below the human ſpecies, the planters, laying aſide the degrading whip, would no longer ſleep in the

the conſtant dread of the inſurrections and conſpiracies of deep revenge; they would in a very ſhort time find their real intereſts not impaired, but promoted, by willing induſtry excited by thoſe hopes which are deareſt to the heart of man. Such regulations would, in my opinion, ſolve the queſtion which has ſo long agitated the nation, and reconcile humanity with private and general intereſts.

There is yet, beſides the preſſure of taxes and ſome partial evils and abuſes, one ſeed of diſcontent, and of even poſſible diſſolution of the whole frame of government, ſtill unremoved in theſe kingdoms. The cure of thoſe muſt neceſſarily be the work of time and gradual reformation: this may be pulled up at once.

The mild religion of Chriſt never certainly authoriſed perſecution in any ſhape, and the church of England has always claimed toleration as its peculiar boaſt; but yet its practice, like that of all other predominant churches, has been far from conformable to this golden rule. As Mr. Paley ingenuouſly obſerves, the anxiety of preſerving power once acquired has ever found various pretexts to gloſs over the practice of perſecution diſavowed in principle. The pretended neceſſary alliance between the eſtabliſhed church and the glorious conſtitution of theſe realms, and the preſervation of both, have hitherto been ſucceſsfully held up as a full juſtification of penal laws againſt all diſſenters from the creed of the former. Thoſe againſt Roman catholics were in ſome caſes ſanguinary, in others highly immoral, provoking and authoriſing legal robbery, exciting not only diſſenſions, but the blackeſt perfidy and ingratitude amongſt the neareſt kindred. To the immortal honour of Engliſhmen, the moral ſenſe of the people has ſeldom ſuffered them to be carried into ſtrict execution in this kingdom. In Ireland, the rapacity of needy adventurers ſent thither to deſpoil inſtead of civilizing or conciliating the natives, and the alarms of their deſcendants, ſuffered them not to ſleep. Rebellions and inſurrections, excited by wrongs and ſeverities not to be tamely borne by human nature, cauſed their ſtrict execution to be looked upon till very lately without horror or diſguſt.

Theſe foul ſtains, which for more than 200 years have ſhamed the laws of a free people, have happily at length been done away; but incapacities of every kind ſtill continue not only to vilify, but to deprive of the nobleſt rights of Britons, thoſe of that perſuaſion not only in Britain but in Ireland, where they conſtitute a very great majority of the nation. In that ſiſter kingdom, the long operation of oppreſſive and degrading penal laws has reduced the numerous catholic peaſantry not only to an indigence, but to a ſtate of abject ſubjection unknown even to the boors of Ruſſia or Poland. By their hard taſk-maſters they were looked upon as an incumbrance they reluctantly ſuffered to exiſt*. Sound policy had at laſt ſuggeſted, in times when mobs were induſtriouſly taught that they alone were ſovereigns, that the abolition of all thoſe remaining penal ſtatutes, which ſtigmatized two thirds of the nation as aliens to the conſtitution, was not only expedient, but perhaps neceſſary to the ſalvation of the empire. Unfortunately the revived apprehenſions of the ruling parties, both in church and ſtate, of loſing any portion of long monopoliſed power and riches, daſhed from the lips of that inſulted people the hopes officially held out of ſpeedy emancipation. It was urged that ſufficient, perhaps more than ſufficient, indulgence had already been ſhewn; that the catholics were re-admitted to the protection of the laws; that even the right of election had been reſtored to them: and it was inſinuated, that the capacity of ſitting in the legiſlative body, or of holding the higher civil or military offices, could be of little moment to the great body of that people, whoſe indigence of courſe excluded them. Inſult was thus added to injuſtice. One of the greateſt bleſſings of our happy conſtitution is, that there is no man, however low his ſtation, who may not hope by induſtry and merit to raiſe himſelf to the higheſt ſituations. By any whatever legal incapacities, not only he, but his lateſt poſterity, is cut off from every hope of riſing to a par with other ſubjects. So much for the juſtice

* An Engliſh gentleman, riding with an Iriſh proprietor, was admiring the beauty of the country; "O yes," replied his conductor, "if it was but peopled." "I ſeldom ſaw a more populous one." "'Tis true, there wants not men, but they are papiſts."—See Mr. Crumpe's account of the treatment of the Iriſh peaſantry, in his eſſay on the beſt means of providing employment for the people.

of this propoſition: let us now conſider it in a political light. The monopoly of riches in any hands can never contribute to the proſperity of a nation. It is the affluence and induſtry of the lower claſſes which can alone make it great. Extreme indigence has made the poor Iriſh catholics idle and profligate, and thence lawleſs, and dangerous to all ſocial order: they have no concern in the public weal. Surely ſound policy requires that every incitement be held out to rouſe them from a ſtate ſo immediately detrimental, ſo threatening to the very exiſtence of ſociety. Dragooning may awe them for a time, but it cannot laſt; and if it could, is this a means of ruling Britiſh ſubjects?

True chriſtianity bluſhed to hear both in ſenates and in private converſations, perſons of otherwiſe mild and candid diſpoſitions aſſert, that a reſtoration of all the privileges of Britiſh ſubjects would be repugnant to his majeſty's coronation oath—as if the king could have taken an oath to withhold his conſent to the abrogation of perſecution. But the deprivation of the deareſt rights of Britons, for the preſervation of which every Briton would ſhed his blood, was maintained to be no perſecution, but a meaſure of ſafety to government and to the eſtabliſhed church. The ſtate has a right to adopt a religion, and to confer on it excluſively the honours and poſſeſſions aſſigned to public worſhip; but though it may have the power, it has no juſt right to force it by civil incapacities upon its ſubjects. Such incapacities are real puniſhments and notes of infamy, if infamy was within its juriſdiction, which juſtice forbids it to inflict except on crimes againſt the ſtate, good order, and the general morality of all religions. Let the church guard, by whatever teſts it may judge proper, its ſufficiently great advantages againſt the intruſion of falſe or hoſtile paſtors; but let it not pretend that civil employments are incompatible with nonconformity to its peculiar doctrines. This is clearly perſecution on religion's account. Particulars may deſerve but have no claim to offices of truſt; government will always have a right to confer its confidence on ſuch perſons only as it ſhall deem worthy of it; but neither church nor ſtate can have a juſt right

to exclude indiſcriminately whole bodies of men, and with them their poſterity, from the common liberties, privileges, and advantages of the community of which they form a part, and to the general proſperity of which they equally contribute their induſtry and fortunes. If the doctrines held by the Roman catholics are not repugnant to the conſtitution, or to the eſtabliſhed government of the country, they have a natural and indefeaſible right to all its privileges without exception. The ſtrong hand of power may withhold their claim, but eternal juſtice will maintain it undiminiſhed.

With whatever patience the catholics of Ireland have been, or may be yet endued, it is an abſurdity in politics to ſuppoſe that a third, and, if the members of the eſtabliſhed church are alone counted, not a ſeventh part of the inhabitants of a country ſhould for ever hold its undivided, its excluſive rule. Protracted deluſive hopes held out can only irritate the feelings of injured men: pray Heaven they may not at length be rouſed to phrenſy! Let the loſs of America warn the rulers of this nation not to extend powers, which reaſon will not juſtify, beyond the term which circumſtances preſcribe.

In Great Britain, the numerous proteſtant diſſenters of every denomination have a no leſs equally juſt claim to unlimited, unreſtricted toleration. That the members of the legally eſtabliſhed church in one part of the kingdom ſhould not be entitled to ſerve their own country in a military line, without being ſubjected to proſecution for not having outwardly conformed to rites repugnant to its tenets, is a manifeſt abſurdity, which an annual indemnity act only makes more glaring. It is alleged that one ſect of theſe diſſenters is even from religious principles not only inimical to the eſtabliſhed church, but to monarchy and the preſent conſtitution. Some of theſe may be really enemies to them, but certainly not all. Already admitted into both houſes of parliament, enjoying many high offices, and filling many corporations throughout England, and thereby poſſeſſed of great power and influence, will not partial reſtrictions naturally make thoſe who

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are already ſo inclined ſtill more hoſtile, and uſe every effort to overturn that government which excludes them from any part of their common rights? To many other ſectaries no principles adverſe to government can be objected, and they can only imbibe ſuch from a ſenſe of grievances under it. Their common perſecution, for ſuch it is, alone binds all theſe otherwiſe heterogeneous parties into one formidable maſs of juſtly diſſatisfied men. Can government and the conſtitution for ever remain ſecure with ſuch a leven, fermenting in ſo large a portion of its ſubjects? Reſtore to all their unreſtricted rights, and all union is diſſolved. Even the moſt hoſtile part will be no longer formidable. Having no longer cauſe of real complaint, they will be deſerted not only by other ſectaries, but by the ſounder part of their own brethren. True policy then, no leſs than juſtice, demands that in this free country every man, whatever be his religious perſuaſion, ſhould enjoy in their fulleſt extent all its rights. Crimes againſt ſociety and the laws ſhould alone exclude. Whoever believes in a religion, in ſo much as he is actuated by his creed is a friend to virtue.

May grievances, however real, yet eaſily removed, ſerve not ambition to undermine a conſtitution as yet the nobleſt boaſt of human wiſdom, and hurl down on theſe realms a ruin equal to that which has overtaken our unhappy neighbours! Extended conqueſts, and exuberant riches with their attendant vices, have been from the beginning of time the bane of every ſtate. Impartial juſtice and protection on the part of governors, union and content amongſt the governed, can alone ſecure the proſperity of nations, ſtrengthen and perpetuate empires.

I have perhaps, in this protracted note, ſwerved from my ſubject. But reflections on the greateſt intereſts of mankind can never be totally miſplaced; and thoſe on a tranſaction which ſtands ſingle on the annals of mankind, and the obſervations it gives riſe to, come naturally within the inveſtigation of the firſt cauſes of calamities brought upon man by the contention of human paſſions.

(nnn) Page 71.

It appears by authentic documents, that the number of males ſubject in Ruſſia to capitation, excluſive of the conquered provinces, and of Siberia and countries north and eaſt of this laſt, amounted to 10,112,182 in the year 1763, and that it had ariſen in 1783 to 12,428,488; an increaſe of more than one fifth in the ſpace of 20 years. In that ſpace indeed no inconſiderable number of Greeks had tranſmigrated from Turkey into its ſouthern provinces. In more fertile countries, and at a time when the age of man was ſtill double to its preſent ſtretch, in the end of the period between the diſperſion and the vocation of Abraham, and in the beginning more than quadruple, we may ſurely without danger of exceſs take this proportion of increaſe as a ſtandard, notwithſtanding the numerous accidents of emigration in the midſt of the yet frequent convulſions of nature to which theſe firſt ſettlers might be expoſed. From the 700,000 ſouls, whom we have ſuppoſed to have ſettled at the diſperſion in all weſtern Aſia, this increaſe of one fifth in the ſpace of every 20 years will give us more than 10,770,639 in the 300th year after the diſperſion. Seventy ſons and grandſons of Jacob had indeed increaſed much faſter in Egypt; but that was owing to a peculiar bleſſing and diſpenſation of Providence, and cannot be alleged as any ordinary rule. At the end of 215 years the number of men capable of bearing arms is reckoned 600,000, and conſequently the whole number of ſouls muſt have been at leaſt 1,800,000. In thoſe days of polygamy the whole families of theſe Iſraelites ſettling in Egypt, including wives and daughters, muſt have probably amounted to 210; from theſe we muſt double the population every 17th year, to give us 1,976,000 in the 211th year after their firſt eſtabliſhment. For 80 years before the exodus great ſeverities and the deſtruction of male children had been exerciſed upon them, ſo that there might probably remain as above, about 1,800,000, to leave the country.

(ooo) Page 72.

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(ppp) Page 73.

Eighty years before the Iſraelites left Egypt, the king of that country gave for reaſon of the cruelties he was about to inflict upon them, that they were ſo increaſed as to equal, if not ſurpaſs, the number of native Egyptians. Their numbers at the exodus were, as we have already ſeen, about 1,800,000. Suppoſing their numbers in proportion to the Egyptians to have been exaggerated by jealouſy, and that their increaſe was greatly retarded by theſe cruelties, we can yet ſcarce allow more than three millions to the Egyptians. Theſe will not form a very conſiderable or formidable nation. We ſhall be told, perhaps, that that country contains not a greater number at preſent, ſince Mr. Volney aſſerts that it has not at this day more than 2,500,000 inhabitants. But we know to what degree its fertility and its population are degraded by the long tyranny of the Mamelucs and Turks. That country no more reſembles antient Egypt in the times of Nechao or of the Ptolemies, than Syria, Paleſtine, Babylonia or Aſſyria, in their preſent ſtate, retrace the memory of thoſe potent kingdoms where Antioch, Jeruſalem, Babylon or Nineveh flouriſhed in the days of their glory.

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(qqq) Page 75.

So late as the year 1412, on occaſion of an intercourſe of embaſſies and letters between Shahrokh, fourth ſon of Timur Khan Sultan of Choraſan, and Day-ming the third prince of the dynaſty of Ming, this laſt is called emperor of Chin and Mâchin. See Diſſertations relating to the Hiſtory and Antiquities of Aſia.

(qqq) Page 86.

Archbiſhop Uſher, and with him Dr. Blair, bring down the vocation of Abraham, and with it all the other events of ſacred hiſtory to the exodus, incluſively, 60 years later. But it is evident that the Hebrew chronology which they adopt, reckons no more than 367 years between the deluge and the vocation of Abraham, which places it in the year 1981 before Chriſt.

(rrr) Page 87.

Sir Iſaac Newton places Mephres in 1125, ſeemingly that the firſt expulſion of the ſhepherds under his ſon may ſtrengthen the Philiſtines who take the ark in 1100. But thoſe Philiſtines had more than once been troubleſome to the Iſraelites before that time. My reaſon for placing him ſo much earlier is, that the reign of his ſon and the expulſion of the ſhepherds may coincide with Herodotus, who aſſerts that Egypt was poſſeſſed by ſhepherd nations during 511 years. Herodotus relates the Egyptian fables as ſuch; but where he gives us, as in this place, his own opinion, he merits all credit as the ſureſt guide through the intricacies of hiſtory.

(sss) Page 88.

It was, I apprehend, during theſe 296 years which followed the retreat of the Iſraelites, that Egypt was ſplit into ſeveral ſovereignties. The loſs of a great army, of the king and of his eldeſt ſon in that event, afforded a very probable opportunity to ambitious chiefs to ſet up for themſelves at Coptos, Thebes, This and Elephantis. In this debilitated ſtate of the country, the nations, driven out of Paleſtine by Moſes and Joſhua, eaſily poſſeſſed

poſſeſſed themſelves of the nearer and more northern parts, and finally erected independent kingdoms at Abaris, Sais, and Memphis, and by degrees extended their dominion into Upper Egypt, till at laſt checked by Mephres, and confined to Abaris by his ſon. During theſe 296 years about 14 kings might reign in each of theſe ſeparate kingdoms, of whom the Egyptians have made more than 100 reigning ſucceſſively over all Egypt. It is perhaps worthy of obſervation, that the tables of Manetho preſent a remarkable degree of confuſion and abſurdity in the 13th, 14th, 15th, 16th, and 17th dynaſties, preceding that wherein Mephres and his ſucceſſors are found. From a wiſh to cover theſe, great variations are no leſs obſervable in his tranſcribers Africanus and Euſebius. In the 13th dynaſty we find 60 kings reigning 184 years, not much more than three years each, according to Africanus: the time is extended to 453 years by Euſebius, but ſtill in ſuch a long ſucceſſion allows not eight years for each reign. In the former the 14th dynaſty is wanting; but in the latter 76 Xoite kings reign according to ſome copies only 184 years, and to others 484. In the one, ſix Phœnician ſhepherds fill a ſpace of 284 years, and in the other, Dioſpolite kings reign 250 years in the 15th dynaſty. In Africanus 32 Greek ſhepherds reign 518 years in the 16th, whilſt in Euſebius five Thebans reign 190 years. By the former the 17th dynaſty is filled by 43 paſtor and as many Theban monarchs, reigning only 153 years; in the latter by four Phœnician ſhepherds during 106 years. It muſt indeed be confeſſed, that the ſame abſurdities and the like diſagreement between the tranſcribers obtain in many dynaſties previous to theſe, particularly in the 4th, 5th, 7th, 8th and 9th dynaſties. One flagrant proof, of placing ſucceſſively contemporary kings, occurs in theſe tables, which I do not remember to have ſeen noticed, though ſufficiently obvious. In the 27th dynaſty the kings of Perſia, from Cambyſes to Darius, are regularly entered. The Egyptians, particularly averſe to the Perſian government, frequently revolted during that time, and were as frequently reduced. The 28th, 29th, and 30th dynaſties conſiſt of thoſe princes who either attempted, or for a time

ſucceeded in throwing off the yoke, and are thus placed in ſucceſſion, though living during the identical period taken up by the 27th Perſian dynaſty.

(ttt) Page 88.

Herodotus informs us, that before the capture of Sardis, 544 years before Chriſt, Crœſus and his predeceſſors Alyattes, Sadyattes, Ardys and Gyges, had reigned over Lydia 170 years; and that a family deſcended from Agron, grandſon of Belus, who was ſprung from Hercules, of whom the laſt was Candaules, had ſwayed its ſceptre 505 years after the extinction of the race of Lydus. This places that epoch of the monarchy in the year 1219 before the Chriſtian æra; and in the uſual courſe of nature Belus, whom he calls a deſcendant of Hercules, in about 1270, and conſequently about the time or ſooner than the Grecian Hercules is ſaid even by the Grecian chronology to have flouriſhed. We have already proved that this hero really lived about two centuries later. It was not therefore from the ſon of Alcæus that the Aſſyrian monarch was deſcended, but it was from ſome more antient hero or god of that name from whom he claimed his origin.

(uuu) Page 89.

We have already ſeen that the ſovereigns of Aſſyria had given a king to Lydia, though it continued to remain independent. The ſame Herodotus dates their dominion over other parts of Upper Aſia beyond the bounds of Aſſyria in 1206. According to him, Aſtyages, from the time of his overthrow by Cyrus in the year 536, and his predeceſſors Cyaxares, Phaortes, and Dejoces, who revolted from Aſſyria, had reigned in Media 150 years. He aſſures us that the Aſſyrians had held the dominion in Upper Aſia 520 years before that revolt; from whence I conclude that the firſt great extenſion of that monarchy is to be dated in 1206.

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Priam was the ſixth ſucceſſor of Dardanus; and as his reign was long, I

have thought proper to allow in ſo ſhort a ſucceſſion 30 years to each reign, one with another.

(yyy) Page 90.

I cannot think with Sir Iſaac Newton, that this Ammenemes, Amenophis, or Ammon, was the original Jupiter Ammon of Egypt; or that the gods or deified men of that country were of the ſame recent date with thoſe of Greece; or that Thebes was called Ammon-no, or part of Libya Ammonia, from the father of Seſoſtris. Ham was the original Jupiter of both countries. That king's flatterers, or thoſe of his ſon, might indeed aſſimilate him to, or identify him with, that more antient founder and god of Egypt; we ſee it attempted much later by Alexander and his courtiers. Herodotus tells us that the Greeks, in adopting the gods of Egypt, had transferred to heroes of their own, of recent date, the titles of divinities adored from time immemorial in Egypt; and this adoption happened in times nearly coinciding with the reign of this monarch. The name of Ammenemes or Amenophis frequently occurs in the liſts of Egyptian kings, who, like thoſe of Aſſyria, often aſſumed titles compounded from thoſe of their firſt deities. This is evidently compounded from Ammon or Ham and Menes or Menoph, the ſame as Mizraim, in the ſame manner as, amongſt others, that of Aſſaraddon in Aſſyria was certainly compoſed of the names of their gods Aſſur and Addon. He certainly did not found, but he might beautify and ſtrengthen, Thebes in Upper Egypt, as ſome of his ſucceſſors adorned Memphis or Meſr, capital of Middle Egypt, which after the fall of Thebes became that of the whole kingdom. Poſſibly too this latter city might at the ſame time have been removed nearer to the Delta. Though Grand Cairo has more than once changed ſites, it has, wherever ſituated, been called Meſr by the Cophts.

(zzz) Page 90.

Herodotus tells us that in the reign of Atys, ſon of Manes one of the monarchs

monarchs of Lydia of the race of Argon, the Lydians, in conſequence of a long continued famine, agreed to ſend out conſiderable colonies in order to exonerate the country. Tyrrhenus was the chief of one of theſe. He ſays they firſt ſought ſettlements in ſeveral of the Grecian iſlands, but that Tyrrhenus and his followers finally fixed in Umbria. To this tranſaction he aſſigns no date; but I think it very probable that at this time the ſon of Alcæus, aſſuming the name of Hercules, firſt came into Crete, and thence paſſed into Greece. I have therefore affixed to it the date of his appearance in theſe countries, as deduced from other events in which that hero was an actor.

(aaaa) Page 91.

To corroborate the opinion of Sir Iſaac Newton, that Seſoſtris is no other than the Seſac of ſcripture, we will obſerve that the liſt of kings given by Herodotus, from Seſoſtris to Sethon, in the beginning of whoſe reign he fixes the flight of Sennacherib the Aſſyrian king, which happened anno 714, will in the courſe of nature fix the reign of Seſoſtris about the time of Seſac. His ſucceſſion runs thus: Seſoſtris was ſucceeded by his ſon Pheron, after whom an elected king, called by the Greeks Proteus, to whom ſucceed Rhampſinitus, Cheops, Chephrenes, Mycerinus Aſychis, Sabacon and Anyſis, living at the ſame time, after whom Sethon was choſen king. Seſoſtris reigned 46 years, after whom reign eight kings to Sethon. As Sabacon and Anyſis together reign above 50 years, and as Cheops and Cephrenes, brothers, are alſo ſaid to have ruled Egypt during a very long time, though the duration given to them by the Egyptians, if brothers, exceeds all poſſibility, we may ſafely give to theſe eight reigns 30 years each, which will bring the commencement of that of Seſoſtris to the year before Chriſt 1000, nearly the date of Seſac as deduced from holy writ. To coincide with his date of the Argonautic expedition, Sir Iſaac Newton ſuppoſes Danaus to have fled into Greece towards the end of that monarch's reign. But I think it full as likely that, Seſoſtris being abſent in Libya at the time of the death of Amenophis, that prince might have then taken occaſion to uſurp his brother's throne, and was on his return expelled from Egypt.

Egypt. Accordingly, in the dynaſties of Manetho, as well as in the liſt of Syncellus, we find Armes or Armais, called Danaus by the Greeks, reigning before his brother Sethos Egyptus, the ſame as Seſac and Seſoſtris.

(bbbb) Page 91.

This was not peculiar to Attica; a ſimilar change took place in moſt of the ſtates of Greece, in Argolis, Lacedemonia, &c. The Phœnicians and Egyptians who ſettled in Greece firſt taught the former wild inhabitants to build houſes; and theſe, ſituated for ſafety pretty near each other, became villages, and in time towns, each having its council and prytaneum, though confederated with a certain number of others, all acknowledging one chief or king. In all theſe, about the ſame period, theſe ſeparate prytanea were united in one town, which thence became the capital and ſeat of government of the whole ſtate. The different quarters of the metropolis, as at Sparta, generally retained the names of the ſmaller tribes or towns. In Arcadia and Theſſaly, as well as in ſome other ſtates of this country, each town and diſtrict continued independent as to internal government, and only at ſtated times ſent deputies to a general confederation whoſe meetings were held at one of them. Leſs adapted to ambition, theſe ſtates acquired leſs renown in ſtory, but were longer exempt from the viciſſitudes of fortune. On the death of Codrus monarchy was aboliſhed at Athens; and about the ſame time, excepting at Sparta, where the title, with very limited authority, was conferred on two families, the very name of king was condemned in all Greece. Macedonia alone retained its monarchy, which ſeems to have been abſolute. To it all theſe long flouriſhing, but ever jarring, republics were finally forced to ſubmit. In order to undermine that empire, the policy of Rome for a time revived the ſpirit of liberty; but, that effected, Greece only changed its yoke, and ſunk into Roman provinces. The rapacity of proconſuls ſtripped it of its moſt precious ornaments of art, and its philoſophers became the ſubſervient tutors, and often ſlaves, of Roman citizens. Their ſophiſtry ſoon corrupted the principles and morals of antient Rome, and an ineffectual law attempted, when too late, to baniſh them from

from the republic. Such will ever be the effects of that pernicious mode of reaſoning into ſyſtematical doubt.

(cccc) Page 91.

I need not here repeat what I have already ſaid on the moſt probable date of theſe two famous eras of Greece, the Argonautic expedition and the ſiege of Troy, by which all the former events of that country and the correſponding ones of Egypt muſt be fixed. I think I have ſhewn the ſtrongeſt grounds for dating them as above, within a few years more or leſs.

(dddd) Page 92.

Egyptian vanity and Manetho's dynaſties, were they really ſucceſſive, remove the building of theſe famous monuments to much higher antiquity, and to at leaſt 1000 years earlier; but Herodotus fixes the foundation of the firſt great pyramid to nearly this date. They certainly did not exiſt when Homer travelled into Egypt, but might have been begun ſoon after.

(eeee) Page 92.

It is clear, both from the hiſtorical and prophetical parts of ſcripture, that Syria and Babylonia were independent of Aſſyria to the time of Pul. Its monarchy began with Aſſur the founder of Nineveh. Herodotus has pointed out the æra of its firſt extenſion, but it is from Pul only we can date its growth into a great and mighty empire.

(ffff) Page 93.

Sir Iſaac Newton in his chronology places Semiramis in 760, making her cotemporary with Pul. But that proud conqueror does not ſeem to me likely to have ſhared with her his empire and his glory. She was more probably the widow of his youngeſt ſon Nabonaſſar, who ſucceeded him at Babylon; and in this opinion Sir Iſaac himſelf ſeems to coincide in his hiſtorical account. During the minority of her ſon ſhe may have aſſumed the reins of government; as Nitocris, a queen no leſs famous for the execu-

tion

tion of ſtupendous works at Babylon, afterwards did during the infancy of her ſon Labynitus. Allowing 30 years for each ſucceſſion upwards, from the taking of Babylon, the age of Semiramis will be with probability fixed as above.

(gggg) Page 93.

Sir Iſaac Newton places this revolt in 711, to make room, I ſuppoſe, for a fifth king of Media before Cyrus. But Herodotus poſitively reſtricts its kings to four, enumerating the years of each reign, making in all 150 from hence to the cloſe of the Median dominion. Sir Iſaac alſo accuſes this hiſtorian of inverting the order of ſucceſſion in Media, by making Cyaxares the father inſtead of the ſon of Aſtyages, in conſequence of which he adds another king Darius the Mede ſon of Cyaxares. I muſt own I do not ſee ſufficient reaſon for this, but am apt to believe that Aſtyages was the laſt king of Media (in which Herodotus is ſupported by Pauſanias), and that he is the ſame prince called in ſcripture Darius the Mede. Sir Iſaac's chief reaſon for removing this prince's reign beyond thoſe events which put an end to the power of Lydia and Babylon, ſeems to be, that he is ſaid to be of ſmall abilities. But all thoſe conqueſts were achieved by the ſuperior conduct of his Perſian general Cyrus, who ſoon diſdained to be ſecond to a weak monarch, and in two years by his overthrow transferred the empire to Perſia.

(hhhh) Page 93.

The Roman hiſtorians ſuppoſe the ſeven kings of Rome to have reigned 244 years; a length of time which Sir Iſaac Newton juſtly thinks improbable, conſidering that ſeveral of theſe princes were ſlain, and that the laſt lived many years after his expulſion. He reduces theſe reigns to 17 years each; which, conſidering that the reigns of two are allowed to have been long, I think too little. I have therefore allowed 23 years to each reign.

(iiii) Page 93.

Sir Iſaac Newton places this invaſion of the Scythians in 635, in the reign

of Aſtyages, whom he ſuppoſes the father of Cyaxares, and grandfather of Darius the Mede; but Herodotus poſitively aſſerts that it took place in the beginning of the reign of Cyaxares, which he allows to have been in 611. The abſence of that monarch in the conqueſt of Nineveh, and in ſettling that new acquiſition, ſeems to afford a probable opportunity for ſuch an irruption into Media drained of troops for that expedition.

THOUGHTS

THOUGHTS

ON THE

STRUCTURE

OF THIS GLOBE.

LETTER II.

Analyſis and Refutation of Mr. Bailly's firſt Syſtem of the Origin of Nations, and all Population derived from the Poles, deduced from antient Annals.

IN my laſt letter I have ſhewn you, Sir, the moſt authentic monuments of hiſtory concurring with general tradition, and the relation of the Jewiſh legiſlator, the firſt known hiſtorian, to eſtabliſh the reality of an univerſal deluge. The reſult of the compariſon, and of an eſtimation certainly not partial, of antient chronologies fixes that event to an epoch which cannot be removed beyond 3500 years before the Chriſtian æra. Strong indications and teſti-

 monies

monies of much greater weight than thoſe chronologies concur to prove that this date preſented by Mr. Bailly in his laſt work as the moſt probable, is yet too high by ſeveral centuries. But I ought not to paſs under ſilence a prior ſyſtem of this ſame author better adapted to the generality of readers, and of courſe better known, of which I have hitherto had occaſion to ſpeak only in a curſory manner. Though his laſt work ſeems amply to contradict and invalidate his firſt pretenſions, yet whatever has fallen from ſo celebrated a pen certainly deſerves to be conſidered in the diſcuſſion which I have undertaken. Shortly after the publication of the famous epochs of nature by Mr. de Buffon, Mr. Bailly, who both by the fire of genius and by ſeducing eloquence was well calculated to be the diſciple and emulator of that celebrated naturaliſt, undertook to ſupport his ſyſtem by the teſtimony of hiſtory. Notwithſtanding the pretended certificates of nature herſelf, invoked by the former with all the authority of an infallible interpreter, he felt how much the direct contrary depoſitions of hiſtory might invalidate thoſe aſſertions, if theſe could not be conciliated with, or reduced to be at leaſt ſomewhat leſs unfavourable to, the ſyſtem. In this eſſay, thoſe ſame antique traditions to which I have ventured to appeal as proofs of that great revolution operated by the deluge being of no very high antiquity, ſeem under his ingenious pen to concur in throwing it not only beyond all exiſting annals, but beyond all calculable date. They will, according to him, confirm that conſtant and imperceptibly ſlow refrigeration of the earth, and that firſt reſidence of man under the

poles in times far antecedent to all hiſtory, and even to the eſtabliſhment of all nations now known, contended for by his maſter; they would in fact exclude, though not an antient prevalence of waters upon the earth, yet ſuch a general deluge as is generally underſtood. It is clear, that according to Mr. de Buffon the reign of waters muſt have preceded the birth of man ſeveral thouſand years, and that ſince that epoch they never could have covered the entire earth. If Mr. Bailly does not openly deny a deluge poſterior to the exiſtence of the human race, which he cannot but own a prominent feature in all theſe traditions, he ſufficiently inſinuates that it is only to be underſtood of the inundation of an iſland the firſt dwelling of men; or even that this ſo general idea aroſe only (the ice having in length of time intercepted all communication with it) from the ſuppoſition of thoſe men who had already ſettled on the continent, that it was really loſt and ſunk in the waters. I ſhall not diſſemble, Sir, that I have ſome reaſon to dread a conteſt with ſuch an antagoniſt, combating with my own arms in ſupport of a ſyſtem which, in your country in particular, and in all countries amongſt thoſe who think it a mark of wiſdom to reject all antient opinions under the name of old prejudices, has received ſo much weight from the authority and impoſing eloquence of the French Pliny; but I truſt in the goodneſs of my cauſe. I hope to prove from Mr. Bailly himſelf, that all that I have advanced in my firſt letter is ſtrictly conformable to the only true and natural ſenſe of thoſe paſſages in antient authors, which we have both quoted; and notwithſtanding the

opinions

opinions of ſeveral modern naturaliſts, I hope hereafter to demonſtrate, that my theſis is neither weakened nor contradicted by the real phyſical monuments of nature.

Mr. Bailly, in his enquiries into the ſtate of antient aſtronomy, had obſerved that ſeveral antient nations, as the Egyptians, Chaldeans, Indians and Chineſe, though ſeated at great diſtances from each other, poſſeſſed ſeveral aſtronomical formulæ common to them all. He alſo found ſeveral learned periods equally eſtabliſhed amongſt them, and particularly that of ſix hundred years, which he alſo remarked to be in uſe amongſt the Tartars, amongſt whom he ſuppoſes a ſtill more profound knowledge of aſtronomy than was even poſſeſſed by any of theſe other nations. It appeared alſo, that all theſe people employed theſe rules and formulæ in the ſame manner as ſeveral of our workmen make uſe of certain mechanical or geometrical rules without any knowledge of the principles on which they are founded. For ſo many ages the learning of all theſe nations has been ſtationary in this reſpect; they neither invented nor dived further; they only traditionally preſerved what had been handed down to them. From thence Mr. Bailly concludes that theſe people were not inventors of this ſcience, but ſimply and blindly followed what they had learnt from ſome more antient and more learned nation. The concluſion ſeems perfectly juſt; and Mr. Bailly, with all the ardour natural to him, ſet himſelf to ſearch into the archives of antiquity, to find the traces of this learned antient nation, firſt in-

ſtructor of all others, whoſe memory ſeemed to him to be loſt. Plato furniſhes him with the firſt intelligence of it. That philoſopher, from the traditions of the Egyptian prieſts, ſpeaks of an iſland ſunk in the ſea, and of a loſt people, which he calls Atlantis and Atlantides. Mr. Bailly ſeizes this idea with that enthuſiaſm which belongs to heated genius, and purſues it with that rare ingenuity which he had received from nature. He ſeeks the origin and follows all the footſteps of this pretended nation with incredible zeal. By the help of great erudition he opens to himſelf a road through ſurrounding difficulties, which, by the charms of ſtyle, and a thouſand ingenious remarks, he has every where ſtrewed with the moſt agreeable flowers. An analyſis muſt neceſſarily be dry; let us however try, through all this erudition and theſe flowers of eloquence, to follow cloſely the thread of this new labyrinth. However leſs agreeable, in order to form a right judgment, it will not be improper to follow his reaſonings ſtript of all thoſe adventitious ornaments with which he has environed them. We ſhall ſee confirmed many of thoſe traditions which I have already occaſionally cited with ſeveral others which I had not mentioned: this will make this extract rather long; but it is neceſſary to examine thoſe firſt ſources from which we have both of us drawn.

According to Plato, a learned prieſt of Egypt informed Solon, that in the temples of Sais in Lower Egypt were preſerved the records of 8000 years ſince the deluge, and that 9000 had elapſed

from

from Uranus to that diſaſter. He told him that, the gods having divided the earth amongſt them, the iſland Atlantis fell to the lot of Neptune. The god found in it one ſingle man Evenor, and his wife Leucippe ſprang from the earth. He married their only daughter Clito, of whom he had ten ſons. He divided his dominion into ten parts amongſt his ten children, of whom Atlas was the eldeſt, and gave his name to the iſland. He and his poſterity reigned with glory in this country of delights, whoſe plenty and riches were never equalled. Its inhabitants were wiſe and virtuous, and were governed each in his diſtrict by Atlas and his nine brothers. Theſe ten chiefs aſſembled every five and ſix years alternately, to deliberate on general concerns, and to ſacrifice to the gods. But this purity of manners of the firſt Atlantides continued not long; they became corrupted, and Jupiter reſolved to exterminate them. The Egyptian prieſt added, that theſe iſlanders, proud of their power, after having ſubdued Libya and all Europe as far as Tyrrhenia, attempted the conqueſt of Egypt and Greece *(a)*; that the Athenians alone reſiſted, and at length triumphed over them; but that in later days there happened earthquakes and great inundations of water, which in one day and night ſwallowed up all the Grecian warriors, whilſt at the ſame time the iſland of Atlantis diſappeared in the ſea. This iſland was ſituated beyond the columns of Hercules, in the weſtern ocean, and was larger than Libya and Aſia together.

Diodorus

Diodorus of Sicily tells us that the Atlantides inhabited a maritime country in which the gods were born. Uranus ſon of the heavens was their firſt king. Amongſt his children were Hyperion, Atlas, and Saturn. The virtuous Hyperion was aſſaſſinated by theſe two brothers. After his death the children of Uranus divided his empire amongſt them. The moſt renowned of theſe were Atlas and Saturn. The maritime countries became the lot of Atlas, who had a virtuous ſon called Heſperus, who was taken up into the air by the winds, and never more ſeen. Maia one of his daughters had, by Jupiter, a ſon called Mercury inventor of letters. The reſt of the Atlantides had alſo illuſtrious ſons. Some of theſe built cities, and others were the fathers of nations. The reign of Saturn was the golden age, and Juſtice was born under him. He reſigned his kingdom to Jupiter; but he ſoon after leagued with the Titans and giants, fierce ſons of the earth, to dethrone Jupiter, who remained conqueror. Diodorus connects the hiſtory of theſe gods with that of Egypt.

Sanconiatho *(b)*, a Phrygian hiſtorian, who is ſuppoſed to have lived before the Trojan war, and to have drawn his accounts from the books of Thot the father of hiſtory, preſerved in the temples of Tyr and Biblos, begins his with the origin of the world formed from Chaos. As yet there exiſted nothing, ſays he, but the breath and ſpirit of a dark air, a chaos full of confuſion and without light. This ſpirit falling in love with Chaos produced Love, and thence mud,

whence all beings proceed. Matter becoming ſuddenly enlightened, the ſun and all the ſtars appeared; the earth and the ſea became inflamed, and from theſe came the winds, clouds, and rain. The mixture of all theſe things produced lightnings and thunder. At this noiſe the animals, as awakened from a profound ſleep, began to move upon the earth. From night and wind were born the firſt mortal man and woman, authors of mankind. He afterwards gives an account of the firſt races of men, and reckons ten generations to the deluge. Uranus, Chronos or Saturn, Thaut or Mercury, Atlas and Jupiter, were of this number; one of the ſons of Uranus is killed by his brother; Mercury invents letters. He ſpeaks not, it is true, of the Atlantic nation, becauſe he attributes all theſe heroes to Phrygia.

In deſpite of Plato, who fixes the Atlantides in an iſland beyond the ſtreights which Hercules opened, notwithſtanding Mount Atlas, and the ocean which bears their name, and the conqueſt of Libya in their neighbourhood, Mr. Bailly not finding any traces of this learned and conquering people in burning Africa, and according to his ſyſtem then too burning to be habitable, tranſports them ſuddenly into the midſt of the continent to the foot of Mount Caucaſus. Hercules was not leſs known in Aſia; two columns were dedicated to him in his temple at Tyr. The Sun, ſometimes figured by that god, by Apollo, Adonis or Oſiris, was adored throughout all Aſia. His worſhip is even derived from Scythia: the proof is at hand. In the adoration paid to the Sun, to Apollo or Oſiris, their death or their abſence

abſence was deplored during 40 days in Egypt, and during ſix months in Phœnicia. This muſt be an inſtitution of northern countries, in which, according to latitudes, the abſence of the ſun was regretted for theſe periods. Atlas and Hercules were known to the Hyperboreans, and from them their gods as well as thoſe of more ſouthern nations are deſcended. Apollo hid his arrows behind the Hyberborean mountains, Prometheus is chained to Caucaſus. From all this Mr. Bailly thinks himſelf entitled to abandon the Atlantic ocean, a name which he obſerves the antients beſtowed equally on the red and frozen ſeas, to place his choſen people in the north.

Not content with tranſporting the Atlantides beyond Phœnicia and to the foot of Caucaſus, Mr. Bailly ſoon contrives to overleap theſe mounds, and, under another name, will find means to ſettle the Atlantides beyond them. In Perſia too are found the traces of a nation prior to all others. The Perſees, deſcendants of that antient people, as yet preſerve their antique traditions, of which the following is a ſummary:

Before the formation of Adam God created the Dives. Theſe were giants, who reigned 7000 years. They became wicked, and were conquered by the Peris, who were beneficent fairies, and reigned 2000 years under their king Gian-ben-gian. They too became corrupt; and on account of their crimes Eblis, or the Devil, was ſent by God to expel them, and confine them in the remoteſt corners of the

earth. After their diſperſion Soliman Haki was the firſt king, and nine generations reigned after him. Caiamurath was the firſt king of Perſia. He ſupported the remainder of the Peris againſt the Dives, who lived beyond the mountains of Demavend, of Caf, of Gog and Magog. Siameck ſon of Caiamurath was killed by giants. That king cauſed his body to be burnt, and thence the origin of the worſhip of fire. The kings of this firſt dynaſty were called Piſchadians. After the extinction of this race Caicobad, who was however deſcended from it, founded a new dynaſty. It is alſo ſaid in the traditions of this country that Surkage, a dives and giant in the days of Adam, reigned over the mountains of Caf. He obeyed the orders of God, and ſubmitted to the father of men; he forbad his ſubjects to moleſt the deſcendants of Seth, who at his requeſt ſent him Rucail his brother, and another ſon of Adam verſed in all ſciences, to enlighten him and govern his dominions. It was in thoſe times that Caiamurath began to reign.

From theſe premiſes Mr. Bailly concludes that the Dives and the Peris were originally from the north, beyond Caucaſus; a mountain whoſe prolongation, under the names of Demavend, of Caf, and of the ramparts of Gog and Magog, bounds all Tartary from the Caſpian ſea to that of Corea. The denomination of Caſpian gates, of ramparts of Gog and Magog, given to parts of this chain, the walls of China and Corea are, ſays he, unqueſtionable teſtimonies that the nations already eſtabliſhed to the ſouth of thoſe bulwarks, natural or artificial,

artificial, were ever employed in repelling the efforts of thoſe powerful and numerous nations, who in their turns endeavoured to paſs them. To me I own it only ſhews that the cultivating nations of the ſouth were obliged to be upon their guard, as is ſtill the caſe, againſt the depredations of wandering ſavages on the other ſide. According to our author, though ſurely that is nowhere intimated in the above paſſage, both nations were originally from the north of thoſe mountains. In theſe conflicts one of theſe nations was almoſt entirely deſtroyed. From the remnants however of this antient root are iſſued all the nations ſince known in eaſtern Aſia. Perſia, Thibet, Indoſtan and China from it inherited the ſciences they yet poſſeſs. The laſt ſite of this learned long loſt nation he fixes amongſt the lateral branches of Caucaſus to the ſouth. The lamas of Thibet and of Siberia, as far as Selinginſkoi, are the true bramins, the ſole lineal and unmixed deſcendants of that venerable race. Thoſe ſtill ſcattered in India yet make pilgrimages of devotion to their antient ſeats on the banks of the Jeniſea. The Sanſcrit language, foreign, ſays Mr. Bailly, to India, ſhews that the bramins are not originally of that country. The ſacerdotal language in Egypt, as well as in India, was different from the vulgar tongue: in both countries this will only prove that the prieſts preſerved immutable the language of their ritual, whilſt that of the nation gradually altered, as has happened in every other country. The immemorial worſhip of fire in Perſia and other places indicates, ſays he, a northern inſtitution. But why northern, if the north in thoſe antient days needed not adventitious

titious heat? Such are Mr. Bailly's *proofs* of the northern extraction of the Perſians and the Indians; and he contends for a like origin to the Chineſe in the following manner: A princeſs called Nanca, who came from the 62d degree of north latitude, founded the city of Nankin. The names of Gog and of Magog, of Gin and of Maggin, of Tchin and Matchin, are ſynonymous in the oriental languages *(c)*. The province of Chanſi was the firſt inhabited: conſequently the firſt inhabitants of China came from the north. Thus we ſee, ſays he, that the Chineſe, the Indians and the Perſians ſet out from that line of circumvallation traced throughout all Aſia by Caucaſus. The Grecian traditions lead the ſteps of the Atlantides to that ſame line. This chain was not only a bulwark, but a common origin. It muſt be owned however, that it is only by inverting the Grecian traditions that we can bring the Atlantides from thence. But the people of Gog and Magog, purſues Mr. Bailly, inhabited both ſides of theſe mountains, for the particle *ma* ſignifies on this ſide. It denotes the Peris retrenched behind theſe ramparts conſtantly employed in repelling the Dives endeavouring to paſs them.

In his rapid courſe Mr. Bailly aſcends the great platform, the elevated grounds of Tartary. Theſe vaſt platforms, extending from the Caſpian ſea to China, are divided by the lateral branches of Caucaſus into ſeveral diſtricts and vallies. From theſe high grounds the Indus and the Ganges fall into the Indian ocean; the yellow river takes its courſe towards the eaſtern ſea of China; from thence pro-

ceed all thoſe mighty rivers which run into the frozen ocean. It is on theſe high platforms that now wander the Eleuth, Uſbec, Kalmouck, Kalcas, Mantchoux and Mongol Tartars. Theſe high countries are conſequently cold, want water and culture. They are thinly peopled in proportion to their extent: but he aſſerts that theſe preſent ſolitudes were the former ſcenes of an enormous population, from whence prodigious ſwarms of men have deſcended to overrun the earth. The depopulation cauſed by theſe emigrations may have occaſioned, for want of cultivation, a ſterility which was not felt in thoſe times when a numerous people cultivated the country: but that cauſe is inſufficient; the antients called the north the nurſery of mankind: it was conſequently once more fertile, it enjoyed a happier temperature than at preſent. Men multiply not ſo faſt there in theſe times, ſince they ſend not forth, as formerly, numberleſs and repeated ſwarms. If theſe are contained by more warlike Europe, the effeminate people of Aſia are not more able to prevent their inroads than heretofore. The real cauſe is then in the gradual cooling of the earth itſelf. Men advanced from the extremeſt north by following up its rivers to theſe high grounds: as their numbers grew too conſiderable, or as the climate of theſe elevated regions became too cold, they deſcended down thoſe rivers, which conducted them to China, to India, Perſia and Syria.

Having thus recogniſed the ſituation of the Tartar countries, our author interrogates their inhabitants concerning their antient traditions.

tions. Here follows their anſwer by Abulghazi, Khan of the Uſbeck Tartars, who reigned in Choraſan in the laſt century, and who wrote the hiſtory of his nation from their traditions and original records.

Theſe Tartars whom we deſpiſe, ſays Mr. Bailly, have preſerved their genealogies, and carry them up to Noah; if they go not higher, it is becauſe they are ſtopped by the deluge. He might have added, that they are not ignorant of that deluge, or of the generations from Adam to Noah preceding it. Theſe people follow paſt times by regular generations and connected events. None except the Arabs are ſo jealous of their genealogies. According to the Tartars, Japhet ſon of Noah firſt peopled the banks of the Jaick and Wolga to the north of the Caſpian ſea. He was ſucceeded by his ſon Turk: he is the father of that nation which in the eaſt is more commonly called Turk than Tartar: this laſt is only a branch. Taunak, ſon and ſucceſſor of Turk, was contemporary with Caiamurath, whom the Perſians erroneouſly ſtyle the ſon of Shem. This connects this hiſtory with that of Perſia. The fifth ſucceſſor of Turk was Alanzi Khan. It was under his reign that his ſubjects, effeminated and debauched by plenty, forgot the true God for the worſhip of idols. Our author remarks this plenty as a proof of the antient fertility of the country. It might be anſwered, that this, as yet very ſmall nation, ſo near its origin, could not then want paſturage, ſole riches of this ſoil. But let us proceed. Alanzi had two ſons, Tatar and Mogul

gul or Mongol. Here the Turkiſh nation ſplits into two branches, into two empires, the one formed to the eaſt by Tatar, the other to the weſt by Mongol. Ogutz, grandſon of Mongol, obtained a great reputation, and aboliſhed idolatry in his domains. It is with his reign that a ſettled chronology begins. Four thouſand years elapſed between Ogutz and Gengis-Khan, and Ogutz is thereby placed 2824 years before Chriſt. Ogutz was a conqueror, and ſubjected Tartary, China, and Perſia. Mr. Bailly imagines theſe roving Mongols made not any permanent conqueſts, as he finds no traces of ſuch, but that they are the ſame people with the Dives. This Mongol empire at laſt yielded to the efforts of the Tatars, for ſo they are properly called. The ſeventh deſcendant of Mongol was killed by the ſeventh ſucceſſor of Tatar. Kayan ſon, and Nagos nephew, of the former, eſcaped almoſt alone the ſlaughter, and took refuge in Igna-cou, a valley ſurrounded by ſteep mountains. Their ſucceſſors becoming more numerous endeavoured to eſcape from this kind of priſon: by means of fire they made a paſſage through a mountain compoſed of iron. They yet celebrate an anniverſary, when they light a great fire in which a piece of iron is melted *(d)*. Theſe two mother branches of Tartars ſtill ſubſiſt round the borders of China under the names of Mantchoux and Mongols. They have ſent colonies to all parts; amongſt theſe are the Hungarians and Bulgarians. Hence our author concludes that all nations come from beyond Caucaſus.

In this ſame Tartary Mr. Pallas has juſt made for our author a happy diſcovery of another antient loſt people. He heſitates not, at the expence of his former favourites the Atlantides and the Peris, to adjudge to this new acquaintance the palm of antiquity, and of wiſdom, and the treaſure of original ſciences. It is their ſtill more northerly ſituation which procures them this complaiſance. Tradition has given to this people the name of Tſchouden or Tſchoudaki. Happily too ſome learned man has alſo given to the antient Finlanders, though ſituated at 900 leagues diſtance, the ſame name; they were then a colony of theſe old Tſchoudaki of Kraſnojarſk on the banks of the Jeniſei. They may have extended ſome branches even to Switzerland, where yet exiſts a noble family of the name of Tſchoudi. This family ſurely owes ſomething to Mr. Bailly, who thus beſtows on it ſo antient an origin, perhaps juſt as well proved as that of many others. In the mountain of ſerpents (Schlangenberg) near the Irtiſh this antique race had worked mines, and their inſtruments of braſs and ſtone are yet to be found; but in their burial places near Kraſnojarſk are found inſtruments, arms, and ornaments in braſs and gold, figures of animals caſt in braſs and in gold well finiſhed. They repreſent elks, rein-deer and ſtags, but yet nothing is found in iron. Theſe different relics teſtify the ſtate of the arts amongſt the people who depoſited them. The firſt ſeat of this nation has been near the Irtiſh, the ſecond near the Jeniſei. The Mongols have from time immemorial known the uſe of iron, the Tſchoudaki are therefore more antient. What moreover proves their high

high antiquity is, that in theſe mines the props that ſuſtain them are petrified, and this petrifaction ſometimes contains braſs and gold. A ſufficient time muſt then have elapſed ſince the mines were worked, for nature to have formed theſe metals, whilſt time has deſtroyed the ſtones with which the buildings of a poliſhed and numerous nation muſt have been built, before it fell into that luxury which the working of mines ſuppoſes. But here our author ſeems to have forgot what Mr. Gmelin tells us, that the moſt ſavage people of Ruſſian Tartary, who rove about with no other habitation than occaſional huts, have, notwithſtanding, the art of melting and forging even iron in little furnaces erected in an inſtant, which our beſt artiſts would perhaps be puzzled to imitate. If thoſe people made uſe of braſs and gold, it was becauſe theſe metals are more generally and eaſily found in thoſe parts. Is it very neceſſary to look after the remains of ſumptuous edifices for theſe Tſchoudaki? He ſhould not have told us the ſpecies of animals whoſe repreſentation theſe very antient people have left us in their burial places. They lived according to him in times when that country, at preſent frozen, was fertile, and proper to produce and nouriſh a great population, and enjoyed a climate at leaſt temperate if not hot. It was the exceſs of population which forced them to travel up the northern rivers, in order to ſpread themſelves over the cooler high grounds amongſt the mountains of Caucaſus, from whence they afterwards deſcended. According to the principles of Mr. Bailly, thoſe repreſentations ſhould have been of bulls, of horſes, camels, and even elephants,

inſtead of rein-deer, which cannot live but in ſuch cold countries as the preſent Lapland. Theſe repreſentations alone prove on the contrary, that theſe countries were then as cold as at this day. But no matter: this unknown and loſt people, of which Mr. Pallas brings tidings, is the moſt antient of the globe. They cultivated the ſciences; and though they have not made ſo much noiſe as others, they were wiſer; they extended themſelves by peaceful colonies, and not by ſanguinary conqueſts. It is true we cannot give them all the honour of ſuch wiſe conduct; they were alone on the earth, and had the ſoil only to ſubject by cultivation.

The derivation of languages *(e)* indicates the origin of nations, and Mr. Bailly forces the Greeks, the Phrygians, and all known people, to do homage to his new favourites. Their deſcendants the Finlanders, who yet preſerve their language, celebrate a feſtival called Ioulu. The Athenians, according to Suidas, had one called Ioleia in honour of Iolaos, and certain hymns to Ceres were by them named Oulos and Ioulos. Alphabets will ſerve to range nations into diſtinct families. He perceives two principal ones: the family whoſe alphabet was at firſt compoſed of 16 letters, and that whoſe alphabet was compoſed of 20 or more. The Phœnicians, the Phrygians, the Etruſcans, the antient Greeks and Latins, the people of the north, the Icelanders, the Teutons and antient Swedes are of the firſt. The Sanſcrit language, that of the Zenda and the Pehlvi have 20 letters; theſe then belong to a different family in a more ad-

vanced ſtate: the Indians and Perſians deſcend from this. The manners and religion of the Phœnicians and Perſians, though pretty near neighbours, were as different as their languages. The Phœnicians on one hand, the Perſians and Indians on the other, though iſſued from the ſame ſource, as we are well aſſured by a conformity of traditions and aſtronomical principles, then left their original ſeats at different epochs, the Phœnicians ſooner, the Perſians and Indians later and in more poliſhed times. Pergamus, the Phœnician name of Troy, is a northern word from Bergh or Berghen. Scaphe in Greek, ſcapha, ſcyphus, in Latin, are derived from ſchiphi or ſchypré (veſſels) in the northern languages: the Engliſh call them ſhips, and the Curules to the north of Kamtchatſka tſhip. The Theban Hercules was called Alcæus: it was only in conſequence of his beneficent labours that that of Hercules was conferred on him as a title of honour; the true Hercules was of Phœnicia, or rather of the north. Herſull or Herculle in Swediſh ſignifies a chief of warriors. Hercules was alſo an emblem of the ſun; that worſhip comes from the north; he was of the family of the Atlantides; conſequently the Atlantides were a northern people.

The antients vary as to the real country of the pretended Amazons. Some place them in Africa, and make them travel thence as far as Caucaſus; others make them neighbours to the Scythians. It was in Africa alſo that ſeveral placed the gardens of the Heſperides, and the name implies a weſtern ſite; but others in an iſland ſurrounded

rounded by darkneſs, and conſequently according to our author in the north; and he, without pity, exiles them with their golden apples into an iſland of the frozen ſea. The ſcene of almoſt all antient fables will alſo be found in the north, though unjuſtly uſurped by the Greeks. It had been thought that Homer placed the infernal regions in the weſtern ocean: as the antients believed that the ſun ſet in that ocean beyond their horizon, it cannot be wondered that they ſhould paint all beyond it as immerſed in darkneſs. But this darkneſs recalls to Mr. Bailly the polar nights, and of courſe it was there Ulyſſes ſought the entrance of hell. The better to ſupport this conjecture, the ingenious author ſeeks and finds in ſome of the northern tongues the roots of the names of the infernal rivers. Pluto, the boat of Charon, in theſe find their etymologies, as well as Minos and Rhadamanthus. All the old heroes of fable ſprang from the north. Their antient country muſt however be more expreſsly pointed out, as well as that of the Atlantides and Dives, and of that antient nation who fought againſt them. Plutarch will diſcover it to us; it is the iſland of Ogygia. That iſland, ſays this author, is diſtant from England about five days navigation towards the north weſt: near it are found three others, in which Jupiter detains Saturn a priſoner: the giant Ogyges or Briareus is ſet there to guard him. The great continent is diſtant 500 ſtadia from Ogygia. A multiplicity of rivers run down from it into a great bay oppoſite the Caſpian ſea. According to Mr. Bailly, theſe four iſlands are Iceland, Greenland, Spitzberg, and Nova Zembla; the bay is the gulph of

the Oby. Plutarch ſays that their antient inhabitants lived in them with Hercules, and mixing with the people of Saturn renewed the Grecian nation. Some of theſe iſlands are inhabited by Greeks, and they have one day in ſummer in which the ſun is ſcarce an hour below the horizon for a month. In that month part of the inhabitants go over to Saturn's iſland to ſerve, during 13 years, the god detained there in a profound ſleep; captivated by the fertility of the ſoil and the ſoftneſs of the air, they generally fix there for life. In ſpite of Grecian vanity, which has appropriated every thing to their own country, here, cries Mr. Bailly, truth breaks out. Saturn reigned not in Italy, nor Jupiter in Crete, nor the Atlantides originally in Africa; their firſt ſeats as well as thoſe of the Greeks were in the frozen ſea. The memory of the fine climate theſe parts of the north, now frozen, once enjoyed, is a complete proof of the gradual cooling of the globe. From thence therefore iſſued both the Atlantides and their Greek antagoniſts. At different times they paſſed over into the northern continent of Aſia, from thence to Mount Caucaſus and Caf, which they paſſed in defiance of the oppoſition of ſuch as had already preceded them, to ſpread themſelves afterwards over ſouthern Aſia and Europe. The oriental traditions confirm the fact. They talk of a dark region in which are ſituated the fortunate iſlands and the fountain of life, beyond the mountains of Caf; of a dry land long ſince inacceſſible, where was the terreſtrial paradiſe. That earth on which we live, ſay they, is ſurrounded by the ocean; but beyond that ocean lies another land which touches

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the walls of heaven, where man was created in a paradiſe of delights. It was during the deluge that Noah was carried by the ark to that earth which his poſterity now inhabits. The Greek and oriental fables then unanimouſly indicate the origin of the Atlantides, and the antient ſeats of a loſt people. If theſe corrupted Atlantides are the ſame as the Dives, if thoſe deſtructive Dives came from thoſe once fertile iſlands, they were alſo the original countries of the Peris, thoſe fairies who ſaved us. In thoſe times, when the internal heat of the earth was greater, and exceeded much more than at preſent that which is derived from the ſun, theſe regions under the pole were the Elyſian fields, the terreſtrial paradiſe, the land of fairies, where Saturn reigned in a golden age.

It is from theſe traditions thus interpreted that Mr. Bailly thinks that he has ſufficiently proved that all nations originally came from the north, and even from the frozen ſea. He plumes himſelf on having fortunately diſcovered five primitive nations inſtead of one he ſought for. Theſe are the Atlantides and Dives, the Greeks and Peris, and the Tſchoudaki ſo luckily found out by Mr. Pallas. It is however poſſible, ſays he, that the two firſt were of the ſame race, and the three laſt one and the ſame nation, ſucceſſively perhaps emigrated from their happy iſlands; ſo that we may not in fact have more than two really diſtinct nations. He is inclined to think that the Tſchoudaki, too multiplied on thoſe propitious iſles, were the firſt who landed on the Aſiatic continent. Corrupted by the delights

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of the delicious plains of the Jeniſei, they were not able to reſiſt the Atlantides, who for the ſame reaſons had followed them to the continent. Flying before theſe, they firſt retreated to the high grounds of Tartary, where they cultivated the ſciences and aſtronomy, and whence they ſent colonies into Thibet, and thence to Indoſtan and China. The Atlantides, preſſed in their turn by other emigrants from thoſe iſlands (the prolific nurſeries of mankind), at length almoſt totally deſtroyed this firſt nation; and the Bramins, who took refuge in Thibet, are the ſole remains of this moſt antient ſtock. Theſe people, the Peris, and the firſt Greeks were the wiſe and primitive preceptors of the continent, the adorers of the true God under the emblem of the heavens or of fire. Their enemies the Atlantides at length forced the ramparts of Caf, and ſpread themſelves in Syria, in Phœnicia and Greece, where they left their falſe gods, their feſtivals and fables. They are thoſe conquering giants who overran the weſt of Aſia and Europe under Bacchus or Oſiris. The origin of nations is then far removed beyond the earlieſt records of hiſtory which have come down to us. Two thouſand years have had little or no effect on the temperature of the earth. Theſe antique nations, whoſe names have ſcarcely ſurvived, exiſted in thoſe ages when the northern polar circle was yet, on account of the ſuppoſed extreme heat of the earth, the only habitable region; judge then of their high antiquity. Certainly it will carry us not only beyond the higheſt Egyptian computations of time, but to ages almoſt infinite. Mr. Bailly draws not the conſequence, but it is ſelf-evident.

This conſequence is very different from that which I have drawn from ſuch of theſe traditions as I have examined in my firſt letter. From them Mr. Bailly concludes an almoſt infinite duration to this world; to me they appeared to confirm the writings of Moſes, which reſtrict it to a comparatively very limited term. Permit me again curſorily to run over theſe antient traditions, and examine which of the two conſequences will moſt naturally follow from them.

It is true that the Egyptian prieſt of whom Plato ſpeaks gives 8000 years from the deluge to the time of Solon. We have already ſhewn what ſtrong reaſons there are to believe that Egyptian vanity had placed ſucceſſively dynaſties, many of whom had reigned at one and the ſame time over different diſtricts of that country; and we have plain evidences of their having greatly antedated facts of pretty recent date. We have ſeen too, and we have Mr. Bailly's own teſtimony for it, that in the firſt periods of their hiſtory years are to be computed by lunar and not by ſolar revolutions, which by his own avowal in his laſt publication reduces this long period to nearly one fourth. From Uranus to the deluge we find not only in Plato but in the Perſian traditions, another period of 9000 years reduced to about or leſs than 2000 by the Moſaical chronologies. But if any weight is to be given to theſe perhaps entirely fictitious periods, it will not be difficult to divine from whence they have thus been exaggerated beyond the truth. The lives of the antediluvian patriarchs

were generally extended to about 900 years. If the ten generations which preceded the deluge are placed, as has been done in the Egyptian dynaſties, ſucceſſively inſtead of collaterally, we ſhall find the ſame reſult of 9000 years. In the progreſs of ſuch antique ſtories the miſtake will ſurely not be improbable. To conclude this point, we have Mr. Bailly's own authority to ſettle this antediluvian period to between 2000 and 2400 years.

Let us now advert to the facts which fill theſe ſeveral ſpaces of greater or leſſer duration. Mr. Bailly's forced and unnatural conſtructions of theſe ſeveral traditions need only to be expoſed to evince their futility. Uranus, Saturn, Jupiter, Neptune, Hercules, Bacchus and Oſiris, whether they were originally emblematical gods or men dignified by theſe ſurnames, are avowedly of Egyptian origin; and it is only by the moſt evident perverſion and inverſion of the fables relating to them that they can be deduced from the north of Aſia, and much leſs from the iſlands of the frozen ocean. The ſtory handed down to us by Plutarch of Saturn and the Greeks in the iſland of Ogygia is too abſurd to merit examination; and even that is too ridiculouſly ſtrained to anſwer Mr. Bailly's purpoſe. The iſland of Atlantis and the Heſperian gardens, violently tranſplanted from the weſtern coaſts of Africa to Spitzberg, is a poetical licence pardonable only to the poetical genius of Mr. Bailly. The Grecian fables of the Elyſian fields and the infernal regions, of Pluto, Charon, Minos and Rhadamanthus, are avowedly fabricated on Egyptian ceremonies

uſed at the burial of their dead, and can only by the ſame licenſe be transferred to the extremeſt north. To ſupport it, Mr. Bailly cites authors who evidently contradict him. Homer ſays that Ulyſſes was tranſported in twelve days navigation from the iſland of Calypſo, ſituated ſomewhere towards the mouth of the Adriatic gulph, to the extremeſt weſtern boundaries of the ocean, where he found the entrance of the infernal regions; and this thus pointedly weſtern ſituation Mr. Bailly is not aſhamed to convert into the northern ocean. From the ſame frozen regions the Greeks are by him derived. That the firſt inhabitants of that country were of northern extraction with reſpect to it, we ſhall readily agree. They were part of the deſcendants of Japhet, who, ſkirting the borders of the Caſpian and Euxine ſeas, firſt penetrated that way into Europe, and were thus related to the Hyperboreans, who in ſtill later times inhabited thoſe parts. But this is very different from deriving them from the frozen ocean, which was little or not at all known to the earlieſt Greeks, and its borders, by them thought uninhabitable from extreme cold.

To dwell any longer on theſe ſtrained interpretations is ſurely unneceſſary. It is time to ſee from what mutilated relics of real facts theſe antient traditions, the groundworks of which are everywhere commemorated in antique annals, can be much more naturally derived. In the traditions of a golden age, in the remembrance of the loſt iſland Atlantis, of the Elyſian fields, of the fortunate iſlands, of the inacceſſible dry iſland, whoſe ſite is by no means determined by

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the orientals to be in the north, but indefinitely beyond or out of the bounds of the preſent earth, we may without any forced conſtruction retrace the memory every where retained of the age of innocence, of a terreſtrial paradiſe loſt to man, of a once different habitation overwhelmed in the waters, and changed from its more happy primæval ſtate. The great cauſe of this ſad change is a prominent feature in all theſe traditions, and, as Mr. Bailly informs us, finds a place in the Chineſe annals, where it is generally ſuppoſed to be leaſt noticed. In all we find, as in Moſes, ten generations of men preceding this great cataſtrophe occaſioned by the crimes of that former race, from which a few only eſcaped to repeople the new world. In Sanconiatho a ſon of Uranus killed by his brothers, in Diodorus the virtuous Hyperion meeting a like fate, Siameck ſon of Caiamurath killed by giants, in the Perſian annals evidently repreſent Abel killed by his brother Cain. In Diodorus, Heſperus one of the deſcendants of Uranus taken up from the earth by the winds recalls the hiſtory of Enoch in ſacred ſtory. Every where, as in the writings of Moſes, giants appear in thoſe times, whether by them are meant men of extraordinary ſtature and ſtrength, or powerful and wicked men. In all theſe annals we find men at firſt virtuous, finally corrupted, and periſhing in a general deluge. Amongſt the Perſians the ſtory of the Dives or the giants, and the Peris or the fairies, ſeems a confuſion between that of the good and bad angels, and the children of God and the children of men. With the Perſians as with Moſes both are at length corrupted, and, except a choſen few, are utterly exterminated.

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The ten generations from Soliman-Haki probably repreſent thoſe which ſucceeded from Adam. A new dynaſty, invariably called the firſt, as that of Yu is in China, but yet iſſued from the Piſchadian race, commences after the extinction of this laſt. Adam, Seth, and Noah preſerve in theſe traditions their Moſaical names. But with the Tartars, as well as the Arabs, not noticed by our author, both equally careful of preſerving their original titles, the names and the genealogies of their deſcendants are found ſtill more nearly correſponding with thoſe of Moſes *(f)*. They derive their origin from Japhet one of the ſons of Noah, and it is to him the ſacred writer attributes the population of northern Aſia and Europe. His ſons or grandſons, Gomer, Turgoma, Gog and Magog, are acknowledged the fathers of all the nations inhabiting thoſe parts of the earth, and from them they take their names. It is from the more faithful traditions of the Tartars that we learn to rectify thoſe of Perſia; and their firſt king is neither, as they ſeem to wiſh to have it believed, the firſt man, nor Noah, but contemporary with the grandſon of the latter. Such are the applications which we think may be fairly made of the general ſubſtance of theſe traditions to the Moſaical narration, and which we preſume ſtrengthen theſe with all the united weight which they can give them. They are partial remnants of a truer hiſtory. It is true they appear in thoſe annals confuſed, and more or leſs disfigured and altered to ſerve the vanity of particular nations; much leſs adulterated however amongſt the ſimpler nations than amongſt the Chaldeans, Phœnicians, Egyptians, and Greeks, where the intereſts of

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idolatry have nearly hidden them under an abſurd addition of fable; but even in theſe laſt ſome principal and leading facts pay homage to the ſimple narrative of the Jewiſh legiſlator.

Mr. Bailly had, as we have obſerved, found amongſt more than one of the moſt antient nations now exiſting, certain rules and methods of calculating eclipſes, ſeveral learned aſtronomical periods, and particularly one of 600 years, which, as the theory is now entirely unknown to them, they muſt have inherited from ſome more antient and truly learned people prior to them all. We have ſeen with what ardour he has rummaged all antiquity to diſcover a loſt antient nation, or at leaſt a name to whom he might attribute this original ſource of wiſdom and ſcience; we have ſeen too with what leger-demain, to ſerve a ſtill more favourite purpoſe, he has, without reſpect to the authors of theſe tales, unmercifully tranſplanted theſe fabulous people from the ſouthern latitudes in which they fixed them to the frozen ocean. Mr. Pallas had in Siberia heard of an extinguiſhed horde called Tſchoudaki. In thoſe ſavage climates, a whole tribe or family exterminated in their cruel wars is, alas! no uncommon event. But this hint is ſufficient for our author to adopt this horde, created by his powerful imagination into a mighty nation, whom he at full pleaſure, ſince no trait in hiſtory can contradict him, adorns with all plenitude of wiſdom, virtue, and ſcience. Their more northern ſituation inclines him even to give this laſt diſcovered people a marked preference to his former favourites, as well in prio-

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rity of antiquity as in excellence. Such are the nations, or rather names, whoſe very exiſtence depends on Egyptian or Perſian legends, or on the tales of Siberian ſavages, whom Mr. Bailly has ſelected to be the great original inſtructors as well as fathers of mankind. But without wading through fabulous legends, or travelling from the Streights of Gibraltar to Spitzberg, Moſes had already offered him an antient people, to whom every early tradition he has cited much more unequivocally refers; who muſt have been the original fathers and the firſt ſources of knowledge preſerved by the few who eſcaped from that general deluge which all of them avow. This people is the whole race of antediluvians, under whatever name they may have been known by various nations. Some perſons, I know not why, ſeem to figure to themſelves this antediluvian race as inconſiderable in numbers and deſtitute of knowledge. But ſurely the middle term of their exiſtence on the earth, 1656 years, is amply ſufficient, under the peculiar circumſtances of that happier age, to have fully peopled the whole earth. It is even probable that men were then more numerous than at preſent, and the calculations which have been made make their numbers at leaſt twenty times greater than that of the actual inhabitants of this new earth. Ignorance is with full as little grounds attributed to them. Moſes is indeed very conciſe, but what little he ſays of them denotes an early poliſhed and civilized people. Cain the ſon of Adam builds the firſt town; Tubalcain was expert in works of braſs and iron; the ſons of Jubal invent muſic and all kinds of inſtruments. Powerful men

ariſe, and luxury is their final ruin. Noah, who with his family was alone ſaved from the wreck, was an expert huſbandman, and before the flood built *(g)* the largeſt ſhip which ever yet exiſted. The dimenſions and particular form for a particular purpoſe were indeed preſcribed to him; but it may be thence fairly inferred, that navigation was not totally unknown. Soon after the deluge, his poſterity undertook to build a tower, the plan of which, however ſenſeleſs the motive, was certainly the moſt vaſt and magnificent ever yet imagined.

The longevity of the antediluvians, probably owing to a more wholeſome ſtate of the earth and a more propitious temperature of the air, certainly authoriſes us to give them more opportunity to acquire a knowledge of the heavens, to repeat their obſervations, and bring aſtronomy to higher perfection. I ſhall ſhew you, Sir, in my next letter, if not with certainty at leaſt with great probability, that the firſt rules and methods of calculating eclipſes, ſtill preſerved in practice by thoſe nations Mr. Bailly mentions, are of antediluvian date, to which in after times their poſterity added certain corrections neceſſary to ſuit with the altered poſition of the globe. Neither Noah nor his ſons were perhaps profeſſed aſtronomers; but they were probably ſufficiently informed of the general theory and practical rules to tranſmit them to their poſterity. The practice thoſe nations, ever remarkable for a ſcrupulous obſervance of their antient

uſages, have retained; but the principles, if ever known to them, have been loſt in the lapſe of time.

From a coincidence in ſound and import of ſome Grecian names to northern languages ſtill in uſe, Mr. Bailly infers a northern extraction. We will readily agree with him, that ſome principal roots both of antient and modern European languages may be traced up to the Celtic, the original language of the ſons of Gomer. Conſidering the mixture which has at various times in all parts of Europe taken place of theſe deſcendants with more ſouthern nations, it is ſurpriſing that ſuch frequent traces of a common origin can yet be diſcovered. But will theſe conformities give the ſmalleſt proof, or ſemblance of proof, that this original language was framed in Spitzberg or Nova Zembla? The firſt language muſt have been inſpired or infuſed; and we are told that Adam, ſoon after his creation, named all the animals of the earth according to their natures. Rouſſeau, who rejects all miracles, merely becauſe they accord not with his notions of philoſophy, yet allows that the firſt formation of a language is incredible and incomprehenſible from the ſole powers of man. Moſes informs us, that before the diſperſion all mankind had one tongue and one voice. In puniſhment of a rebellious attempt which ſeemed to bid defiance to God, and in order to force upon men the command of diſperſing according to families in order to people the earth, their language was confounded. It was probably

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at firſt ſplit into three tongues only; and this might be effected at firſt more by a change of accent and pronunciation than of words. Of various and multiplied conformities in the roots of theſe we have yet evident traces in all languages of the earth, and this will certainly prove one common origin to all. Mr. Court de Gibelin has with uncommon ingenuity evinced this almoſt beyond contradiction, and thence began a new grammar to ſeveral principal languages, from which he meant to deduce one common grammar, which would eaſily lead to the comprehenſion of all languages and dialects. Unfortunately for the world, poverty and death put an end to this laborious enterpriſe, or at leaſt to its publication, for he aſſerts the materials to have been ready. He certainly bid fair to fulfil his promiſe in a very ſatisfactory manner. The conformity will certainly be greateſt amongſt thoſe derived from the three firſt diviſions of tongue; and of this we have the ſtrongeſt proofs in the ſimilarity of roots in the languages of nations diſperſed over immenſe tracts of the globe. Alphabets, or the reduction of ſounds to a certain number of elements, are a later invention, more or leſs improved at various times in different nations, and will ſcarcely be any proof of the diſtinction of nations into families. Whatever inferences may be drawn from the derivation of languages will then certainly tend to corroborate the Moſaical account of mankind, and will by no means ſerve Mr. Bailly as the ſlighteſt evidence of the polar circle being the firſt inhabited part of the earth.

There is yet another part of Mr. Bailly's reaſoning which it behoves us to examine. From the ſucceſſive inundations of men which ſome parts of hiſtory repreſent to us as iſſuing from the north to overrun and lay waſte the earth, he concludes that the north was in antient times the fruitful nurſery of mankind, or, as the Latins called it, *officina generis humani*. It muſt be granted that this denomination, which has paſſed from mouth to mouth, has formed a prejudice in favour of this opinion; but it becomes not philoſophers to adopt any without previous examination.

We know from the example of the ſavages of America, that to the ſmalleſt tribe living upon the produce of the chace, the ſole reſource of cold uncultivated climates, a very great extent of country is required. Somewhat leſs ſuffices for the ſubſiſtence of ſhepherd nations, but yet far more conſiderable than is neceſſary for the ſupport of a ſettled people who apply themſelves to cultivation. The northern Tartars are in the firſt claſs, and thoſe who wander through the vaſt tracts of more ſouthern Tartary are yet to be reckoned in the ſecond. In conſequence, a population which would be very ſmall for a nation of huſbandmen would be too numerous for a country, even in more favourable climes, abandoned to ſimple nature. Soon then muſt theſe inhabitants either exterminate one another, or ſeek a ſubſiſtence for gradual increaſe, by pouring in their ſupernumeraries upon their more provident neighbours; and theſe Tartars, ever wandering and on horſeback, have at all times been as prone to as rapid

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in their invaſions. The ſole profeſſions known or eſteemed in thoſe countries are thoſe of ſhepherds and warriors. Whenever the whole country is overburthened by numbers, neceſſity prompts them to unite in extending the means of ſubſiſtence. Two or three hundred thouſand ferocious men falling ſuddenly, and with that rapidity of march which belongs only to Tartar nations, upon their peaceful cultivating neighbours, naturally diſmayed them, and fear inclined them to ſuppoſe that theſe northern tracts ſwarmed with men. Were it poſſible that all the inhabitants capable of bearing arms, of London or Paris, and of twenty miles in their circumference, ſhould ſuddenly take it into their heads to change their habitations, and emigrate in a body to invade their neighbours; from armies thus numerous, theſe would very naturally conclude that England and France were much more populous than they really are. Three hundred thouſand men form an immenſe army, but a very ſmall nation.

But Mr. Bailly pretends that it was in times very remote, in times when the north well cultivated enjoyed a happy climate, that the polar parts of the earth were the nurſery of mankind. It muſt then have been at a period prior to all hiſtory, to all memory of man. The moſt antient records afford no notices of ſuch early emigrations; thoſe which hiſtory does mention are too recent to approach theſe fancied days of northern fertility. The higher it carries us, the leſs we hear of northern irruptions; nor does it point out the

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ſmalleſt incident from which we can infer that our own climates, or thoſe of Europe, have grown cooler within theſe 1800 years. On the contrary, if any change has taken place, it has been in diminution, not in increaſe, of cold; and the climate of Europe ſeems to be more temperate now than in the days of Cæſar *(b)*. That able obſerver thought it not poſſible that vines ſhould flouriſh beyond Vienne in Dauphiny. Horace tells us that the Tyber was ſometimes frozen over; which never happens in our days. The emperor Julian, who was not ſurely effeminate, ſpeaks of the cold of Paris as inſupportable. For a change to warmth philoſophy accounts. The cultivation of Germania and Gaul, and of more northern countries ſince thoſe times, has ſoftened the rigour of our winters, as a like circumſtance has certainly done in North America. If in ſome centuries hence the whole of Ruſſia comes to be cleared and cultivated, we may venture to predict that the cold of thoſe climates as well as of ours will be ſenſibly diminiſhed. The poſſibility then of the north enjoying that mild climate our author ſpeaks of, is neceſſarily thrown back to an immenſe diſtance of time.

It is not therefore any change of temperature beyond all poſſibility of record which occaſioned the antients to call the north the nurſery of man; frequent irruptions of northern armies, from whoſe numbers they erroneouſly calculated the population of thoſe climates, were the cauſe. Let us therefore examine the dates of thoſe irruptions which hiſtory records. They will not anſwer Mr. Bailly's end;

for they will, on the contrary, ſhew that a much longer time was required to give even ſuch an inferior population as might overburthen ſhepherd nations, than was neceſſary to raiſe it to an overflowing height in cultivated countries and in more propitious climates. In the early periods of Aſiatic hiſtory we hear nothing of northern invaſions; on the contrary, all ſuch proceed from the ſouth *(i)*. During the great power of Aſſyria nothing of the kind appears. The firſt notice we have of any northern irruption is after that power declined, when the Scythians invaded Media, and held poſſeſſion of it during 28 years, in the 609th year before Chriſt. They were expelled; and though that nation was ſufficiently provoked by Cyrus, we hear no more of their ſtirring beyond their frontiers, where cold and deſerts guarded them from ambitious monarchs during the whole duration of the Perſian, Grecian or Roman dominion in Aſia. During all that time, if their numbers became too great for the paſturage which their then country afforded, they muſt have diſburthened it of their ſuperfluous numbers by ſpreading either to the eaſt towards China, or to the weſt in northern Europe. Contrary to the ſuppoſition of Mr. Bailly, all conqueſts, fabulous or real, in the earlieſt times are ſaid to be, or were really, achieved by ſouthern nations. Bacchus, Oſiris, Semiramis, Seſoſtris, ſet out from Egypt or Chaldea. The Aſſyrians, Babylonians, Medes, Perſians, Greeks and Romans, who ſucceſſively domineered in Aſia, were nations ſouth of Caucaſus. But in oppoſition to facts Mr. Bailly aſſerts, that by the unerring rule of philoſophic theory ſouthern nations

tions are unfit for conqueſt and diſtant expeditions. I ſuppoſe he means the nations ſouth of Babylon. But how ſhall we rely on theſe philoſophic reaſonings? The thirſt of dominion will rouſe even the moſt indolent nations into action, notwithſtanding this influence of climate. Some of the former mentioned conqueſts may be fabulous; but he will not ſurely deny thoſe of the Arabs under Mahomet, the moſt rapid, the moſt extenſive, and the moſt permanent that hiſtory records. To this day, as appears by the travels of Mr. Niebuhr, theſe ſame Arabs, under nominal ſubmiſſion to the Sultans, are the real maſters of all interior Aſia, ranſoming at pleaſure even the coaſts under their more immediate command. To find any northern dominion in Aſia, we muſt come down to the 12th, 13th, and 14th centuries after Chriſt, when the Turks and Turcomans ſeized the Arabian thrones, and when Gengiſkan and Tamerlan overran all Aſia, and gave new ſovereigns to Perſia and Indoſtan *(k)*. It was in this ſame 14th century that the Tartars firſt made themſelves maſters of China; and it was in the laſt age that new Tartars again conquered that country, in which they at this day reign.

In Europe, the firſt appearance of a northern invaſion was that of the Gauls who ſacked Rome under Brennus in 390 before Chriſt. That people had ſettled about 280 years before in northern Italy, till that time probably uninhabited. But the riſing power of Rome ſoon checked all farther attempts, and the Ciſalpine Gauls with every other

other Italian nation ſubmitted to the Roman yoke. It was 200 years after that the Teutones and Cimbri, having traverſed Gaul with an army of 300,000 men, again threatened Italy, and were totally defeated by Marius. During the firſt Roman emperors ſome northern barbarians began to preſs on the frontiers of the empire in Illyria, Pannonia and Dacia; but they were yet contained within their limits by its power, and ſerved only to recruit the Roman armies. It was not till the decline of that empire, in the fifth and following ages after Chriſt, that theſe invaſions became frequent and formidable; and that ſeveral northern nations, the Francs, the Germans, the Huns, the Alani, the Goths, Viſigoths and Vandals, ſucceſſively broke in on all ſides on that empire already crumbling under its own weight, and weakened by the corruption and indiſcipline of its armies. In the ninth and tenth centuries the Saxons, Danes, and Normans invaded England and France. However barren the countries from whence all theſe invaders iſſued, yet are we well aſſured that they were leſs cultivated, and conſequently leſs populous, in thoſe times than at preſent. It appears then that the firſt trifling and unconſequential northern invaſions date not more than 2400 years before the preſent times; that the firſt of any importance took not place in Europe until the 5th century after Chriſt; and that no northern nation made permanent conqueſts in Aſia until the 13th century. Every circumſtance recorded in hiſtory proves that the temperature of Europe is not grown colder now than it was 1800

years ago; many indicate the contrary: the great irruptions of northern nations into Aſia are too recent to ſuppoſe the ſmalleſt ſenſible change. Shall we then be told that the happy climates of Spitzberg, Siberia, or Norway, in thoſe ſo very little diſtant days nouriſhed an immenſe and overflowing population? Mr. Bailly will not pretend it. We may then conclude, that no known irruption of northern nations gives the leaſt ſupport to this author's ſyſtem; but that it appears that the barren and uncultivated tracts of northern Aſia and Europe ſufficed, for more than 2000 years after the diſperſion, for the ſubſiſtence of the population which had during all that period been very ſlowly ſpreading itſelf over thoſe immenſe regions. It was not till after that lapſe of time that thoſe countries became overcharged with inhabitants, and that, forced by neceſſity, thoſe barbarians began collectively to preſs on their ſouthern neighbours. It was from their firſt ſucceſs in Media, which they held 28 years, that they firſt began to learn to increaſe by induſtry beyond the pure boon of nature the means of ſubſiſtence; and it was not till they had done ſo that they became ſufficiently populous to be really formidable. The population of all Tartary is ſtill very ſcanty if compared with an equal extent of any cultivated country, and was from internal evidence much more ſo before the times we ſpeak of. The argument founded on an old popular prejudice inſtilled by fear, is therefore not more ſolid than thoſe forced inferences which our author has drawn from antient traditions glaringly perverted

perverted to his purpoſe. That this has been every where the caſe, the ſimple expoſition of his evidences and of his concluſions ſufficiently proves. On the other hand, the conſequences which I had deduced from theſe and numberleſs ſimilar records flow from them moſt naturally and without conſtraint. We can ſcarce diſſemble to ourſelves, that the groundwork of all theſe traditions ſeems originally laid on the ſame foundations with the Moſaical accounts, every circumſtance of which is to be found in ſome one or other of them. Even the proper names made uſe of by that author, although changed in ſome nations by a vanity which appropriated to themſelves the ſuppoſed merit of prior antiquity, or adulterated to connect them with their abſurd mythology, appear without any alteration amongſt thoſe ſimpler nations who have more ſcrupulouſly preſerved their antient traditions and genealogy. In one important point, the atteſtation of a general deluge, all theſe ſcattered fragments concur with the whole general tenor of the hiſtory of man. We have already ſeen that this author, in a later publication, avows that its date cannot be carried with any probability higher than 3501 years before Chriſt. The event itſelf, whether it happened a few centuries ſooner or later, annihilates the whole ſyſtem of Mr. de Buffon, which aſſerts the whole earth to have been in a ſtate of ignition, and that it has been gradually cooling in a ſeries of many thouſand years: whence he deduces the polar circles to have been the firſt poſſible habitation of man, and that from thence all popula-

tion proceeded. All the ingenious ſubtleties of Mr. Bailly fail, as we have ſeen, to give the ſmalleſt ſupport to this chimerical hypotheſis, either from the traditions or hiſtory of man, however diſtorted to the purpoſe. On the contrary, all hiſtory ſhews us that the firſt appearance of great population was in ſouth-weſtern Aſia and the ſouthern countries moſt contiguous to it; that from them, as from a centre, it was ſlowly ſpread to the neareſt, and progreſſively to more diſtant regions; and that this extenſion happened ſo many ages after the date aſſigned by that author for the deluge, that there is thence great reaſon to ſuſpect that it is by him removed ſeveral centuries beyond the truth; that at all times ſince that period the northern parts both of Europe and Aſia have been leſs cultivated and civilized, and conſequently much leſs populous, than the ſouthern. Our own knowledge aſſures us, that the former, though they have gained much in very recent times in all theſe reſpects, by a greater intercourſe with more poliſhed nations, are yet, and are likely to continue ſeveral centuries, proportionably leſs populous than even the climate might permit, and that fear alone could have produced the idea that they at any time nouriſhed an uncommon population. From no circumſtance of tradition or hiſtory can it therefore be inferred, that the north was the original ſeat of mankind ſince the general deluge, or that, as Mr. Bailly contends, all population was derived from thence. From that great event, the only fact concurrently and invariably teſtified by all thoſe traditions to which Mr. Bailly

Bailly has had recourſe, and the date of which they equally point out not to be very antient, the continued and connected traces every where diſcoverable of progreſſive colonization from ſouthern interior Aſia give, on the contrary, the faireſt and moſt unequivocal teſtimonies that the renovation of mankind had there its commencement, and that population was thence ſlowly and gradually diffuſed both over the north and over every other part of the earth.

NOTES

NOTES AND ILLUSTRATIONS

TO

LETTER II.

(a) Page 208.

WITHOUT reckoning an iſland Atlantis in the Gulph of Egina, not far from Athens, there was alſo another iſland of that name between that of Eubœa and the Locrian coaſt, detached as the antients ſuppoſed from theſe contiguous lands by a great inundation; or rather this ſpot remained in the ſtreights when the iſland of Eubœa itſelf was torn from Bœotia by the irruption of the lake of Theſſaly, which according to Herodotus formerly covered the plains of this laſt country. This iſland Atlantis was conquered by the Athenians, but was ſoon after ſunk and almoſt entirely deſtroyed by an earthquake. Is it not this iſland which Plato, taking advantage of Egyptian tales, has tranſported beyond the ſtreights of Gibraltar, in order to give us an ideal hiſtory of felicity ſpringing from virtue, and of puniſhment and misfortune conſequent to corruption? It is true, one ſees not how ſuch an iſland could conquer Libya; but the inhabitants of an iſland in the Atlantic ocean were not more likely to make war on Egypt or Athens. Wars in the weſtern world, yet thinly inhabited, were, in the times we ſpeak of, that is to ſay, about 3300 years ago, little more than the deſcents of reſtleſs pirates who frequently changed their habitations, and made no long voyages, unleſs forced by ſtorms beyond their knowledge. It is then much

more probable that the coaſts of Egypt and the yet village of Athens ſhould have been aſſaulted by adventurers from an iſland in the Egean ſea, than attacked by a great nation living beyond the columns of Hercules. Beyond the interior of Aſia and Egypt, nations, ſome centuries after formidable, were yet petty tribes compoſed of a few families of adventurers. Fifty or a hundred perſons united to ſeek new ſettlements on the deſert coaſts of Europe and Africa, and to ſeize on the firſt country to their liking. Theſe were not unfrequently expelled by ſucceeding ones, and were again forced to ſeek new ſeats wherever they found the leaſt oppoſition. In times much [illegible], in all civil contentions the emigration of the weaker party was the conſtant and ſufficiently wiſe advice of the oracles of old. Such is the whole hiſtory of theſe parts of the world in thoſe times. Can we doubt that the renovation of the human race was little diſtant from them? Some adventurers from the Grecian iſlands of Atlantis were probably caſt on the weſtern coaſts of Africa, and gave the name of their country to mount Atlas and to the neighbouring ſea; as diſcoverers in more modern times have given their own names, or thoſe of their original countries or towns, to much more extenſive regions.

(b) Page 209.

Some have ſuppoſed Sanconiatho contemporary with Joſhua; Sir Iſaac Newton, with more probability, to have flouriſhed about the year 760 before Chriſt. He wrote in Phœnician, and his works were tranſlated into Greek by Philon of Byblos, of which Euſebius has preſerved ſome fragments. However faulty his deſcription of the origin of the world, we cannot but remark ſeveral traits correſponding with the narration of Moſes. It is true the hand of the great architect, of God, is wanting, but the chaos therein mentioned is the abyſs; the wind is the breath of God; the mud he ſpeaks of repreſents the firſt liquid ſtate of the earth. Light is produced, and ſoon after the ſun and ſtars appear. Marine and terreſtrial animals are ſucceſſively animated; and laſtly, the firſt man and woman vivified by the wind or breath of God. The ſame order of production is obſerved. The doctrine

doctrine of Orpheus, as it is preſerved to us in abridgment by Timotheus the chronographer, is, that God, or the firſt being, inviſible and incomprehenſible, author of all things material and immaterial, created, in the beginning, the æther or the heavens, and beneath them chaos, and night or darkneſs, which laſt covered all things under the æther, which, as well as the earth, was by that means inviſible until light, which he ſeems to think God himſelf, piercing through æther, enlightened the whole creation: the Divinity then formed man from the earth, and communicated to him a reaſonable ſoul. This ſyſtem of the creation, as well as that which Ovid ſings, probably taken from the doctrine of the great myſteries, approaches ſtill nearer to the Moſaic account, and is viſibly drawn from the ſomewhat obſcured and mutilated traditions tranſmitted from the firſt men eſcaped from the deluge. As the true religion wore out in the minds of men, theſe were variouſly accommodated in different countries to the reigning mythology, till at laſt ſceptic philoſophy ſubſtituted plaſtic Nature to an intelligent author, and is now again ſtraining every nerve to reduce us to the ſame point. Our advanced knowledge in the admirable concatenation of all exiſting beings, and the avowed inſufficiency of fortuitous Nature to produce one ſingle new entity, or to ſwerve one line beyond the bounds aſſigned to it, are inadequate to repreſs the ambition of framing new ſyſtems, however abſurd. Intoxicated by the pride of ſome fortunate diſcovery in the ordinary courſe of nature, the vain philoſopher thence preſumes to ſcan the power of the Almighty by his own narrow conception: according to the proceſs of his little laboratory, he ſcruples not to meaſure out time to the operations of that Being from whoſe fiat ſhe received her laws, and literally makes himſelf the god of God.

(c) Page 214.

The ramparts of Gog and Magog, ſo often mentioned in oriental hiſtory, ſhew us the firſt ſeats of thoſe children of Japhet called by thoſe names by Moſes and the ſcriptures. From thoſe mountains they deſcended into China, which to this day retains their name. Theſe names ſoftened, as Mr.

Bailly informs us, into Gin and Magin, Tchin and Matchin, by the oriental Tartars and Chineſe, ſufficiently prove the origin of the latter. The denominations of Tching, of Tſing, of Tſin and Tſi, given by the Chineſe to ſeveral of their dynaſties, are further teſtimonies of the genealogical claims of their firſt ſovereigns. We ſee thence, that Moſes indicates to us with no leſs truth the fathers of far diſtant nations than the origin of thoſe who had nearer connections with the children of Abraham. Their deſcendants, unknown to the Jews, and no leſs ſo to thoſe nations who ſucceſſively lorded it over the weſtern world, were only made known to us a few centuries ago, ſtill bearing the very name of that Moſaical patriarch. Mr. Huet, the learned biſhop of Avranches, tells us, that the oriental Scythia of the antients was the country to which the Arabs, who alone in the ſouth retained the memory of antient appellations, gave the name of Gog and Magog. In the moſt eaſtern parts of Aſia, he ſays, the antients placed three nations, the oriental Scythians, who occupied Chineſe Tartary; the Seres, who inhabited northern China, or, as I am more apt to believe, northern India; and the Sinæ, who held the ſouthern part of China. Theſe laſt were faintly known to the Romans by the commerce in ſilk during the reigns of their emperors. The names of Sinæ or Thinæ, indifferently attributed to this nation, are ſuch ſlight variations of Tchin or of Tſin, that we cannot doubt but that the Chineſe were thereby meant, though the Romans were yet ignorant of the true ſituation of their country, undiſcovered till the Portugueſe ſailed round the Cape of Good Hope. In proceſs of time the country of the oriental Tartars was known under the name of Caracathay, or black Cathay, and that of the Seres was called Cathay, the ſame as the Cathæan region of Strabo inhabited by the Chætean Scythians of Ptolemy. In the 14th century ſouthern China was called Mangi, or Matchin, by the Tartars. Thoſe who wiſhed to give an impoſing antiquity to the Chineſe empire, have repreſented it as having from earlieſt times reunited all its preſent provinces; but it is certain that, conformable to this diviſion of the antients, the northern and ſouthern parts of it continued till after that time entirely ſeparate and diſtinct dominions. Northern China itſelf long continued divided into

ſeparate

ſeparate ſtates, acknowledging, like Germany, one titular head of the empire; a diſtinction probably given to the deſcendants of Gog by eldeſt ſons. In one of theſe ſubordinate co-eſtates, Confucius, himſelf of the race of its ſovereigns, was born in 550 before Chriſt.

(d) Page 217.

Cayat was the name of a horde which the Mongol Tartars eſteemed to be the firſt in rank. That horde became extinct; and under claim of ſome alliance Cabal-Khan, great grandfather of Gengis-Khan, added the ſurname of Cayat to his own horde, called Niron. Hence that chief claimed by deſcent, as well as by his exploits, to be Grand Khan of Tartary. That more antient tribe had formerly eſtabliſhed iron forges on a mountain called Arckenchom, whence all Tartary was furniſhed with arms. It was in honour of this horde as general benefactors, and not in memory of the fable Mr. Bailly here gives us, that this feſtival was inſtituted. Vide Petit de la Croix, Hiſtory of Gengis-Khan, taken from Tartar and Arabian authors.

(e) Page 220.

Mr. Bailly would no doubt exult to find, in Captain Cook's third voyage, the moſt probable reaſons to think that the language of Greenland, or, if he pleaſes, of the antient Finlanders or Tſchoudaki, is the mother tongue of all thoſe that are ſpoken throughout the northern parts of both hemiſpheres. It may alſo, as he imagines to perceive, have ſome connection with the Celtic, and thence with the Greek and Latin languages. But this will only render more probable, what Moſes had already told us, that all the northern world was originally peopled by the deſcendants of Japhet. Conjecture againſt conjecture, would it be abſurd to ſuppoſe, as I have already remarked, that only three abſolutely diſtinct languages were formed on the confuſion of tongues, attributed to the three races who divided the earth; and that from theſe three mother tongues all other dialects are derived? Not many years ago, celebrated philoſophers aſſured us with triumphant confidence, that the great diſtance and vaſt ſeas interpoſed between the old and

new world rendered an abſolutely diſtinct generation, both of men and animals, neceſſary for the peopling of America. It is only ſince Cook's laſt voyages that theſe pretended invincible objections to one common origin of men fall of themſelves. He has proved that weſtern America is only ſeparated from eaſtern Aſia in latitude 66 north by a ſtreight of not more than 13 leagues over, and that their diſtances for many degrees ſouth of it are interſperſed with innumerable iſlands. By a conformity of manners, and ſlightly varied idioms of one common mother language, he has alſo ſhewn the filiation of divers nations, on whoſe origin theſe philoſophers affected to be embarraſſed. All the tribes of north America from the 195th to the 345th meridian from Greenwich ſpeak the language of Greenland. That rude language, ſuited to the paucity of ideas of the inhabitants, has ſuffered little variation in that vaſt circumference. The old Celtic will probably be found to bear great affinity to it. This laſt, yet ſpoken by the commonalty in ſufficiently diſtant parts of Europe, in Lower Britanny, Wales, the Highlands of Scotland, Ireland, and ſome diſtricts of Spain, is ſtill to be retraced in the roots of many Greek and Latin words. But theſe were poliſhed and refined by knowledge and ſcience, and the former no doubt greatly enriched by intercourſe with Aſia and Egypt. With the Roman empire the Latin particularly ſpread itſelf over all ſouthern Europe: but a mixture of Celtic and Gothic again adulterated the ſpeech of all its various nations, in all whoſe tongues remnants of all theſe languages may be traced. The language of the arctic circle, that of Gomer, is probably then the mother of all the various tongues which have been, or are, ſpoken in Europe. His other ſons, ſpread in a more ſoutherly tract of eaſtern Aſia, framed to themſelves a very different dialect. Mr. Cook has alſo ſhewn us, that all the different tribes diſperſed in that multitude of iſlands which have been viſited in the Pacific and Eaſtern oceans, ſpeak a dialect very ſlightly varied of the Malay language; whence it appears that that nation, which Mr. Roberts very judiciouſly calls the Phœnicians of the eaſt, has coloniſed them all in an extent of 180 degrees, or half round the globe.

Theſe

Theſe important voyages have alſo ſhewn us by what accidents all theſe iſlands, whoſe cluſters are often ſeparated by extenſive ſeas, may have been peopled. They demonſtrate that America may not only have been peopled from northern Aſia, but alſo by like accidents of ſtorms driving very frail veſſels hundreds of leagues beyond their intended deſtinations, at various and diſtant intervals from theſe iſlands, from Japan, China, and all the oriental coaſts and iſlands of Aſia. Better conſtructed ſhips of the Phœnicians and Carthaginians, thoſe bold navigators of antiquity, may have alſo been driven from the weſt to people the ſouth and eaſt coaſts and iſlands of that continent. The interior of America is as yet too little known to the learned world to inſiſt much on the veſtiges of antient times which may yet remain in it. The ſordid policy of Spain has been intent on keeping the reſt of the world as much as poſſible ignorant of by far the greateſt ſhare of it. It has been ſaid, that the language of ſome of the north-weſtern tribes bears great affinity with the Hebrew. In that caſe, a dialect derived from one of the antient languages of the ſons of Shem would prove that this race has alſo contributed to people that country. If it is true that an inſcription on a rock in New England is in the Phœnician language, it will alſo ſhew that this antient people, of the line of Cham, had alſo ſome ſhare in its colonization. That the northern Tartars had, there can be little doubt; and thus it will have received inhabitants from all the three races deſcended from Noah; and it will not be ſurpriſing if ſome traces of their different languages be yet found amongſt its various tribes. The greateſt part of its ſavage tribes owe, no doubt, their origin to the barbarous nations of northern Aſia. But more poliſhed emigrants from more ſouthern Tartary, from Japan, China, India, and the Malay coaſts, may have alſo landed there, and thus have been the progenitors of the Mexicans and Peruvians. It is affirmed that regular fortreſſes in ſtone, and even in brick, have been diſcovered on the banks of the Ohio. Theſe would certify that thoſe parts were, at ſome time or other, inhabited by people much more advanced in the arts than are the preſent ſavage race. Whilſt theſe laſt are ſprung from the wandering tribes of northern Aſia, of Greenland, and the Laplands: the

former were probably fugitives diſperſed by the revolutions of Japan, of China, or of India beyond the Ganges. Their firſt abodes ſeem to have been in northern America, moſt contiguous to their former countries, whence they paſſed on to more favourable climates. We know that the Mexicans came from thence; and the Natches, a nation exterminated ſince the beginning of the preſent century, ſeemed to have been the remnants of thoſe more poliſhed emigrants who had continued in Florida. Like the Peruvians they adored the ſun, and pretended their ſovereigns iſſued from him. This worſhip was that of the Aſiatic nation, from whence they came, at the time of their ſeparation. The Natches and Peruvians were probably of the moſt antient poliſhed ſtock ſettled in that continent; whereas the Mexicans ſeem to have come later into that part of the world.

(f) Page 230.

Etymologies, often conjectural and frequently ſtrained, are certainly a weak baſis on which to build hiſtorical truths; but when to names, as nearly reſembling as different languages and pronunciations will permit, ſimilar actions are attributed, it becomes unreaſonable ſcepticiſm not to allow, that by them the ſame perſonages are meant. In Mr. Wilford's learned diſquiſitions on Egypt and the Nile, from the antient books of the Hindus, contained in the Aſiatic Diſſertations, we cannot help remarking many etymologies, tending to deduce from India both Egyptian and Grecian fables, to be ſomewhat forced. The bias of the author, as well as of the Indian legends, to attribute both the ſources of ſcience and of population to that nation, is no leſs conſpicuous. But there is a paſſage cited by him from the Padma-puran, and tranſlated by Sir William Jones, which is too evident and ſtrong a confirmation of the Moſaical account of the deluge, and of the derivation of the preſent race of men from the three ſons of Noah, not to be here tranſcribed. In this we find not only the names of theſe three patriarchs, as nearly ſimilar as can be ſuppoſed in different languages, but ſeveral remarkable circumſtances exactly coinciding with the more ſimple narrative of the Jewiſh hiſtorian. As we have already noticed

noticed in a former note, the perſon ſaved with eight attendants in a boat from a general deluge by the Indian god Viſhnu is by them called Satyavrata or Satyavarman, a name certainly very unlike that of Noah, but which is probably a title of honour. But whatever name may have been given to him by various nations, the circumſtance of his being thus ſaved can belong only to one and the ſame perſon. The paſſage runs thus:

1. To Satyavarman, that ſovereign of the whole earth, were born three ſons; the eldeſt Sherma (in the vulgar dialect Sham); then C'harma (vulgarly C'ham); and thirdly Jyá-peti, by name.

2. They were all men of good morals, excellent in virtue and virtuous deeds, ſkilled in the uſe of weapons to ſtrike with or to be thrown; brave men, eager for victory in battle.

3. But Satyavarman being continually delighted with devout meditations, and ſeeing his ſons fit for dominion, laid upon them the burden of government.

4. Whilſt he remained honouring the gods, and prieſts and kine, one day, by the act of deſtiny, the king, having drunk mead,

5. Became ſenſeleſs, and lay aſleep naked. Then was he ſeen by C'harma, and by him were his two brothers called.

6. To whom he ſaid: What now has befallen? In what ſtate is this our fire? By thoſe two was he hidden with clothes, and called to his ſenſes again and again.

7. Having recovered his intellect, and perfectly knowing what had paſſed, he curſed C'harma, ſaying: Thou ſhalt be the ſervant of ſervants.

8. And ſince thou waſt a laugher in their preſence, from laughter ſhalt thou acquire a name. Then he gave to Sherma the wide domain on the ſouth of the ſnowy mountains.

9. And to Jyá-peti he gave all on the north of the ſnowy mountains; but he, by the power of religious contemplation, attained ſupreme bliſs.

This paſſage is a further proof of what I have already advanced, that there is ſcarcely a ſingle circumſtance of Moſes's account of the deluge, which may not be found in one or other of the primitive traditions of nations.

tions. Sir William Jones very properly remarks, that this paſſage fixes the utmoſt limit of Indian chronology to the æra of Noah. To the objection, that Moſes had drawn all his accounts from the Egyptians, we may alſo anſwer with him, that it is indeed probable that at that early period all nations had preſerved ſome particulars of the great event of the deluge. With the Egyptians and Indians they were already adulterated by a mixture of fable and allegory, and all their accounts were obſcured by a redundancy of fictitious incidents. If that venerable author drew any thing from thoſe ſources, it was the plain unadorned truth, expreſſed with that noble ſimplicity which belongs to it.

(g) Page 233.

According to ſcripture, the ark was 300 cubits in length, 50 in breadth, and 30 in height. Taking the cubit at only 18 inches, it will be found that it muſt have been of the burden of 42,413 tons. A firſt-rate man of war, of 100 guns, is between 2200 and 2300 tons; and conſequently the ark had the capacity of 18 of theſe ſhips, the largeſt in preſent uſe, and might carry 20,000 men, with proviſions for ſix months, beſides the weight of 1800 cannons, and of all military ſtores. It was then by much the largeſt ſhip ever built. Can we doubt of its being ſufficient to contain eight perſons, and about 200 or 250 pairs of quadrupeds? a number to which, according to Mr. Buffon, all the various diſtinct ſpecies may be reduced, together with all the ſubſiſtence neceſſary for a twelvemonth? The birds and reptiles would not, certainly, require very great additional ſpace.

(h) Page 238.

Local circumſtances may, however, greatly alter climates. Provence complains of much ſeverer cold than it experienced ſome centuries ago. The reaſon is, that the foreſts formerly growing on the ſummits of the mountains being entirely deſtroyed, it is now more expoſed to the north-eaſt winds, deſcending without break from the Alps. In ſome of the high valleys of thoſe mountains ſnows have accumulated from accidental huſhes, proceeding

proceeding from overloaded icy ſummits; and in ſuch places an increaſe of cold is felt in the ſubjacent diſtricts. It has been pretended that the glacieres of Switzerland have generally extended themſelves; but their general extenſion is far from aſcertained. When we were there ſome young men told us, that thoſe of Grindelwald had much advanced within the laſt 15 years; but ſeveral old men aſſured us that they had ſeen them ſtill more advanced into the plain 50 years ago than they are at preſent. A hot wind, which they call the Snow-eater, conſumes more ſnow in eight days than does without it a whole ſummer's ſun. I have been aſſured that they have been very much decreaſed ſince our journey thither. Years are not alike either in heat or cold, and much leſs amongſt mountains; and conſequently the increaſe or diminution of theſe ſnows is not permanent, but accidental.

(i) Page 239.

The Scythians, according to Herodotus, were, and reckoned themſelves, a new nation. They computed only 1000 years from their firſt eſtabliſhment on the banks of the Danube, or of the Boriſthenes. Theſe were huſbandmen. The wandering tribes dwelt round the ſea of Aſof, on the Don and Wolga, in the Cuban beyond Caucaſus, on the northern and eaſtern borders of the Caſpian ſea. Thoſe ſeated on the Boriſthenes occupied no more than eleven days journey, or at moſt 80 leagues of country, towards the north. Beyond them they themſelves ſaid that the country was uninhabitable, from the quantity of feathers (ſnow) which fell from the heavens. The Greeks, indeed, talked of many nations, as the Hyperboreans, the Ariſmaſpians, and the Anthropophages, to the north of the Scythians. Herodotus ſeems to give no credit to the fables told of theſe, but, from the informations he had received, believed that all was ſolitude beyond, both to the north and eaſt. He was, no doubt, miſtaken; but it was only in ſuppoſing abſolutely null a very thin and ſcanty population. Theſe northern regions probably had ſome inhabitants long before the date he here gives to the Scythian nation; but, as we ſhall hereafter ſhew, it is not improbable that before that date the lands they inhabited in his time were covered by the northern extenſion

of the Euxine ſea, which both natural indications and antient records point out. Before that ſea was diminiſhed by the breaking down of its ſouthern mounds on the Boſphorus of Thrace, they lived much higher up on the Boriſthenes; but when more ſouthern lands were uncovered, and the north grew colder by the dereliction of the ſea, they came down the river, and became nearer neighbours to the Greeks and more poliſhed nations of Aſia. Theſe ſnows and eight months of winter, which Herodotus deſcribes in his time in their then country, which is the moſt ſouthern part of Ruſſian Ukraine and Tartary, and which are ſuppoſed to have been inhabited only 1000 years before the hiſtorian, and to be ſtill very thinly peopled, by no means ſupport the ſyſtem of Mr. Bailly. To the eaſt, except their ſhort and late irruption into Media, they kept on the defenſive againſt the Perſians, in which they were favoured not by their numbers, but by the barrenneſs and difficulties of the country they inhabited.

(*k*) Page 240.

It was in 1218 that Jenghiz-Khan advanced againſt the ſultan of Karaſm. He was the conductor of the firſt great irruption of the northern nations into ſouthern Aſia. This conqueror, having cauſed himſelf to be acknowledged grand Khan of the Mongol Tartars, had already ſubdued all eaſtern Tartary inhabited by the Mantchoux, and had reunited to his dominions all weſtern and northern Tartary now ſubject to Ruſſia. In the time of this irruption Indoſtan was governed by ſeveral ſovereigns, the moſt powerful of whom was the king of the Patans, the moſt northern nation of that country. The ſultan of Karaſm, of the family of the Seljukians, poſſeſſed part of Turkeſtan, all Tranſoxiana, and the beſt part of antient Parthia, called Iran and Irac Agemi, as alſo northern Perſia, called Fars. The king of the greater Armenia paid tribute to him. Georgia had its independent princes. The calif Naſſer reigned at Bagdat over Chaldea or Irac Araby, over part of Meſopotamia and the three Arabias. The Atabequite princes of Mouſel, deſcendants of the great Nourradin, reigned over part of Syria and the remainder of Meſopotamia; the ſucceſſors of Saladin held the reſt of Syria and

and Egypt. It was then Almalkamel, nephew of Saladin. The ſultans of Iconia of the third branch of the Seljukians were maſters of Biladerſoum or Anatolia. The French had at that time ſeized Conſtantinople and the remains of the weſtern empire. The diſſenſions of all theſe ſovereigns favoured the conqueſts of this invader in Aſia. In 1213 he invaded the ſeven provinces of northern China, then called Kitay, the emperor of which, called by the Mongols Alou-Khan, loſt both his throne and life on this occaſion. The generals of Jenghiz-Khan ſoon after added Kurje or Correa to his conqueſts; and he was preparing to add the country of Mangi or Matchin (ſouthern China), then ruled by a diſtinct monarch, to his dominions, when death arreſted him in the midſt of his triumphs. His ſon Kublai-Khan purſued the enterpriſe, and was the firſt ſovereign of all China. One hundred years after him Timur-Khan or Tamerlan, who pretended to be iſſued from him, puſhed his conqueſts ſtill further, and made himſelf maſter of Indoſtan.

THOUGHTS

ON THE

STRUCTURE

OF THIS GLOBE.

LETTER III.

Examination of Teſtimonies adduced from antient Aſtronomy, to prove the Antiquity of the World; and particularly of Mr. Bailly's ſecond Syſtem, founded on an Indian Era pretended to be fixed on real Aſtronomical Obſervations.

WE have ſeen, Sir, the ſubterfuges by which ſome fragments of antient authors have been wreſted, in order to prove an indefinite antiquity to the population of the earth; and I flatter myſelf to have ſufficiently demonſtrated the futility and inadmiſſibility of theſe forced explications. Inwardly ſenſible of the weakneſs of ſuch means, which ſolely conſiſt in perverting the moſt evident ſenſe of theſe traditions, and aſhamed of laying much ſtreſs on the ridiculous pretenſions of thoſe nations who, to prolong their exiſtence,

exiſtence, have had recourſe to imaginary beings, the favourers of the high antiquity of the world imagined they had at laſt found triumphant proofs of it in the pretended ſeries of eclipſes obſerved in China. But ſuch aſtronomers as have attempted to verify them have uniformly agreed, that it was impoſſible to lay any ſolid foundation on obſervations of ſuch early periods. They generally bear no other date but that of a reign: are never ſo preciſe as to mark the ſeaſon of the year, or the place of obſervation;—circumſtances, however, abſolutely neceſſary to fix the reality of ſuch obſervations in a country ſo extenſive as China. From the moſt learned reſearches they have concluded, that the real obſervations of the Chineſe do not carry us ſo high as thoſe which the Chaldeans are ſaid, on more authentic teſtimonies, to have made *(a)*. Beſides, evident abſurdities intermixed with theſe pretended obſervations, ſuch as that of the ſun being ſtationary during ten days, ſufficiently ſhew what little regard is to be had to them. The as yet very narrow ſcience of that nation, which, though it has carefully preſerved the degree of knowledge it had once acquired, has been ever very little ſolicitous of acquiring further perfection, is ill calculated to inſpire us with much confidence on theſe points *(b)*. It is certain that, whether this nation was originally leſs learned in aſtronomy, or whether it has loſt more of its former knowledge in its frequent revolutions, its principles in this ſcience are leſs exact, notwithſtanding its college of mathematicians, than thoſe of its neighbours the Tartars, and ſtill leſs ſo than thoſe of Indoſtan.

Reduced

Reduced to abandon this ſo little ſolid ſupport, it is towards theſe Indians that the partiſans of high antiquity have lately turned their attention. Notwithſtanding all the reſpect we may be inclined to pay to the certainly very antique race of the Bramins, we are forced to allow that the fables gravely retailed by them, on their origin and early hiſtory, are at leaſt as extravagant as thoſe of other nations who have ſet up equal pretenſions. But it is aſſerted that aſtronomical calculations, founded upon real obſervations, aſſure to this people a pre-eminent antiquity, the proofs of which are thus rendered indubitable. We have already touched on the recent work of Mr. Bailly on Indian Aſtronomy, and we have drawn from it important lights in the diſcuſſion of ſeveral objects. We have ſeen that this judicious author, abandoning to pure fiction the years of the firſt and ſecond Indian ages, has reduced to reaſonable compaſs thoſe of the third, in order to make it coincide with the duration of the antediluvian times, as gathered from other teſtimonies. Notwithſtanding the propenſity ſo natural to man to ſupport an opinion once advanced, I cannot ſuppoſe that a perſon of his high reputation in ſcience could have the ſmalleſt intention ever to meaſure back his ſteps, or to retract ſo formal a declaration, limiting the race of man to a period leſs than 6000 years before Chriſt, in order to revive the idea of a burning globe cooling by ſlow degrees, which, like that of Mr. de Buffon, would require a duration ſince the time of its being covered with waters, of 30,000, or indeed of 60,000 years. Before I examine the pretended era of 3101 years before Chriſt of the preſent

ſent age, I muſt not diſſemble that it is my opinion that neither of the three preceding ages really deſerves a ſerious conſideration. The two firſt are certainly fabulous ; and to the third, grounded no doubt on the original tradition of an antediluvian world, no calculation or reduction can be applied with any degree of confidence. As I have already indicated in a former note, the number of years attributed to theſe three ages, arithmetically decreaſing, is viſibly framed at pleaſure by the combination of myſtical and ſuperſtitious numbers, multiplied by one another, and really deſerves no more attention than the prophetically determined period of the preſent age. The body of this laſt publication of Mr. Bailly, conſecrated to eſtabliſh the epoch of 3101 years before Chriſt, determined on real obſervations, is certainly a work equally learned and laborious. He therein calculates by diverſe Indian tables and formulæ the poſitions of the ſun, moon, and planets, at different periods, till he arrives at this principal era ; and verifies them nearly by the more perfect rules of our aſtronomy. Nothing can be more dazzling than this ſcientific diſplay, nor more impoſing than this kind of proof, which we are accuſtomed to look upon as demonſtration. In mathematics a faulty baſis, or the ſmalleſt error in initial cyphers, overturns at once the whole fabric of the moſt perfect calculations. I have no ſuch reproach to make to Mr. Bailly, and am far from equal to conteſt theſe points with him. But here admitting the ſolidity of his baſis, and the accuracy of his calculations, it is the concluſions drawn from theſe that are far from deciſive. Without following the author in

operations far beyond common reach, this point may be diſcuſſed by ſimple reaſoning.

What Mr. Bailly ſeems to have very clearly proved, is, that the antient inhabitants of Indoſtan have inherited from their anceſtors tolerably perfect rules and formulæ for the calculation of the motions of the ſun and planets, though they have loſt all knowledge of the principles on which they are founded. He thinks that all the other nations of the eaſt have borrowed from them their knowledge of aſtronomy, conveyed to them by the Bramins of the north; and that the firſt ſeat of primitive aſtronomy was between the 40th and 50th degree of latitude; and he ſeems inclined to fix it in Thibet or Boud-tan, though that country lies in a more ſouthern latitude. This is recurring to his antient opinion of northern derivations, and is a matter of opinion. If the latitude of 40 is fixed upon, Armenia, under that ſame latitude, in which all oriental traditions place the cradle of mankind after the deluge, will have at leaſt equal pretenſions to it. It reſults from his verifications of Indian aſtronomy, and from the precious relics of that ſcience which this author has diſcovered in all parts of Aſia, that a ſufficiently perfect theory of aſtronomy, drawn from one common ſource, has been antiently pretty generally diffuſed amongſt the nations of the eaſt, whoſe poſterity has preſerved its tables and methods, without underſtanding their principles. It is a moſt valuable work, containing the moſt curious diſcoveries, for which the learned world certainly owes great

obligations to the author. If Mr. Bailly could have aſcertained with ſufficient evidence, that the era of 3101 is founded, not on retrograde calculations, but on real obſervations, he would have truly aſſured to the Indians the undoubted palm of the higheſt known antiquity, ſince we certainly have no other well authenticated obſervations which carry us by any means ſo high. But I will dare to ſay, that this eſſential point is by no means proved, but, on the contrary, remains as uncertain as before. The queſtion is ſtill to know, whether theſe Indians, antient or modern, have not calculated upon their tables backwards, as Mr. Bailly himſelf has done on theſe ſame tables, from ſome one known epoch, till they found by them a certain aſpect of the heavens deemed ſufficiently remarkable and proper to fix as an aſtronomical period, which they afterwards applied to their chronology. On this occaſion it was to fix the beginning of a new age. I think the probability will be, that ſuch has been the means of fixing it. The pretty juſt preciſion of theſe calculations will only ſerve to determine the value of their tables and methods of calculation. We know that the ſame tables which ſerve to predict the motions of the heavens for times to come, can alſo equally aſcertain them for times paſt, however remote. If the preſent Indians, by a blind application of theſe rules on thoſe tables, of the principles of which they are now entirely ignorant, are yet capable of predicting, with nearly juſt preciſion, the ſeveral eclipſes and conjunctions of the planets for the future; how much more eaſily might their anceſtors, who had not yet loſt the keys of this ſcience, from any fixed date

and

and well known position of the heavenly bodies determine what must have been their respective situations at any whatever anterior instant of time! Mr. Bailly himself asserts, that the Indians reckon several of these astronomical epochs much more recent, to and from which they not unusually calculate; such are those of the years 78, 499, (c) 638, 1282, and 1491, since the Christian era. One of these, or perhaps some one still more antient, may have served as a basis to ascend up to the year 3101 before Christ. He himself owns that the antient Indians had deduced, from calculation only, another era decidedly fictitious, rising to 20,400 years before this fourth age, in order to find in it the coincidence of the origin of their moveable zodiac with the equinox, and a conjunction of the sun and moon in this first point. He pretends, indeed, very gratuitously, that the Indians had taken for basis of this long, laborious calculation, the epoch of 3101 fixed upon real observations. To carry us thus back so many thousand years, it surely is of small consequence whence we start; and these calculations will be comparatively little increased, though they should have had a basis less antient by some hundred years. The idea alone of thus making such long retrograde calculations, sufficiently proves a decided systematical aim of seeking singular aspects of the heavens, in order to make pretended earthly events coincide with them, and to give weight to the absurd fables of their mythology. The strong propensity of astronomers, who, like the Indians, are addicted to astrology, to imagine and look out for extraordinary affinities and influences between the heavens and

this earth, are too well known not to ſhew us the real drift of all theſe laborious calculations. Will it not then be very probable that the epoch of 3101 itſelf has been alſo fictively eſtabliſhed, on account of the uncommon conjunction of all, or of moſt of the principal planets deduced from the calculation of that particular point of paſt time? From the example of one avowed aſtronomical fiction amongſt the Indians, we may ſurely conclude, that the fixation of that epoch by real obſervations is yet to be proved: on the contrary, it from thence certainly becomes extremely queſtionable; the more ſo, as the intent of fixing upon this particular inſtant of time, conſonant to their aſtrological ideas, is very perceptible. Should we allow, though ſuch conceſſion would be purely gratuitous, that it is not fictitious, but grounded on real obſervations, it will not affect our preſent purpoſe. It exceeds by very little the date of the Samaritan, and falls ſhort of the Septuagint chronology; and is very far from eſtabliſhing a very long or indefinite duration to the preſent world. Mr. Bailly, it is true, has taken the liberty of adding to this Indian age the 400 years of interval which they talk of, in order to give them ſufficient time to learn the principles of this ſcience. We are ignorant what is meant by this interval. If it is really grounded on old traditions, it probably expreſſes the duration of the deluge; and theſe 400 years, like thoſe of the preceding age, according to Mr. Bailly, are ſo many days, nearly equal to the real time of that great inundation. Our author, in adding them as ſo many ſolar years to the duration of the preſent age, is refuted by the Indians themſelves, who aſſure us, that

this

this era of 3101 years, the beginning of this age, was immediately preceded by an univerſal deluge.

I am no leſs perſuaded than this aſtronomer, that this ſublime ſcience, which he ſo eminently poſſeſſed, really dates from very high antiquity. The long life of the antediluvian patriarchs muſt have given them a taſte for the ſtudy as well as the means of perfecting themſelves in the knowledge of the heavenly motions. The life of Noah and of his children, already poſſeſſed of that ſcience, was ſufficiently long after the deluge to enable them to continue it, and to rectify its tables and methods, if, as I am apt to believe, a change in the poſition and revolution of the earth required it. This correction, the neceſſity of which would be ſoon perceived, would no doubt demand the ſtudy and experience of many years; but when the baſe is once acquired, we know to what height one ſingle happy genius is capable of carrying the moſt abſtract ſciences.

In the whole courſe of his work Mr. Bailly is much embarraſſed to find a year of 360 days in uſe, as the meaſure of time amongſt all the nations of high antiquity, ſerving as the baſe of the Indian ages, and a primary calculation every where to be corrected in their computations. This year, which is neither ſolar nor lunar, appears, as he thinks, the more ſingularly in theſe, as he pretends that the Indians were well acquainted with the nearly true ſolar year of more than 365 days before this era of 3101. This adoption of an error appears

pears to him ſo extraordinary, that he knows not how to account for it. This faulty year could not, continues he, exiſt in any nation for civil uſe; it muſt have then been purely fictitious, and a mere ſuppoſition of calculation. But why, may he be aſked, ſhould enlightened aſtronomers imagine and perſiſt in making uſe of erroneous data, merely to have the pleaſure of correcting them at every inſtant in their calculations? It is eaſy to imagine that the odd hours and minutes ſhould make a ſeparate calculation convenient; but in the firſt inſtance it was ſurely as eaſy to calculate from 365 as from 360 whole days. So ſingular a cuſtom ſo univerſally adopted in early times, muſt however have been founded in ſome reaſon, and ſurely hides ſome myſtery. It appears to me, that Mr. Court de Gibelin will furniſh a very happy ſolution of this difficulty. That author, as reſpectable as learned, who has thrown ſo much light on all parts of antiquity, equally ſtruck with this ſame ſingularity, gives an explication, which in my apprehenſion carries conviction with it. Before the deluge the earth ran through without deviation the 360 degrees of the equator in equal times; and that preciſe number of days, each of 24 exact hours, made up the true ſolar year, without any fraction. At the deluge this regular and natural motion was deranged, the courſe of the earth was diverged from the plan of the ſolar way, it became oblique, lengthened, variable and almoſt incalculable, and afforded no meaſure without fraction either to the year, the day, or the hour. This diſorder was no doubt ſoon perceived after the deluge; but habit in the

firſt

firſt patriarchs, and the reſpect ſtill borne to antiquity, occaſioned that, without changing thean tient year, it was endeavoured to ſupply its preſent deficiency by adding to the end of twelve months, of thirty days each, which conſtituted the antediluvian year, five days called Epagomenes; and this is ſignified by the Egyptians, who ſaid that Mercury had won from the moon theſe five days in favour of Rhea. According to them, Mercury, one of their demi-gods, was the firſt who proved the neceſſity of adding them to the civil year. It was not however long before it was perceived, that this addition was inſufficient; and it required the reiterated obſervations of ſucceeding aſtronomers to come to a nearer approximation, and the exact true year was not definitively determined till about 200 years ago.

The conſtant primary application of this year of 360 days to the Indian calculations is, I think, a very ſingular confirmation of Mr. Court's conjecture. The firſt calculation ſtill conſtantly employed is that which was tranſmitted to them from the antediluvians, and which was the true and only one requiſite for them; the ſecond is the neceſſary correction to the firſt after the deluge and the derangement of the earth's motion, and is the reſult of obſervations made after that event. That by it they ſhould approach ſo near to the truth as a few minutes, is a proof of the exactneſs of this correction. This proceſs, which keeps theſe two calculations diſtinct, is certainly the longeſt, but very natural to the firſt authors of aſtronomy,

nomy, corrected after a change which rendered the firſt inſufficient. It appears to me to be a ſtriking and ſingular proof of the great antiquity of the firſt formula, which could only ſuit a different ſtate of things, and no leſs ſo of a real change in the revolution of the earth, which had ſubſequently taken place, and neceſſitated this correction. This diſtinct employ of the antient formula, and of its correction, in the aſtronomical calculations of the Indians, becomes a true monument, confirming the opinion I have always had of the inclination of the poles taking place at that event. I had not hoped to find in the aſtronomical operations of that nation ſo direct a teſtimony of that great change in the economy of our globe. It is a new obliquity in the axis, and in the courſe of the earth, that this ſupplementary formula eſtabliſhes, the reaſons of which Mr. Bailly is ſo much at a loſs to find. The near approximation to truth of the Indian year will prove, that that aſtronomy which the nation formerly poſſeſſed, but of which they now only retain the rules without comprehending the principles, was ſurpriſingly correct, and probably of very antient date; but in no wiſe demonſtrates that they were acquainted with the true year before the pretended era of 3101, being the commencement of the poſtdiluvian age. The correction conſtantly applied in their computations, not only of hours and minutes but of five whole days, tends on the contrary to ſhew a ſupplement to anterior knowledge.

From the remarks which I have laid before you, Sir, it will reſult that

the aſtronomical obſervations of the Chaldeans, extending only to 2233 before Jeſus Chriſt, cannot authoriſe a very high antiquity of the earth ſince the deluge, and that thoſe of the Chineſe are too vague and uncertain to be admitted. It will appear, in ſpite of the efforts of Mr. Bailly, that the calculations of the Indians up to their pretended era of 3101 cannot be proved founded on real obſervations; but have on the contrary every appearance of being retrograde deductions upon paper, like others avowedly of the ſame nature. Mr. Bailly will however have proved, that the Indians ſtill exiſting as an unmixed nation, though generally ſubjected to foreign domination, have preſerved with more integrity the practical rules of aſtronomy, which they as well as the other nations of the Eaſt had received from their common anceſtors. Their mathematical formulæ atteſt ſtill more irrefragably than the writings of hiſtorians the very antient uſe of a year of 360 preciſe days; which is no longer ours, but to which all nations were at ſome certain period obliged to add, in order to bring it to the actual revolution of the earth, five days, and afterwards ſeveral hours and minutes, according to the more or leſs exact preciſion of their aſtronomical obſervations. It appears that the Indians, like all other antient people, had the knowledge of an univerſal deluge, which began the preſent age, preceded by a more happy ſtate of man, whoſe creation was poſterior to that of other beings of a ſuperior order. All theſe ideas are not particular to them. Bolder than other people, they have attempted to fix with preciſion the era of this deluge, and of the commencement of

our preſent age; but it is far from ſure that they have done it from real obſervations. It is much more probable, that, knowing the date of that event not to be very far diſtant, they ſought, purſuant to their ideas of the influence of the planets, to determine it to the preciſe moment when by their tables they had found that an extraordinary conjunction of the ſun and moon and moſt of the principal planets ſhould, according to the rules of aſtronomy, have taken place. Their undertaking, by ſtill more laborious calculations, to find out a ſtill more extraordinary conjunction, in order to determine by it another celeſtial and terreſtrial era, at the immenſe diſtance of more than 20,000 years beyond it, adds a further probability to the fictitious fixation of the firſt. Mr. Bailly is too learned and ſagacious to attempt with them to give ſanction and credit to the neceſſity of theſe celeſtial conjunctions to produce a deluge on this earth (the ſole point univerſally agreed on), or to effect any other events amongſt mankind at that or any other period. Though it ſhould be allowed that the real obſervations of the Indians approach very nearly the time of that great event, and we ſhall readily agree that ſuch obſervations were made very ſoon after it by the firſt fathers of that and of every other nation equally ſprung from them, this ſingular conjunction of the celeſtial bodies, very important according to them, will only be proper to make us ſuſpect that they had fixed its preciſe date rather upon this imaginary connection than upon real truth. We can only from thence conjecture, that this era, without being abſolutely exact, is not perhaps very far from the true period to which tradition

tradition had vaguely fixed that memorable event. As we have before obſerved, the date the Indians give it will not exceed by many centuries the one I have allowed it, the Samaritan chronology by ſtill fewer, and does not even attain the antiquity beſtowed on it by the Septuagint. It will certainly be very far from authoriſing that prodigious number of ages required by modern philoſophers, and which we muſt neceſſarily admit, to give time for the ſuppoſed hot and happy climate of the poles to cool by degrees, and, as the experience of more than 2000 years evinces, very imperceptibly, to their preſent cold temperature. Mr. Bailly has, not only unwarranted by the Indians, but in direct contradiction to them, added 400 years to their era of the deluge, ſeemingly for no other purpoſe than to carry that event beyond any verſion of ſcriptural chronology. From the few obſervations I have made, I think, Sir, that you will agree with me, that notwithſtanding his labours it ſtill remains at leaſt doubtful whether any credit is to be given to the original Indian epoch of 3101 years before Chriſt, as founded on real obſervations. Their avowed retrograde calculations, to found on aſtrological principles a prior certainly fictitious era, afford the ſtrongeſt ſuſpicions that this laſt has been aſcertained in a ſimilar manner; and the ſingularity of the conjunctions of diverſe planets equally incident to it gives additional force to this ſuſpicion. The very remarkable circumſtance in their proceſſes of calculating firſt for 360, and ſeparately for five more whole days, beſides the additional calculations for hours and minutes in their year, certainly ſhews that the aſtronomical formulæ

which they have inherited and blindly follow without underſtanding their principles, were originally framed either when 360 days was the true year, or before the additional number of days was found to be neceſſary. So perfect however are theſe formulæ, that it is difficult to ſuppoſe that their original conſtructors could err ſo very widely from the truth.

NOTES

NOTES AND ILLUSTRATIONS

TO

LETTER III.

(a) Page 262.

CALISTHENES ſent to Ariſtotle a ſeries of aſtronomical obſervations made by the Chaldeans, comprehending a ſpace of 1903 years. It is poſſible that their numbers and antiquity may have been ſomewhat exaggerated; but the Chaldeans were ſeated very near the firſt abodes of man, and on the very ſpot where all mankind had been collected before the diſperſion. They were leſs than any other people expoſed to loſe the principles of that ſcience, which the long lives of the antediluvians invited them to cultivate, and afforded the means of bringing to perfection by the experience of centuries. At their firſt eſtabliſhment the three patriarchs born before the deluge were ſtill living, and men yet extended their exiſtence to more than 400 years. Their climate was propitious, and the tower of Babel, though unfiniſhed, offered them the firſt convenient obſervatory. According to my ideas, the diſperſion of mankind took place in the year 2297 before Chriſt, and their earlieſt obſervations date in about 2233, or nearly about the time when Nimrod, expelling Aſſur, may be ſuppoſed to have taken poſſeſſion of that country. The Egyptians claimed the excluſive right to firſt antiquity and to the invention of all ſciences, and thence pretended that the Chaldeans had many ages after derived from them their knowledge in aſtronomy. Theſe obſervations

vations ſhew at leaſt the falſity of theſe aſſertions. Cham and his deſcendants, who travelled ſouthward, were probably not ignorant of its principles; but as Egypt, excepting Libya, was the laſt ſettled country of his inheritance, obſervations could not have been made there ſo ſoon as in Chaldea: nor do we find in antiquity any ſuch continued ſeries of obſervations certified amongſt them.

(*b*) Page 262.

Little ſtreſs can be laid on the antient knowledge of the Chineſe in aſtronomy, as facts prove that they are yet at this day very little advanced in it. In the beginning of this century the whole tribunal of mathematicians were incapable of calculating an eclipſe with any degree of preciſion. The then emperor cauſed their chief to be beheaded, and found it neceſſary to recall the jeſuits, lately expelled and ſtill reſident at Macao, to compile their almanacks; an object of great importance to a nation ſo addicted to judicial aſtrology. As ſince the extinction of that order few learned miſſionaries go into China, the preſent reigning emperor ſent orders to Canton in 1778 to aſk artiſts of various kinds, but particularly aſtronomers, from all the European nations.

Mr. Playfair obſerves, that it is recorded in the Chineſe annals, that in the reign of Chong-tang the mathematicians Hi and Ho were puniſhed, according to a law of the emperor Yu, for not having predicted an eclipſe of the ſun, which happened in the year 2159 before Chriſt. But though this eclipſe, which did not exceed one digit at Pekin, is there ſaid to have alarmed the whole nation, and to have occaſioned the death of its principal mathematicians; yet their ſucceſſors, uncorrected by this ſeverity, totally neglected recording any other eclipſe for the ſpace of 1312 years, as the next mentioned dates no higher than 776 years before Chriſt. From this we may reaſonably infer, that the former pretended obſervations and records are ſpurious. As this obſervation of an eclipſe correſponds with the era of the firſt olympiad, and nearly with that of Nabonaſſar, periods when the ſcience of aſtronomy was much perfected, it is not improbable that

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the Chineſe, receiving new lights from the more weſtern parts of Aſia, might about the ſame time begin to record a more perfect ſeries of celeſtial obſervations. At that time northern China was ſtill in a divided ſtate, and its ſouthern provinces yet barbarous. 400 years after it all its original records were deſtroyed; and when again endeavoured to be reſtored by ſucceeding men of learning, it is probable they would have recourſe to their neighbours for ſuch obſervations as might tend to give order to the ſcattered remnants of hiſtory and ſcience.

(c) Page 267.

Certain it is now from the recent reſearches made by the authors of the Diſſertations relating to the antiquities of Aſia, that it was in this very year 499 after Chriſt, that the date of the preſent Indian age was fixed. In that year their moſt celebrated aſtronomer found by obſervations, that the vernal equinox coincided with the origin of their ecliptic. Imagining, in conſequence of their theory, that it muſt have had the ſame poſition 3,600 years before, he thence, according to their aſtrological ideas of regulating all ſublunary things by the poſition of the heavens, determined that epoch as the undoubted era of the Caliyuga. From that ſuppoſition alone it is now ſo fixed by the Hindus. Such are the grounds on which Mr. Bailly has thought proper to aſſert the actual obſervations of the Indians carried ſo far back as the year 3101 before Chriſt: for this purpoſe he filled a whole quarto volume with retrograde calculations, which he had been at the pains of making, both on the Indian formulæ, and according to the rules of our aſtronomy. The almoſt perfect agreement of their reſults ſhews indeed the very near approach to truth of the rules and tables of the Hindus, though they are perfectly ignorant of their principles, and even of the figure of the earth. Nearly the ſame rules, with the ſame ignorance of principles, have been preſerved in Tartary and in China. This laborious work of Mr. Bailly ſhews with what induſtry infidels catch at the ſlendereſt threads to invalidate the authority of ſcripture. In order to raiſe the age of the world ſince the deluge, beyond the reach of even the Septuagint verſion, he

has, in defiance of his own favourite Indian authority, added their interval of 400 years between their third and fourth age to the ſum of the preſent age. It ſhould ſeem, that a ſimilar motive has engaged him to prolong the former age by thoſe ſame 400 years. From the above-mentioned diſſertations it appears, that the origin of Indian hiſtory cannot be carried higher than about 2029 years before Chriſt, and that the appearance of Buddha muſt be at fartheſt dated 1027 years before our era.

THOUGHTS

ON THE

STRUCTURE

OF THIS GLOBE.

LETTER IV.

Remarks on the Monuments of Nature alleged as Proofs of the Antiquity of the Earth.—Reflections on the Syſtem of Mr. de Buffon, and of divers other modern Philoſophers.

UNDER the ſpecious pretext of the obſcurity and uncertainty of antient ſtory, and confounding in their ſcepticiſm particular and iſolated facts, invented by the intereſt of prieſts or imagined by the vanity of this or that people, with thoſe great events which belong to the whole human race, and whoſe eſſential and fundamental points are atteſted by all nations, ſeveral perſons think they have a right to reject all hiſtorical teſtimony. It is Nature alone, ſay they, who muſt be interrogated on her age. A conſiderable number of modern naturaliſts affirm, that the veſtiges and monuments of that

Nature, much more authentic than the dubious records of hiſtory, loudly proclaim a much higher antiquity. In vain do the traditions of all nations aſſert the event of an univerſal deluge, whoſe date is not very far removed; in vain do they diſcloſe the cradle and infancy of the moſt antient nations, and the firſt population of more than three parts of the earth as yet recent: againſt all theſe teſtimonies they ſet the irrefragable authority of that book whoſe characters are manifeſt to their ſagacity. This globe has, no doubt, ſay they, undergone many revolutions; but that recent deluge of which ſo many nations ſpeak was neither general, nor worthy to be ranked amongſt the great epochs of nature, the lateſt of which muſt at leaſt be removed 100 centuries before our times. That deluge recorded in our ſcriptures Mr. de Buffon terms the particular and caſual inundation of Armenia, equally partial and local as thoſe ſpoken of by the Greeks and Egyptians. It muſt be allowed that, was the voice of nature clear and preciſe, an undoubted preference would be due to it above traditions, which, however univerſal, are tinctured by great confuſion and many variable circumſtances. But nothing as yet clearly indicates the authenticity of that voice; it is the verſatile language of its pretended interpreters, always in contradiction with one another, and often with themſelves, which I hear. Avowing the rapid progreſſes of natural philoſophy in many parts, I have yet ſtrong reaſons to doubt whether it is ſufficiently advanced to pronounce without appeal on the whole ſyſtem and order of nature. Many very celebrated naturaliſts agree, however, in maintaining that

that the moſt certain indications of nature prove a much more antient exiſtence of the preſent earth than is given to it by common opinion and vulgar prejudices; and that the very conſtruction of this globe announces many thouſand years more, ſince the poſſibility of any univerſal deluge, than can at any rate be made to coincide with the relation of Moſes; and that every part of it is incompatible with his account of the creation, calculated, ſay they, to ſuit the ideas of an ignorant people, and nowiſe worthy to be the guide of philoſophers. We ought, no doubt, to hear them: but, notwithſtanding the authority of great names, it will be lawful to examine if this their deciſion is in truth irrevocable; and if it may not perhaps be yet poſſible to explain the preſent order of things, without abſolutely contradicting the few words left us on that head, as the general tradition of his times, by the oldeſt and moſt reſpectable of hiſtorians *(a)*. It will not be leſs uſeful perhaps to conſider, if the ſyſtems which have been ſubſtituted to his plain narration are in fact more conſonant to the few well known laws of Nature, or to its more generally averred operations. I will own to you, Sir, that the principles of theſe philoſophers often appear to me rather founded in their own bold and brilliant imaginations than in Nature. If they have often happy coincidences with her, it muſt be allowed that ſometimes it is not Nature which preſſes the ſyſtem upon us, but the ſyſtem which forcibly bends her to its gratuitous deciſions.

The ambition of framing general ſyſtems tyranniſes the moſt ſober

heads, and attaches us to certain ideas, to which, without perceiving it, we ſtrive to make all Nature pay homage, even where ſhe is moſt ſtubbornly oppoſite. How many pretended experimental diſcoveries have we ſeen, which could never be repeated by others! How many aſſertions are hazarded upon the partial inſpection of one country, which are falſified by the examination of another! How many ſpurious or incorrect accounts *(b)* have been eagerly adopted without ſcrutiny, becauſe they were favourable to the particular ſyſtem embraced! Theſe are weakneſſes natural and common to all thoſe who ſupport with warmth any opinion once imbibed. Amongſt the French philoſophers in particular, over and above the common vanity of important diſcovery, and of dealing out laws as ſecond creators of the univerſe, another motive has in general had no ſmall influence. Many of them have been avowedly combined to overturn by all poſſible means, each in his diſtinct department, not the particular mode adopted in France, but the general foundations of chriſtianity itſelf, which in many points ſeemed to cramp their genius, and ſet bounds to that human wiſdom of which they have, or think they have, ſo large a ſhare. To ſet nature at variance with the aſſertions of one of its firſt props, and with a ſuppoſed inſpired writer, was no ſmall object. The ſhort account he has given us of the creation runs counter to the opinions ſaid to be framed on the unerring proofs of Nature by many celebrated philoſophers; and has not yet been ſo ſatisfactorily explained as not to meet with ſome undeniable objections. Notwithſtanding my feeble

efforts to pave the way to a more ſatisfactory explanation, the object will no doubt by many be deemed not only unattained, but every part of my reaſoning inadequate to command the conviction they require. To time, and the more ſucceſsful labours of men of ſuperior talents and knowledge, who may hereafter deign to follow the track I have ventured to point out, I muſt leave this. But before I enter into this diſcuſſion, it will be proper to lay before you, Sir, and to examine with you, thoſe more celebrated modern ſyſtems in particular which have been triumphantly ſubſtituted to the Moſaical narration; and to conſider whether theſe are, in fact, more intelligible and more conformable to the known laws of Nature, than that account, however ſhort and obſcure. You with juſtice require me to give my reaſons for diſſenting from ſyſtems ſupported by the blaze of celebrated names, and ſanctioned by the number of their proſelytes. To Mr. de Buffon's ſyſtem to which you, Sir, are more particularly attached, I ſhall expoſe my objections more at length. In fact, moſt other ſyſtems ſince him are nearly eſtabliſhed on the ſame general foundations.

In his Introduction to the Hiſtory of Animals Mr. de Buffon, already diſtinguiſhed in the learned world, after having briefly expoſed and refuted the ſeveral ſyſtems of Woodward, Whiſton, and Burnet, gave to the world a new Theory of the Earth. Amongſt his countrymen the ſublimity and eloquence of his ſtyle gained him many admirers, diſpoſed to give credit to the ideas of a philoſopher who promiſed to

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do great honour to his nation. The learned of other nations paſſed it over as the licenſed flight of a great genius. Having gained very deſerved reputation by the accuracy of his deſcriptions of the forms, and his ſagacious diſquiſitions on the nature and manners of that multiplicity of quadrupeds, birds, and fiſhes he had treated; he, after more than twenty years interval, again came forward, no longer to give a bold conjecture on the formation and theory of the univerſe, but, with pretended proofs in hand, to evince not only the poſſibility, but on moſt points the neceſſary truth, of his former aſſertions. This was no longer in the ſtyle of a man who offers his ideas and conjectures to the world, but in the magiſterial and dictatorial tone of one who is perfectly ſure of whatever he advances. Already highly prejudiced in his favour, his countrymen very generally received his dictates with implicit faith; and many learned men of other nations, who had imbibed the unbelieving principles of French philoſophy, adopted great part of his ſyſtem, as fully ſufficient to overturn at leaſt all prejudices grounded on the Moſaical and ſcriptural account of the creation and of time. I muſt firſt lay before you, Sir, a ſummary view of the ſyſtem itſelf, before I offer thoſe objections to it which to me ſeem unanſwerable. I have to combat, with unequal arms, a genius of high reputation and of ſuperior eloquence: to neither of theſe can I pretend; but I truſt to the naked force of fair reaſoning.

In this celebrated ſyſtem fire is the principal, or rather ſole agent.

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In our planetary world it is in the ſun that it eſſentially exiſts. That immenſe globe is a maſs of vitreous matter in fuſion, kept in ſtrong and perpetual motion, firſt by the preſſure of the comets, which he ſuppoſes to amount to between 400 and 500, and at leaſt to 115, and afterwards accelerated by the additional preſſure of the planets gravitating on it. It is not ſaid whether our ſun and the ſtars, the ſuns of other ſyſtems, were originally created, or whether they exiſted from all eternity. After making rather an excuſe to, than paying homage to the popular prejudice of an intelligent Supreme Architect—in the whole courſe of his reaſoning, plaſtic Nature is aimed to be ſhewn ſelf-ſufficient. In the moment in which Mr. de Buffon takes up his regular narration, a comet falling obliquely with immenſe force and velocity into the ſun, carries off with it a portion of its exterior limb, amounting to about an eight hundredth part of his whole maſs. This inflamed matter, combined with that of the comet itſelf, was diſperſed and thrown by the ſhock to immenſe diſtances. The impulſion in a ſtraight line, leſs efficient on the weightier parts firſt attracted to each other, ſoon formed the maſs of thoſe planets nearer to the ſun; whilſt the lighter parts, in proportion to their ſpecific gravities, were by the ſame force thrown to much greater diſtances, to form the more diſtant orbs. This projectile motion, gradually weakened by the attraction of the ſun, was at laſt arreſted by its force. The planets, preſerving a rotation round their axes, were by its power conſtrained to move in a circle, each in its preſent orbit, but in the ſame plane, round that primary body. The vivacity of the internal

nal motion, of the fire and brightneſs of the ſun, was then increaſed by the additional preſſure of theſe new-formed planets, acting upon it as the ſpokes of a wheel upon the axle-tree. The whole matter of all theſe projected planets was compoſed of liquid glaſs, ſurrounded by an atmoſphere of watery vapours, ſuch as ſtill encompaſſes their parent ſun. Not having the ſame preſſure, they preſerved not, at the diſtance they were thrown, their original internal motion and heat; but gradually cooled, and became conſolidated in proportion to their denſities and diameters. Their ſurfaces were firſt cooled, and their whole maſſes progreſſively towards the centre, till at laſt they ſhall loſe all heat, and become dead, and incapable of ſuſtaining vegetable or animal life. From the analogy of the time required to cool a red-hot cannon ball, our author has ventured to fix the times in which each planet ceaſed to be red-hot on its ſurface, and thoſe in which they will finally loſe their central heat. The duration of incandeſcence, or of their retaining a red-hot ſurface, laſted till each planet became conſolidated to its centre; and is thus determined: 2936 years for the Earth, 644 for the Moon, 2127 for Mercury, 1130 for Mars, 3596 for Venus, 5140 for Saturn, and 9433 years for Jupiter. By the ſame rule, the time of each becoming habitable, and that of each finally loſing all heat, are fixed. The Moon has long become frigid, and Jupiter is not yet ſufficiently cooled to bear animal life. The Moon, the ſatellites of Jupiter and Saturn, formed from the leſs denſe particles of theſe planets, were projected from their equators in the time of their ebullition by the centrifugal force of theſe planets,

proportional

proportional to the velocity of their ſeveral rotations. For want of this velocity Mars has no ſatellite, Mercury probably has none, but Venus might have one imperceptible to us, though ſuch projection may have been prevented by the extreme denſity and adherence of its ſubſtance. In his epochs of Nature Mr. de Buffon modeſtly declines abſolutely determining that the formation of the planets was neceſſarily owing to the action of this comet ſkimming and carrying off with it part of the ſurface of the ſun. But he aſſerts that it is both poſſible and probable that this was the caſe; and maintains, as a very probable hypotheſis, that a comet, which in its perihelium ſhould approach near enough to the ſun to raiſe and plough its ſurface, might produce ſuch effects; and that it is far from impoſſible that ſome day new planets ſhould be formed in this ſame manner; all of which would circulate, like the preſent planets, in the ſame direction, and nearly in the ſame plane round the ſun. Such planets would turn upon their own axes, and their ſubſtance emerging from the ſun in a ſtate of liquefaction would obey the ſame centrifugal force, would be in like manner elevated towards the equator, and depreſſed towards the poles; they might alſo have their ſatellites, become gradually cool, and finally peopled in the ſame manner as the preſent planets. Thus we ſee, without any, or at leaſt any new interference of the Godhead, a new fund prepared for the formation of new worlds, and new inhabitants, to all eternity. But to return: He conjectures that this and all other comets of our planetary ſyſtem, whether equally beneficently active or inactive,

were originally formed by the exploſion of a fixed ſtar, the neareſt to our ſun, whoſe parts, thus diſperſed, having no longer any common centre, were forced to obey the attractive force of our ſun, who from that inſtant became the focus and pivot of all our comets. Though he does not aſſert the agency of this creative comet abſolutely certain, yet he maintains poſitively, that all our planets are compoſed of the ſame materials as the ſun, and are, probably, by ſome ſuch accident, detached portions of that body. All our planets, though of different denſities, are entirely compoſed of melted glaſs, and conſequently all earthly matter, without exception, is vitreous. This truly hermaphroditical glaſs is at the ſame time the ſeed and matrix of all that exiſts upon the planets, of all poſſible beings, animated or inanimate. It ſeems early to have produced air and water, by ſublimation, as it had produced fire by friction; and thoſe elements accompanied our planets as minor captives robbed from the ſun's atmoſphere. Whilſt our planet continued in the ſtate of incandeſcence, theſe were kept aloof for the ſpace of 2936 years: but when this interior heat was diminiſhed, and our globe became conſolidated to the centre; theſe elements, which cannot ſupport a temperature ſo hot as was till then the ſurface of the earth, began to make ſucceſsful inroads on its cooling ſurface. They fell upon it, but were often yet repelled. At laſt the waters fixed upon the cooleſt parts of it, towards the poles; and this might happen about 25,000 years after its firſt formation. During this firſt epoch of Nature, matter became more and more fixed and compreſſed, ſo as to form

form the whole ſolid baſis of the Earth, and of the higheſt mountains of vitreous rock, ſuch as we ſee it at preſent. The firſt aſperities and cracks on the ſurface were the effect of gradual cooling from the red-hot ſtate, during the firſt epoch; and theſe were greatly increaſed in the ſecond, by the final cooling to the degree neceſſary for waters to fix upon the moſt elevated heights under the poles, where heat was ſooneſt evaporated, and poſſibly on the higheſt equatorial mountains. It was alſo during this firſt period, and the ſubſequent 12,000 years, that the great veins of metals were formed. The primordial metallic veins were formed by fuſion and ſublimation only, in the perpendicular crevices of the firſt high mountains. Gold and ſilver, eſpecially when found in their native form, and in vitreous rocks in the higheſt mountains, are to be reckoned amongſt theſe *(c)*. The ſecondary mines of gold and ſilver, in inferior ſituations, and often in horizontal poſitions, and alſo moſt other metals found in a mineraliſed ſtate, were lodged there by the additional intervention of waters. The reaſon why fewer gold and ſilver mines are found in the north, is becauſe the mountains of thoſe regions are generally lower. During the ſame time that the action of fire, and the effects of refrigeration and conſolidation, produced the firſt great eminences, theſe ſame cauſes formed ebullitions or bubbles, covering great vallies and cavities under the exterior coat. But *both* theſe primitive eminences and cavities underwent great alterations by the ſubſequent workings of the waters when theſe became eſtabliſhed upon the earth; and the higheſt mountains of vitreous rock are the

only monuments remaining of the firſt ſkeleton of the globe. Theſe, and the interior rock of the earth, owe their origin to fire alone. Whilſt the whole terreſtrial ſubſtance was in fuſion, matter ran from the two poles to elevate the equator; and in conſequence, the higheſt eminences, the greateſt depths, and the deepeſt ſubterraneous cavities, are there to be found; but it ſeems that the arctic circle furniſhed more than the antarctic.

At the end of 30 or 35,000 years, beginning the third epoch of Nature, the Earth was ſufficiently cooled to retain the waters. At this time not only the waters, but all volatile ſubſtances, hitherto kept ſuſpended by too violent heat, fell upon the earth, filled all its depths and cavities, and covered all its eminences (excepting perhaps ſome of the moſt elevated), at leaſt to the height of 1500 toiſes, under which are ſtill found depoſits of ſhells and marine productions. The firſt fall of the waters and other volatilized ſubſtances upon the earth yet heated, produced violent agitations and tempeſts, and during this epoch almoſt totally changed the firſt ſurface of the earth. Agitated by the action of the ſun and moon, now firſt apparent, and the violence of winds, they overthrew many points of its eminences, broke through the chain of its mountains in the weakeſt points, deepened its vallies in other parts, undermined the vaults of its caverns, filling them, and opening new paſſages to ſtill more ſubterraneous cavities. By theſe laſt efforts the level of the waters kept gradually ſinking from its firſt level of 2000 toiſes above the general ſurface of the globe.

globe. The maſs of waters ſeized on all thoſe ſubſtances which it could diſſolve, and combined itſelf with air, earth, and fire, to form acids, ſalts, &c.; it converted the broken and pulverized ſcoria of primitive glaſs into argillaceous earths; by its motion it tranſported all theſe new ſubſtances from place to place. During the period between 35,000 and 50,000 years after the firſt formation, by breaking down and filtrating into the great cavities and caverns of the earth, the almoſt univerſal ſea which covered the globe gradually ſunk down to its preſent level. During this ſpace the waters produced infinite generations of ſhell-fiſh, and of other aquatic animals, many of whoſe ſpecies, capable only of ſubſiſting in a degree of heat now ſubſided, are no longer to be found alive. Great depoſits of the exuviæ of all theſe, and many others, are to be found buried under the whole ſurface of the earth, and as high as 1500 toiſes above the level of the preſent ſeas. Whilſt Nature fecundated the water, ſhe at the ſame time ſpread the principles of life both over thoſe lands which the ſea had never covered, and thoſe which it ſucceſſively abandoned; every part of the earth emerged from the waters was covered with trees and vegetables of luxuriant growth. To theſe, floated and depoſited by the waters, all ſlates, coals, and bituminous ſubſtances owe their origin. The ſhell-fiſh of this period having prodigiouſly multiplied during 20,000 years, theſe, and all thoſe aquatic animals who have the faculty of converting ſea-water into ſtone, left, after their ſhort lives, immenſe depoſits of their exuviæ, to be triturated and tranſported from place to place by the waters; and thus formed the regular layers of calcareous earths, covering the

clays already formed, or forming, by the combination of water, ſalts and acids with the duſt and ſands of vitreous rock, mixed as well as thoſe with ſhells in a more or leſs perfect ſtate, and often enclofing other kinds of fiſh. In theſe times began the motions of tides and regular winds: theſe, and the waters more or leſs confined by riſing lands, produced currents. The currents gave to the leſſer hills, now forming, correſpondent directions, and ſcooped out the vallies with correſponding angles. To this period muſt be referred the depoſition of ſecondary metallic mines, the formation of all argillaceous earth, and the birth of the firſt ſhell-fiſh and vegetables, origin of all calcareous ſubſtances, of coals, and bitumens. In this time all the immenſe quantities of theſe new ſubſtances were depoſited in regular ſtrata, horizontal or inclined, according to the firſt baſis, by the flux and re-flux and various agitations of the waters; whilſt new currents gave direction to theſe accumulating mounds, or, by forcing a paſſage through thoſe already formed, excavated the vallies. Our author thinks the time he has allowed barely ſufficient for all theſe operations.

The decompoſition of the immenſe quantities of vegetable ſubſtances depoſited at various depths by the waters during the foregoing period, produced ſulphurs and bitumens. The electric matter proceeding from the interior heat of the earth, fire, air, and water, combining with theſe, produced ſubterraneous thunders and earthquakes, which frequently rent the caverns of the earth, and, producing great changes on the ſurface, contributed to lower the level

of

of the waters. But the firſt volcanos appeared not till the fourth epoch, 50,000 years after the formation, firſt burſting from the higheſt mountains ſurrounded by waters, and by degrees in inferior parts as the waters ſunk beneath them, but before they had entirely left their vicinity. Theſe volcanos breaking out in all parts, in thoſe even where they have long entirely ceaſed, during this whole period of 10,000 years, greatly altered the earth by their ravages, rending it in ſome places, and throwing up new mountains in others, and ſpreading over the ſurface great quantities of volcanic matter, formed by mixtures of all the former ſubſtances vitrified afreſh by the action of fire.

When theſe terrible convulſions had in great part ſubſided, the firſt elephants and larger terreſtrial animals were produced, in the fifth epoch, on thoſe parts of the earth which were now ſufficiently cool to receive them; that is, under the poles, where the central heat had ſooner evaporated.——Here we muſt ſtop a while to give an account of the moſt curious part of our author's ſyſtem, the perfect intelligence of which I muſt leave to more ſagacious heads, as I own it entirely paſſes my conception. I ſhall therefore collect it from the author's words.

All organized nature, plants, fiſh, animals, and men, owe their primary exiſtence to an infinity of living organical atoms, or moleculæ, every where floating, and to certain interior forms or matrixes (moules intérieures), ready to receive and abſorb them. If

theſe

theſe produce not now new organiſed beings, it is becauſe there is already a ſufficient number of exiſting beings to receive and abſorb them. All production, all generation, all development and growth ſuppoſe the concourſe and reunion of a great quantity of theſe organical atoms; they animate all organiſed bodies, and are ſucceſſively employed for the nouriſhment and generation of all beings. Should a great part of theſe beings who now abſorb them be ſuddenly ſuppreſſed, we ſhould ſee new ſpecies appear, becauſe theſe organical atoms, indeſtructible and ever active, would in that caſe reunite to compoſe other organiſed bodies; but when entirely abſorbed by the interior forms of already exiſting beings, no new ſpecies can be formed, at leaſt in the firſt great claſſes of nature. In the formation of man, doubtleſs not to ſhock too violently vulgar prejudices, he allows a particular interference of the Divinity, who imparted to him that intelligent ſpirit which renders him ſo ſuperior to other animals. He inſinuates, however, that from analogy this might be diſpenſed with, and that with reſpect to his body the common law of animal production was followed.

Having thus briefly expoſed that mechaniſm of Nature by which, according to our author, not only all vegetation, but all aquatic and terreſtrial animals were produced, let us return to the particular facts which mark this epoch, which laſted 5000 years.

It required 60,000 years after the firſt formation, before any part of

of this earth was ſufficiently cooled to ſuffer the exiſtence of terreſtrial animal life. The firſt parts of it which obtained that requiſite temperature were the polar circles, on account of the leſſer diameter of the earth, and the leſs intenſe heat of the ſun. In our hemiſphere, our author conjectures that 60 degrees of latitude north, as under it lie the moſt elevated parts of thoſe regions, firſt ſaw the production of terreſtrial animals. Theſe were the elephant, hippopotamus, and another ſpecies of ſtill greater magnitude, now loſt: the two firſt can now live only in the equatorial regions. But theſe, their firſt prototypes, the productions of nature in her fulleſt vigour, were much larger than any now exiſting in thoſe ſouthern countries. This is proved by the quantities of bones of the elephant and hippopotamus, and of that ſtill larger unknown animal, dug up in many parts of Siberia and Canada. Probably they may be found in the mountainous parts of Lapland. The preſent habitations of theſe animals under the equator were yet too burning hot to receive them, or perhaps even to permit the permanent reſting of the waters on thoſe parts. To the polar regions they were yet confined; and there theſe animals, of a ſize and ſtrength now unknown, lived and multiplied exceedingly during this whole period of 5000 years. It was not till after it that, theſe parts becoming gradually too cold, they ſucceſſively removed to the 50th, 40th, and 30th degrees of latitude; and it was not till after the lapſe of about 10,000 years that they at length took refuge under the equator, and 20 degrees on each ſide of it, where at preſent are the natural habitations of an inferior

race. The time of their exiſtence in the north was prior to the ſeparation of the American continent from ours. In the New World, after that event, the whole race periſhed, becauſe the mountains of Panama, where the cold is too great, ſuffered them not to reach the equator as in our continent: and hence, though the exuviæ of theſe enormous animals are equally to be found in north America as in northern Europe and Aſia, no remnants of them are to be traced in the ſouthern parts of that continent. Hence too the warmeſt climes of it produce only animals of poſterior production, and of inferior ſize. Thoſe animals, on the contrary, which populate cold and temperate climates, are equally found on both continents, and equally preſerve their races in them. Theſe were later productions of leſs vigorous nature. The rein-deer are the laſt of theſe; and who knows, ſays he, in the ſucceſſion of time, when the regions wherein they now live become much colder, if other animals may not be produced hereafter, whoſe temperament ſhall differ as much from that of the rein-deer, as the nature of this laſt is different in that reſpect from that of the elephant? In our continent, ſays our author, no new animals were produced under the equator. The large animals, whoſe nature is congenial to heat, had multiplied exceedingly in the north; and, when driven from thence by cold, took refuge in great numbers in its equatorial climates: there they inſtantly abſorbed all the living organical atoms, and left no ſuperfluous ones to form new ſpecies. The larger animals not having been able, from the reaſons already mentioned, to penetrate into

ſouthern America, theſe atoms not being abſorbed by the interior forms of any living animal, produced new and totally diſtinct beings, which, in the decay of nature, attained neither the ſize nor ſtrength of thoſe which were derived from the more prolific north at a time when nature furniſhed a greater abundance of this animating organical matter. The reaſon of this greater abundance at that epoch in the northern regions is evident to Mr. de Buffon. All thoſe aqueous, oily, and ductile particles, which enter into the compoſition of organiſed beings, fell with the waters, both ſooner and in greater quantities, upon the northern than on any other parts of the earth. It was on theſe aqueous and ductile particles that the organical living atoms firſt exerciſed their powers to model and develop organiſed bodies; and as theſe organical atoms are only produced by heat, on this ductile matter, they were more abundant in the north than in the ſouth, where this ſame matter fell in leſs quantity. Hence it is not to be wondered that the firſt, the ſtrongeſt, and the largeſt productions of animated nature exiſted in theſe northern lands; whilſt under the equator, and particularly in ſouthern America, where the quantity of ductile matter was much leſs, inferior, weaker and ſmaller ſpecies were formed. At the time when elephants inhabited our northern regions, thoſe trees and plants which now only grow in ſouthern climes, covered the ſurface of the north. The monuments of nature declare it; for all the impreſſions of plants which are found in our ſlates and coals, repreſent thoſe only which now exiſt excluſively in the Indies, or more ſouthern

parts. It may be objected, ſays he, that trees and plants cannot travel like animals; but they may ſow themſelves progreſſively in congenial ſoils, and may thus have been tranſplanted from the poles to the equator, whilſt their prototypes periſhed in the north from increaſing cold. But this ſucceſſive tranſplantation of woods is not neceſſary, adds he, to account for the preſent exiſtence of theſe vegetables in the ſouth; for the ſame degree of heat produces every where the ſame plants without tranſplanting. From the diſcovery of the above curious mechaniſm of procreative nature, our author had already peopled the globe with living animals, and we now ſee him producing plants without ſeed or ſlip from the more ſimple operation of plaſtic heat. Whatever relates to theſe organical atoms, and interior forms or models, I have here given, as nearly as poſſible, in Mr. de Buffon's own words, to be found in the ninth volume of his Supplement to Natural Hiſtory. If this ſingular part of his ſyſtem is not clearly underſtood, it will not, therefore, be my fault.

Great and ſolid reaſons, purſues our author, combine to prove that the formation of man was the laſt great work of nature. It may be ſaid, that analogy ſeems to demonſtrate that the human ſpecies followed the ſame ſteps and dates from the ſame time as other ſpecies; and that, if the epoch of his creation is poſterior to that of animals, nothing proves that man did not undergo the ſame laws of nature, the ſame alterations and changes. We will agree, ſays he,

that

that the human ſpecies does not eſſentially differ from other ſpecies by its corporal faculties; and that, in that reſpect, its origin may have been the ſame with that of other animals: but can we doubt a great difference between man and other animals proceeding from that divine ray which it has pleaſed the Supreme Being to impart to him? The ſuperior faculties of man enabled him to guard himſelf againſt cold, but he has no means of preſerving himſelf againſt heat; and he is unable to bear a degree of that which is even congenial to ſome other animals. Independently then of ſcripture authority, we may pronounce that man was formed the laſt of animals, and in the north, where firſt was found a temperature proper for his exiſtence. The hiſtory of his firſt race is reſerved to the ſeventh epoch.

The ſeparation of the two great continents happened in the ſixth epoch, about 10,000 years ago. It was poſterior to that period when elephants inhabited the northern regions, ſince it appears that their ſpecies exiſted originally at the ſame time in America as well as in Europe and Aſia. This is proved by the exuviæ of thoſe animals, though no longer exiſting there, which are equally found in the northern parts of the new continent. This ſeparation was effected by the ſinking of great tracts of land to the eaſt and weſt of our continent, the ſpace of which was filled up by the waters. This depreſſion of the land was more conſiderable towards the ſouthern pole, becauſe the firſt great current and motion of the waters was from north to ſouth. This impetuous current ſhaped the ſouthern

parts

parts of both continents into points. So long as the waters continued falling upon this earth, this motion of the ſea from north to ſouth prevailed alone; but when theſe were fallen, and the ſun and moon began to act upon the earth, this was ſucceeded by a ſtrong motion from eaſt to weſt. Its influence was little leſs conſiderable; it accumulated the mountains towards all weſtern coaſts; and when the waters began to ſettle, running with violence from thoſe heights they worked the ſhores beneath into abrupts and precipices, by their precipitate fall, in the ſame manner as we ſee a cataract deſpoiling the rocks of their ſoil, and ſcooping out the earth below. The firſt beginning of the ſeparation of the two continents our author conjectures to have taken place in the Pacific ſea, whoſe numerous iſlands from north to ſouth are the broken remnants of vaſt tracts of land ſunken and ſwallowed up by that ocean. The ſinking of the great Atlantic iſland, ſpoken of by the Egyptians, produced the great chaſm between Africa, Spain, and the oppoſite American ſhores. But this, as man has preſerved ſome tradition of the event, he imagines to have happened much later. Laſt of all was made the ſeparation between Greenland and Norway; but whether the ſeparation of that country from Europe ſtill farther north is perfect and complete, he doubts. It was during this epoch alſo, that England was ſeparated from France, Ireland from England, Sicily from Italy, Sardinia from Corſica, and both of theſe from Africa. It was probable alſo at this time, or ſhortly after, that Cuba, St. Domingo, and the Antilla iſlands were torn from America. In conſequence of theſe concuſſions,

concuſſions, the ſtreights of Gibraltar, and of the Boſphorus of Thrace, were opened. Before this happened, Lac Aral, the Caſpian and Black ſeas formed one great interior ſea, whilſt the Mediterranean was yet a lake of inconſiderable extent; but by the rupture of the Boſphorus it was greatly enlarged by the pouring in of the waters of the Black ſea; and by this inundation as much land was loſt, and great part of it for ever, in Europe and Africa, as was gained in Aſia by the reduction of the waters of the Black and Caſpian ſeas. This was the firſt great deluge in thoſe parts of the world. A ſecond happened when the gates of the ſtreights of Gibraltar were thrown open by ſome earthquake, or the undermining force of the Atlantic, which let in the waters of the ocean, laid under water ſtill more conſiderable parts of the former continents of Europe and Africa, and ſtill further increaſed the extent of the Mediterranean ſea. The ſeparation of the continents, and thoſe deluges occaſioned by the rupture of theſe ſtreights, appear to have been of much earlier date than any of thoſe preſerved in the traditions of men. That of Deucalion dates only about 1500 years before Chriſt, and that of Ogyges about 1800. Theſe were only partial inundations, ravaging the lands of Theſſalia or Attica, occaſioned by ſome earthquake heaving up the neighbouring ſeas to flow upon theſe lands for a ſhort time. The deluges of Armenia and Egypt, the memory of which was preſerved by the Hebrews and Egyptians, though about five centuries more antient than that of Ogyges, is ſtill without compariſon more recent than thoſe times when elephants inhabited the north; ſince

ſince in the moſt antient records we are told, that ivory was drawn from ſouthern countries, and, conſequently, that thoſe animals had already emigrated to thoſe countries where they now live, above 3000 years ago. Theſe three deluges therefore, however memorable, muſt be looked upon merely as local and tranſitory inundations, and are not to be compared, either as to extent or antiquity, to thoſe former deluges which laid ſuch vaſt tracts between the two continents, and ſuch extenſive lands round the ſmall lake of the now Mediterranean ſea, under water for ever. Theſe events, though poſterior to the eſtabliſhment of terreſtrial animals in the north, probably preceded their arrival in the equatorial regions; and the gradual emigration of elephants from Siberia to their preſent countries, long too hot for the reſidence of animal life, took up a ſpace of 10,000 years. Since the ſeparation of the continents, and the rupture of the ſtreights, the ſea has rather gained than loſt upon the land. Independently of the acquiſitions of lands in Aſia, around the Black and Caſpian ſeas, and the lake of Aral, all great rivers have gradually formed iſlands at their mouths: the Nile has formed the Delta, the river Amour a great iſland in the Tartarian ſea, the Miſſiſſippi a great part of Louiſiana, and the river Amazon and other great rivers in America the extenſive tracts of Guiana, great parts of which are yet ſcarcely to be called land. A giant race, long extirpated in Aſia by the extreme population of men of ordinary ſize, ſtill exiſts in ſome parts of ſouthern America. But in proportion as men have multiplied in thoſe climates, which are

now

now temperate or warm, the human race has gradually diminiſhed by the increaſing cold in thoſe northern parts where it originally flouriſhed. The polar regions are no doubt entirely frozen, and the circuit and extent of ice daily augments, and will augment till it ſhall progreſſively advance to the equator itſelf, and thus render the whole globe incapable of bearing either animal or vegetable life. This, by his calculation of its progreſſion, will happen in about 89,000 years: and this nearly accords with thoſe calculations formed on the laws of refrigeration, by which our learned author had already fixed that final death of nature at the period of 93,000 years from the preſent moment. The ice has, and will gain much faſter from the antarctic than from the arctic pole, becauſe it has leſs land and more ſea *(d)*.

Thus have I, ſays Mr. de Buffon, deſcended in the ſcale of time, from the firſt iſſuing of this globe from its parent ſun, to ages not very far removed from ours. The ſtate of incandeſcence, and the time which was neceſſary to cool the earth ſufficiently to receive the waters, laſted about 25,000 years: 10,000 years more were required for the total fall of the waters. In the third epoch an univerſal ſea covered the earth; the firſt teſtaceous fiſh and the firſt vegetables were produced; the ſurface of the earth was covered with horizontal beds: and theſe works took from 15,000 to 20,000 years. Towards the end of the third, and the beginning of the fourth epoch, the waters began to retire, the currents of the ſea faſhioned out vallies, and ſubterraneous fires began to ravage the earth by

their exploſions. Theſe motions laſted 10,000 years; and, upon the whole, all theſe operations took up a ſucceſſion of 60,000 years. In the fifth epoch Nature, in her firſt moment of repoſe, brought forth her nobleſt productions; terreſtrial animals were generated; and in the ſixth epoch the great changes, operated by the ſeparation of the continents, took place, 70,000 years after the formation of the earth. This brings us to about 5000 years before our preſent times, diſtant about 75,000 years from the firſt exiſtence of this globe; from which, to the final extinction of productive nature, Mr. de Buffon computes 172,000 years. Nature is already dead in ſome of the planets, as in the Moon. We are not told what is to become of all thoſe uſeleſs orbs, when in proceſs of time ſhe ſhall be equally extinguiſhed in all.

In the ſeventh and laſt epoch our author places the period when the powers of man began to ſecond thoſe of nature. No longer terrified by thoſe frequent convulſions of nature, which, till then, every where threatened him with deſtruction, and the memory of which was long preſerved amongſt his poſterity, and bent his mind to ſuperſtition, man began to multiply; to ſubdue the earth by culture, to invent the means of extracting fire, to tame and domeſticate animals, and to aſſert dominion over all the works of nature. From his calculations it may be deduced, that man firſt appeared upon the earth about 6700 years before the preſent times. He was firſt produced in the moſt elevated parts of northern Aſia, where the earth

was firſt cooled to that degree of temperature which ſuits his nature, that is to ſay, in about the 60th degree of latitude north. It was neither in Africa, nor in the ſouthern parts of Aſia, that the firſt great ſocieties were formed. The centre of the Aſiatic continent, from the 55th to the 40th degree of northern latitude, that is, ſouthern Siberia, was the firſt ſeat of civilized man about 6000 years ago. There it was that was firſt formed that poliſhed and enlightened nation, firſt deſerving of that name, and worthy of our higheſt reſpect as the creator of ſcience, arts, and every uſeful inſtitution. This is demonſtrated to us both by the monuments of nature, and the inconceivable progreſſes made by this people in aſtronomy. It was this learned nation which firſt found out the luni-ſolar period of 600 years; which implies the moſt perfect knowledge of the motions of the earth and moon, and which was not afterwards diſcovered or demonſtrated till our times by Dominick Caſſini. This knowledge ſuppoſes a long ſeries of experiments and ſtudy, which could not have been brought to perfection under leſs than 2400 years; and 600 years more are required for man to have formed into ſociety, and to have learned the firſt rudiments of ſuch profound ſcience. Unfortunately theſe ſublime ſciences, cultivated by a happy and wiſe people, were loſt; and nothing remains to us but a few ſcattered remnants, amongſt the nations of the eaſt, which ſerve to prove their former exiſtence and perfection. From theſe the Bramins, though totally ignorant both of the nature and motions of the earth and planets, derive thoſe learned aſtronomical formulæ, and thoſe tables,

from which they are yet enabled to calculate eclipſes, without the leaſt knowledge of the principles on which they are grounded. Some relics of this ſcience have been alſo preſerved by the Chineſe and the Tartars, who, like the Indians, never invented any thing, but have blindly preſerved without ever attempting to perfect what has been handed down to them from the earlieſt times of their exiſtence. Mr. de Buffon conjectures that, when the earth ſituated to the north beyond this happy country became too cold, the inhabitants of thoſe parts, as yet ignorant and ſavage, invaded this region of delights, of arts and cultivation, and annihilated even the memory of ſcience: ſo that thirty ages of ignorance probably ſucceeded as many ages of knowledge; nothing but the dregs of theſe firſt and nobleſt fruits of human underſtanding ſurvived. Religious metaphyſics, being above comprehenſion, required no ſtudy, but memory alone always kept alive by the marvellous. Hence, therefore, theſe metaphyſical notions, the adoration of ſymbolical idols, ſimilar in very diſtant countries, pilgrimages to the Grand Lama, and the doctrine of the Metempſichoſis, were carried to and received by the Indians, the Ethiopians, and the Atlantides; and theſe ſame ideas, variouſly diſfigured, penetrated amongſt the Chineſe, Perſians, and Greeks. Yet after the loſs of ſcience, the uſeful and neceſſary arts of life, become more neceſſary as nature loſt her former warmth and vigour, ſurvived, and followed the courſe of population. The empire of China, and that of the Atlantides in Africa, firſt aroſe. Thoſe of the continent of Aſia, of Ethiopia, Egypt, and laſtly that of Rome ſucceeded.

During

During the exiſtence of theſe great ſocieties, and downwards to the preſent times, men have ſucceſſively learnt to ſecond, to correct, and, in many inſtances, to ameliorate nature, and gradually, though ſlowly, to recover thoſe ſublime ſciences which originally flouriſhed in the once fortunate climate of Siberia. Our author concludes with the benevolent wiſh that nations, laying aſide all the arts of deſtruction, may at length live in unity and everlaſting peace. It is indeed to be hoped, that whilſt the people of all countries are deterred by the ſad experience of France from ever again purſuing thoſe philoſophical theories which muſt lead to anarchy and the worſt of tyrannies, the ſovereigns of Europe will at laſt perceive that wars of ambition, by laying intolerable burdens on their ſubjects, muſt ſhake their thrones, expoſe their perſons to the fury of enraged multitudes, and once more replunge, by ſucceeding anarchy, all nations into the ſtate of ſavage barbariſm.

Having thus laid before you a faithful abſtract of this celebrated ſyſtem, let us, Sir, impartially examine its ſeveral parts.

In this philoſophical theory, which is boaſted to be ſo much more ſatisfactory, ſo much more conſonant to the real teſtimonies and monuments of nature, and ſo much more intelligible than the narration of Moſes, I apprehend it will appear that many parts are at leaſt as obſcure and unintelligible as that author's account of the creation, and that others are in direct contradiction with the moſt certain

certain and well known laws and facts of nature. Though the eſſence of the Divine Being is, and ever will be, inexplicable by man, yet the idea of one all powerful and ſupreme Architect, faſhioning at will the materials of the univerſe, is at leaſt a ſimple and compre-henſible idea. The abſolute creation from nothing is indeed beyond our conception; but the eternal exiſtence of ſenſeleſs matter combining itſelf in various forms by innate internal activity is no leſs ſo. Solid matter is of itſelf inert, and the ſolid vitreous baſis of the earth, though yet retaining heat, is now totally quieſcent. Whence then aroſe its activity? From heat or fire. Whence that fire? From the preſſure of attraction. Whence that attraction? No anſwer has, or can be given, without recurring to the will of a ſuperior being. In Mr. de Buffon's ſyſtem, though the Godhead is ſometimes mentioned, it is evident that his agency is looked upon as ſuperfluous. All procreative heat and plaſtic nature are ſelf-ſufficient both for the combination of matter, and the production of vegetable and animal life. He ſeems indeed to except the ſpiritual intellectual part of man; but this ſeems rather a conceſſion to prejudice, than a conviction. But to argue with thoſe who think that the moſt perfect machine, compoſed of innumerable and complicated wheels, all proportioned and actuated to one great end, without an intelligent maker, architect and director, is more eaſily conceived than the exiſtence of one Supreme Being, whoſe omnipotence is ſufficient both to form and faſhion its materials, would be uſeleſs. The ſubject has already been reiteratedly handled by ſuperior writers, with whom I leave it.

That

That the great body of the ſun is a maſs of glaſs or pure vitreous matter in fuſion, is at leaſt a doubtful and hypothetical idea, and yet on that the whole baſis of the ſyſtem hangs. Mr. de Buffon poſitively aſſerts, that the whole matter of the ſun, and of the planets, iſſued from it, is vitreous; and hence it ſhould ſeem to be implied, that one ſingle primordial ſubſtance exiſts in nature. As this matter was in fuſion by heat or fire, one ſhould be led to ſuppoſe that he at leaſt admits fire to be a diſtinct and ſeparate element. But his ſubſequent reaſoning appears to exclude that idea. He aſſures us that the heat which produced fuſion proceeded merely and ſolely from the preſſure of the comets, and from friction. Can any of his diſciples explain this doctrine? I apprehend nature will not. We cannot conceive the fuſion or liquefaction of any ſolid without the intervention of ſome diſtinct element, whether fire or water, which ſhall diſunite its particles, and keep them floating in its menſtruum. Without ſuch intervention, preſſure can only condenſe; and friction could only be momentary till the laſt period of condenſation: there all motion would be at an end. In vain would he ſuppoſe fire to be compoſed of the moſt ſubtle and minute particles of the ſame matter; it would only unite more cloſely with the groſſer particles. To divide and keep theſe floating, and in motion, it requires that the intervening particles of a diſtinct matter ſhould have a greater affinity with each other than with thoſe of the ſubſtance ſuſpended in it. This part of his ſyſtem is therefore both inconceivable to common reaſoning, and contradictory to the known proceſs of nature.

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The exploſion of a neighbouring ſtar or ſun, from whence proceed the comets which now preſs upon our ſun, and give it internal heat and motion, is ſurely a poor expedient, a flight of imagination. If he excludes the will of a Deity, no natural cauſe can be given for ſuch exploſion of a ſolid body; and if that ſtar was of the ſame nature as our ſun, its exploſion, without ſome exterior cauſe, is impoſſible. Gravity and affinity, which he admits, oppoſe it. What was the ſun, and how was it contained in its ſtation before any comets weighed upon it?

The oblique falling of a comet, ſo as to penetrate and ſkim the diſk of the ſun, and carry off with it a portion of its ſubſtance, is, I believe, totally contradictory to the known laws of gravity, to thoſe of attraction and repulſion. According to the eſtabliſhed doctrine, comets, when in their perihelium, are repelled with a force equal to that which attracted them. If ſuch law, of a mechaniſm of which we ſhall be probably for ever ignorant, though the end is viſible, exiſted not, the comet, inſtead of ſkimming the ſurface of the ſun, would be infallibly drawn into its vortex, and whirled about with it for ever. The particles, both of its ſubſtance, and of that of the ſun, which might be expelled by the ſhock, would be inſtantly recalled, and reunited by the ſtronger irreſiſtible force of the attraction of that great body.

Since, without the intervention of any diſtinct principle or element,

ment, our author thinks it poſſible to produce heat and fluidity, we are not to wonder that the ſame ſingle ſubſtance is made to produce by ſublimation air and that aqueous matter which forms the ſun's atmoſphere. With a part of the more ſolid ſubſtance of the ſun, the victorious comet carried off a ſhare of theſe to form the atmoſphere of all the planets thence compoſed.

The liquid vitreous matter of which the planets are formed, impelled by the ſhock to various diſtances, according to the ſpecific gravities, denſities, and diameters of theſe bodies, cools in various proportionable ſpaces of time. That a cannon ball, from which the analogy is taken, made red-hot, ſhould, according to its diameter and denſity, cool in a given time, is according to nature. We know that heat accumulated in any body will evaporate till it is placed in equilibrium with circumambient bodies. If the analogy was followed, the heat of the ſun itſelf would evaporate into ſpace: but the ſun, ſays he, is conſtantly kept in fuſion by the preſſure of comets and other planets. In this caſe, heat would be as conſtantly diffuſed. If the ſole preſſure of the comets and other planets, not only ſingly but aggregately inferior to the ſun, is ſufficient to keep that body in fuſion, why ſhould not the preſſure of that great body, joined to that of the comets, and of ſo many planets exceeding the earth in magnitude, all weighing upon this ſmall globe, keep it alſo in the ſame inalterable degree of heat and fuſion?

The whole ſubſtance of this earth, and of every other planet, is vitreous, and, like its parent ſun, was in a ſtate of fuſion when it iſſued thence. That the whole was once vitrified, and in the ſtate of liquid glaſs, Mr. de Buffon aſſerts to be perfectly demonſtrated, becauſe all ſubſtances, ſays he, are vitrifiable by heat. But ſurely to be vitrifiable is no proof of having been really vitrified. But we ſhall ſoon ſee our author making uſe of a no leſs abſurd ſyllogiſm. The ſhells of all teſtaceous fiſh are reducible to lime; therefore all calcareous ſubſtances are wholly compoſed of the exuviæ of teſtaceous fiſh. Should we not laugh at a diſciple of the antient ſchool of Ariſtotle, who ſhould gravely tell us, all wood is by fire reducible into aſhes, therefore all wood was originally aſhes: the bodies of all animals may be reduced to aſhes, therefore all aſhes are the relics of animal bodies?

The aſſertion that all ſubſtances are vitrifiable by heat is not only controvertible, but, according to experience, falſe. He himſelf allowed that calcareous ſubſtances ſeemed not fuſible by the efforts of chemiſtry; but he afterwards pretends to have diſcovered, by more recent experiments, that theſe bodies may alſo be vitrified. The whole difference, ſays he, is, that they muſt be firſt calcined before they can be melted *(e)*. Taking theſe dubious experiments as ſufficient proof, he proceeds:—The earth, to have aſſumed its preſent form, muſt have been in a ſtate of liquefaction. Fire alone can have that effect on all ſubſtances, as many are indiſſoluble by water; there-

fore it is demonſtrable that the whole earth was originally in fuſion by fire, and never could have been diſſolved in water. Unfortunately great part of that vitreous matter itſelf, quartz, which, according to him, conſtitutes the great baſis of the globe, is avowedly refractory to fire: and it is no leſs evident that granite, which forms the higheſt primitive mountains, adhering cloſely to that baſis, though now fuſible, never could have been perfectly melted. It is not, however, poſſible to imagine this whole globe inflamed, and in the moſt violent agitation of boiling liquefaction when firſt iſſuing from the ſun, without vitrifying every particle of matter capable of vitrification to that ultimate and moſt perfect degree beyond which our weak operations could not carry it. Its whole compoſition muſt have been reduced to the moſt perfect glaſs, and like the diamond indiſſoluble but by evaporation. For this very reaſon, indeed, becauſe it cannot be melted by our fire, he ſuppoſes quartz to be the true primitive glaſs. He owns, however, that clays and chalks, though formed by water, are equally refractory. Yet this very quartz, this pure glaſs of the ſun, inattackable by fire, is, he allows, reducible into powder, and even into ſoil, by air and humidity. The ſame may be ſaid of every other ſubſtance, whether refractory or not to fire. Is it from theſe facts that we are to conclude with him that the earth muſt have been in fuſion by fire, but never could have been diſſolved in water? Surely we might more juſtly infer the direct contrary. Chemiſtry is his guide; but from its hitherto known powers we cannot certainly deduce the impoſſibility of ge-

neral diſſolution in water, or of fuſion in fire. That ſame ſcience teaches us, that ſeveral ſubſtances which by themſelves are indiſſoluble in water, or refractory in fire, yet become eaſily diſſoluble or fuſible by the addition of a ſecond body, and ſometimes more eaſily by the addition of a third or more. Conſequently, in the great recipient of univerſal nature, where every force and every kind of menſtruum were united, we cannot determine the abſolute poſſibility or impoſſibility of every ſubſtance having been liquidated either by fire or water. This muſt depend on the inſpection of the preſent ſtate of the various ſubſtances of which the earth is now compoſed; and on the certain effects which we know by experience fire or water muſt have had on them had they formerly experienced the action of the one or of the other of theſe elements. I cannot better elucidate this queſtion than by quoting the ſagacious reaſonings of Mr. de Luc in anſwer to Dr. Hutton, who has alſo inſiſted that all ſubſtances have been originally liquefied by fire.

The diſtinctive characters of ſolids produced by fuſion, ſays that able naturaliſt, are, that ſuch ſolids may be melted again by mere heat; and that after cooling they ſhall be the ſame, or nearly ſo, as before. But of all the ſolid ſtrata of our continents, lavas only are of this nature: no other ſolid body can be liquefied by fire, without undergoing great alterations in its conſtituent parts. If ſuch a ſolid is compoſed of heterogeneous particles, they muſt firſt be reduced to ſuch a ſtate as to combine with fire in the manner which produces liquidity;

liquidity; and for this they muſt combine together ſo as to become nearly homogeneous. It is known by experience, that theſe combinations are produced by more or leſs alterations in the very ingredients of the ſubſtance; either by the loſs of ſome of theſe ingredients, or by the addition of new ones, or by both; whence the new ſolid produced by cooling, bears hardly any reſemblance to the ſolid melted. To prove this, he examines ſome of the facts alleged by the Doctor in ſupport of his hypotheſis, which clearly make againſt it. On the contrary, for the aggregation of looſe and heterogeneous particles by ſolution in water, it is not neceſſary that all of them ſhould be diſſolved; it is ſufficient that that vehicle ſhall help minute particles to inſert themſelves between larger ones, ſo as to multiply the points of contact in the maſs, thereby conſolidating them as ſoon as theſe heavier particles are precipitated, and the ſuperfluous water withdrawn from their interſtices is expelled by preſſure to their ſurface, ſo as to ſwim above them, or, if the quantity of water be ſmall, is totally evaporated by ſubſequent heat. This therefore is the only method of accounting for the inſertion of woods, ſhells, and a variety of diſtinct heterogeneous matters, often in a ſtate of almoſt perfect preſervation, in maſſes become ſolid. This alone can account for ſtrata of cloſely cemented lime-ſtone found upon looſe marle, or of ſand-ſtone and petro-ſilex upon looſe ſand or pebbles. If the uppermoſt ſtrata had been melted, thoſe under them could not have remained unaltered; whereas by ſolution in water, thoſe particles which had not, either in themſelves or

by

by adventitious materials, a ſufficient number of points of contact, remain in their original looſe ſtate after the loſs of the liquid in which they floated. Granite, which ſeems the moſt general underſtratum of the globe, is compoſed of a variety of diſſimilar particles, viſibly unadulterated and unmixed by fuſion, but united by a cement or gluten, the conſolidation of which could not have been the effect of fuſion, but which may be the effect of precipitation in a ſolution of water. Water alone would not, perhaps, be a ſufficient diſſolvent of the cements which unite theſe particles; but by the mixture of other menſtruums of which we may be ignorant, but which might then operate, they may have been diſſolved, and their contents held in a ſtate of fluidity.

Here we have the conciſe theory of fuſion and ſolution, grounded not on vague opinions, but on experiment and the invariable proceſs of Nature. The undoubted and conſtant effects of the agency of fire and water prove, on one ſide, that it is impoſſible that heterogeneous bodies, compoſed of perfectly diſtinct matters, and particularly granites, which Mr. de Buffon contends to have been in primitive fuſion, could ever have been melted by fire; and, on the other ſide, the clear not only poſſibility, but probability, not to ſay certainty, that all ſubſtances, and granites more eſpecially, may have been held in a ſtate of fluidity by water. I know the inſtances here mentioned of compact bodies incumbent on looſe marle, or on ſands, are to be accorded with Mr. Buffon's opinions on a ſecondary formation

mation by water; but equal inſtances may be produced in rocks entirely compoſed of primitive or vitreous matter, in which ſtrata of looſe ſtone are interpoſed between others perfectly compact *(f)*. Neither could ſtrata of entire different ſubſtances, though all equally what is called primitive, lie perfectly diſtinct one upon another, without even any regard to ſpecific gravity, if all had been melted at one and the ſame time, which they muſt have been in the general and perfect fuſion of the whole globe. Held in fluidity by water, they may have been depoſited one above another, without regard to ſpecific gravity, accordingly as the waters in this or that place, or at one or at another time, may have been ſaturated by the particles which compoſe thoſe different ſtrata.

But after having inſiſted on the neceſſity of all matter having been in fuſion by fire, which, had it even acted upon naturally heterogeneous ſubſtances, muſt have finally reduced them to a ſtate of abſolute or nearly abſolute homogeneity, Mr. de Buffon is forced himſelf to have recourſe to water to new model the ſurface of the earth, and produce thoſe varieties of form and apparent natures and qualities diſcoverable in the now heterogeneous matter of the earth. This he ſuppoſes to have been effected in the waters, partly by the attrition and pulverization of primitive matter, and partly by a diſſolution which the waters, by their combination with air and fire, and with the aſſiſtance of acids, alkalis and ſalts produced from that combination, were now permitted to exerciſe on ſome parts of this ſame

vitreous

vitreous matter. But if all matter was then equally perfect glaſs, why not on the whole? In his Hiſtory of Minerals he allows that even quartz, the moſt pure of all vitreous ſubſtances, may be decompoſed by humid vapours, and again reinſtated by evaporation; and he admits a ſecondary quartz and jaſper formed in water: rock cryſtals too, and probably diamonds, the hardeſt ſubſtances and the moſt reſembling perfect glaſs, he owns, are cryſtallizations formed by the filtration of waters. Nature and experience therefore ſhew, that the component parts of the pureſt vitreous ſubſtances may be equally decompoſed in water, and again reinſtated or cryſtallized by its evaporation, as by fire and cooling. It will then only remain to know which of the two elements exerciſed that power in the firſt inſtance. If, in the beginning of things, the component particles of vitreous matter might have been diſunited by, and conſequently floated in, water, that ſubſtance had no need of fuſion by fire. It is ſurely quite unneceſſary to melt it firſt by fire, and, after cooling and conſolidation during ſome thouſands of years, to reduce it again into minute particles by the medium of water before a ſecond and final conſolidation.

Hence we may deduce, that the firſt of his diſtinctive qualities which ſeparate vitreous from calcareous matter, the neceſſity of the former having been formed and melted by fire, is not only imaginary, but evidently falſe; as the pureſt of thoſe ſubſtances are not only refractory in fire, but are found to be ſoluble in water, or at leaſt in humid

humid air. His ſecond diſtinction between theſe two ſubſtances will be found, by examination, to be equally controverted by facts. Mr. de Buffon aſſerts, that vitreous rocks, adherent to the great baſis of the earth, are always found in great blocks and maſſes, undiſtinguiſhed by beds or ſtrata, and ſplit only by perpendicular cracks and fiſſures, occaſioned by contraction on the cooling of their melted matter; whereas calcareous rocks are every where depoſited in viſible beds or ſtrata, horizontal or inclined, according to the primitive baſis on which they have been ſuperinduced. No man has ſurveyed with a more diligent and ſagacious eye every part of the Alps, where the nature of every kind of rock is viſible, than Mr. de Sauſſure, in his annual viſits for more than twenty years through that vaſt range of mountains; and yet he declares that in all their inmoſt receſſes and vallies, as well as on their higheſt cliffs and mountains, he has conſtantly obſerved certain and regular beds, or ſtrata, though frequently of greater thickneſs, no leſs in the vitreous than in calcareous rocks. Theſe beds are frequently divided by others of very diſtinct natures, and ſometimes at very great depths under the ſummits by calcareous ſtrata. Where all the beds are of primitive matter they are diſtinguiſhed by alternate bands of granite, of ſchiſtus, and ſchorl, and often interſperſed with others compoſed of looſe fragments of quartz mixed with other ſubſtances. Strata containing no mica are often immediately ſucceeded by others where that conſpicuous ſubſtance is thickly ſtrewn in their texture. Theſe ſtrata, in various poſitions, though generally more or leſs

inclined, are, it is true, frequently nearly perpendicular to the horizon, but they ſometimes interſect each other, and on the whole face of one mountain in particular appear in this uncommon form ⨯. In others, the ſtrata of free or ſand-ſtone are ſtrongly undulated. Many kinds of rocks declared vitreous by Mr. de Buffon, as ſchiſti and ſlates, are not only in beds, continued in the ſame inclination throughout whole mountains, but are interiorly compoſed of an infinity of thin laminæ, and conſequently never could have been melted by fire.

Mr. de Buffon laughs at Mr. de Sauſſure for having made uſe of the expreſſion of perpendicular beds, as a contradiction in terms; but waving grammatical criticiſms, the expreſſion is intelligible, and the fact true. By whatever name we ought to call diſtinct bands of matter, in various poſitions, this is ſufficiently underſtood; and this laſt author clearly explains, that it is not from the poſition of the whole maſs, but from the interior texture of their ſubſtance, that he thus denominates them beds. Great maſſes of calcareous as well as of vitreous rocks are frequently found in a vertical poſition. Yet Mr. de Buffon ſuppoſes all the former to have been depoſited in beds. Both the one and the other have been deranged from their original horizontal poſition to a more or leſs inclined and even vertical one by ſome great convulſion, which has at once ſubverted whole mountains with all their component ſtrata *(g)*. It is not from their actual ſituation, but from the interior ſtructure and the

veins

veins and grain of rocks, that we are to judge whether they have been formed in beds, and theſe originally horizontal or nearly ſo. All ſchiſti are, as above obſerved, whatever their ſituations, compoſed of laminæ; and even in the moſt compact ſtones the grain and veins are no leſs viſible. In ſome, as this author obſerves, mica is ſtrewn in regular lines in one part, whilſt none appears in another; and if the maſs is placed in an horizontal poſition, theſe layers of mica will appear regularly horizontal; which proves them to have been originally formed in that ſituation, as it is impoſſible to conceive theſe particles regularly applied to them in a perpendicular one. Many are the proofs of this which the ſurvey of Alpine mountains afford *(b)*.

Neither is the abſolute ſeparation of vitreous or primitive from calcareous or ſecondary ſubſtances, eſtabliſhed by Mr. de Buffon, better founded in facts: innumerable, on the contrary, are the proofs of their having floated together, before conſolidation, in one common liquid. Mr. de Sauſſure ſhews, that in many parts of the Alps the tranſition from vitreous to calcareous rocks is not to be fixed by any line of demarcation. The two ſubſtances, towards their junction, whether they lie in ſtrata one upon another, or are joined longitudinally, are frequently ſo intimately blended and intermixed, as to make it impoſſible to point out where the one ends or the other begins. In the very inward texture of their ſubſtances that intimate mixture frequently appears. Mica and quartz, declared

of the pureſt primitive nature, are often mixed in conſiderable quantities in calcareous rocks; and in rocks apparently vitreous Mr. de Sauſſure has found, by their analyſis, calcareous matter, ſometimes indeed in ſmall proportions, but alſo ſometimes in quantities equal to a fourth part of the whole. Nature too extracts, at times, the pureſt matter of both ſubſtances from one and the ſame rock, as is proved by cryſtals of calcareous ſpaths being found in the ſame grottos, called cryſtal ovens in the country, with cryſtals of vitreous matter, equally cryſtallized by the filtration of waters through rocks whoſe ſubſtance ſeems entirely primitive *(i)*. In the ſpace of 3000 toiſes along the road called Mont-Jovet, in the duchy of Aouſt, the rocks through which that road is cut are not only, ſays Mr. de Sauſſure, of various natures, and diſpoſed one above another without any diſcriminating order, but in moſt of them what are called calcareous or ſecondary ſubſtances are frequently blended with and make a component part with vitreous or what is called primitive matter. This mixture of quartz, of ſchorl and mica with calcareous ſubſtances in every poſſible form proves, ſays he, that naturaliſts have been in too great a hurry to place preciſe limits between theſe two ſpecies. They are not only blended in the ſame beds, but thoſe beds are placed above or below each other, without any reſpect for thoſe laws which they have been pleaſed to eſtabliſh. Vide Sauſſure's Travels in the Alps, vol. ii. 4to. page 398. Hence it appears that both theſe kinds of matter, before they were conſolidated, have floated at one and the ſame time together, without adulteration, in the ſame liquid, which

could not be fire. This, indeed, Mr. de Buffon is partly obliged to avow; but he refers it to a ſecond period. Yet if this common ſolution in water was ever poſſible, why not in the firſt origin of things? To this no anſwer can be given, but that it would render the preceding part of his ſyſtem uſeleſs.

The cracks and fiſſures of primitive rocks are not, as Mr. de Buffon maintains, perpendicular to the horizon, as they ſhould be in caſe their maſſes had been melted in their preſent ſituation, but perpendicular to the vein or grain of their interior texture, and horizontal or nearly ſo, or not forming an angle of more than 35 degrees with the plane of the horizon. This, as Mr. Sauſſure obſerves, is an almoſt convincing proof that thoſe ſtrata, now in a vertical or greatly inclined poſition, were formed in an horizontal ſituation, from which they have been deranged by ſome ſubſequent convulſion *(k)*. There are other great maſſes of rock, and particularly the Needles of La Blaitiere, forming pyramids of granite, whoſe internal diviſions are in pyramidal leaves, applied one againſt the other in an angle of 66 degrees with the horizon, which can be attributed to neither fuſion nor depoſition, but muſt to all appearance be the effect of cryſtallization. Their cracks are irregular, and in all directions.

From all the above obſervations, grounded not on ideal ſyſtems, but on thoſe monuments of Nature which Mr. de Buffon and his diſciples are continually invoking, it will appear, that thoſe diſtinc-

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tive characteriſtics between vitrifiable and calcareous ſubſtances, tending to prove the former to have been in fuſion by fire, are erroneous, and contradicted by every evidence of Nature. So ſtrong are thoſe evidences, that that author himſelf has been obliged to allow a ſubſequent ſolution in a watery liquid; which conſequently makes their prior fuſion unneceſſary, and a mere gratuitous ſuppoſition.

But the power of holding in diſſolution the triturated ſcoria of vitreous matter is not the only one Mr. de Buffon beſtows on the waters when once fairly ſettled on the earth. Between 35,000 and 50,000 years after the formation of this globe, they ſpontaneouſly produced aquatic animals, and more particularly teſtaceous fiſh. Whether this formation of aquatic animal life was effected by their own prolific powers, or by thoſe ſingular powers to which he afterwards attributes terreſtrial animal life, we are left to divine. However that might be, the multiplication in particular of teſtaceous fiſh during 15,000 years was aſtoniſhing: it was ſufficiently great to produce, from their ſpoils and relics, the whole quantity of calcareous ſubſtances which now cover no inconſiderable portion of the ſurface of the earth. Theſe ſubſtances were, ſays he, like all others, originally vitreous, but they paſſed through a filtration which changed their nature; they were formed in water, and are entirely compoſed of the ſpoils of madrepores and ſhell-fiſh, which have alone the art of converting liquid into ſolid, and of transforming ſea-water into ſtone. Marbles, and other calcareous ſtones, are entirely compoſed either

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of entire ſhells, or of portions of ſhells of madrepores, and of all teſtaceous fiſh, often yet eaſily diſtinguiſhed in their texture. Calcareous gravels are only the broken remnants of theſe ſtones detached from the rocks. From all theſe lime may be made; and lime is alſo made from ſhells: therefore every thing which can be made into lime is originally compoſed of theſe ſhells. Such argument ſurely deſerves not refutation; nor ſhould I think of waſting time on it, were it not on account of that authority which Mr. de Buffon, by his eloquence and his deciſive tone of aſſertion, has gained over ſo many perſons who have blindly adopted his ſyſtem. I have already touched on the glaring abſurdity of this ſyllogiſm. Whence were generated theſe ſhell-fiſh themſelves, whoſe exuviæ have formed ſo conſiderable a portion of the earth? Surely his prolific glaſs, by whatever ſubtle power of mechaniſm it was enabled to engender ſhell-fiſh, of wonderfully perfect and infinitely varied forms, endued with life and motion, might have as eaſily reſolved itſelf into a much more ſimple lifeleſs ſubſtance, in many caſes ſcarce diſcernible from it; and often not to be diſcovered but by laborious chemical decompoſition, and the evidence of one ſingle diſtinct quality. A longer circuitous proceſs no doubt ſuited better Mr. de Buffon's deſire of lengthening the ages of formation. Would it not have been much more logical to have concluded, that theſe ſhells are compoſed of calcareous particles, becauſe the animals which carry them feed on that kind of earth, or on plants which ſpring from it? Animals draw their ſuſtenance and their growth from the food which

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ſupports them; each claſs eſtabliſhes itſelf in preference where that nouriſhment is moſt abundant, and without that would periſh. This nouriſhment is either directly drawn from the earth itſelf, or indirectly from thoſe particular plants which that earth produces, or from the fleſh of other animals who have been fattened on it, or on its products. Plants themſelves draw their nouriſhment from the earth combined with the other three elements and various ſalts which they appropriate to themſelves by ſuction and filtration, in a manner which man can neither perfectly underſtand nor imitate: but the earth is the baſis of their nouriſhment, as well as their ſupport; and according to its qualities they flouriſh or periſh in different places. Animals in like manner transform into their peculiar ſubſtances, by digeſtion, ſuch earths or plants, or animal fleſh, as are proper for their nouriſhment and growth. The various kinds of fiſh proſper and multiply only on thoſe coaſts, or in thoſe parts of the ſea, where the ſoil and its plants, if ſuch is their food, are congenial to their natures; and, though accidentally carried to or ſpawned in other parts, ſoon periſh for want of proper aliments. Animals as well as plants, indeed, by their decompoſition, reſtore to the earth much more than they had drawn from it; becauſe they have added conſiderable proportions of ſalts, of fixed fire, air, and water, which are not immediately volatilized, and which render it perhaps ſtill more proper for the nouriſhment and growth of future races. I would then allow, with Mr. de Buffon, no inconſiderable increaſe of calcareous ſubſtance, from the decompoſition of teſtaceous animals; but

but he muſt diſpenſe me from believing that the whole fund of calcareous matter is the product of their exuviæ. I am perſuaded, on the contrary, that the exiſtence of various kinds of earth was neceſſary, to give nouriſhment and growth both to plants, and animals which are fed from them; and that if ſuch various beds of earth had not exiſted before their birth, the ſeeds of plants could never have germinated, nor thoſe animals, which are nouriſhed directly or indirectly from thoſe ſoils, have received their proper growth; and that conſequently both would have periſhed almoſt as ſoon as produced; and the whole earth would have been, and remained, barren and deſert. I will agree with him that moſt calcareous bodies are apparently ſediments depoſited by waters; and that the greateſt part of the mountains and rocks, compoſed of that ſpecies of matter, bears evident marks of having been formed under the ſea; but I believe that calcareous matter is compoſed of the fineſt particles of other ſubſtances, not excepting vitrifiable ones, depoſited by and under the waters, which either originally covered the whole earth, or have covered it at ſome ſubſequent period. I am alſo perſuaded that the greateſt part of the ſurface of the preſent dry land, before a great revolution which entirely altered the exterior form of this globe, was formerly the bottom of the ſea. The peculiar ſalts which impregnate ſea-water may have been the means of reducing the decompoſition of other ſubſtances into thoſe finer particles of which calcareous matter is compoſed, and of their concretion and more regular depoſition in beds. The parts of it ſo

formed are conſequently ſomewhat different from thoſe ſtalactites of the ſame ſubſtance which we ſee formed under our eyes by cryſtallization and the filtration of pure waters through the pores of the earth. Without recurring to the ſlow operations of hundreds of ages, the firſt total immerſion and formation of the earth under the waters, and the ſubſequent change of ſea into land, and of land into ſea, by a great revolution on its ſurface, will ſufficiently account for its preſent appearance and ſtratification, and for all extraneous ſhells and bodies, accumulated in former ſeas during ſeventeen centuries, now found in ſand-rocks and argillaceous earths, as well as in calcareous rocks and bodies.

According to our author, whilſt the ſea was repleniſhing, by powers unknown to us, with this multitude of teſtaceous fiſh, whoſe exuviæ ſufficed to produce all calcareous matter, the higheſt points of the globe, which the waters had either never ſurmounted, or which they relinquiſhed as they gradually ſubſided, ſpontaneouſly produced all kinds of vegetables, plants, and trees, without ſeed or ſlip, or any of the uſual modes of propagation. Heat alone, he maintains, is capable of producing them. To avoid the interference of a Creator, plaſtic Nature and prolific heat are left to bring forth all the infinite variety of vegetable life, the ſmalleſt leaf of which is of a ſtructure never to be ſufficiently admired. From the putrefaction of theſe firſt plants all vegetable earth is produced. But if Nature alone could give birth to and foſter plants of the moſt luxuriant growth, this vegetable ſoil

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ſeems rather unneceſſary. But in time the powers of prolific heat were to fail; in thoſe times the powers of Nature in every reſpect were as much beyond common conception as beyond its preſent force. This unmodified aſſertion of Mr. de Buffon, and of ſeveral of his diſciples (ſome of whom carry the matter ſtill farther, and aſſure that argillaceous earths, which according to him are the products of ſands rotted in the waters, are compoſed of the relics of plants mixed with the fleſh of animals, and marles of the bones of theſe laſt), is indeed ſo abſurd, that one cannot help wondering how it has been implicitly adopted by ſo many men of ſenſe and learning. Over and above the particular ſeed capable of producing and reproducing each particular plant, every thing that grows requires a firſt proper matrix to receive its ſeeds, and foſter its firſt tender ſhoots. Without it plants could neither root nor flouriſh, even for a ſingle hour: neither his hard ſcoria of melted glaſs, nor unmixed barren ſands or naked rocks, which heat could only render ſtill more barren, could afford ſuch to the firſt efforts of vegetation; and the earth, without a variety of ſoils, muſt have remained for ever deſolate, in ſpite of all his generating powers. If he had contented himſelf with aſſuring that the reſiduum of plants helps not only to increaſe the fund, but to extend the ſphere of vegetable ſoil, to places where there was originally none, or very little, we muſt have agreed with him. Trees, in particular, ſending their roots deep into the earth below the vegetable ſoil, and through the crevices of rocks, moſt certainly return to the ſurface, by their decay and by the fall of their leaves, much more

than they had drawn from it. The deep roots of a tree ſeek, elaborate, and transform into its ſubſtance, particles of earth originally barren; and its bark, branches, and leaves, imbibing through all their pores fixed fire, air, water, nitre and ſalts, and whatever the atmoſphere contributes to their compoſition and growth, add by the fall of the leaves, and finally by the mouldering branches and trunk, much more vegetable ſubſtance to the ſurface than the tree had originally received from thence *(l)*.

But vegetable ſoil is not the only preſent which theſe firſt ſpontaneous plants have made us: they have prepared for us other treaſures in the bowels of the earth. Their decayed ſubſtances, during many thouſand years floated backwards and forwards and depoſited at various depths by the waters, produced coals, bitumens, and ſulphurs. Bitumens, ſays he, are the oils of vegetables decompoſed by water, and mixed with acids; ſulphurs are a combination of the fixed fire of plants with vitriolic acids: both proceed from vegetables. Theſe impregnated the whole waters of the ſea; and theſe, incorporated with decayed plants and trees, were depoſited by the waters in the places where coals are now found, and ſucceſſively formed at various depths ſeams of coal in regular ſtrata, interiorly compoſed of thin laminæ, and yet frequently intermixed with woods and leaves not only foreign to the ſoil and climate, but of kinds now unknown. Theſe, however, are oftener viſible in the ſtrata of argillaceous earths, which are always incumbent on coal, and ſeparate its different

ſeams. The learned Mr. Whitehurſt is of the ſame opinion as to the origin of coal and of iron, which he thinks are derived from vegetable ſubſtances; not that he refers their production to ſo diſtant an era as Mr. de Buffon, but to the deluge ſubſequent to the creation of man, when the ſurface of the earth to a conſiderable depth was diſlocated and overturned. He alſo is of opinion, that all coals are incloſed in beds of argillaceous earths, like thoſe of Derbyſhire and in the north of Ireland. Such general concluſions are too haſty; as it is no leſs certain that coals, in ſome other parts of England, as well as on the continent, are enchaſed in and adhering to ſolid rock of various natures, without any appearance of intervening earths *(m)*. But even ſhould argillaceous earths be always found incumbent on coal and thoſe earths frequently mixed with relics of plants, it appears not to me any proof that all coal was originally generated from decayed vegetables. I rather take their origin to be the ſame as that of blue ſlates from indurated clay, mixed with a bituminous and ſulphureous matter, but in greater quantities than neceſſary to form ſlates. What ſeems a ſtrong and I think an almoſt convincing proof of this general origin is, that the firſt upper ſeams of coal are frequently little better than ſlate; pieces of which are yet half ſlate, half coal, until the latter gradually becomes more perfect. The beſt coal is ſeldom found but in the ſecond and third ſeams, and there frequently intermixed with ſmaller ſeams of half-formed coal. Where argillaceous earths are yet found between the rock and the coal, it is, probably, becauſe thoſe beds are not ſufficiently impregnated with bitumens.

bitumens and ſulphurs to be transformed into coal; and conſequently their appearance rather favours this ſuppoſition. As to the forms or relics of plants to be found in the ſuperincumbent clays or rocks, they may be eaſily accounted for, as conveyed thither by the numerous cracks and fiſſures opened at the (*n*) great convulſion of the deluge. We ſhall hereafter alſo account for theſe being frequently of kinds not indigenous of the preſent ſoil or climate. But ſhould it be granted that all coals originate in vegetables and woods, of which it is probable that cannel coal contains no inconſiderable mixture, yet it is far from neceſſary to refer their production to a period preceding all terreſtrial animals. The convulſion which the earth experienced at the deluge, when great portions of its former horizontal ſtrata ſunk deep into the bowels of the preſent earth, with all their plants and woods, will afford a ſufficient explanation. That this has taken place in the neighbourhood of coal mines the ſame Mr. Whitehurſt has fully proved. There, as well as in every other hilly or mountainous part of the earth, vaſt portions of the originally horizontal ſtrata of the earth, violently rent and fractured, have ſunk deep at one end into ſubterraneous caverns, whilſt the other end was raiſed much above the former level into high mountains, preſenting broken precipices on one ſide, and gentle declivities on the other. That ſuch a convulſion has taken place ſince the firſt formation of the earth, his curious inveſtigation of the ſame regular ſtrata of varied rocks and earths, following in exact ſimilar order, and in the ſame inclination, uplifted throughout the hills and rocks, where they are viſible

viſible in open day, and by mining found to be exactly repeated in the ſame direction within the earth to the utmoſt penetrated depths, ſurely proves to demonſtration. He alſo ſhews, that where the firſt or outward ſtrata appear wanting on the ſurface of the mountains, the ruins or rubbiſh of theſe are ever to be found forming to great depths the mixed ſubſtance of adjoining vallies, which were in the firſt moments of diſlocation and convulſion immenſe fiſſures, till thus filled to their preſent level *(o)*. Theſe evident marks of convulſion, joined to the probable change of former ſeas into land, and vice verſa, which might as well be occaſioned by one great revolution as by many, eaſily account for the mixture of ſhells and plants found in all parts of the globe, as well on the higheſt mountains as in the bowels of the preſent earth, and for the formation of coals from antediluvian foreſts (if ſuch, which I much doubt, ſhould really be their origin), without recurring to Mr. de Buffon's gradual formation during ſo many thouſand years. If to be accounted for by the effects of one great revolution, the reality of which appears in the general records of mankind, is it reaſonable or neceſſary to reſort to an ideal ſyſtem, unwarranted, and impoſſible to be warranted, by any tradition, and in its very baſis, the ſpontaneous production of plants, contradictory to the known proceſſes of Nature?

The changes made in ſeveral parts of the earth by earthquakes, and the eruptions of volcanos, are attributed by Mr. de Buffon to his ſucceeding epoch. After ſuch a convulſion as was capable of producing a general

a general deluge, and ſuch changes as we have already noticed, the war of jumbled elements eaſily accounts for their frequency and univerſality, both immediately and for ſome ages after the deluge. Earthquakes and volcanos, after ſuch a ſtate of confuſion, may be eaſily conceived to have taken place in countries where they are now unknown and unuſual; and where, in the uninhabited ſtate of the world, they muſt have remained unrecorded. They would overturn ſome mountains, and form new ones wherever they burſt forth; or in other places theſe fires might ſpend themſelves within the bowels of the earth, and greatly alter its interior ſtructure. To this laſt circumſtance Mr. Whitehurſt, with ſome probability, attributes the formation of toad-ſtone, frequently incumbent on coal mines, and which ſeems to be compoſed of melted matter. The effects of theſe earthquakes and volcanos, and the burſting of the momentary mounds of a multitude of lakes and pools of water, formed in the firſt diſorder of the ſurface, whoſe traces are not diſcernible to common ſpectators, would undoubtedly produce great ſubſequent alterations on the yet ſettling frame of this fractured globe. Of many of theſe convulſions we can have no record, but it is far from neceſſary that they ſhould have continued during 10,000 years.

Merely to furniſh coals, the uſe of which was not diſcovered till many ages after the firſt exiſtence of man, theſe plants and trees flouriſhed with luxuriancy for 25,000 years, without affording food or ſhelter to any terreſtrial animal. The time was come when they were

were to be peopled, and Nature, by a mechaniſm more wonderful than any yet diſcloſed, produced the largeſt and moſt vigorous of the ſpecies. This curious creative mechaniſm, producing that variety of organiſed members admirably adapted to the nature of each terreſtrial animal, and induing them with life and motion, through the means of living organical atoms operating by the aid of prolific heat on ductile oily matter, and ſwallowed up by interior forms and moulds, I ſhall not pretend to diſcuſs or explain. To me it appears as little philoſophical, and as little intelligible, as the entities and quidities of the Ariſtotelian ſchool, and an additional proof of thoſe abſurdities to which the ſublimeſt human genius is liable. The nature of a ſelf-exiſtent omnipotent Creator is, indeed, and ever muſt remain, inſcrutable to human reaſoning; but the idea of ſuch a one is naturally and eaſily conceived by every underſtanding; nor can his exiſtence be ſupplied but by palpable abſurdities. To thoſe who, rather than admit an intelligent Architect to the admirable ſtructure of this univerſe, and of its inhabitants, in which every part is ſo wiſely and ſo minutely adapted both to general and particular ends, can digeſt the above-mentioned crude ideas, I leave them to be elucidated.

Following his hypotheſis of a yet interiorly burning ſpheroid, flattened at its poles, gradually cooling on the ſurface, Mr. de Buffon aſſerts, that the higheſt parts of the polar circle were the firſt ſuſceptible of receiving animal inhabitants. Theſe were ſuch whoſe natures are congenial to very hot climates. There, by the abundance

of his organical atoms, the elephant, the hippopotamus, the rhinoceros, of a magnitude and vigour ſuperior to their deſcendants, now confined to equatorial climes, were firſt produced. Other animals too, of a yet larger ſize, whoſe relics are ſtill met with, but are now extinct, exiſted in thoſe vigorous days of Nature. The proofs are, that the bones of theſe animals, of a larger ſize than common, are yet to be found in Siberia and in North America, where they can no longer live. To make this a proof of theſe countries being their original, and then only habitation, he ſhould ſhew that the poſſibility of their exuviæ being found there is not to be explained by any other means. Many, however, preſent themſelves. The temperature of the whole earth was probably, as we ſhall hereafter ſhew, very different before the deluge to what it has been ſince; and it was not entirely altered till ſome ages after it. To this the univerſal tradition of the vigour and longevity of the firſt men is at leaſt a collateral teſtimony. Though elephants, even before the deluge, might not have been habitual inhabitants of Siberia, yet they may have lived in latitudes not very far diſtant from it; and ſome of theſe, flying from the increaſing waters of the deluge, may have eſcaped to find their graves on that high platform; or the waters, prevailing over the whole earth for a twelvemonth, may have tranſported their carcaſes far from their native homes. The teeth and bones of the elephant and hippopotamus have, indeed, been accidentally dug up in ſome parts of that northern region; but if that was their original country, where, as Mr. de Buffon pretends, in thoſe prolific times of Nature,

Nature, they multiplied exceſſively, it would not be here and there that a few relics of thoſe animals would be diſcovered, but the whole ſoil would be thick ſtrewn with the remains of animals who had made it for ſo many thouſand years their abode, undiſturbed for many centuries of it by the concurrence of other animals, produced, according to him, long after their firſt exiſtence, by a much cooler temperature than that which laſted there for many ages. So far from this; the number of theſe relics, probably greatly exaggerated by travellers, is not ſo great as to exclude the poſſibility of their being the remains of elephants brought thither in the train of the armies of Gengis-Khan, or Timur-Khan. The exiſtence of the relics of elephants in Canada is, I believe, not quite ſo clear; but if ſuch are there to be found, they muſt, and may undoubtedly, be referred to the effects of the deluge. Southern Spaniſh America is certainly not ſufficiently explored to be aſſured that no ſuch exuviæ there exiſt. If any eſcaped from Aſia after the deluge, they would probably periſh in the more northern climates of the new continent. The pretended ſize of theſe teeth and bones found in Siberia, much larger than thoſe of ſimilar animals now exiſting, may probably be aſcribed to the more ſalubrious temperature of the antediluvian world. Hence we cannot admit as proof of his aſſertion, what may with equal probability be explained by other ſuppoſitions full as reaſonable. Having aſcribed the ſize of animals to heat, our author is ſomewhat embarraſſed by the whale, the conſtant inhabitant of northern and even icy ſeas. For this he finds a ſubterfuge. Theſe enormous fiſh were

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alſo the original produce of thoſe vigorous times; but whilſt the two continents were yet united they were ſhut up in the northern ſeas, and, contrary to the elephant, grew accuſtomed to its altering climate; and, what is ſtill more wonderful in theſe original creatures of heat, have taken a predilection for cold.

The ſeparation, perhaps at firſt not ſo entire, of the new from the old continent, attributed by Mr. de Buffon to this ſame era, is as eaſily explained by the operations of a later well-atteſted deluge as by thoſe of an anterior unknown one. The terreſtrial animals now exiſting in America may have paſſed over thither ſince the deluge, by the numberleſs iſlands ſtill remaining in the narrow ſtreights between that country and northern Aſia, or by more connected lands ſubſiſting ſome ages after it, though now deſtroyed by ſucceeding accidents; theſe, as we ſhall hereafter ſhew, may have at ſeveral periods greatly altered the connections and face of many parts of the earth, by the breaking down of the mounds of many great interior lakes, now thrown into the ocean, of whoſe former mounds ſeveral ſtrings of iſlands are the only remnants.

To this ſame period, and prior to the exiſtence of man, our author refers the rupture of the formerly exiſting mounds through which the ſtreights of the Dardanelles and of Gibraltar have been opened. Though no tradition remains of the more important ſeparation of the two continents, which took place about the ſame time, or even of the antiently

antiently hot and delectable climate of Siberia, which continued in full vigour many thouſand years after, he yet allows that ſome memory of the opening of theſe ſtreights has been handed down to us by hiſtory; though, according to his ſyſtem, man was not yet produced even in the extremeſt north, and conſequently could not have inhabited the more ſouthern regions where they are ſituated. This, ſurely, ſhould prove that theſe accidents were much poſterior to his ſuppoſed diſtant epoch.

I will readily agree with him that ſeveral records of antiquity give room to think, and that the evident traces of Nature ſtill more ſtrongly ſhew, that there was a time, and, according to the former, of no very diſtant date, when the Black ſea, ſtill confined by oppoſing mounds between Europe and Aſia, covered a much greater extent of both countries (*p*) northward, and was very probably united in one great lake with the Caſpian ſea and the lake of Aral; and that, by the burſting of thoſe mounds, either undermined and overthrown by the weight of waters, or rent by earthquakes and volcanos, or by the union of both circumſtances, great part of its waters were ſuddenly poured into the Mediterranean; thereby uncovering great tracts of land behind it, and reducing this great lake, the Caſpian, and lake of Aral, to their preſent dimenſions, and inundating the borders of the Mediterranean, till then ſtill ſeparated from the ocean. Both of this event and of the opening of the ſtreights of Gibraltar hiſtory has preſerved the tradition, though mixed with

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fable, and fixes the latter, which would naturally follow the firſt pretty cloſely, to the age of the Grecian Hercules, or poſſibly of a ſomewhat more antient Egyptian hero, whoſe name the ſon of Alcmena had aſſumed. To ſome part of his reaſoning on the Mediterranean ſea I muſt beg leave to make ſome objections, as ſeveral of his ſuppoſitions appear to me neither probable nor founded in Nature.

It is not on the authority of antient traditions, nor even on the aſpect of the lands north of the Black ſea, or between it and the Caſpian, which by innumerable ſtill ſubſiſting traces give room to conclude that they have formerly been covered by its waters, that Mr. de Buffon founds his belief of the much greater antient extent of that ſea, or former great lake. The infallibility of his phyſical knowledge outweighs every other evidence. It is on the unerring calculations of receipt and evaporation of waters that he grounds the aſſertion; and it is from theſe calculations alone that he maintains that the Mediterranean ſea, before it was laid open to the ocean, muſt have been nearly as much ſmaller than at preſent, as the other was more extenſive. The Black ſea, ſays he, muſt in the time of its full extent have received a much greater number of rivers producing a much greater quantity of water than thoſe that flow into the baſon of the Mediterranean; a much greater extent of ſurface was neceſſary to the Black ſea, when cloſed, to maintain the neceſſary balance between its receipts and the evaporation of its waters; whereas the Mediterranean receiving a much ſmaller ſupply of waters by rivers, the equili-

brium maintained between receipt and evaporation neceſſarily implies a much ſmaller ſurface when it was cloſed than it has at preſent. The balance of its evaporation in its preſent extent requires not only the overplus of the Black ſea pouring into it through the ſtreights of the Dardanelles, but alſo a great acceſſion of waters, which he aſſerts are continually flowing into it from the ocean by the ſtreights of Gibraltar. When unſupplied by theſe abundant ſources, its ſurface muſt have been much leſs, to preſerve the neceſſary equilibrium *(q)*.

Here it muſt be remarked, that the quantity of water ſupplied by rivers to theſe former lakes is alone taken into conſideration: the quantity of rain falling on their ſurface is neglected. Rains, however, in the northern climate, to which the Black ſea is ſuppoſed to have been extended, muſt have been both frequent and plentiful; and in the Mediterranean, though not ſo frequent, yet when they do fall in thoſe climates, it is not in what would in the north be called heavy ſhowers, but in torrents. In many parts of theſe latitudes, notwithſtanding many unclouded ſummer months, it may be doubted whether there does not fall as great a quantity of rain within the year as in the more ſhowery northern climates. The whole quantity of rain falling into water is a real addition to that water. What falls on any given ſurface of the earth is not only employed to repleniſh it with moiſture when dried up by the ſun, but alſo goes towards the nouriſhment and increaſe of the whole vegetable and animal creation thereon exiſting; whilſt the overplus ſerves to feed perpetual ſprings and

reſervoirs

reſervoirs within the bowels of the earth, the ſuperabundance of which is again carried down to the ſea by ever-flowing rivers. On the land, then, rain and dews alone more than ſuffice for evaporation. We muſt then conſider, that though the power of evaporation is greater from water than from land, yet it is its only drain, and conſequently will alſo leave a ſurplus from the rain falling upon it, the quantity of which will be increaſed proportionably with the extent of ſurface expoſed to evaporation. Whatever then might have been the extent of ſurface of the antient Black ſea, it muſt ſurely appear, from theſe circumſtances fairly taken into calculation, that the evaporation from it never could have been ſufficient entirely to balance its receipts both from rains falling on it and from the tribute of ſo many large rivers. The ſurplus thence accruing muſt have been conveyed into the inferior Mediterranean lake by ſome great river. Here then is one of the ſources of this latter reſtored to it.

Let us now conſider the Mediterranean, cloſed and ſhut out, as it was then ſuppoſed to be, from the ocean by a barrier between Africa and Spain. We have already ſeen that it probably, and by a fairer calculation almoſt certainly, received a very conſiderable ſupply by ſome great river pouring into it the overplus of the great interior Black ſea. To this muſt be added the waters of the Nile and Po, and of all other rivers emptying themſelves into its baſon, and the quantity of rain falling upon its ſurface. Theſe ample ſupplies, if not ſo ſuperabundant as to have required, like thoſe of the Black ſea,

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a drain into the ocean, muſt yet have been upon a fairer eſtimation ſufficient to compenſate evaporation from the whole ſurface it at preſent occupies. But all theſe ſources are, ſays our philoſopher, evidently inſufficient to maintain its level, ſince it is certain that a great quantity of water is poured into it by the ocean through the ſtreights of Gibraltar. But this poſitive aſſertion is far from certain.

Though the apparently moſt conſiderable currents may flow into the Mediterranean, yet there is a current alſo from it, taking its courſe along the Spaniſh ſhore, which flows the contrary way with ſuch great impetuoſity, that ſhips to enter the ſtreights are forced firſt to gain Cape Spartel, on the African ſide, to effect their purpoſe; eſpecially if they aim to enter the bay of Gibraltar. But even ſhould this ſuperior current flowing outward not be deemed a compenſation for thoſe that flow inward, are we ſure that inferior currents do not amply make amends for this deficiency? The ingenious experiment of Mr. Deſlandes in the gulph of Guinea, recorded by Mr. de Buffon himſelf, proves beyond a doubt the exiſtence of ſuch inferior currents moving in a contrary direction to ſuperior ones; and this is very juſtly attributed to the eddies formed by the head-lands of great gulphs and bays *(r)*. The ſame cauſe may juſtly be ſuppoſed to operate in the ſtreights of Gibraltar as in the gulph of Guinea, and, as this navigator conjectures, in every gulph and bay. Mr. de Buffon allows the general probability; but here he rejects the natural ſimilarity of cauſe and effect, without alleging any fact to contradict

it, merely becauſe it would militate againſt his poſitive aſſertion. No one doubts but that the Black ſea pours a conſiderable ſurplus into the Mediterranean, though one might judge otherwiſe if the apparent ſuperior currents of one part of the ſtreights of Conſtantinople only were attended to. Over againſt that city the moſt rapid of its ſuperior currents drives into the Black ſea, along the coaſt of Aſia. In the ſtreights of Gibraltar, though it ſhould be equally certain that the Mediterranean flows into the ocean, I conceive that the ſuperior currents would generally appear to have a contrary direction. In that as well as in all interior ſeas the tides are very inſenſible; but its waters meeting at the ſtreights the waves of the ocean agitated by their movements, it is very natural that theſe ſhould in a manner riſe upon their backs, and by that means form ſuperior currents generally flowing inward. This happens in every river when the tide flows; but though it retards, it does not ſtop the current of the river from continuing to be diſcharged into the ſea. Here not only the flowing tide will have this momentary effect, but the whole body of the ocean coming acroſs the ſtreights muſt make it permanent; and thus the ocean, though apparently flowing inward, will only retard but not prevent the diſcharge of that ſea by inferior currents. Hence, from the certainty of one great current flowing outward, and the great probability from all theſe conſiderations of inferior ones running in that ſame direction in theſe ſtreights, it appears at leaſt a matter of doubt whether the Mediterranean receives a ſupply from the ocean, or diſcharges a ſurplus into it.

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But there is a circumſtance which evidently proves the latter to be the caſe. The undoubted motion and general current of that ſea are from eaſt to weſt. This is aſcertained beyond a doubt by the conſtant, *cæteris paribus*, longer time required to navigate from the ſtreights to the coaſt of Aſia than from that coaſt to the ſtreights; and hence the nautical term amongſt all mariners of failing up or down the Mediterranean. This circumſtance alone, invariable in thoſe parts of that ſea where the currents are not diverted into contrary directions by the eddies of a ſtreight, the particular bearings of head lands, or the confluence of other waters, invincibly proves that this ſea muſt diſcharge into the ocean more than it receives from thence; and therefore that the preſent and even a higher level of its waters might have been maintained when the ocean was ſhut out. There is another proof that in its iſolated ſtate it muſt have been, at leaſt originally, as full as the height of its ſurrounding mounds would allow it. Mr. de Buffon agrees with every other philoſopher, that there was a time, the date imports not, when the whole earth was covered with waters. When theſe ſubſided into the general bed prepared for them, they ran off from every part which had an outlet into it; but wherever they met with a deep baſon, ſurrounded on every ſide by banks of a certain height, they muſt have left it full to the level of its loweſt border. If at ſeaſons, in the great and deep baſon of the Mediterranean, as happens in little to ſmaller pieces of water, evaporation exhauſted part of its contents, it would at other ſeaſons be repleniſhed from all higher ſurrounding lands. If this formerly

interior lake was reduced to half its preſent compaſs, it would certainly preſent lands much lower than any known upon the earth, and much below the level of the ocean; conſequently, as well the interior reſervoirs as the exterior moiſture of ſurrounding higher grounds would haſten even to exhauſtion to fill up this deep baſon. Notwithſtanding all the mounds ſuppoſed between them, the waters of the ocean itſelf would force ſubterraneous paſſages to repleniſh it to its level. In fact, no dry lands now exiſt ſo much below its level as theſe muſt have been.

From all the foregoing circumſtances I conclude, in contradiction to Mr. de Buffon's gratuitous aſſertion, that natural reaſons evince that even when there exiſted no full communication between the Black and Mediterranean ſeas, a certain ſurplus of the former, notwithſtanding its extenſion, was by ſome river or drain carried into the Mediterranean; and that the latter, though ſhut out from any direct communication with the Atlantic, muſt have been originally left full to the height of its loweſt banks, and muſt have been generally repleniſhed with waters to that whatever level; and that therefore, inſtead of being lower, its waters muſt have been as much higher than at preſent as the elevation of its loweſt banks towards the ocean permitted. Whatever was the height of its waters, it is evident that this ſea or interior lake, overcharged by the ſudden irruption of great part of the waters of the Black ſea on the rupture of its former intervening mounds, and probably at different periods, prior or poſterior, by a like diſcharge

of

of the waters of ſeveral other interior lakes in Theſſaly, in Aſia Minor, and in Egypt, of all which hiſtory furniſhes us ſome traditions, muſt have made, and did make, a great effort againſt thoſe mounds which till then ſeparated it from the Atlantic, and in its turn broke theſe down to find a diſcharge for this vaſt acceſſion of ſuperabundant waters. All antient traditions confirm theſe facts by informing us in clear and preciſe terms, that the ſudden diſcharge of great part of the waters of the Euxine ſea, opening themſelves a paſſage through the Boſphorus of Thrace, cauſed great ravages and deluges on the coaſts of the Mediterranean; and that this acceſſion and new weight of waters cauſed that ſea to overturn part of the rocks which till then ſeparated it from the Atlantic near the columns of Hercules, and, thus opening a diſcharge into that ocean, again relieved that part of its coaſts which had been inundated by the firſt accident *(s)*. Tradition alſo reported, that the ſudden diſcharge of theſe waters overwhelmed that Atlantic iſland of which Plato ſpeaks, ſituated beyond the preſent ſtreights. Though the ſize of that iſland is probably not only exaggerated, but amplified beyond all credible bounds; though its very exiſtence may be abſolutely fabulous; yet the tradition itſelf gives evidence to the frightful idea which mankind had formed of the force of this irruption of waters; and further indicates that the diſcharge was not from the ocean breaking into the Mediterranean, but from this laſt into the Atlantic *(t)*. The above obſervations on this particular ſubject are in ſome degree foreign to the conſideration of the general ſyſtem now before us; but I thought it

it not improper to diſcuſs here this appendix to Mr. de Buffon's hiſtory of the Black and Mediterranean ſeas. It will, I flatter myſelf, ſhew the haſtineſs of his concluſions, every where announced as undoubted axioms. We will now return to the ſequel of his plan of original formation, concluding with that of man.

The temperature of the earth and atmoſphere was now ſufficiently cool for man to live and breathe in, and the abundance of Mr. de Buffon's living organical atoms immediately produced the human ſpecies. In what numbers men firſt ſtarted from the earth it is not ſaid; but we may conclude this prolific mechaniſm could hardly be confined to one ſingle couple on one ſingle ſpot of the earth fitted to receive this new being. The date of the firſt exiſtence of man ſeems to be fixed by our author to between ſix and ſeven thouſand years ago. He hints the probability of his body having been formed like that of other animals by the ſole mechaniſm of Nature. His intellectual part he indeed vouchſafes to attribute to the intervention of a Divinity, hitherto unacknowledged, and ſhewn to be inactive and unneceſſary: a conceſſion which appears to be rather a ſacrifice to what he, no doubt, deemed prejudices, than an atteſtation of his own fixed belief. Could the powerful Creator of what is moſt perfect in the world have remained ſo long a paſſive ſpectator? Could he have ſtood in need of Nature's ſcarce leſs admirable previous operations, or have required 67,000 years to form an habitation for man, his only work, alone capable of admiring and comprehending the beauties of

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that univerſe in which his Maker had ſo ſmall a ſhare? Mr. de Buffon's doctrine is a repetition of that of the leſs refined philoſophers of antient paganiſm, who, though they attributed to chance the formation of inanimate and ſenſeleſs beings, were yet ſo ſtruck with the *pars divinior* of man as to pronounce it an emanation of ſome ſuperior being. The ſublimer genius of a Socrates and of a Plato caught a glimpſe of one ſupreme intelligent author and diſpoſer of all that is. Mr. de Buffon would lead us back into the darkeſt paths of heatheniſm. Though the intellectual ſpark ſhould be a gift of the Divinity; yet if plaſtic Nature alone ſupplies the means of its perceptions and enjoyments, it would neither be impiety nor folly to raiſe once more the altars of gratitude to the ſun, to the ocean, to mountains, woods, and rivers. The whole tribe of ſhell-fiſh, to whoſe labours we owe ſo large a portion of our dwelling and of our comforts, would certainly claim peculiar veneration; and we might juſtly invoke thoſe living organical atoms parents of life and motion. *Veni, Aura, veni!* might with propriety be repeated by every mouth.

In purſuance of the ſyſtem, man was firſt produced on the higheſt mountains of the polar circle; and it was on the delicious plains of the formerly happy climate of Siberia that was formed, the firſt great ſociety of virtuous and happy men, the learned inſtitutors of ſcience, from whom are derived the ſcanty remnants of knowledge of which ſome traces are diſcoverable amongſt the oriental nations. But having

having already diſcuſſed the like aſſertions of his diſciple Mr. Bailly, who has endeavoured to ſupport from hiſtory what his maſter oracularly pronounced as the certain indications of Nature, I ſhall not again travel over that part of the ſyſtem. This learned ſociety reigned in peace and happineſs about 3000 years, and our preſent traditions and hiſtories commence only about 4000 years ago. Mr. de Buffon admits that the climate of middle Europe has not loſt but rather gained in warmth from the effects of culture in the laſt 2000 years. If the refrigeration of the globe has been ſo very ſlow as to be ſo eaſily counteracted, it is evident that the times of the not only warm but hot climate of Siberia muſt be removed to at leaſt 30,000 inſtead of 5000 years *(u)*.

From the above, I hope it will be allowed, fair examination of this celebrated ſyſtem of Mr. de Buffon, it will, I think, Sir, appear, that not only its firſt baſis is hypothetical and dubious, but in many points is in direct contradiction with the ſureſt acknowledged laws of motion; that all its component parts are not only controvertible, but very frequently in oppoſition with facts, and the hitherto aſcertained proceſſes of Nature; that the reaſonings on which his concluſions are grounded are not only unlogical, but ſometimes abſurd. His ideal mechaniſm of Nature, creative both of animal forms and life, is ſurely as abſtracted and as myſterious, and much leſs conceivable than the intervention of a ſupreme intelligent architect, which it is calculated to avoid. The Moſaical account of the creation, however

difficult to be explained philoſophically, certainly preſents fewer difficulties to be accorded with Nature, and the preſent ſtate of things, than this imaginary ſyſtem ſo triumphantly ſubſtituted to it.

It only remains, Sir, to take a curſory view of ſome other modern ſyſtems, though not equally detailed, and differing in ſome particulars from that of Mr. de Buffon, yet coinciding with him in affirming the neceſſity of a long and almoſt infinite ſeries of ages to produce the actual ſtructure and preſent appearances of this globe. In contradiction to holy writ, and to the moſt authentic documents of hiſtory, which equally ſhew us the infancy of population even in countries not very far removed from weſtern Aſia, all claim with him the ſtill more authentic monuments of Nature, to prove the much higher antiquity at leaſt of the globe itſelf, if not of the preſent race of men. The earth, ſay ſome, has undergone not one, but many revolutions, in which the greater part of mankind has often been deſtroyed and renewed; whilſt others aſſert that the waters in an infinite ſeries of ages are conſtantly making the round of the globe, ſucceſſively, and in continual rotation, abandoning on one ſide former lands, and invading equal portions on the other. As well in ſupport of their common opinion on the great antiquity of the earth, as of the particular parts of their ſeveral ſyſtems, in which they differ from Mr. de Buffon and from each other, all atteſt as undeniable proofs the to them certain indications and evidences of Nature, whoſe book, which all theſe philoſophers read with equal certainty, is ſo much more authen-

tic than any other. To build ſuch ſtreſs upon it, the interpretation of this book ſhould ſurely be equally authentic, and as ſuch unanimouſly admitted by all theſe ſages; which we ſhall ſee is far from being the caſe.

Inſtead of fire, ſome of theſe authors eſtabliſh water alone as the *primum mobile* and prolific mother of all ſubſtances. Mr. de Buffon had aſſerted that there exiſted a general motion or current of the ſea from eaſt to weſt; and Mr. Raynal has adopted this ſuppoſed motion as a full and ſufficient cauſe not only of the interior ſtructure of the earth, but of the conſtant ſlow progreſſive revolution which has been from all eternity taking place on its for ever varying ſurface. According to Mr. de Buffon, this motion immediately ſucceeded the great current from the poles to the equator, whilſt the earth was yet ſoft and covered by the waters. His opinion is, that when the waters were generally withdrawn from the earth, this ſame motion, though ſtill continued, has very little effect, and that the land is generally gaining on the ſea. But Mr. Raynal contends that this ſingle motion has worked, and is ſtill working, a continual though infinitely ſlow revolution on the face of the earth, which alone accounts for the preſent appearances of its ſtructure, and particularly the abruptneſs of all weſtern coaſts and mountains, aſſerted by both to be one of its moſt prominent features.

In anſwer to all theſe hypotheſes I muſt obſerve, that the exiſtence

of this general conſtant current of the ſea from eaſt to weſt is at leaſt far from certain, if not entirely imaginary. It is attributed to the ſucceſſive influence of the ſun. In calm weather, ſuch a motion preceding its riſe is perceptible in the air; but that appears not owing to the direct impulſion of that great body, but to rarefaction by heat. If any thing could create a general motion of the ſea, it ſhould be the perpetual motion and rotation of the earth itſelf, which is from weſt to eaſt, which would naturally give it in that direction. The great attraction felt by the ſea is that of the moon, which is equal on all parts of the great body of the ocean as it ſucceſſively paſſes over it. The general current of the Atlantic ſeems to be from north to ſouth *(x)*; though that is infinitely varied from the different bearings of the lands, and probably from the direction of the valleys in the bed of the ſea, or from other cauſes as yet hidden to us.

The abruptneſs of all weſtern coaſts is far from general. The coaſts of middle weſtern Africa are not uſually abrupt, but gentle; though thoſe of its northern and ſouthern parts on the ſame ſide are ſteep. Nor is it more true that all weſtern ſides of mountains are abrupt. In mountainous countries precipices often front each other; and, when diſtant, as often look to ſeveral quarters indifferently, to north or ſouth, to eaſt or weſt. All that can be ſaid is, that in ſome great chains the more general aſpect of its precipices may be to one particular quarter, though various in different ranges; and this we ſhall hereafter endeavour to explain. Mr. de Buffon's idea of the

ſuppoſed weſtern precipices being formed, whilſt the earth was yet ſoft, by the precipitate fall of waters from accumulated heights, is at leaſt plauſible; but it is utterly impoſſible that Mr. Raynal's ſlow motion ſhould ever form ſuch. As Mr. de Luc obſerves, this pretended ſlow progreſſive motion of the ſea from eaſt to weſt, as for example, from the coaſts of Chili and Peru, which ſeem to have given riſe to this generaliſed idea, could never leave precipices behind it, but uniformly and gently ſloping declivities, diverſified at moſt by ſand banks thrown up by accidental ſtorms and winds, whilſt it would, on the contrary, undermine and break into abrupts the ſhores it invaded. The real fact is, that the abruptneſs or gentle declivity of all ſhores, whether eaſtern or weſtern, depends ſolely on the ſituation of mountains. Wherever theſe are near the ſea, with their precipices turned towards it, its coaſts are ſteep, and its waters proportionably deep: wherever they are far removed within land, or turn their backs to the ſea, a gentle ſlope conducts to its ſhallower waters. This is I believe almoſt invariable; and I flatter myſelf to be able to account for it alſo from a cauſe at leaſt as probable as any theſe authors have offered us. The example which Mr. Raynal adduces of the invaſion of the ſea upon the land from this general current is rather unlucky. Chineſe induſtry, ſays he, has been for ever ſtruggling againſt this general motion of Nature from eaſt to weſt conſtantly menacing them with ſubmerſion. The fact is, that the eaſtern coaſt of China has been invariably gaining upon the ſea inſtead of loſing from its invaſion. Chineſe activity has only done what the Egyptians and

and Dutch have done on northern or weſtern coaſts, and what is daily executing on many others. They raiſed dykes in order to gain ſomewhat ſooner to cultivation thoſe ſhallows which the ſea was ready to relinquiſh, and which the ſucceſſive depoſits of great rivers were beginning to raiſe above the ordinary level of its waters, and by advanced mounds, for ſome time expoſed to the fury of the waves, defended theſe new acquiſitions from the effects of extraordinary tides and tempeſts. The Chineſe hiſtory uniformly acquaints us, that its eaſtern provinces on the mouth of the Yellow River were formerly covered with water, and were by induſtry ſucceſſively drained and extended. The yet nature of this flat and marſhy country ſufficiently corroborates this account. The ſea coaſts where there are neither bays nor rivers change not perceptibly, unleſs by ſudden and uncommon accidents of ſtorms, tempeſts, or earthquakes. Inſtead of the pretended rotation by which the ſea gradually gains on one ſide what it loſes on the other, by a general motion, which is at leaſt doubtful, it is evident that whatever flow changes, unleſs by partial accidents, do take place, are univerſally in favour of the land. Whenever the coaſt preſents ſteep rocky cliffs, either the conſtant daſhing of the waves undermines their foundations, or the wind and weather wear away their mouldering ſummits and faces, and detached fragments are conſtantly falling at their feet. However ſlowly, theſe at laſt, by their decompoſition, preſent a more indeſtructible fence againſt the fury of the ocean, a ſloping beach on which its waves have no hold. Wherever, on the contrary, almoſt level plains or ſloping

ſhores

ſhores conduct to the limits of the ocean, it is evident that every part of the higher lands, from the moſt elevated mountain to the ſmalleſt mount, waſhed down by rains and torrents, ſlowly contribute to raiſe theſe ſhores. The hardeſt rocks on the mountain's ſummit decay, and their fragments are carried down by torrents, and by theſe conveyed to rivers, where pulverized at length, they both raiſe the beds of the rivers themſelves, and by their inundations add ſomething to the adjacent plains *(y)*. Large and ſtrong rivers throw up and extend ſand-beds wherever they diſcharge their waters into the ſea, and by more abundant depoſits at length raiſed above the reach of its waves, often accelerated by human induſtry, prolong the continent, and incroach upon the ocean. The ſlow operations of Nature thus evidently tend to level its heights; and the more rugged theſe are, the faſter they are worn down. Slopes alone, cloſe covered with graſſes and plants, oppoſe this general degradation of every higher ground; but theſe are often attacked by haſty rains and torrents, and contribute their ſhare to the general elevation and extenſion of the land. The common receptacle of all depoſits which are hurried beyond the land, the bottom of the ſea muſt be raiſed from their accumulation, and muſt in conſequence raiſe the level of its waters; but as by much the greateſt ſhare of theſe depoſits are ſtopped before they reach it, and as the ſurface of the ocean is much greater than that of the land, this muſt be proportionably in a ſtill ſlower progreſſion. It is univerſally acknowledged that the cold of every climate depends greatly on the elevation of the land above the level of the ſea. As by this two-fold

operation,

operation, however imperceptible, the height of every eminence above this level decreaſes, our moſt diſtant poſterity has not to fear that increaſing cold with which Mr. de Buffon menaces it, and which will freeze all Nature in 90,000 years. On the contrary, we may with confidence predict to it a much ſofter temperature. The mountains gradually lowered, the plains and general ſurface of the earth levelled and extended by their ſpoils, the bottom of the ſea and the level of its waters raiſed, muſt be continually, however ſlowly, producing that effect; though I ſhall not preſume to calculate in what number of years it will become perceptible. A general milder temperature will be much more rapidly accelerated by the increaſing cultivation and population of the north. Leſs than two centuries will probably ſee a hundred millions of inhabitants in the preſent territories of Ruſſia vigorouſly contributing to this change.

Mr. Pallas, intent on volcanic fires, whoſe traces appear to him in every corner of the earth, aſſerts that the poſitions of ſeas and lands have been perpetually changing from the effects of their exploſions. He places their great focus amidſt the Molucco iſlands. He maintains that the eaſtern ocean, heaved up by dreadful volcanos and earthquakes, invaded the immenſe tracts of land which he ſuppoſes to have exiſted formerly between the preſent Indian and Chineſe coaſts, and the Philippine, Mariane, and Caroline iſlands, New Guinea, New Holland, the Molucco and Maldiva iſles, whoſe outward coaſts deſcribe the limits of a former continent united to, and part of that

which

which exiſts at preſent. From theſe imaginary premiſes he contends, that the whole earth has been ſucceſſively invaded on one hand, and heaved up on the other, by the effects of ſimilar volcanos taking place all round its ſurface. When ſuch unſupported ſyſtems are gravely palmed upon us, ſhall we think it neceſſary to refute them? And ſhall we on ſuch grounds reject the ſcripture account corroborated by the general traditions and hiſtory of mankind, although ſome points may not yet be clearly explained to philoſophers? I ſhall perhaps agree with him that theſe iſlands may have been once connected with the continent, though not by ſolid land, but by an interior ſea, whoſe mounds theſe iſlands may have formed. However terrible and great the effect of earthquakes and volcanos, the ſhock which could have deſtroyed and ſunk ſuch immenſe tracts of ſolid land as he ſuppoſes, muſt have diſlocated the whole frame and baſis of the earth, and even altered its poſition. Such deſtruction, and even greater, from whatever cauſe, may have happened at that deluge which covered the whole earth with water, when, as I apprehend, and ſhall hereafter explain, the very centre of gravity of the globe was diſplaced; but ſuch vaſt alterations could not have been effected before or ſince by any force of exploſion without a revolution ſimilar to it. To have ſwallowed up ſuch great tracts of land the moſt important changes muſt have taken place in the interior of the globe. But one or more mediterranean ſeas, left by the waters which had covered the whole earth, wherever they found a cloſed baſon to receive them, are eaſily conceived, and are very natural circumſtances conſequent to the

the idea of a general deluge. It is not more difficult to imagine that the weight of waters accumulating from ſurrounding lands, aided very probably in that climate by earthquakes and volcanos, may have in proceſs of time broken down their mounds in the weakeſt parts, and thus have greatly altered the face of a conſiderable ſurface of the earth without endangering its frame. In the Black and Mediterranean ſeas, ſurrounded as they are on every ſide, one ſingle point excepted, by vaſt continents, one part only of their barriers was liable to ſuch an accident. In the Baltic two paſſages have been forced. In the interior ſea or ſeas of which we are ſpeaking, many parts of their mounds may have been equally weak, and thrown down either by the waters or by earthquakes. The majority of the iſlands indicated may be conjectured to have been the ſtrongeſt parts of a narrow chain which formerly connected them with the continent, whilſt others may have perhaps been formed by the ruins of that land carried to a diſtance by the irruption of ſuch an immenſe body of waters, till then ſuſpended much above the common level of the ocean. Thus we may here, as well as in the gulph of Mexico, allow the probability of that former connection with the continent which ſeems to be indicated by a nearly regular continued chain of iſlands, without endangering a diſlocation of the whole frame of the earth, which certainly muſt have been the caſe if ſuch vaſt tracts of land had been deſtroyed by the ſudden exploſions of volcanos kindled in its boſom. It is perhaps neceſſary to admit ſuch alterations in that part of the world ſince the deluge, in order to explain the finding of elephants in the Mo-

luccos long before the conſtruction of ſhips ſufficiently capacious to convey them thither.

Sir William Hamilton, Mr. Ferber, and Mr. Brydone, the two former of whom have particularly applied themſelves to the ſtudy of volcanos, without giving general ſyſtems, have affirmed that the certain indications furniſhed by theſe phenomena announce beyond all poſſibility of doubt, not one but many revolutions in this globe during an infinity of ages; and according to the laſt of theſe gentlemen, the poor abbé Recupero trembles in ſecret for the credit of the Old Teſtament.

Seams of vegetable earth repeated at ſeveral depths, frequently found under and over diſtinct and ſucceſſive beds of hard lava, and the whole exteriorly covered with vegetable earth compoſed of the mouldered ſcoria of lava, whilſt in other places lavas are found as intact as when firſt iſſuing from the mountain, appear to theſe gentlemen certain and undeniable proofs of the incalculable antiquity of volcanos, and conſequently of the earth itſelf. They do not advert that all lavas are not compoſed of the ſame ſubſtances; all have not undergone the ſame degree of vitrification, and of courſe are more or leſs ſuſceptible of decompoſition. When their compoſition is the ſame, much depends on the ſtate in which they are emitted. When poured from the crater in the ferment of boiling liquefaction, a droſs or ſcoria riſes like broken waves upon the ſurface, and is eaſily pul-

verized by the air and weather. When the heat is leſs violent, or the torrent is cooled in its courſe, an even impenetrable ſurface defies the influence of the atmoſphere. Theſe philoſophers do not recollect that Herculaneum, the date of whoſe deſtruction is well known, is covered by nearly 70 feet of lava, interſperſed with ſeven diſtinct ſeams of friable earth, the whole covered with good ſoil. Yet all this has been the undoubted produce of leſs than 1800 years. Other lavas, probably iſſued at the ſame epoch, remain on the contrary hard, impenetrable, and bare of ſoil. Volcanos, eſpecially on their firſt eruptions, or when theſe have been preceded by a long calm, throw out materials of very different natures. At their firſt opening they muſt diſgorge all ſuperior incumbent matters, all that variety of ſtrata of different rocks, of earths and ſands, of which the mountain was compoſed; many of theſe pure and unmixed, or mixed with water only; others more or leſs calcined, reduced to aſhes, or melted by a mixture of metals. Sometimes they vomit huge unaltered maſſes of ſolid rock: and this ſeems to have been alone the caſe of a volcano in the iſle of Iſchia, in an eruption about 600 years ago; after which its fires immediately ſubſided, and yet remain extinct. There a valley of above a mile in breadth and two miles in length is yet to be ſeen covered with vaſt fragments of granite, many containing 20 or 30 cubic feet, in the very ſelf ſame ſtate in which they are found in the mountain from whence they iſſued, whilſt no traces of melted lava are to be perceived. Something like this muſt not only have happened at the firſt breaking out of Veſu-

vius, but does happen whenever by taking a different direction its mouth is changed. At other times, volcanos vomit deluges of ſand and water; and again at others, clouds of aſhes and pumice-ſtones; and finally, torrents of liquid fiery matter, in which all theſe have been completely melted to form that heterogeneous ſubſtance called lava. All theſe irregularly ſucceſſive eruptions of various matter muſt form beds more or leſs ſolid, or more or leſs deſtructible by air or weather; and theſe different ſtrata require not ages to accumulate without order one upon another: a few months, nay, a few days, are ſufficient to produce a repetition of all theſe different layers in one place, whilſt in another the original ſoil is thinly covered by a ſingle bed. Lavas apparently the ſame are in one place hardened and in another ſoftened by their expoſition. The rivers of lava are generally hardeſt, and remain moſt intact, near the ſea. Cooled in their paſſage, they had ſubſided into a calmer ſtate of liquefaction, and perhaps the ſalt air and water may have the effect of indurating. After the firſt recorded eruption of Mount Veſuvius, of which the younger Pliny was a witneſs, and has left us an accurate deſcription, its fires totally ceaſed in the ſixth century, and remained extinguiſhed till the fifteenth, when the mountain was entirely fertilized not only to its ſummit, but even within its crater, then covered with vineyards. The witneſſes of this renewal of eruptions deplore the ravages occaſioned on ſo rich a ſpot. This is a proof that the ſcoria of its former lavas had in ſome hundreds of years generally formed a rich vegetable ſoil. It ſhews alſo, how little time is to be meaſured by the

repetition

repetition of euptions. The fires of Veſuvius have been kindled ever ſince, but important eruptions have taken place at very unequal diſtances. The great eruption of 1736 was ſucceeded by a calm to 1752, ſince which eruptions have been frequent for the laſt 40 years, and have greatly altered the ſtate of the crater and of the whole mountain (z). Since ſuch important changes have been effected by a few eruptions within that time, will theſe gentlemen pretend that thouſands of years are neceſſary for thoſe uncertain ones of which they think they have obſerved the traces?

Theſe ſyſtematic authors often fall into evident inconſequences. Mr. Ferber aſſerts, that many hundreds of ages are required to have raiſed Veſuvius to its preſent height, which he thinks, and poſſibly with reaſon, is the mere ruin of a formerly much more elevated volcano; and yet in the ſame breath he relates the formation of Monte Nuovo, which is 1000 feet high, and three miles in circumference, thrown up in 48 hours by the efforts of one ſingle exploſion, unſucceeded ſince by any other. Between the iſlands of Tercera and St. Michael, the ſea vomited amidſt fire and flames in 1628 a new iſland, on a ſpot where before its waters were 160 fathoms deep. This iſland contained at firſt only five or ſix acres, but in fourteen days became three leagues in length, and a league and a half in breadth, and roſe 360 feet above the water. In 1669 the quantity of matter emitted by Mount Etna was more than equal to the whole volume of Veſuvius. An eruption at Arequipa in Peru threw up in twenty days a quantity of ſandand aſhes which,

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if ſpread out to the depth of three feet, Mr. Whitehurſt computes would occupy a ſpace of 34,636 ſquare miles. Many more inſtances might be given, in almoſt every age and region, of mountains and iſlands thrown up in very ſhort ſpaces of time: and not fewer of mountains ſunk; amongſt which I ſhall only mention the Pico in the Moluccos, accounted of equal height with that of Teneriffe, entirely ſwallowed up into the earth, and leaving a lake behind it. When philoſophers are well acquainted with ſuch vaſt changes effected in a few hours or days, with what face can they aſſert that hundreds of ages are neceſſary to produce others of much leſs magnitude? Mr. Ferber has moreover here taken for granted what is by no means certain, viz. that the whole of Veſuvius is a volcanic production. Though we have ſeen, from the above-cited inſtances, that this is poſſible without the continued operation of an infinity of ages, yet from all appearances it is by no means probable. Veſuvius is connected with, and forms one, though an exterior one, of a very extenſive chain of mountains to which it naturally belongs; and therefore its entire formation is not raſhly and without proof to be attributed to extraordinary accidents.

Mr. de Buffon gives it as his poſitive opinion, that the focus of volcanos is not deep within the bowels of mountains, but very little below their apparent fires. Others, and I think with much more probability, aſſert, that in ſome mountains at leaſt the focus is not only below, but much below their roots. The cauſe of earthquakes certainly

certainly lies very deep in the earth, and frequently below the bottom of the deepeſt ſeas: ſufficiently proved by their extenſion through vaſt tracts of countries ſeparated by intervening ſeas. Volcanos are no other than the funnels through which theſe commotions find a vent. A ſenſible connection has been long obſerved between Veſuvius and Mount Etna, which muſt be by communications under the ſea which ſeparates them. Both in the convulſions of earthquakes and volcanos the neighbouring ſeas are violently agitated, and the firſt effects of exploſions in Veſuvius as well as Etna have generally been the vomiting vaſt quantities of water, ſucked up into their vortex by conſtant or temporary channels; and this in the latter mountain was accompanied in 1631 and 1698 by great quantities of calcined ſea ſhells; which leaves no doubt whence theſe waters were derived. We may here obſerve, that ſea-water, as long as it is thus ſucked in and mixed in the cauldron of melted matter, may greatly alter the nature of the lava immediately following, and may be no ſmall cauſe of its being more or leſs ſuſceptible of decompoſition. Thus do we find on every point the frequent diſagreement between theſe infallible interpreters of nature, whoſe deciſions are ſo often founded on doubtful, partial, or erroneous premiſes. Whatever difficulties may occur in the narration of Moſes, it is not ſurely ſuch authorities which can yet ſhake its credit.

Mr. de la Condamine, Sir William Hamilton, Mr. Ferber, and Mr. Faujas, having diſcovered evident traces of volcanos in Italy, Germany,

Germany, and in the Vivarais, in parts where no records of hiſtory inform us of ſuch events, from thence confidently conclude that the world is much older than either ſcripture or hiſtory can warrant, and that it muſt have gone through unknown revolutions in an infinite ſucceſſion of ages. In the ſinking of a well at the foot of Veſuvius about a mile from the ſea, on the ſpot where the city of Pompeia ſtood, ſays Sir William Hamilton, ten alternate ſtrata of ſoil and vitrified ſtone were found before a ſtratum of ſoft ſtone appeared, when the quantity of water prevented further reſearches at the depth of about 67 feet. At the depth of 21 feet, coals, tools, and an inſcription relative to Pompeia, were found under the fourth ſtratum; therefore the ſix under ſtrata proceeded from eruptions prior to the building of that town, ſaid to be founded by Hercules, who is here intimated to have lived in the days of Abraham, more than 1900 years before Chriſt; and hence is inſinuated the length of time required for the date of the loweſt ſtratum of lava. Herculaneum may indeed have been founded by Hercules, or it may have been built by the Heraclidæ during their expulſion from Greece, or perhaps ſome ages after, in honour of that hero. Pompeia may or may not be of equal date, equally unknown and unfixed even by fable. But we muſt here obſerve, that the Grecian chronology carries not the age of Hercules to 1300 years before Chriſt; and that we have already ſhewn it not to have really exceeded 1000 years before that era. Hence much is to be defalcated from this premiſed high antiquity. Mr. de la Condamine ſays, and probably with reaſon, that the lake of Albano,

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the exiſtence of which dates before the building of Rome or Alba, is no other than the tunnel of a former ſunken volcano. Both he and Sir William Hamilton, from the inſpection of the ſoil and rocks adjoining both to Rome and Naples, and almoſt throughout all Italy, announce the evident traces of volcanic productions, and of volcanos unrecorded in hiſtory. The latter thinks the ſea formerly waſhed the foot of Veſuvius; and this might probably be the caſe when the waters of the Mediterranean were much higher before the opening of the ſtreights of Gibraltar; and that the mountain itſelf is an entire volcanic production, thrown up from the bottom of the ſea. This too may be poſſible, though not probable. We will alſo agree with Meſſrs. Ferber and Faujas, that undoubted traces of former volcanos, of which not the ſmalleſt traditions remain, are equally to be diſcovered in many parts of France and Germany. The Giant's Cauſeway in Ireland ſeems alſo an indiſputable volcanic production; and many other evident ſigns of volcanos having exiſted beyond all hiſtorical records, are probably diſcoverable on every quarter of the globe. But on the evidence of theſe generally juſt obſervations the antiquity of the earth, either before or ſince the deluge, is no wiſe dependent. It is not at all neceſſary that a ſingle age ſhould be added to the uſually ſuppoſed date of the deluge, to comprehend all theſe ancient events of nature, though now in many of theſe countries, and unrecorded in any. In the firſt place, from the experience of what we do know of volcanos, it appears that time can neither be eſtimated by the number of eruptions, nor

by the accumulation of different ſtrata vomited by them. As we have already ſeen, Veſuvius, after a ſucceſſion of eruptions from the days of Pliny to the ſixth century, ceaſed entirely until the fifteenth, ſince which it has more or leſs raged at very unequal diſtances to our times. A few years, months, and even days throw out varieties of matter to form very different ſtrata; and in one place theſe have been accumulated one above another in a few days, whilſt in others their ſucceſſion has been the work of ages. One day the eruption is entirely compoſed of water, mud, ſand, or aſhes, capable of becoming immediately good ſoil; and the next day nothing proceeds from the mountain but torrents of melted matter of various degrees of heat, ſpreading over theſe ſtrata of vitrified lava, more or leſs ſuſceptible of decompoſition. From the repetition of varied ſtrata in any place, no proof of the time employed in forming them can therefore be drawn. In the ſecond place, though evident volcanic matter may appear in parts or countries where hiſtory and tradition are entirely ſilent as to the exiſtence of volcanos, it is not neceſſary that theſe ſhould date from an infinite ſeries of ages. If theſe volcanos exiſted only in the firſt five or ſix hundred years after the deluge, ſhould we have any account of them in countries which either were not then inhabited, or were inhabited by diſperſed barbarians, who have left neither traditions nor hiſtories after them? It was very vaguely known to us, through the firſt conquerors of Peru, that there were volcanos in that country; but it required that Mr. de la Condamine ſhould viſit it, to inform the learned how frequent and multi-

plied they are in the vaſt range of the Andes. From the time of that country being ſeized by the Spaniards near 300 years ago, how many volcanos have broken out and how many have been extinguiſhed in thoſe extenſive mountains, which that myſterious people have kept a ſecret from theſe enquiring philoſophic ages! Our poſterity, obſerving no records of theſe any more than of others which have preceded them, may with equal authority take a fancy to date them from 3000 or from 30,000 years. After a convulſion whoſe effects had ſunk the former lands into ſea, and elevated the bottoms of antient ſeas into mountainous continents, it is not only natural but probable, that, from the war of contending elements, great commotions, earthquakes and volcanos ſhould take place on every part of the yet trembling ſurface of the globe, not only immediately after, but during ſeveral ages, whilſt the new earth was yet gradually ſubſiding to its preſent ſtate of quiet. Air and water pent up in the firſt confuſion within its bowels, at length heated and rarefied by kindling fires, would at various periods burſt their priſons again to inundate ſmall portions of the earth. The proximity of ſea and waters is thought greatly to contribute to the kindling of ſubterraneous fires. For many ages after the deluge, it appears that ſeveral ſeas, as we have already obſerved of the Black and Baltic ſeas, were much more extenſive than at preſent; and from the aſpect of ſeveral countries it is nearly demonſtrable, that the waters of lakes which ſtill exiſt were at ſome period much higher than at preſent, and conſequently covered much more extenſive tracts (*aa*), whilſt the yet viſible baſons

of other lakes, where no waters now remain ſhew that they have once been much more multiplied (*bb*). There was a time when Europe appeared to the Aſiatics an aſſemblage of iſlands, and from thence was antiently called by them the Iſles of the Nations. If we figure to ourſelves the extenſion of theſe ſeas and the exiſtence of lakes, of which ſome traditions remain, on the parts adjoining to Aſia, we ſhall not be ſurpriſed at the appellation. As well the traces of theſe waters, as of volcanic matter, found in countries where no waters or fires now exiſt, equally ſhew us that both have diſappeared for many ages, but by no means demonſtrate that they are to be dated from an incalculable number of years. For many ages after the deluge, no part of Europe, not even Greece, was fully inhabited. We have already ſhewn that, even according to the erroneous chronology of Greece, the firſt civilized colonies who fixed in that delightful climate arrived not there ſooner than three centuries after the Hebrew date of the deluge, which is itſelf probably erroneous by at leaſt three centuries; but that, according to the moſt probable corrected chronology, theſe firſt colonies ſettled not there until four centuries later, and not before 1500 or 1400 years before Chriſt. Whenever they are to be dated, they found no other inhabitants but roving ſavages, who left neither traditions nor hiſtories behind them. Theſe colonies required ſeveral ages to become numerous ſocieties, and hiſtories were not written till many ages after: what wonder then that we are not informed of the events of nature during ſuch periods? Of ſome very important changes in the aſpect of

of the neighbouring countries, the opening of the ſtreights of the Boſphorus and of Gibraltar, hiſtory from imperfect traditions does inform us; but of how many events preceding theſe muſt it be ſilent! If in the more ſcientific times of Greece and Rome ſuch are ſometimes recorded, in their more antient ſtory thoſe only which happened to produce impediments in their warlike expeditions, and had whole armies for ſpectators, are caſually mentioned.

Shells, and ſometimes the impreſſions of fiſh incloſed in argillaceous, ſandy or calcareous rocks, and often at very great depths under the ſurface, are, according to many of theſe philoſophers, irrefragable proofs of the great antiquity of the earth. The date uſually allowed to it certainly gives ample time for the induration of theſe rocks; and natural accidents, both at the deluge and previous to it, will eaſily explain the mixture of ſhells in their primitive ſtate of ſoft mud. No perſon doubts but that there exiſts in nature a well averred petrifying quality which hardens into rock, and that from many well-known inſtances (*cc*) in a very ſhort time, ſuch ſubſtances as are capable of petrifaction; and therefore, that it is impoſſible to fix any number of years which would be required for their complete induration. Many of the preſent rocks were poſſibly hardened under the waters, whilſt other beds of formerly liquid mud or ſand have taken the conſiſtency of ſtone within the bowels of the earth. On theſe beds, previous to induration, extraneous bodies may have often been depoſited, and again covered by new ſediments whilſt they yet

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remained under the waters. Accordingly as the ſubſtances which compoſe theſe rocks have been depoſited ſlowly by the tides or ſuddenly accumulated by violent tempeſts and currents, either before the deluge, when moſt of the preſent lands were ſeas, or during the deluge itſelf, or after it during the exiſtence of many waters long ſince diſappeared, theſe rocks are formed of homogeneous or heterogeneous, of calcareous or vitrifiable matter, mixed or unmixed with pebbles rounded by the waters, encloſing or not encloſing various ſhells of one or of different ſpecies, as theſe happened to have been generated in the former ſeas now become parts of our continent. Larger and more active fiſh have alſo been accidentally buried in theſe former muds, which yet retain their impreſſions. Moſt of theſe were buried or intimately mixed with the depoſits accumulated by the agitations of antediluvian ſeas, which covered them for ages. If they are now found on the tops of our mountains, or deep buried in our plains, it is owing to, and a proof of, the great changes operated by that great convulſion which diſlocated the whole exterior coat of the earth. If fluviatile as well as marine ſhells and fiſh are ſometimes found encloſed in ſtone, it is becauſe the rocks in which they are contained lay under interior ſeas or lakes, many of which, though now reduced or perfectly drained, covered great tracts of land for many ages after the deluge. Neither is the frequent appearance in our cold or temperate climates of ſhells belonging to fiſh either now unknown, or inhabiting the depth of the ſea, or living only in hot climates, any proof of multiplied revolutions on this earth in an in-

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finite ſucceſſion of ages. In the great changes operated at the ſame time and by the ſame cauſe which was capable of inundating the whole earth at the deluge, the outlines of which, authoriſed both by the natural conſequences of a convulſion adequate to that effect, and by the actual broken and viſibly diſlocated ſtructure of the earth, I ſhall hereafter attempt to draw, the waters muſt in their agitations and retreat have hurried with them the ſpoils of former ſeas now elevated into the midſt of our continents. Hence the tranſpoſition of the exuviæ of ſhell-fiſh to places far diſtant from their native beds is eaſily conceivable. This alone will account for origins of very different climates from thoſe in which their exuviæ are now found. But I ſhall alſo hereafter ſhew, that both the general temperature of the antediluvian world, and the particular climates of many parts of it, were very different then from what they are at preſent; and that, by the very probable change in the poſition of the globe itſelf at that epoch, countries now far removed into the temperate zones then lay under or not far diſtant from the tropics. From all theſe different obſervations it will appear, that all theſe phenomena may be eaſily accounted for by the immediate or conſequent effects of one ſingle well atteſted revolution, without adding one ſingle year to the age of the world. The effects, however great, which I have hinted at, can ſcarcely be exaggerated, as a convulſion which could have laid the whole earth under water even for a moment, muſt be conceived both violent and univerſal. From it alone, when duly conſidered, the appearance of the ſhells of former ſeas deep buried both

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on the ſummits of our mountains and in our plains may be explained without the aid of frequently repeated revolutions. If the various phenomena which ſtrike us are the effects of convulſion, why not of one alone ſufficient for the purpoſe?

I muſt not paſs unnoticed the opinions of many leſs bold and leſs ſyſtematic philoſophers, who are convinced with me that the date of the laſt great revolution which the earth has undergone cannot be very remote, but yet think themſelves obliged, by the various phenomena of geology, by the formation, the cryſtallization, the depoſition and arrangement of ſtony matters, to admit, if not the eternity at leaſt the infinitely far removed origin of what they call the carcaſs of this globe (*dd*). Such ſeems to be the idea of Mr. de Sauſſure; and others, ſuch as Mr. Bourit, flatter themſelves that this far removed antiquity is reconcileable to the Moſaical narration. This however appears to me impoſſible, as according to Geneſis the whole work of the creation, including that of the abyſs, of the earth, of the ſun, moon and ſtars, is there repreſented, not as an interrupted, but as a continued operation completed by the formation of man, whoſe exiſtence is limited to 17 or at moſt 22 ages before the deluge. But I muſt own, that it appears to me ſurpriſing, that perſons ſo familiarized with the phenomena of chemiſtry; who are daily witneſſes, in our little chemical experiments, of the promptitude with which the intimate mixture of the moſt diſſimilar matters is effected; who as quickly ſee them again ſeparated and depoſited according to their affinities; who

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view without aſtoniſhment the cryſtallization of different ſalts in regular though various forms, the arboriſation of metals, and the decompoſition or the ſublimation of the hardeſt ſubſtances within the ſhort interval of a few hours;—it ſeems, I ſay, ſurpriſing, that ſuch perſons ſhould think it neceſſary to recur to the operation of infinite ages to conceive the concretion or cryſtallization of ſtony ſubſtances in the great laboratory of nature, where every kind of menſtruum was abundant and every kind of agency at hand, and ſurely many as yet unknown to chemiſts. (*ee*) The ſimple and familiar operation of the churn may give an eaſily conceivable and perhaps no inapt idea of the formation of the different groſſer ſubſtances of the globe. The rotation of the earth, the forces of affinity or repulſion, will ſurely ſupply abundant motion to excite the neceſſary fermentation. Could then the great Creator, who had all the materials and all the forces of univerſal nature at his command, require innumerable ages to accompliſh operations which are not in fact more difficult to be conceived, and differ only in magnitude and variety? Would the ſeemingly gradual depoſition of calcareous particles, or the concretion or cryſtallization of vitreous ones, require thouſands of years from the hands of the Omnipotent, whilſt the milkmaid ſees ſimilar effects proceed from her feeble operations in a few hours? But if, after all, ſix days of twenty-four hours ſhould yet appear to theſe gentlemen too ſhort a time for the pretended very ſlow depoſition in beds of many ſubſtances, I will obſerve, that the duration of that night which preceded the creation of light is by no means limited by

Moſes; and that, as I ſhall hereafter ſhew, the days of the creation, and particularly the firſt, are probably not to be meaſured by ours. From theſe they may take the time which they may ſtill think neceſſary for the completion of operations, which, they will however own, are not to be calculated by the powers of feeble man.

From this impartial review of the ſeveral ſyſtems of modern ſyſtematic philoſophy, and the curſory obſervations I have made on them, you will, I think, Sir, find that their very baſis is either founded on dubious, miſtaken or perverted facts, or in many points directly contradictory to the only well-known fundamental laws of nature; that the concluſions drawn from partial, controvertible, or real facts are generally haſty, and by no means convincing. Hence, whatever may be thought of the Moſaical narration, and of the moſt antient traditions of mankind, according with it in every main point, they are not yet overturned by any ſyſtem hitherto broached, claiming ſuperior and much leſs unreſtricted confidence. If the brief account of the creation and deluge given us in Geneſis is yet inſufficiently explained to theſe ſublime philoſophers, ſhould it even ſtill remain inexplicable in all its parts, and ſhould we yet find it difficult to adapt to it the actual phenomena of this earth, the queſtion ſtill will be, whether its veracity or our inſufficient knowledge of nature is to be controverted?

NOTES AND ILLUSTRATIONS

TO

LETTER IV.

(a) Page 283.

HOW is it poſſible, ſay many of theſe philoſophers, to give the ſmalleſt credit to an author who tells us of ſo many miraculous facts, which we declare to be impoſſible, becauſe they are contrary to nature? If the laws of nature are the will of God, they muſt be, like him, immutable. Such are the ſophiſms of theſe ſublime reaſoners: but plain common ſenſe, at leaſt as valuable as their logic, can eaſily conceive that the free author of a work diſpoſed to anſwer one general end, may, yet without abſurdity, momentarily alter the direction of ſome part of it to ſerve a particular purpoſe, without breaking into his firſt deſign. But in whoſe favour, continue they, could theſe infringements on the general laws of nature be permitted? Is it credible that it ſhould be for the moſt inſignificant, the moſt unworthy, and the vileſt race that ever crawled upon the earth? The national vanity of this Jewiſh writer is ſtill more abſurd, and more impertinent, than that of the Egyptians. But does that vanity appear like theirs in perpetually exalting his nation above all others? Whilſt he tells them that they are the predeſtined inſtruments in the hands of God, to preſerve his name to future nations, does he aim to exalt their origin above that of other men? On the contrary, he for ever lays before them their forlorn

and defenceleſs ſtate, from which they were raiſed, not by their own powers, but by the hand of God. He ſhews them to be one of the laſt and ſmalleſt branches of then exiſting nations; and takes away from them, as well as from the reſt of mankind, every ſilly pretenſion to a divine or very diſtant origin. He expoſes to them the ſignal favours they had received, and reminds them of the marvels operated for them, of which they had themſelves been witneſſes. It is not to their merits theſe are attributed, but to promiſes made to ſome of their anceſtors for the happineſs of future generations. To them he ſpares not the biteereſt reproaches on their ſtiff-necked indocility. In the face of ſo many prodigies their frequent diſobedience is no leſs extraordinary than the miracles themſelves. It is no leſs ſingular, that a nation ſhould have preſerved with ſo much veneration a book which bears ſuch hard teſtimonies againſt it, and which places the great body of the people in the rank of the moſt vile and moſt deteſtable of men. All theſe ſingularities are as marvellous, and as contrary to the common workings of the human mind, as the miracles which Moſes reports are incompatible with the common laws and order of phyſical nature. At leaſt, if Moſes, like ſome other legiſlators, the better to ſubjugate his people, and to make his laws received, had deceived an ignorant nation by illuſive prodigies, he certainly did not flatter it on its origin; and for the times anterior to Abraham, he could have no intereſt in falſifying the traditions commonly received. Theſe traditions are confirmed by thoſe of two nations yet exiſting, the Tartars and Arabs, ſeparated from one another by immenſe tracts of country, and which, like the Jewiſh nation, have alone preſerved their races without mixture. With the firſt of theſe the people to whom Moſes addreſſed himſelf never had the ſmalleſt intercourſe or relation.

(b) Page 284.

Mr. de Maillet, or Telliamed, who has left us many valuable obſervations on the formation of valleys, and on the concretion of ſtony ſubſtances, and whom, though Mr. de Buffon has borrowed much from his ideas, it muſt be obſerved, he never mentions, is a ſtriking example how far a man of

ſenſe

ſenſe may be miſled by ſyſtems. Seduced by his aquatic ſyſtem, and by the productive powers of water, he at laſt ſeems to have really perſuaded himſelf that men might have been originally fiſh. To ſupport his ſyſtem Mr. de Buffon aſſerts, that all the higheſt chains of mountains are ſituated towards the line, and in the direction of the equator, or at leaſt deviating only 23 degrees from it; and, to confirm it, cauſed maps to be drawn by Mr. Buache. Theſe are made for the ſyſtem, and not for the globe. In fact, as the Abbé Roſier remarks, ſo far from the higheſt eminences of the earth lying near the equator, the moſt immenſe known plains are ſituated either under it, or on each ſide of it. In Africa the deſerts of Nigritia and ſuperior Ethiopia, the ſandy plains of Caffreria, of Monemugi, and Zanguebar; from its eaſtern coaſts to the Sunda Iſlands, a ſea of 1500 leagues; from the Moluccos and New Guinea to Peru, an ocean of 3000 leagues; and another from America to the weſtern coaſts of Africa, occupy the torrid zone. The two high mountains of Cimboraſo and of Pitchinqua under the line are only an exception without conſequence, as the great chain of the Andes, inſtead of running in its direction, ſtretch almoſt directly ſouth. The immenſe plain between the Orinoco and the river of Amazons is a further contradiction to this aſſertion. All the great chains moreover diverge from the equator either to the north-eaſt or to the ſouth-weſt. If it is admitted that the axis of the globe was inclined at the deluge, many great chains will then appear to have been, at the firſt creation, either under the line then concentrical with the zodiac, or not more than 25 degrees diverged from its direction. In that caſe, the preſent formation of mountains would not ſo greatly militate againſt the ſuppoſition of this great naturaliſt, that the centrifugal force muſt not only have elevated towards the equator the general ſurface of the earth, but have occaſioned its higheſt protuberances to run in that direction. According to my ideas, however, as the greateſt part of the ſurface of the earth was overturned and diſlocated at the deluge, very little of this former very probable arrangement can now be expected to appear. In fact, we muſt always force the real truth to bend it to this ſuppoſition. Even by changing the poſition of the poles 23 degrees, the Alps, mount Krapack,

Krapack, the Caucaſus would ſtill be found too diſtant; whilſt the high mountains of Canada and Norway, the elevated platform of Siberia, and of the deſert of Chamo, would yet ſwerve ſtill more from the equator. In his firſt writings Mr. de Buffon, with much more ingenuity, has deſtined the higheſt mountains, whoſe greateſt chains cut the equator obliquely in diverging 25 degrees, to be the counterpoiſes which balance the two continents. Thus we ſee does this philoſopher forcibly bend all nature to his predetermined opinions. He is no leſs apt to ſuffer himſelf to be deluded by the obſervations favourable to his ſyſtem, ſent to him by ſubaltern candidates for the honour of being named in his writings. On ſuch grounds he roundly aſſerts, that the whole chain of the Voſges is compoſed of granite, or of hard free-ſtone. It may be ſo on the ſide of Lorrain; but I can anſwer for it that in Alſace, in the part of the great chain from St. Odille to the Banc de la Roche, the whole of thoſe mountains, from their feet to their ſummits, are formed of a ſtone compoſed of large and ſmall pebbles cemented by a coarſe ſand. The Banc de la Roche is alone of granite; after which, in the principality of Salm, the ſame nature of rock begins again. In that branch which runs from Phalſburgh to Schirmeck, and to the Donau, including that mountain, the higheſt of all the Voſges, excepting a few quarries of purer and finer red, or reddiſh ſand ſtone, and ſome interſperſed of lime ſtone, the ſame remarkable kind of rock preſents itſelf every where. From the like unfaithful reports, he affirms that the mines of St. Marie aux Mines have been worked to the depth of 200 toiſes below the level of the Rhine: he ſhould have ſaid, no doubt, 200 toiſes below the entrance of their ſhafts on the high mountain of Giromani, far removed from the Rhine. The levels or drains which have been made to draw off the waters from thoſe mines are yet, as I was well informed in the country, far above the roots of that mountain. Theſe mines are in great part abandoned, becauſe the expence of making new drains, as yet very practicable, would exceed the probable profits. No fire engines have ever been employed; which, however, muſt have been neceſſary, had the works been ever puſhed a ſingle inch below the level of the plain, or of the river many miles diſtant

diſtant from the mountain. Many more inſtances might be adduced of ſpurious or doubtful obſervations, boldly alleged as proofs of his ſyſtem.

(c) Page 291.

This aſſertion of Mr. de Buffon is not only not warranted, but ſeems contrary to the general fact. The famous mines of Potoſi, in which, at their firſt diſcovery, ſo much native ſilver, in great maſſes, was found, are not ſituated in the high mountains themſelves, but in lower mountains, which may indeed be ſaid to belong to them; but are iſolated from the higheſt ridges of the Andes by intervening valleys. The mountain of Hartz, in Lower Saxony, and thoſe in which ſilver mines are found in the duchy of Saxony, are not 400 toiſes high. The mines of Hungary are not in the high ridges of mount Krapack. Though hilly, there are no high mountains in Cornwall, ſo famous for its tin mines. The lead and copper mines of Derbyſhire are in calcareous mountains, not 150 toiſes in height; and this latter metal is found in many parts of England, in plain and level countries. Mr. de Buffon could not deny that no inconſiderable mines of gold and ſilver are worked in Siberia; but yet he affirms that gold and ſilver are almoſt the ſole property of equatorial climates, for the ſingle reaſon, that in theſe are found the higheſt mountains; yet it appears that in theſe ſame ſouthern regions native gold in great abundance is not only found in hilly or mountainous, but in plain and level countries. In 1771 the Spaniards, in an expedition againſt the Indians, found the richeſt mines of gold yet perhaps diſcovered, great quantities of which appeared even on the very ſurface of a plain of 14 leagues extent, at Cineguilla in the province of Sonora. So great was the harveſt, that before the end of that ſame year thoſe hitherto deſert and uninhabited plains had attracted 2000 workmen. Other rich mines of the ſame metal were found in the province of Cinalao. Vide Robertſon's Notes to his Hiſtory of America. The whole of theſe provinces, part of the kingdom of New Mexico, is, however, without mountains, and even diſtant at leaſt 200 leagues from any high mountain. The great veins of gold and ſilver ore are not always inchaſed, as this author

afferts, in the perpendicular fiſſures of mountains. Thoſe of ſilver in the mines of Hartz are ſo nearly horizontal as only to incline 10 or 12 degrees. The principal veins of lead or copper ore are, I apprehend, always either horizontal or very little inclined. They are ſometimes ſuddenly broken off by rocks, which have ſlipped down lower into ſome deep cavern, and have carried down under them the hopes of the miner to unknown depths. To recover the loſt vein, either ſhafts muſt be ſunk lower, if that part of the mountain with its various ſtrata has ſunk down perpendicularly; or levels muſt be carried on either on one ſide or on the other of this intervening wall of ſeparation, in caſe the bed of ore has only been ſhoved out of its direction by the lateral ſlip of the vein with its ſuperincumbent ſtrata in that particular part of the mountain. The ſureſt chance to recover the vein, is to ſeek for it at ſome diſtance, at the ſame depth, and in the ſame direction as it was found before the interruption. Theſe are the occaſions of great uncertainty in the profits of theſe mines. Owing to ſimilar diſlocations, great lumps or iſolated bodies of ore are ſometimes found, which delude the miners with the hopes of finding a continued vein of equal richneſs. All theſe accidents prove the interior as well as exterior convulſion and diſlocation, which almoſt all mountains have experienced ſince the creation of the earth, and for which the change of centre of gravity, and conſequent ſubverſion of great part of the earth, which I am perſuaded took place at the deluge, ſufficiently account.

(d) Page 305.

This was contrary to the then eſtabliſhed opinion, which was, that icy ſeas were ſure indications of lands; and hence it was ſuppoſed, that a vaſt inacceſſible continent lay under the antarctic pole. But from Captain Cook's obſervations it appears, that if northern ſhores are frequently ſurrounded by ice, it is not on the account of the proximity of land, but on account of the ſhallowneſs of the beach which environs it. Wherever the ſhore is ſteep and the ſea deep, there is no more ſolid ice than in open ſeas in the ſame latitudes. The great depoſits carried into the adjoining ſea by thoſe

thoſe mighty rivers the Oby, the Janiſea and Irtiſh, by rendering its coaſts much ſhallower than formerly, are the probable cauſes that the navigation, by coaſting round to Kamchatzka, poſſible according to ſome accounts one hundred years ago, is now become impracticable by reaſon of ice perhaps now eternally fixed to the bottom of theſe ſhallower coaſts. There is probably no land under the antarctic pole, but the ſea that ſurrounds it is ſo ſhallow, that in latitude 72 the ice is every where adherent to the bottom, and precludes all poſſibility of further navigation.

(e) Page 314.

The whole difference, ſays Mr. de Buffon, in the vitrification of vitreous and calcareous bodies is, that the firſt are capable of immediate vitrification, whereas the latter muſt firſt be calcined before they can be melted. Calcareous ſtones, ſays he, may be finally reduced to glaſs by the heat of burning glaſſes. Mr. D'Arcet melted calcareous ſpath without the addition of any other matter, in a fierce furnace, and by mixing vitreous matter with calcareous it may be melted in the more ordinary furnaces. Mr. de Buffon has appeared on many occaſions ſo very ready to admit the truth of every light experiment which has been offered to him when favourable to his ſyſtem, that we may reaſonably require fuller proofs before we admit the certainty of theſe facts. Extraneous matters ſo often imperceptibly alter the proceſſes of chemiſtry, that we have a right to demand frequent and careful repetitions invariably offering the ſame reſults. In the firſt caſe, what was melted was perhaps mixed with ſome ſubſtance foreign to the calcareous matter; in the laſt, where a diſtinct menſtruum is added, the entire fuſion may be very poſſible. The different airs created by intenſe heats, the decompoſition of ſalts or of particles of the veſſel in which the experiment is made, may in both caſes have ſerved as menſtrua.

(g) Page 322.

The whole of the great chain of Mount Jura is calcareous. On its

ſummit, the beds of its calcareous rocks are perfectly horizontal, ſplit by perpendicular fiſſures, and frequently aſſume the appearance of regularly built caſtles. As the hills fall on each ſide, theſe beds become inclined, and towards the foot of the mountain are frequently found in an abſolutely perpendicular poſition, particularly towards its more abrupt face looking into Switzerland: if all theſe beds were formed by depoſition, theſe laſt as well as the former muſt have been originally in an horizontal or nearly horizontal ſituation, and muſt have been diſplaced by ſome convulſion. The ſtratification of rocks, whatever be their nature, is to be concluded from the paralleliſm of their veins, whatever may be the ſituation, horizontal, inclined, or vertical, of their maſſes. We ſee in Mr. de Sauſſure's deſcription of Alpine mountains, laminated rocks of granite, vol. ii. page 5; rocks of the ſame, thick ſtrewn with mica in parallel lines, page 50; the ſtratification of granites parallel with beds of laminated rocks throughout the whole height of Mont Blanc, page 85. Pudding-ſtones in vertical beds, incruſted in a cement of ſchiſteous matter compoſed of very thin laminæ parallel with the poſition of the pudding-ſtones, could not have been originally formed in that ſituation, but muſt have fallen into it by ſome accident. A frequently repeated ſucceſſion of theſe pudding-ſtones, of ſlates, of free-ſtone and of calcareous rocks, mixed or unmixed with mica, all in the ſame direction, prove that all theſe ſeveral beds have been at one and the ſame time deranged from their original poſition to be ſet upright. Page 100.

(*b*) Page 323.

Over and above the ſeveral examples cited, it may not be amiſs to point out ſome of the numerous inſtances given in the above author's travels in the Alps, of the frequent intermixture of laminated primitive rocks, which bear the moſt evident marks of formation in water, indifferently lying under or over other rocks of a more compact ſubſtance, and both of theſe intermixed with others of calcareous or what is called ſecondary natures. Of the perfect amalgamation of theſe two pretended diſtinct matters, and of the frequently imper-

imperceptible gradation from one to the other, he gives many inſtances which prove that before they ſubſided they have all floated together in one common liquid, which could not be fire, the certain operation of which would have been to have confounded them all into one ſolid maſs. Under the needles of Chamouni we ſee ſolid granite gradually declining into laminated rocks, and frequently great tables and ſometimes knots of the former encloſed in theſe. The ſouthern needle itſelf is compoſed of a great variety of rocks. In one place is a ſtratum of granite encloſed between two others of grey rock of a very different nature. The ſame bed is here of pure granite, and there of this grey ſtone. Farther on appear tranſverſal veins of granite, and ſometimes knots of it encloſed in that ſame diſtinct ſubſtance:—the whole in ſtrata ſtrongly marked in a nearly vertical poſition. This, the author obſerves, can only be explained by cryſtallization in a fluid which had kept diſtinct ſubſtances ſuſpended in its menſtruum, when accident determined their elements to unite in greater abundance in this or that part. Vol. *ii.* page 69 to 80.—Imperfectly formed granites becoming gradually more perfect, encloſed within very thin laminated horn-ſtone, prove the firſt to have been formed in the ſame manner as other rocks. Page 86.—In the mountain of Valorſine pudding-ſtones are found interpoſed between primitive and ſecondary ſubſtances; and theſe two qualities of matter gradually changing from one to the other, ſlates by degrees becoming free-ſtones, and *vice verſa*, ſhews that the ſediments of which they are compoſed were ſometimes pure, and at other times mixed with mud, with ſand or other matters. Page 104.—The free-ſtone and pudding-ſtones of primitive mountains have a cement of quartzeous matter, whilſt that of the ſecondary rocks is generally calcareous. I know not whether this will demonſtrate the prior date of the former; but, as the author remarks, it will ſhew, that at the time of their formation the waters were not then and in that place impregnated with calcareous ſediments. Page 107.—Mr. de Sauſſure thinks, with reſpect to calcareous bodies called ſecondary, that ſlates, and ſuch rocks as are of a blueiſh or blackiſh colour, mixed with mica or quartz, muſt have been formed before that revolution which gave to mountains their preſent

form, and which deranged their beds from their original poſition; but that gypſum and calcareous ſtones of a more porous texture are of later formation. Page 119.—By analyſing, this naturaliſt found a ſmall quantity of calcareous matter in cryſtals of feldſpath. The rock on which theſe cryſtals are formed is a laminated ſtone mixed with quartz, with horn-ſtone, and threads of amianthus. This amianthus is in great quantities between the beds to which theſe cryſtals adhere, and is often mixed in various directions in the body of the cryſtals. Page 123.—Beds of free-ſtone mixed with rounded pebbles are alternately and repeatedly intermixed with beds of calcareous ſtone. Page 179.—Calcareous ſtrata mixed with laminæ of a ferruginous quartz, and others with mica. Page 187.—Free-ſtone mixed with pebbles of primitive nature, upon which are ſtrata of pure free-ſtone whoſe cement is calcareous, and over theſe ſlates, on the ſummit of Mount les Fours, at the height of 1396 toiſes. Page 192.—Quartz rock ſprinkled with mica, between beds of ſlates deemed of ſecondary formation. Page 286.—Strata of calcareous fragments mixed with mica and filtrations of quartz. Page 271.—On the col de la Seigne, two very pointed pyramids of calcareous ſtone mixed with mica. Page 275.—In the ſame mountain, paralled and alternate ſtrata of ſlates and of quartz, which prove, ſays the author, that nature ceaſed not to produce primitive rocks after having formed ſecondary ones. Page 276.—Gradual tranſition from ſchiſtous rocks to pure granite. Page 290.

(i) Page 324.

The ancient quarries of white marble of Paros and Antiparos, exhauſted by the Greeks and Romans, are filling again with calcareous ſtalactites of the pureſt white. Mr. Monnet however aſſures us, that theſe iſlands are entirely compoſed of what is called primordial matter or granite, and that the waters filtrating into their caverns apparently paſs not through any calcareous rocks. Mr. de Buffon and Mr. Pallas aſſert, that all high mountains are of vitrificable matter. Probably thoſe they had examined were of that nature; and, as the abbot Roſier remarks, every one forms his ſyſtem on

on that part of the earth only which he has ſeen, and concludes without heſitation that every other muſt reſemble it. Mr. de Sauſſure, whoſe reſearches on mountains have been more perſeverant than thoſe of any other naturaliſt, aſſures us that ſome of the higheſt mountains in the Alps, and thoſe in their very central parts, are of calcareous rocks. He alſo obſerves, that wherever theſe are joined on to vitrificable rocks, the two ſubſtances are ſo perfectly blended together as to make it impoſſible to determine any line where the one ends and the other begins. He alſo remarked, in ſeveral places, calcareous ſtones forming in vitreous rocks by the exſudation or filtration of waters through what is called primitive rocks.

Mr. de Caroſi and Mr. Macquer aſſert, that calcedony grows not only in the ſolid body of gypſum in the mine itſelf, but even in ſpecimens of that calcareous ſubſtance preſerved in their cabinets. Thoſe flints which are ſo frequently diſſeminated on the ſurface of chalky grounds, are very apparently concentric concretions from that matter, formed under the atmoſpheric influence by filtrating waters combining with it phlogiſton, acids or alkalis. The pureſt ſilex, though ranged by naturaliſts amongſt primitive ſubſtances deemed by them of an entirely diſtinct nature, has probably no other origin. The gradual and imperceptible tranſitions from primitive to calcareous rocks, ſo frequently obſerved by Mr. de Sauſſure, are ſtrong evidences either of their coeval formation or of their convertibility. Experiments daily ſhew us, that from various proceſſes the moſt eſſential alterations are operated on many ſubſtances; and hence we muſt conclude that the qualities of matter may be entirely changed, either by the loſs of ſome component principles, or by the accretion of others, or by both. From Dr. Watſon's Chemical Eſſays it appears by analyſis, that, of 100 parts of ſlate, 46 are found to be of flint, 26 of clay, both deemed primitive materials, 8 of magneſia, 4 of calcareous earths, and 14 of iron. When heated red hot, the ſlate loſes 2 parts; but, when held in combuſtion a longer time, nearly one-tenth of its weight. But, notwithſtanding the ſmall proportion of calcareous earth, the calcined ſlate reduced into powder is acted upon with great

great violence by acids, and, put into water, forms in a few days a ſtrong lime water, and depoſits, as other lime water does, an earth which effervesces with acids. Here is a converſion of the whole remaining ſubſtance, after the evaporation of one-tenth, into calcareous earth, whilſt it originally contained only one 25th part of that matter. Hence it appears to me evident, that what philoſophers are pleaſed to call primitive ſubſtances, and calcareous bodies by them denominated ſecondary, both equally of original creation, are mutually convertible by the chemical proceſſes of nature.——From all theſe circumſtances, it ſeems not unfair to preſume that calcareous ſubſtances are probably compoſed of the minuteſt and fineſt particles of all terreous matter, not excepting vitrificable matter, which either at the creation, or within the antediluvian ſeas, or at the deluge, being longer ſuſpended in the waters, were the laſt to be depoſited by them; and that they are alſo ſometimes compoſed, and continue to be formed from the duſt and fineſt particles of groſſer vitrificable ſubſtances, detached from theſe by waters, or depoſited by their filtration through ſuperincumbent beds of ſubſtances which naturaliſts have been pleaſed to call of primitive formation, in contradiſtinction to all calcareous bodies, which they indiſcriminately declare to be of ſecond formation, and the ſole product, as Mr. de Buffon and his diſciples contend, of the exuviæ of teſtaceous fiſh.

(*k*) Page 325.

Mr. de Sauſſure obſerves, that in all mountains where the poſition of their ſtrata is horizontal, or nearly ſo, they are divided and ſplit by fiſſures perpendicular to the horizon; but wherever the ſituation of their ſtrata is very much inclined, or nearly perpendicular to the horizon, then the fiſſures parallel to each other form nearly right angles with that ſituation, and are nearly horizontal. In the firſt caſe, it ſhews that the ſtrata have preſerved their original direction; in the ſecond, that it has been changed. Had the ſtrata been formed in a ſituation nearly perpendicular, it would have been impoſſible that they ſhould have uniformly ſplit in directions contrary to the

efforts of gravity and preſſure. That the fiſſures ſhould frequently be neither abſolutely perpendicular to, nor parallel with, the horizon, is eaſily to be accounted for; as in their primitive ſituation their direction might in many caſes be conſiderably altered by the inequalities or variable ſolidity of the baſis on which they reſted. In their violent precipitation from their original horizontal to a vertical poſition, the ſtrata may have alſo frequently ſuffered new cracks, which often ſub-divide the rocks into parallelopipeds.

(l) Page 332.

Some years ago I planted about 40 acres of ground chiefly with Scotch fir: the ſoil was ſo barren that the farmer found it uſeleſs to attempt to produce corn on it; nor would it cover with graſs; he therefore willingly yielded it at one ſhilling per acre during his leaſe. Though the plantation is yet young, it is now covered underneath with luxuriant graſs. The fall of leaves and branches cannot as yet have produced any conſiderable addition; but it is probable that trees attract and draw from the atmoſphere, fire, ſalts, and nitre, which have invigorated the earth.

(m) Page 333.

In the earl of Carliſle's mines in Cumberland, the coals are encloſed in calcareous rocks; in thoſe of the earl of Lonſdale at Whitehaven, they are cloſely adhering to a ſchiſteous rock. In the country of Liege, the different bands of coal are divided by a kind of rock which Mr. Gennete calls agas, from the filtrations of which he aſſures us that new beds of coal are regenerated in many parts in the ſpace of 40 years. Mr. de Genſanne thinks that coals are generated from mixed argillaceous earths impregnated with bitumens and ſulphureous principles. Mr. Gennete, from ocular inſpection, gives an account of 61 beds of coal worked in the mountain of St. Gilles near Liege, to the depth of 4125 Liege feet. Mr. de Buffon, who cites at length his deſcription of theſe veins, aſſures us, though he never viſited them, that only 23 of them can have been worked to the depth of 1288.

1288 feet. The caſe, I apprehend, is, that one of theſe authors computes the depth from the ſummit of the mountain, whilſt the other reckons it only from the entrance of ſome ſhaft on its ſide. Mr. de Buffon aſſures us, that the deepeſt pits in Europe are thoſe of Namur, which have been worked to the depth of 2400 feet: thoſe of Whitehaven, the deepeſt in England, he looks upon as comparatively ſhallow. But if by depth is meant, as it certainly ſhould be, the loweſt point to which men have penetrated in mining under the general ſurface of the earth, I will venture to ſay, that the mines of Whitehaven are the deepeſt which have been worked for any mineral in any country. Some ſhafts are drove from the ſummit of the hill above them, which is not elevated more than 40 fathoms above the level of the ſea; but the great entrance into theſe mines is at the bottom of this hill, and deſcends gradually by a road wide enough to admit carts to the depth of 100 fathoms more; and theſe mines extend under the harbour and ſea a quarter of a mile to that depth under the level of its waters. Whatever may be the depth taken from the ſhafts on the tops or ſides of hills far advanced in the land, I believe no other mines are worked in any country ſo much below the level of the ſea itſelf.

(*n*) Page 334.

In moor lands, where coals are generally found, gullies or deep holes in the form of inverted cones are frequently to be ſeen. Theſe with the waters muſt frequently convey the exuviæ of plants through their ſubterraneous paſſages into the bowels of the earth. Where the moors are left in their wild ſtate theſe tunnels are yet to be found; but, for the purpoſe of cultivation, or to avoid danger, are in general filled up by the induſtry of man. Such certainly muſt have been much more frequent from the numerous cracks and fiſſures opened at the deluge, or when the ſurface of the earth ſettled to its preſent ſtate; through which the remaining waters would find a paſſage into the caverns of the earth, and carry with them the ſpoils of numerous plants, very different from thoſe that now grow there in the altered ſtate and temperature of the globe.

(*o*) Page

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The rocks below Briſtol Hot-Wells, whoſe ſtrata, inclined in an angle of about 45 degrees, dip under the river Avon on each ſide, thus leaving a paſſage for it, ſpeakingly proclaim to the eye of the numerous viſitants of that place the ſame effects of a violent convulſion, which has thus diſlocated theſe rocks, as well as thoſe of Derbyſhire, and, in fact, of every other mountainous country, even where the rocks and mountains infinitely ſurpaſs theſe in height; though in ſuch vaſt-extents theſe effects are not ſo eaſily to be followed.

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Many local evidences give, in fact, the greateſt reaſon to think that the Black and Caſpian ſeas, and the lake of Aral, are only the remains of one ſea formerly much more extenſive, and comprehending them all three. Not only on their immediate borders, but to very great diſtances northward, up the courſes of the Don, the Wolga, and Jaick, theſe three ſeas are ſurrounded by flat and ſandy deſerts, deſtitute of freſh water, but interſperſed with innumerable ſmall lakes, whoſe waters are ſalt or bitter. The plains of Cuban, ſtretching between the Black and Caſpian ſeas, and thoſe that lie between this laſt and the lake of Aral, and far towards the eaſt of that lake, bear ſtill more evident marks of having been once covered by its waters. All theſe deſerts are ſtrewed with ſhells belonging to fiſh of ſimilar kinds with thoſe yet found in the Caſpian. The author of a Diſſertation on the primæval Form of Europe, inſerted in the ſecond number of the Monthly Magazine, aſſerts to have traced in his travels the ancient extent of this former interior ſea over the whole deſert of Aſtracan and beyond the Jaick, by the ſymptoms of coaſt with which the elevated plains of Ruſſia border this deſert, and by the foſſil productions covering its whole ſurface. He alſo obſerves, that Guillaume Le Vaſſeur aſcribes the ſame appearances to the plains of the Boriſthenes. Other travellers have remarked the traces of ſea in the plains of Aſia Minor and of Perſia, and

along the Danube very far above the actual limits of the Caſpian and the Black ſea. Before the rupture of the Boſphorus, this formerly great interior ſea, re-uniting the three above-mentioned ſeas, would have no other bounds towards the north-eaſt and eaſt than thoſe which the gradual riſing of the lands in Ruſſia and in Great Tartary would give it; and as this is very gentle, its waters would of courſe cover great tracts of thoſe flat countries. Towards the north and north-weſt it will have extended itſelf over conſiderable parts of Poliſh and Ruſſian Ukraine. Towards the ſouth in Europe, the chain of mount Krappack will have been its barrier; but turning round this in Wallachia, it will have formed a great bay in Temeſwar and Lower Hungary, hemmed in towards the north by this ſame chain of mount Krappack, towards the weſt by the hills which ſeparate Hungary from Auſtria, whence it would receive the Danube, and to the ſouth by the chain of mount Hæmus. In Aſia, the formerly connected rocks of the Boſphorus and the various branches of mount Caucaſus would form its ſouthern barriers. The whole of this ſouthern boundary is ſo ſtrong, that it could not be broken through in any other part than where the preſent ſtreights are ſituated. By the former height of theſe laſt-mentioned mounds before they gave way, the extenſion of this great interior ſea northward and eaſtward muſt have been determined. Over and above including the three ſeas which ſtill remain, it probably covered great part of the country of the Uſbeck Tartars, the governments of Orinburg and Aſtracan, and the Cuban in Aſia: in Europe, the plains of Little Tartary and Crimea, of the Ruſſian and Poliſh Ukraine; Moldavia, Wallachia, Lower Hungary, Servia, Boſnia, and Bulgaria, would be under its dominion. This ſea, diverſified in Europe by ſeveral iſlands formed by intervening mountains, and generally ſhallow towards the north, weſt, and eaſt, would conſequently be of great extent. Probably from the above circumſtance, and the then exiſtence of ſeveral lakes in Greece and Aſia Minor, Europe originally bore the denomination of the Iſles of the Nations.

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This opinion was generally founded on a diſſertation of our learned countryman Mr. Hales, who in about 1750 publiſhed an eſſay, in which he argued, that evaporation being ſufficient in the Caſpian ſea to abſorb the ſurplus of waters poured into it from the great river Wolga, and other conſiderable rivers, without any other viſible drain, the Mediterranean preſenting ſo much a larger ſurface to evaporation, without receiving a ſupply of waters in proportion with its extent, muſt be recruited from the ocean. I remember to have read at the time this publication, and to have thought his reaſonings very ingenious, but not concluſive. Not having the work, and having tried in vain to procure it, I cannot now pretend to follow all the arguments therein adduced. The Caſpian ſea, circumſtanced as above mentioned, is the foundation of his calculations on the balance of receipt and evaporation, applied to the Black and Mediterranean ſeas. The Black ſea is avowed to have a ſurplus of water which it diſcharges into the Mediterranean; but it is contended, that this latter muſt be recruited from the ocean, from whence the general currents run inwards, though I believe it is allowed that one ſingle current runs outward. With reſpect to the Caſpian, though it has no river flowing from it, yet it is not perfectly ſure whether it may not have ſome ſubterraneous drains. Experienced Engliſh mariners, who navigated that ſea in the reign of Peter the Great, aſſerted, that in ſome parts of it were found great whirlpools and vortexes, by which they ſuppoſed its ſurplus waters might have a ſubterraneous vent into the diſtant Perſian Gulph; and, to confirm this, remarked, that ſeveral kinds of reeds and willows, common on the borders of the Caſpian, are found floating in great quantities in that gulph, on the ſhores of which no ſuch plants are ſeen to grow. To confute this, Mr. de Buffon wrote to the Academy of St. Peterſburg, to know whether any ſuch whirlpools had been diſcovered in the Caſpian: its anſwer was in the negative; whence he concludes the certain falſity of this aſſertion. It is to be remarked, however, that, ſince the time of thoſe navigators, that ſea has not been frequented

by any other than very inexpert Tartar mariners from Aſtracan, who barely coaſt it from thence to Terki, and ſometimes from this laſt to the neareſt Perſian coaſts. Their teſtimony, as never venturing into full ſea, is conſequently of little weight. But, ſetting aſide this very dubious queſtion, let us obſerve, that the Caſpian is by its ſituation in a very different predicament from the Black or Mediterranean ſeas. It lies in a very inland ſituation, diſtant from every ſea, and, as well as the lake of Aral, is on all ſides ſurrounded by thirſty ſandy deſerts, which, inſtead of ſupplying it with ſuperabundant moiſture, muſt drink up much of its waters. From the very nature of a vaſt extent, of more than 200 leagues to the eaſt and of 100 to the weſt and ſouth, of circumambient ſandy ſoil, dews and rains muſt be very ſcanty in an eaſtern climate naturally dry. Great part of the moiſture which evaporation draws from the ſurface of that ſea, which in ſuch a climate muſt be very conſiderable, is wafted to a diſtance to fall on theſe thirſty deſerts, never to be returned into its boſom. In all the tracts of country bordering on the Caſpian to the ſouth and eaſt, rains are very uncommon, and freſh-water ſprings almoſt as rare as in the deſerts of Africa, though ſalt ſprings are very common, which rather prove a ſuction of its waters. The few ſcanty rivers of its eaſtern boundaries are dried up and loſt long before they reach its borders. In conſequence, it is the Caſpian ſea alone which, either by the evaporation from its ſurface wafted to theſe burning regions, or by ſubterraneous ducts, ſupplies them with the little water they have. No wonder then that it ſtands not in need of any viſible drain, notwithſtanding its ample receipts from the north. There is alſo great appearance that its extent is daily, though ſlowly, diminiſhing. The antients repreſent it as much larger: from a compariſon of the ſurveys and charts taken of it at the beginning of this century by order of Czar Peter, and ſince by command of the reigning Empreſs, it ſhould ſeem to have conſiderably diminiſhed. The Wolga daily extends its ſands into it; and all its borders are very ſhallow and grown up with reeds. But, to aſcertain this point, a leſs interrupted knowledge of that great lake, and perhaps greater accuracy, would be neceſſary.

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The Black ſea, it is on all hands agreed, diſcharges a ſurplus of its waters; but it is contended, that evaporation on the extended ſurface of the Mediterranean exhauſts much more than all the ſupplies it receives, either from thence, or from the great rivers which are diſembogued into it, added to the rains falling into its boſom, neceſſitating thereby a further conſtant ſupply from the ocean to maintain the equilibrium of its waters. It appears to me, that all theſe receipts from the Black ſea and from the great rivers muſt be under-rated. The ſupply from the former, independent of the rains falling into it, muſt be much more conſiderable than has been calculated. The Danube, the Dnieſter, the Don, and Cuban, pour into it the collected ſuperabundance of waters, from an extent all around that ſea northward, weſtward, and eaſtward, of at leaſt 200 leagues of very rainy countries. The Nile carries into it the tropical rains of Abyſſinia, which in their paſſage cover the whole land of Egypt for ſeveral months. The Po, the Adige, and the Rhone, collect in their courſes all the abundant rains and melted ſnows of the Tirolian Alps not carried into the Danube, and more than one half of thoſe of the Alps of Switzerland. The great rivers of Spain throw into it the waters of the ſouthern Pyrenean mountains, and of two thirds of that whole kingdom. The generally dry coaſts of Aſia, and of the Barbary ſtates, afford but a ſmall proportional ſupply; but upon the whole it ſhould appear to me, that the ſum total of theſe receipts ſhould nearly, if not fully, equal the evaporation from the ſurface, though very extenſive, of that ſea. But it above all ſeems to me, that Mr. Hales muſt have greatly undervalued the quantity of rain falling into its own boſom. I think it evident, that wherever that quantity is not more than ſufficient for evaporation on any given conſiderable extent of the earth, it muſt produce barren ſandy deſerts, as in ſome parts of the interior of Aſia and Africa.

Taking the length of the Mediterranean, excluſive of its narrower parts towards the ſtreights, from the medium longitude of the eaſtern coaſts of Spain, 18 degrees from the iſle of Fero to the coaſt of Syria, it will contain 35 degrees in length, upon an average of ſeven degrees in breadth, preſenting a ſurface

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of about 4800 ſquare marine leagues. As it is well known that in ſome parts of Italy as much rain falls in a year as in any other part of Europe, yet conſidering that much leſs falls on the oppoſite more ſouthern and ſandy coaſts of Africa, we will ſuppoſe that only 18 inches of rain fall in a year upon a general average on its ſurface. It will ſurely be allowed that 18 inches on ſuch a number of ſquare leagues muſt form of itſelf, independent of the receipt from rivers, an ample fund for evaporation even in that climate. To prove that it does, let us take into conſideration a tract of land under the ſame latitudes, from the coaſt of Syria in longitude 53 to longitude 88. It will include all weſtern Aſia Proper, part of Deſert Arabia, all ſouthern Perſia, and a part of northern Indoſtan. No one can imagine that more rain falls in a year on that ſurface of the continent than on the boſom of the Mediterranean: on the contrary, there is every reaſon to ſuppoſe that much leſs does fall. In that extent of land very great tracts of ſandy deſerts are found; owing, no doubt, originally to a deficiency of rain and dews. On theſe level countries the rains wafted thither from other parts, falling on their thirſty ſurface, ſink immediately ſo deep into the earth as to be in great part beyond the reach of being pumped up again by the moſt ardent rays of the ſun, to form new clouds or reſervoirs of dews. Yet upon the whole of this extent the quantity of rains and dews falling is not only in balance with evaporation, but, after ſupplying a ſufficiency of water for all vegetable and animal life exiſting within that compaſs, affords a conſiderable ſurplus, which is carried off into the ſea not only by the leſſer rivers falling into the Mediterranean, but by the great rivers Tigris and Euphrates, by the Hyſtaſpes and Indus, and a great number of rivers flowing between theſe two laſt. It will be remarked with juſtice, that evaporation is much ſtronger from a watery ſurface than from land; but let it alſo be remembered, that not a drop of water falling into water is loſt, but is pure addition to it; whereas much of the water falling upon land ſinks too deep, by numberleſs ducts, into the bowels of the earth to be again expoſed to evaporation: no inconſiderable quantity is alſo abſorbed for the nouriſhment of plants and animals. Hence, and from the analogy of an extent of land equal to the Mediterranean, in a much drier climate,

climate, affording a very great ſurplus over and above what is carried off by evaporation, I conclude that Mr. Hales's calculations muſt be erroneous; and that the quantity of rain falling into the baſon of the Mediterranean is at leaſt fully adequate to the annual evaporation from it; and that therefore all the additional ſupplies it receives from the Black ſea, and from the great and leſſer rivers falling into it, muſt afford a ſuperabundance of waters, which muſt finally be carried off into the ocean, inſtead of the Mediterranean requiring, as it has been ſuppoſed, a conſtant influx from the ocean to keep it repleniſhed to its preſent level.

I have heard it aſſerted, that no ſuperior current runs from the Mediterranean into the ocean; but in a chart publiſhed in Germany during the ſiege of Gibraltar, in which the tides and currents in the Streights are laid down, it appears, that, whilſt a ſtrong current drives from the ocean into the Mediterranean along the coaſts of Africa, a contrary current ſets into the ocean from that ſea, turning round the point of Europe into the bay of Gibraltar, and, ſweeping round that bay, takes its courſe along the coaſts of Andaluſia. According to that chart, the whole Streights may be divided into five bands, in all of which the tides are different. In the middle channel the tide coincides with that of the ocean; in the two bands on each ſide, the hours of flow and ebb are different from that of the ocean, and different from each other; in the two bands following the two coaſts, the hours of tide are the ſame, though different from all the others.

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The narrative of Mr. Deſlandes runs thus: "The direction of the currents, which is north north-weſt, following exactly the bearings of land, forced me to lay-to between the capes Gonſalves and St. Catherine in the gulph of Guinea. The uſual winds in that quarter are from ſouth ſouth-eaſt, ſouth ſouth-weſt, and ſouth-weſt. I waited two months and a half in the uſeleſs expectation of a change, making daily efforts to gain the coaſts of Loango, where I had buſineſs. During this time I obſerved, that the ſea ran in the above-

mentioned direction, at the rate of from half a league to a league an hour, and that at certain depths the currents ran counter beneath with equal velocity. By the following method I aſcertained the depth of theſe different currents. Being laid-to in eight fathoms water, I hung a plummet to a line, to which, at about two fathoms from the lead, I tied a napkin by the corner. Letting fall the lead into the water, then exceedingly clear, I ſaw it immediately taking the direction of the firſt current; in ſinking the line I perceived that this current had no longer any influence on it, and ſtopping there, the napkin floated indifferently round the line. Here, therefore, there was a ſuſpenſe of currents. Dropping the line one foot, it took a direction directly contrary to that which it had at firſt taken. Marking the line at the ſurface of the water, I found this was at three fathoms diſtance from the napkin; whence I concluded, that, of the eight fathoms of water, three ran to the north north-weſt, and five in a contrary direction to the ſouth ſouth-eaſt. Repeating the ſame experiment the ſame day in fifty fathoms water, at ſix or ſeven leagues from land, I was ſurpriſed to find the column of the ſuperior current deeper, and in ſome proportion to the whole depth. On fifty fathoms water, I eſtimated twelve or fifteen to run in the firſt direction. This circumſtance, however, was not conſtant during the whole two months and a half, but took place at intervals for a full month of that time. During the intermiſſion, the whole current ſeemed to drive into the gulph of Guinea. In conſequence of theſe obſervations, I made a machine of volume ſufficient to try the experiment on my ſloop, by letting down of which into the inferior current, I ſucceeded to balance the effect of the contrary ſuperior current, joined to that of the wind. Materials were wanting to try it on the ſhip.—This is the modeſt account of this officer, who proceeds to reaſon very ſagaciouſly on the probable cauſes of theſe contrary currents in this gulph. This information was ſent to Mr. Buffon, on hearing that he had aſſerted that no ſuch contrary inferior currents could exiſt in the Streights of Gibraltar. This great maſter's anſwer is, that this only ſhews that there may be partial exceptions to his general rule; but that, notwithſtanding, it is no leſs certain, that it was the ocean

ocean that firſt opened itſelf a paſſage and ſtill runs into the Mediterranean. I ſupport this opinion, adds he, not only on the currents running into that ſea from the ocean, but on the correſpondence of the ſtrata on each ſide the ſtreights :—as if this latter circumſtance would not equally exiſt in the caſe of the Mediterranean having forced a paſſage *into the ocean.*

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Diodorus of Sicily aſſerts, that the Euxine ſea was formerly a great lake, whoſe waters, increaſed by length of time, had at laſt broken down the mounds which retained them, and had forced themſelves a paſſage in the firſt inſtance near the Cyannean iſlands, and finally through the Helleſpont. Strabo tells us, from the authority of Strato, that the Euxine had formerly no outlet near Byzantium, but that the great rivers which diſcharge themſelves into it with violence had at laſt forced an opening, and from thence flowed into the Propontis, and from this laſt opened a paſſage through the Helleſpont. He ſays, that the ſame thing had happened to the Mediterranean, and that being ſwelled by a great number of rivers (and no doubt by the recent influx of waters from the Euxine), it had opened itſelf a paſſage near the columns of Hercules into the Atlantic; and that, by this great diſcharge, great tracts of land which were before covered with water now firſt appeared. This ſeems confirmed by Ariſtotle, who informs us, that great part of the Peloponneſus was yet covered with waters at the time of the Trojan war; thoſe, no doubt, which had been left in hollow places; and that they were not entirely drained off until his own times. Hence we may conclude, that before the opening of the ſtreights of Gibraltar, the waters of the Mediterranean were not only not lower but higher than at preſent, and that this height was momentarily increaſed much above its former level by the diſcharge of the Euxine ſea. It was by the rupture of its mounds near Gibraltar, that the iſland Atalantis, ſituated beyond them in the Atlantic ocean, was, according to Plato, overwhelmed. This is a ſtrong proof, that the idea preſerved by tradition was, that the Mediterranean had forced a paſſage into the ocean, and not that the ocean had forced its way into the

former. All the Grecian hiſtorians ſpeak of two deluges having happened in Greece, thoſe of Ogyges and Deucalion, the latter of which they have confounded with the general deluge, though not having taken place, even according to their own chronology, 1400 years before Chriſt. It is poſſible, though I ſhould rather imagine the firſt great rupture of the Boſphorus anterior to both theſe Grecian deluges, that it might not have been entirely completed till the days of Deucalion, whoſe deluge is by them repreſented as the moſt important and deſtructive. The leſſer one of Ogyges may have been occaſioned by the breaking down of the mounds confining the lake which Herodotus ſuppoſes to have formerly exiſted in Theſſaly. The irruption of ſo large a portion of the waters of the Euxine, whether completed at once or at two diſtinct periods, muſt naturally be ſuppoſed to have made great ravages on many parts of Greece, formerly perhaps connected with Aſia in thoſe parts where numerous iſlands now remain. Whether connected lands or iſlands, they would certainly ſuffer much from ſuch an overwhelming torrent, and the inhabitants would generally periſh. Deucalion and Pyrrha may have remained alone on the remnants of ſome land or iſland which reſiſted this exploſion, and may naturally have thought themſelves alone in the world; whence the Grecians attributed to this particular deluge all or moſt of the circumſtances handed down by previous tradition as belonging to the more antient univerſal deluge. The ruins of lands or iſlands overthrown by this diſaſter not improbably formed other iſlands, now exiſting in the Egean ſea, and very poſſibly either entirely raiſed or greatly increaſed the iſle of Crete, which directly faces that ſea, and the torrent iſſuing from the Boſphorus. Still exiſting monuments of nature ſeem to confirm this event. Petrified human bones are found, not in ſmall but in very great numbers, incaſed in the ſolid rock, or heaped together in ſubterraneous caverns, opened by the works carried on to improve the fortifications of Gibraltar. Their petrifaction proves them to be of very antient date, and that the ſubſtances of which the rocks are compoſed, formerly in a looſe ſtate, when unexpoſed to the influence of ſalt water and air, have had time to be

hardened into ſtone by their joint operation. They are probably the remains of the inhabitants of the iſlands and deſtroyed lands of the Archipelago, and of the various coaſts of the Mediterranean, ſwept away by the ſudden irruption of the Black ſea, and conveyed thither, not by the waters of the then uninhabited coaſts of the ocean, but by thoſe of the Mediterranean driving in a ſtrong current againſt theſe former ſands, violently attacked, but not yet perforated by the accumulated weight of this new torrent. If ſuch is, and it is ſurely probable, the origin of their depoſition, it will confirm with hiſtory that mankind exiſted ſome ages before the opening of the ſtreights of Gibraltar, and that it was not the ocean which forced open thoſe former barriers, but the ſudden weight and impetuoſity of a great ſuperabundant body of waters preſſing againſt them from the Mediterranean.

(*t*) Page 349.

Modern philoſophers have in like manner thought proper to attribute the rupture of the ſtreights of the Baltic, and the inundation of the preſent baſon of that ſea, to the efforts of the ocean. To conceive this, we muſt either ſuppoſe that the baſon of that ſea, which, though not very deep, is greatly below the level of the ſurrounding lands, was at one time nearly of the ſame height with theſe, and in that caſe the inundation would have been only temporary; or that the lands now forming its baſon were at the very inſtant of the irruption of the ocean ſunk to their preſent depth in order to retain them. If, on the contrary, it always preſented the ſame depth below the ſurrounding countries, and was towards the ocean ſeparated from it by higher lands, it either muſt have been originally left full by the waters which, at whatever period, once covered the whole earth, or, if thoſe were by any ſubterraneous accident withdrawn, muſt have filled again, by the waters of all the rivers of the ſurrounding higher lands of Germany, Poland, Ruſſia, Sweden, and Denmark, to the full height of its loweſt banks. Theſe rivers are as numerous and as copious as thoſe that flow into the Black ſea; and it ſurely will not be pretended that

evaporation in that cold climate could exhauſt this immenſe receipt. The obſervations of the Swediſh philoſophers for more than 150 years paſt tend to prove, that this ſea, inſtead of receiving any increaſe from the ocean, is conſtantly, though ſlowly, growing ſhallower; no doubt by the gradual deepening of its conducts into the ocean. Profeſſor Wallerius, who had alſo adopted this generally received opinion of the formation of the Baltic by an irruption of the ocean, furniſhes himſelf a ſtrong argument againſt it. He ſays, that the oldeſt Swediſh hiſtorians, no doubt upon the faith of antient traditions, affirm that formerly their whole country, except its mountains which then compoſed a group of iſlands, was covered with water. If this was in any degree true—and the yet nature of many of the countries ſurrounding the Baltic, Holſtein, Mecklenburg, Pruſſia, Livonia, and Finland, furniſhes ſtrong evidences that theſe at leaſt were once ſo covered—the Baltic, inſtead of being an empty baſon, muſt have been filled with waters to a much greater height than at preſent. Linnæus and Celſius, in the *Amœnitates & Acta Academiæ Sueciæ*, obſerve that the two very tall mountains of Torſburg and Hoburg in Gothland, formed of calcareous rock, were marked and hollowed out by the force of the water, at the ſame time that all Gothland lay immerſed in the ſea except theſe two mountains, which raiſed their heads out of the deep in the ſame manner and with a ſimilar appearance to the Carlſoe iſlands in their preſent ſtate. They add that the ſea-ports of Eaſt and Weſt Bothnia and of the eaſtern ſide of Gothland are every year decreaſing in depth, and that the inhabitants of Weſt Bothnia have obſerved by marks upon rocks that the ſea decreaſes every ten years above five inches. This no doubt is effected by the gradual deepening of the ſtreights which carry off the Baltic waters into the North ſea. Profeſſor Pallas obſerves, that as ſoon as, from the marſhes of Ingria forming towards the Baltic a ſort of gulph of low lands, you begin aſcending the elevated ſoil of Ruſſia, antient traces of the ſea occur at every ſtep: at firſt in a ſoil interſected with ravines which has viſibly ſuffered by the flowing-off of an enormous maſs of waters: afterwards in calcareous beds, which can only reſult from the depoſites of a ſea

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at reſt: firſt occur, ſtrata of depoſited earth mingled with blocks of granite detached from their original rock; then, vaſt banks of rolled pebbles and of gravel mixed with fragments of calcareous ſtone, of petrifactions broken or changed into flint, and even of bones. A like ſubverſion of the original ſtrata, and eſpecially of the calcareous beds, has been obſerved in the environs of lake Onega, where thoſe mountains begin to riſe which join the Laplandiſh and Swediſh Alps. Theſe traces of the ſea may be obſerved in all the lands contiguous to the gulph of Finland. It almoſt ſeems ſufficient to dwell upon the map with an intelligent eye, in order to be convinced that the great number of lakes between this gulph and the White ſea—that the iſlands, rocks, and broken coaſts of theſe regions—are effects of a deluge which there ſought an outlet.—*Acta Acad. Petropolitanæ.* Traditions handed down to us by the Greeks give room to think, that if this ſea did not at one time communicate with the Black ſea, its ſouthern borders approached at leaſt much nearer to it than at preſent. Diodorus records from antient traditions, that the Argonauts ſailed from the Euxine up the Tanais, and that, after a ſhort paſſage by land, they found rivers which carried them into the Northern ſea and thence into the ocean, from whence they returned through the ſtreights of Hercules to Telamon. The ſtory is no doubt improbable, but it ſhews that there exiſted formerly an idea, that the Euxine ſea was once not very diſtant from the Baltic. The antient name of Pontus, or the great ſea, given to the Euxine, may alſo denote that it was once not only of much greater extent, but joined or nearly joined to the Baltic. This idea of the Euxine being the great ſea muſt have ariſen from times preceding both the Argonautic expedition and the ſiege of Troy. In thoſe days, the Grecians were too well acquainted both with the extent of the Mediterranean and Euxine ſeas to imagine, that the latter ſurpaſſed the former in magnitude. Whilſt the Baltic remained a cloſed ſea, Mr. de Buffon's pretended balance of evaporation and receipts cannot, on account of the cold climate in which it is ſituated, be admitted; and therefore it muſt have been the ſuperabundance of its waters which at length forced a paſſage into

into the ocean; and thence we may infer, that it is moſt probable that the ſtreights of the Mediterranean, as well as thoſe of the Baltic and Black ſea, were opened by the weight of their own increaſing waters, and not by irruptions of the ocean. The ſame may probably be conjectured of the formerly interior Red ſea, and of the Perſian gulph, the former of which was antiently called the Lake of Reeds.

(*u*) Page 352.

Though from the plain reaſoning above alleged it is evident, that theſe northern regions could not have enjoyed the happy climate Mr. de Buffon has beſtowed upon them either 5000 or 8000 years ago, yet I have no doubt but that before the deluge, both from the different poſition of the whole globe itſelf and from the very different aſpect of its then ſurface, as I ſhall hereafter explain, they might boaſt of a much more temperate climate. Even many centuries after the deluge, previous to the rupture of the ſtreights of the Baltic and of the Boſphorus, I apprehend the climate in particular of northern Europe and of the parts adjacent, of Aſiatic Tartary and Siberia, was much leſs cold than at preſent. It is well known, that the vicinity of ſea greatly tempers the cold, which would otherwiſe affect countries ſituated in high northern latitudes; and that it is greatly increaſed where they are, as is the preſent caſe of Siberia, ſurrounded on all ſides by a very extenſive continent. When both the then interior ſeas, the Baltic and the Black ſea, were of double and probably much more than double their preſent dimenſions, when on one ſide the former covered all the adjacent low-lands of Germany, Pruſſia, and Ruſſia, now interſected with ſtagnant waters much colder than thoſe of the ſea, and on the other the latter extended itſelf not only towards the north, but to the eaſt, as far as or beyond the lake of Aral, it is evident that all the intervening countries betwixt theſe perhaps in ſome places nearly approaching ſeas, as well as Siberia, whoſe ſouthern borders were then waſhed by the Black ſea, muſt have felt a much leſs degree of cold. Though the latter is, by its central poſition in the midſt of the whole continent,

tinent, a high country, it was then much leſs elevated above the level of the waters of the Black ſea, now much ſunk below its former height; and we know that it is from the level of the ſea that we are to compute that elevation which gives the proportional degrees of atmoſpherical cold. Hence the neighbouring mountains, from a moiſter air, were leſs covered with ſnows, and that for a ſhorter time. All theſe circumſtances would concur in rendering the cold of theſe northern regions much leſs ſevere than at preſent. Theſe parts, conſequently more ſuſceptible of cultivation, were then probably much better peopled by the ſons of Gomer, of Gog and Magog, than they have been ſince; and this will account for the frequent ruins and traces of habitations in parts now almoſt deſert. When a large proportion of the waters of the Baltic and Black ſeas was drained off by the rupture of their reſpective mounds, theſe countries would become daily colder, and the northern nations, as ſoon as the lands deſerted by the Black ſea became ſufficiently dry to be habitable, would willingly abandon their former abodes, now become intolerably cold and barren, to come further ſouth. Accordingly we find in Herodotus, that the Scythians had not inhabited the banks of the Danube, the borders of the Black and Caſpian ſeas, more than 1450 years before Chriſt. The rupture of the Boſphorus might, I think, probably happen in the days of Jacob, and have been the occaſion, by the inundations conſequent to it, of the ſeven years famine in Paleſtine and Egypt, mentioned in his time, and about the time which the Grecians have affixed to the deluge of Ogyges. The ſudden influx of ſo vaſt a body of water would undoubtedly inundate much of the coaſts of Africa, Aſia, and Greece; and we accordingly find recorded in hiſtory, that the Peloponneſus and Attica did not recover the inundation cauſed by the deluge of Ogyges for 200 years. But as ſoon as the ſtreights of Gibraltar were opened, and it would probably ſoon follow, thoſe waters would be not only drawn off, but the Mediterranean itſelf would be ſunk below its former level, and thus more completely extend all the ſhores of that ſea, and amongſt other circumſtances greatly leſſen the depth and extent of the interior ſea which covered the Delta of Egypt, which

which was not, however, completely elevated above the actual level of the ſea, till after the days of Homer, by the depoſites of the Nile, diverted from its former courſe through Libya by ſubſequent Egyptian induſtry. Before the opening of thoſe ſtreights, as hiſtory records, not only the Delta but great part of Egypt was under water, from which the diſtrict of Thebais alone, as Plato tells us, roſe an habitable iſland. The ſudden irruption of ſuch an immenſe body of water, and its no leſs ſudden diſcharge, would, no doubt, occaſion many other important changes on the ſurrounding coaſts, and more particularly on thoſe expoſed to the firſt fury of the torrent. It probably broke down the mounds which formerly, as Herodotus tells us both from tradition and natural indications, upheld the lake which antiently covered the valleys of Theſſaly in Greece, and of Menander in Aſia Minor. The uninhabited ſtate of theſe fertile countries, and particularly of the latter, ſome centuries after the era we have mentioned, ſtrongly indicates the ravages which that event muſt have occaſioned. The deſerted ſtate in which Dardanus found the coaſt of Phrygia, which I have ſhewn to have moſt probably happened not more than 1120 years before Chriſt, and the like ſituation in which about the ſame time the Cretan emigrants in the days of Minos found the coaſts of Caria and Lycia, at a time when the interior parts of Aſia and the neighbouring kingdom of Lydia had long been fully inhabited, ſhew both the reality and extent of the ravages made by theſe repeated accidents. In the vicinity of ſuch great population, thoſe fertile and delightful countries muſt have been long before filled with inhabitants, had not ſuch a cataſtrophe ſuddenly ſwept away its former owners and left them deſerts at ſo late a period; for late it ſtill would be, though we ſhould admit the Grecian chronologies, which only date their colonization three or four centuries ſooner.

(*x*) Page 355.

Mr. de St. Pierre in his Etudes de la Nature maintains, that the only great and general currents of the ocean are alternate, from the ſouthern pole

pole to the northern, and from the north to the ſouth, and theſe occaſioned by the alternate melting of the ice and ſnows accumulated during their reſpective winters under the poles at the approach of returning ſummer. His argument is ſupported with great ingenuity; but facts ſtrongly contradict it. On this ſuppoſition, it would be during our ſummer that the great current would proceed from the arctic pole, whilſt in winter the current would run from the antarctic: but, on the contrary, ſo greatly is the general current of the Atlantic from the north increaſed during our winters, whilſt the ice is accumulating in the arctic and melting in the antarctic, that it is well known that navigation from Europe to all parts of North America is entirely cut off; and that, even by gaining the Weſt India iſlands, it is impoſſible to make way againſt the current by coaſting along the American ſhores. In the American war, our army at Boſton was reduced both to diſtreſs and entire ignorance of what paſſed in Europe, by our fleet deſtined to carry out proviſions having loſt by a few days the ſeaſon of its paſſage. This circumſtance was predicted to me at the time by a naval officer, who, hearing the fleet was not ſailed before the middle of October, ſaid it would probably never arrive at its deſtination. Even in ſummer, ſhips from northern Europe muſt make the Canaries or Azores iſlands before they can gain their paſſage to North America; which ſhews a conſtant current from the north driving more particularly in ſummer along the coaſts of Europe, and in winter along the coaſts of America. Governor Pownall aſſures us, that there exiſts a partial current which, even in winter, will carry ſhips directly from England to North America. But this is probably a return of the great current driving from the north along the coaſts of Europe, which is carried northward in the middle of the Atlantic towards the point of Newfoundland, where it joins and increaſes the impetuoſity of that which ſweeps ſouthward along the ſhores of America.

(y) Page 358.

Mr. de Volney and Mr. Bruce, in oppoſition to Mr. Savary (who had in

ſupport of his opinion, that the Delta of Egypt had been gradually raiſed from the ſea, alleged traditions from antient authors, that in former times a much leſs quantity of water was ſufficient to overflow and fecundate Egypt than at preſent), juſtly, I believe, contend, that this is founded on a miſtake, and thence triumphantly aſſure that the Delta is no new land. The meaſures of the nilometer ſeem to have been at all times kept as a myſtery, the knowledge of which was reſerved to government; and it is very probable that theſe authors alſo ſupported their opinion of the raiſing of the Delta on a miſtake, occaſioned by different meaſures uſed at different times in calculating the height of the inundation in the nilometer. In fact, the quantity of rain falling in Ethiopia, which produces the waters of the inundation, was probably *communibus annis* nearly the ſame antiently as at preſent. But the general equality of inundation neceſſary to fertilize Egypt in the earlieſt times as in the moſt modern is no proof that the depoſites of the Nile had not, when the whole of its ſtream was directed into that courſe, filled the formerly interior ſea that covered the Delta, or do not even now continue gradually to raiſe not only that fertile ſpot but the whole valley of Egypt. The mud of the Nile not only raiſes the level of the plains of Egypt, but alſo the channel itſelf of the Nile; and that being equally raiſed, the ſame quantity of water will be ſufficient to overflow the adjacent country: the only difference will be, that the inundation will thence extend itſelf further inland on each ſide; or, when that is precluded by hills or mountains, carry its depoſites, as it has done, further into the ſea, and thus inſenſibly prolong the continent. In all parts of the world, the earth waſhed down by torrents from the hills in the firſt inſtance raiſes the beds of rivers, before it is accumulated into ſand beds at their mouths, or ſpread over the adjoining plains by their inundations. Mr. Bruce, in his account of the nilometer, ſhews that a foot or two are conſtantly allowed for the accumulation of mud within it, and that the height of the inundation is only calculated from that point.

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In 1751, when I viſited Mount Veſuvius, no great eruption had happened ſince the year 1736. At that time I deſcended above 300 yards into its crater. Within, it was then a plain of about a mile in diameter, entirely formed of, or at leaſt incruſted with, ſulphur hard enough to walk upon; from whoſe multiplied cracks ſmoke iſſued, and which was every where ſufficiently hot to damage the ſhoes. Near the middle of this plain of ſulphur roſe a conical mount, ſomewhat exceeding the exterior borders of the crater in height, through whoſe hollow tunnel continually iſſued volumes of ſmoke, and, at about the interval of two minutes, torrents of aſhes, pumice-ſtones, and fragments of rocks, which either fell on the ſides and augmented the conic mountain, or dropped back into the mouth itſelf. We attempted to ſee whether any ſide of it was acceſſible, but found that the ſtones fell indifferently all around it. On one part of this plain we were ſhewn the ſunken remains of a former mouth. It was then a cavern, about 8 feet deep, into which we deſcended, with the caution of obſerving the intervals of emiſſion of thick ſmoke, which iſſued in puffs from a lateral furnace reſembling that of a glaſs-houſe, on whoſe ſides we gathered flower of brimſtone in the ſhape of large muſhrooms. In 1752 this immenſe cauldron boiled over, and the weight of matter broke down one of its ſides, from which iſſued torrents of melted lava. By this, and the frequent eruptions which have happened ſince, the whole face and appearance of the volcano have been altered; as well the whole crater I then ſaw as its conic interior mount have been overturned, and a new inferior crater and mouth have been formed, and changed with every new eruption.

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Switzerland, Alſace, part of Suabia and of the Palatinate, the countries of Triers and Mentz, are ſhut up between chains of mountains, on the ſides of which the veſtiges of water are every where viſible. Theſe

mountains have but very ſtrait paſſages for the courſes of the Rhone, the Rhine, and Danube. We need only figure to ourſelves theſe paſſages cloſed to a certain height to conceive all the low grounds circumſcribed by the Alps, Mount Jura, the Voſges, the Ardennes, and Black Foreſt, inundated and becoming a great lake. As well the preſent narrow iſſues of all theſe rivers in parts of their courſe through almoſt joining rocks, as the ſides of all the valleys and lakes contained within theſe mountains from Geneva to Coblentz, bear the viſible wave-worn marks of a much higher level of their waters. From the narrow country of the Vallais, the Rhone ſeems as yet to work its way with difficulty through almoſt cloſing rocks. This probably formed a ſeparate lake whoſe iſſue was, as yet appears from traces on thoſe rocks, much more elevated. The paſſage of the Rhine was probably once ſhut up at Baſil, as well as that of the Rhone near Geneva, to a height much more elevated than their preſent courſes. Mr. de Luc and almoſt every philoſopher have obſerved the evident traces of much higher waters than at preſent, on the rocks which afford a narrow paſſage to the Rhone near Geneva, on thoſe through which the Rhine flows near Baſil, and laſtly near Coblentz. The rocks bordering the lake of Lucerne every where ſhew the moſt unequivocal traces of its waters having been once many toiſes higher than at preſent. The rocks which bound the vale of Alſace, exteriorly compoſed of coarſe ſand-ſtone mixed with pebbles even to their tops, plainly manifeſt that their outward coats have been formed and depoſited by waters which once filled the encloſed valley almoſt to their total height. This lake, which I ſhall call the Lake of Switzerland, would be, however, interſperſed with a very great number of iſlands formed by interior hills and mountains, and would have no other communication with that which covered Alſace, the Palatinate, and the valleys of Germany in Suabia, the countries of Triers and Mentz, than by the preſent lake of Conſtance. From this great lake the Rhine would only iſſue near Coblentz, and the Danube in Suabia, there forming conſiderable cataracts. On the, I think, probable ſuppoſition of the preſent narrow paſſages of all theſe rivers, cloſed to the heights which are indicated on the rocks

through which they now have free paſſage, it would be curious to form a map of this once great ſheet of water. For this purpoſe it would be neceſſary, firſt to take the height of all theſe numerous traces of higher waters viſible on the rocks which border the lake of Lucerne, and which would, I dare ſay, be equally recognized on the ſides of every valley, as well as on the flanks of exterior and of interior mountains. Whatever ſhall be found below that level will have been part of this antient lake; whatever riſes above will have been its banks or iſlands riſing out of it. On the model in relievo which General Piffer has made, of about 20 leagues round Lucerne, it would be eaſy to verify part of the effect. As already mentioned, the rocks which border the lake of Lucerne bear the moſt evident traces of a higher level of its waters. By cloſing on this model the paſſages of all its mountains, to the height which thoſe water-marks ſhould fully juſtify, we ſhould have at once the certain level of this great lake which once covered the valleys of Switzerland, and conſequently all the lower countries which border it to the north; the extent and height of which in thoſe parts might be again verified by the traces of water on the rocks which leave a narrow paſſage to the Rhine near Coblentz. This river not having yet forced a paſſage near Baſil, we ſhould ſee this lake, after having covered great part of Switzerland, turning to the right over the lake of Conſtance to inundate the valleys of Suabia; and ſweeping round the Black Foreſt, which would form a peninſula, cover behind it the long vale, encloſed on one ſide by the weſtern flanks of that mountain, and on the other by the Voſges and Ardennes as far as Coblentz; from whence it would have its principal iſſue by the Rhine. How far it might extend on the right-hand ſide of the Rhine within that ſpace muſt be determined either by the mountains or the riſing of lands towards Bavaria, whence the Danube muſt have offered another outlet to its ſuperabundant waters, as the Rhone muſt have done on the ſide of France, from a paſſage which ſtill-evident marks ſhew to have been once much more elevated than that which it has ſince viſibly forced. The central height of this great lake might be eaſily determined on the above-mentioned model of General Piffer,

Piffer, a work of equal ingenuity and curioſity, on which the proportional height of all the mountains comprehended in it from the preſent level of the lake of Lucerne is accurately delineated, and the mountains themſelves compoſed of the very kind of rock which principally conſtitutes them. To a philoſophical eye the inſpection of this curious model is alone worth a journey to Lucerne.

To give examples, in the new continent, of ſimilar appearances of former lakes no longer exiſting, it may not be amiſs to quote ſome obſervations of Mr. Thomſon, Secretary of Congreſs, on viewing the paſſage of the Potowmac river through the blue ridge forming one of the long valleys cloſed to the north and ſouth between ſeveral parallel ridges of the Virginian mountains. They have been already tranſcribed by Dr. Hutton for a different purpoſe. The broken and rugged faces of the mountain on each ſide of the river; the bed of the river for ſeveral miles below, obſtructed and filled with the looſe ſtones carried from this mound; in ſhort, every thing on which you caſt your eye evidently demonſtrates a diſrupture and breach in the mountain, and that, before this happened, what is now a fruitful vale was formerly a great lake, which might have here formed a mighty caſcade, or had its vent by the Suſquehanna, where the blue ridge ſeems to terminate. Beſides this, there are other parts of this country which bear evident traces of a like convulſion. From the beſt accounts I have been able to obtain, the place where the Delaware now flows through the Kittatinny mountain, a continuation of what is called the North Ridge, was not its original courſe, but that its paſſage was through what is now called the Wind-gap, ſeveral miles to the weſtward, and above an hundred feet higher than the preſent bed of the river. This Wind-gap is about a mile broad, and the ſtones in it ſuch as ſeem to have been waſhed for ages by water running over them. Should this have been the caſe, there muſt have been a lake behind that mountain; and, by ſome uncommon ſwell in the waters, or by ſome convulſion of nature, the river muſt have opened its way through a different part of the mountain, and, meeting there with

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leſs obſtruction, carried away with it the oppoſing mounds of earth, and deluged the country below with the immenſe collection of waters to which this new paſſage gave vent. There are ſtill remaining, and are daily diſcovered, innumerable inſtances of ſuch a deluge on both ſides of the river, after it paſſed the hills above the falls of Trenton and reached the champaign. On the New Jerſey ſide, which is flatter than the Pennſylvania ſide, all the country below Croſwick hills ſeems to have been overflowed to the diſtance of from ten to fifteen miles back from the river, and to have acquired a new ſoil by the earth and clay brought down and mixed with the native ſand. The ſpot on which Philadelphia ſtands evidently appears to be made ground. The different ſtrata through which they paſs in digging for water, the acorns, leaves, and ſometimes branches, which are found above 20 feet below the ſurface, all ſeem to demonſtrate this.

Dr. Hutton thinks this ſtatement and view of things far from corroborating that ſudden convulſion conjectured by the judicious obſerver from ſo many concurring teſtimonies. His ſyſtem requires him to reject all ſuch; and he here ſees nothing but the rivers gradually excavating the ſeveral valleys between theſe parallel ridges, and conveying their ſpoils during an infinity of ages through theſe gaps to the ſea. It is rather curious to find an author confidently quoting ſuch apparent marks of a convulſion, either ſudden or ſuch as might be effected in no great length of time, as proofs of an infinitely ſlow degradation. It ſeems he ſhould at leaſt have ſhewn the impoſſibility or improbability of lakes having once filled thoſe valleys. But no; the author is himſelf convinced, and ſees not the neceſſity of convincing others. Such is the very natural faſcination of predetermined ſyſtem. It is ſaid that ſome ſmall part of the rocks forming the fall of Niagara has lately tumbled in. The violence of ſuch a ſtream ruſhing over them, and that corroding power of waters ſo frequently the theme of Dr. Hutton, may certainly from time to time detach one fragment after another, and thus, in a few thouſands inſtead of millions of years, level down this great barrier without occaſioning any material damage in the ſubjacent

jacent countries. Earthquakes have not been experienced for many years in thoſe parts; but ſoon after the French firſt ſettled in Canada, very tremendous ones were felt. Dr. Hutton will then allow it poſſible, that an earthquake may even at once effectuate the deſtruction of the whole mound which now ſuſtains lake Erie. It is devoutly to be hoped that ſuch cataſtrophe may not take place, as in that caſe lake Ontario and the river St. Lawrence would be ſo ſwelled as to overflow all the countries around them, to the probable deſtruction of their now numerous inhabitants. But ſhould this head be, either gradually in the courſe of many centuries, or by convulſion at once, ſuddenly diſrupted, it is evident that the lake above it, and all the great weſtern lakes communicating with it, would be ſucceſſively or inſtantly drained either of the whole or of great part of their waters. Their beds would then exhibit either much diminiſhed lakes, or valleys, in a ſhort time not unfruitful, traverſed by one or more rivers. In a certain term of years, no other natural proofs would remain of the exiſtence of former lakes than ſuch traces as are now diſcoverable in the paſſages of the Potowmac and Delaware rivers, and in the countries below them. Such ſurely may be the very natural fate of every lake ſuſpended high above the general level, without the neceſſary intervention of millions of years. In times immediately ſubſequent to the deluge, when all nature was yet in the full paroxyſm of convulſion, it is more than probable that ſuch unrecorded accidents did happen; and to ſuch many actual appearances muſt be referred.

(*bb*) Page 372.

From the obſervations I have made, particularly on the aſcents of Mount Jura from Franche Comté, the baſons of many formerly-exiſting lakes are very likely to have been frequently miſtaken for the remnants of volcanos by thoſe philoſophers who, prepoſſeſſed with the idea of finding every where their traces, have without heſitation adopted them as the craters of antient eruptions. Extenſive level plains, although in a circular form, ſurrounded by moderate eminences broken down in one part only, and

that

that always towards the deſcent, preſent, however, very different aſpects from the mouths of volcanos. On this aſcent of Mount Jura many of theſe of various extent, but leſs ſpacious towards the ſummit, are to be remarked one above another. The breaking down of the mounds of one of theſe uppermoſt lakes would neceſſarily occaſion the rupture of all the lower reſervoirs thus ſuddenly overcharged, nearly, as it appears to have happened, in the ſame direction. I do not know that there are any volcanic appearances on the ſides of theſe baſons; but, if there were, it would not exclude their formerly being filled with water, which their remarkably level bottoms without any tunnel-like appearance clearly indicate. In the neighbourhood of ſo much water favourable to the kindling of volcanic fires, earthquakes may have contributed to break down their banks. That aſſiſtance ſeems, however, neither neceſſary nor probable, from the above-mentioned ſimilar direction of the ruptures. Theſe delightful oval or circular meadows, encircled by ſloping banks covered with wood, repeated at various ſtages, form the moſt beautiful and pleaſing variety I ever beheld. I have no doubt but many ſuch emptied baſons of former lakes, very natural to have exiſted after a general inundation, and to have diſappeared from the conſequences of various accidents at various times, are frequently taken for volcanic craters by thoſe who have adopted the ſyſtem of formation by fire. The attribution of many of theſe to water excludes not, however, frequent and undoubted indications of volcanic fires. The multiplicity of waters in the early periods ſucceeding the deluge make theſe but the more probable, and both are likely to have then exiſted in countries where neither lakes nor volcanos now remain.

(cc) Page 373.

Mr. Monnet in his Mineralogy aſſures us, that a great cavity filled with water, when a certain gallery in the mines of Sainte Marie aux Mines in Alſace was abandoned, was found, after 50 years when that gallery was again opened, filled with tranſparent quartz. As Mr. de Buffon informs us, there is a ſpecies of earth on the Pharos of Meſſina which petri-

fies with aſtoniſhing rapidity. To form it into mill-ſtones, no other operation is neceſſary but, after having cleared away about two feet of ſoil, to kneed the under-ſtratum and form it into the ſhape required, and then cover it looſely again with the ſame ſoil. In a year's time the mill-ſtone is found perfectly hardened. The hardneſs of coble and pebble-ſtones occaſions them to be generally looked upon as ſtones of very antient petrification: this is, however, often not the caſe. In the dried bed of a torrent in Italy, I remember to have gathered in a ſhort time, as I walked along it, a number of ſpecimens of pebbles of very different degrees of hardneſs and formation—from that which ſtill received the impreſſion of the finger, or eaſily crumbled when preſſed, to that degree which ſurpaſſes the hardneſs of moſt other kinds of ſtones. Theſe new-moulded pebbles, frequently interſected by veins of different colours, perfectly reſembled others in the completeſt degree of induration. Clays, thus rounded and gradually hardened, are eaſily to be found in the bed of every torrent expoſed to be ſometimes filled with waters, and at other times laid dry. The petrifying qualities of many waters are too well known to be inſiſted upon. One inſtance of the abundance and minuteneſs of ſtony particles contained in waters, and of the celerity with which they ſuperinduce a ſtony incruſtation, is worthy to be recorded. It is mentioned by Mr. Dietrich, the late philoſophic mayor of Straſburg, and inſerted by Mr. de Buffon in his Natural Hiſtory of Minerals. By the ingenious management of the waters of Santo Filppo on the mountain Santa Fiora near Sienna, Doctor Leonardo Vegni has contrived to take off the impreſſion of medals and baſſi relievi, by incruſtation; even caſts have been taken from buſtos, and he hopes at length to be able to take off whole ſtatues. Any porous ſubſtances may be impregnated both inwardly and outwardly with theſe ſediments; and if the animal or vegetable ſubſtance which ſerves as a mould ſhould decay, the remaining concretion will appear a true petrification of the body itſelf, though it has really been only incruſted, interiorly as well as exteriorly. If woods or ſhells are thrown into theſe quickly-accumulating concretions, they will be as completely petrified within them, as we ſometimes find ſuch ſubſtances

ſtances in foſſil bodies. By a diſſolution of fernambuco wood, the doctor gives various colours to theſe petrifications. Thus theſe great interpreters of nature cannot help acknowledging the extreme promptitude of her actual proceſſes on a ſmall ſcale, whilſt they diſavow the poſſibility of a like celerity in her primæval powers of concretion on a larger; becauſe it would militate againſt their favourite ſyſtem, of ſlow operations during an infinity of ages.

(dd) Page 376.

It is well known that artificial ſtones, perfectly reſembling in appearance and ſolidity Portland ſtone, have been long fabricated in London. Variegated alabaſters, jaſpers, and agates, are cryſtallized at Aſhbourne and other places. The art of man has not yet been able to give their genuine luſtre or ſolidity to the imitations of diamonds and the finer precious ſtones; but all other kinds of ſtones are imitated to a degree of perfect deception by a hundred artiſts in every part of Europe. Shall plaſtic Nature in her fulleſt vigour, the goddeſs whom ſome philoſophers alone adore, or the omnipotent God of Nature herſelf, require thouſands and ten thouſands of years to complete the originals, however greatly they may ſurpaſs the imitations?

(ee) Page 377.

The cryſtallization, or what is called the vegetation, of lead in water by zinc is but lately diſcovered. Sugar of lead in water is ſo powerfully and quickly attracted by a piece of zinc, that in a few hours the whole forms a beautiful arborization pendent in the bottle from that matter. Such cryſtallizations are alſo effected by fire. Mr. Ferber obſerves, that various ſhorl cryſtallizations are formed in the empty bubbles of the torrents of lava, cooling on the ſuperficies whilſt yet in violent fuſion underneath. Diamond-like cryſtallizations are likewiſe formed in it, though much inferior in hardneſs, in regularity, and brightneſs of colours, to real gems which are cryſtallized in water. When the whole earth was yet a liquid pulp

ſwimming in every kind of menſtruum, actuated upon by the great maſs of univerſal light, and when dry land appeared, by the full force of its ruling ſun, how can we ſuppoſe that theſe ſame laws of nature in their fulleſt vigour ſhould require thouſands of years to cryſtallize or coagulate the various ſubſtances of which we ſee it now compoſed? What theſe watery menſtrua did not effect, frequent volcanic fires—natural in the firſt great fermentation of matter, either immediately after the creation or after the deluge, when its exterior coat was nearly reduced to the ſame ſituation—might well bring to perfection during the firſt four centuries, when men were yet confined to a narrow ſpot. That at this laſt epoch its whole exterior ſurface was convulſed, diſlocated, and diſſolved, every monument of nature amply teſtifies. God had ſaid that he would deſtroy not only the whole impious race of men but the earth with them; and he afterwards promiſes Noah that there ſhall not be another deluge—"diſſipating," according to the literal words of the Hebrew; according to the Samaritan verſion "ſcattering," or "diſperſing;" tranſlated by the Greek "to cor-" rupt," or "disfigure," and by the Syriac and Arabic "to deſtroy" the earth; that is to ſay, ſince the body of the globe remained, its outward form and ſurface.

THOUGHTS

THOUGHTS

ON THE

STRUCTURE

OF THIS GLOBE.

LETTER V.

Various Opinions on the Nature of Light, Heat, and Fire.

SIR,

AFTER having in my preceding letter laid before you the celebrated ſyſtem of Mr. de Buffon, and the ſeveral opinions of many other modern philoſophers tending with him to prove not only the high antiquity of this globe, but the numberleſs ages required to elaborate and conſolidate its component parts, and to faſhion its actual ſtructure; and having given you with freedom my reaſons for diſſenting from their pretended irrefragable proofs of this theſis; you will give me leave, previous to any further diſcuſſion on that ſubject, to ſay, with extreme diffidence, a few words on the nature of Light, Heat, and Fire. On this head natural philoſophy, as yet in its infancy, is very undecided, and has produced a number

ber of diſcordant opinions. It is, however, a point which appears to me of great importance, and by no means indifferent for the ſettling of our ideas, both on the original and actual formation of this earth and on the continued operations of nature. On this difficult ſubject, I ſhall rather produce the different opinions of others than preſume to offer any fixed ſentiment of my own. Heat, Fire, and Light, have till very lately been generally looked upon as one and the ſame matter, proceeding from one and the ſame cauſe, diſtinct only in degree—fire generated from heat, and light from fire. All three, however, appear in many inſtances perfectly diſtinct, and diſcriminated by various and frequently oppoſite effects. The ſource of all three has been generally placed in the ſun, or at leaſt that body has been looked upon as their great magazine; but on this too there are different opinions.

It is on the baſis of fire firſt exiſting in the ſun and purloined from thence by other bodies that Mr. de Buffon has laid his ſyſtem. Having once kindled and fixed it there as in its ſeat, he imagines whatever relics remain of it in our planet to be no other than a ſlackened portion thence originally derived. As we have already ſeen, he conſiders not heat, fire, and light, deemed only different degrees from one and the ſame cauſe, as a diſtinct element from his ſole vitreous ſubſtance. They are, according to him, purely generated from, and the effects of, preſſure and friction. By their operation, without the intervention of any other diſtinct matter, the ſun

was

was put and remains in fuſion, and became a liquid maſs of glaſs producing heat, fire, and light. The poſſibility of theſe emanating from his vitreous matter by mere preſſure and friction we have already noticed, and left to his more ſagacious diſciples to explain. Had he allowed fire to be a diſtinct though yet inactive menſtruum, the agency of preſſure and friction might have given motion to a more ſubtle interſperſed element, and have communicated it to a naturally inert and ſolid maſs immerſed therein; but without ſuch intervention we cannot conceive preſſure to have any other effect but that of conſolidating. We have ſeen that this author imagines the earth and other planets to be portions of this liquid fiery maſs, which, whilſt their parent ſun continues in full vigour of fuſion, have darkened and cooled, and are ſtill cooling by degrees. The centre of our globe is ſtill burning, and he aſſerts that the greateſt part of the heat yet experienced on its ſurface proceeds from thence, and not, as was generally ſuppoſed, from the ſun. Adopting the calculations of Mr. de Mairan, he determines this heat to be at preſent 31 times greater than that communicated by the ſun; but as the centre cools it will gradually diminiſh, till at length the whole ſurface of the earth will become frozen and incapable of preſerving animal or vegetable life. Mr. de Mairan's calculations are founded on a ſcale of degrees between extreme cold and extreme heat, applied to the unvaried temperature of the caves of the obſervatory at Paris, much greater than that of the air in times of froſt. The heat of their atmoſphere is conſtantly at 10 degrees of de Reaumur's

Reaumur's thermometer, and Mr. de Buffon aſſerts, that at equal depths the ſame will always be found in the waters. A late experiment of Mr. de Sauſſure in the lake of Geneva contradicts, however, this aſſertion; as, at certain depths to be found even in that lake, the heat was diminiſhed to four degrees. In Mr. de Buffon's ſyſtem, heat muſt increaſe as we deſcend deeper into the bowels of the earth, and accordingly, ſays he, "the air of deep mines is inſufferably hot. It ariſes from their ſo much greater proximity to the burning centre." For this, however, more evident and leſs remote cauſes may be aſſigned. The removing of earth, the breaking of ſtones exciting latent heat and fires where phlogiſtic matter abounds, the confined perſpiration and breath of the miners, and the heat of the lights by which they work, ſufficiently account for it. He pretends that the natural and proper heat of the earth is no leſs proved by electricity. The heat and fire excited by electric concuſſion prove not, however, an active heat in the ſubſtance electrified, but a dormant fire brought into rapid action by the ſtroke. Electricity is no doubt more eaſily excited in a body to which ſome degree of heat is previouſly communicated; but it will have its effect on all ſubſtances ſuſceptible of it in a cold ſtate. Common fire is alſo brought forth in the ſame manner. A piece of ſteel, both exteriorly and interiorly as cold as ice, ſtruck againſt a flint in the ſame ſtate of coldneſs, draws fire from it as well as if previouſly heated. The cold experienced on high mountains is alleged as proof that much the greater portion of heat proceeds from

from the central fire. At the height of 1500 toiſes from the level of the ſea, the heat is diminiſhed from 20 to 30 degrees. If this diminution proceeds from that further diſtance from the centre, the waters at equal depths below that level, if the temperature of any ſuch could be tried, would ſurely be boiling, and thoſe which lay very deep would have at leaſt their proportionable degree of increaſed heat. The earth and waters under the flattened poles, much nearer to the centre than equatorial lands or ſeas, ſhould according to this ſyſtem, notwithſtanding the feebleneſs of the ſun's rays and its longer abſences, poſſeſs a much greater interior heat than thoſe which lie under the equator. Neither are volcanic fires or warm ſprings proofs of conſtant active heat in the bowels of the earth. Theſe proceed from other cauſes, and chemical mixtures will produce the like effects where there was no previous heat or diſtant communication with it. From all theſe obſervations we may, I think, conclude, that the heat of the earth is not occaſioned by that of its burning centre, and conſequently that Mr. de Buffon's idea is an unſubſtantiated reverie.

Before we determine the ſource and cauſes of heat, fire, and light, it will be proper to ſcrutinize their natures and qualities, at leaſt as far as their effects may lead us. Hence we may perhaps reſolve whether they are only different degrees and appearances of one and the ſame element, or are various modifications and combinations of that with other elements. From thence we may poſſibly

be conducted to divine their original ſource. In this inveſtigation the obſervations of the celebrated Swediſh profeſſor Wallerius, and of the learned Mr. de Luc of Geneva, will greatly aid us. As they generally agree in principles, it is from the firſt of theſe authors that I ſhall chiefly ſelect ſuch articles as may make you, Sir, tolerably acquainted with his opinions on theſe ſubjects.

Fire exiſts not, ſays Mr. Wallerius, without a matter proper to receive and maintain it: that matter is the food or aliment of fire which chemiſts call the inflammable principle, or phlogiſton. As fire is always combined with heat, it has been concluded that inflammable matter was ſcarcely diſtinct from the matter of heat, calorific matter, or, as Mr. de Luc calls it, the fiery fluid; but they are diſtinguiſhable in ſeveral circumſtances.

1ſt. The inflammable principle, abounding in certain bodies, as in oils, ſpirits, &c. may hinder theſe from freezing, but it cannot liquefy ſolid bodies. Heat is ſo fluid and has ſuch force as to liquefy the moſt ſolid bodies. The principle of fluidity exiſts in heat, and without it no fluid could exiſt.

2dly. The matter of heat is ſo ſubtle as to traverſe the moſt ſolid bodies, leave them and be diſperſed without effecting any ſenſible change in the bodies heated; but inflammable matter cannot be combined with other bodies without contact and mixture, and when

when intimately combined produces a conſiderable change in thoſe bodies. It requires force to be again ſeparated from them. Calcination and the reduction of metals demonſtrate this to chemiſts. It however of itſelf abandons liquids in time. The ſpirit of ſulphur loſes its phlogiſton, and oils, on loſing their inflammable principle, become rancid.

3dly. Phlogiſton unites itſelf with difficulty to, and ſeparates ſlowly from, other bodies; whilſt calorific matter, more ſubtle, eaſily penetrates the pores of other bodies, and is diſſipated with equal facility. Inflamed metals cool promptly, but the inflammable matter remains. Theſe ſubſtances are therefore really diſtinct.

It appears that calorific matter is of a very fluid, ſubtle, and active nature, and that all natural motion is produced by it; that it is elaſtic ſince it acts expanſively, and endued with a certain gravity, though imperceptible, which is proved by the ſucceſſive diminution of heat; for, if it did not gravitate, it would abandon the atmoſphere and riſe beyond it.

By fire is underſtood a matter affording light and warmth, which conſumes ſome ſubſtances by deſtroying the connection of their parts; but it can only attack thoſe bodies which contain inflammable or calorific matter. Fire conſiſts in the motion of inflammable and calorific matter; it is always accompanied by vapours and

ſmoke. Its three degrees are cryſtallization, incandeſcence, and flame. Relatively to theſe three degrees it muſt be obſerved, that the heat and force of fire are not proportional to this motion and to theſe degrees. A heap of ſtraw inflamed is leſs hot than a pile of wood which burns, but its flame is ſtronger. The force of fire decreaſes in ratio of the tenuity of parts, but light is not proportional to the force of fire. It is well known that flame is nothing but burning ſmoke.

Fire exiſts not without light, but light may exiſt without fire; witneſs phoſphoric bodies, and the ſplendour of the ſun often greater in a fine winter's day than in the heat of ſummer.

The properties of light are:

Light wants no aliment, no inflammable matter to ſuſtain it. In the concentration of the ſolar rays, light conſtantly enjoys the ſame force without ſmoke or vapour.

Light exerciſes its force not only in the whole ſpace of air but alſo in vacuo. It extends itſelf to the bottom of the waters, though our eyes cannot follow it ſo far. Marine animals would not want the organs of ſight, if light did not exiſt in the bottom of the waters. Light penetrates glaſs bodies without expanding them, and without communicating any motion to their parts. The rays

of

of light ſuffer more or leſs refraction according to the denſity of the bodies which it penetrates, but are reflected when they fall on certain hard bodies whoſe pores are more irregular. Light is then diſtinct from air, from fire, from inflammable or calorific matter.

Mr. de Luc remarks another moſt eſſential and decided difference between light and heat. Light always moves in a ſtraight line. All is darkneſs around a ray of light admitted into an obſcure room. Heat propagates itſelf in all directions, and progreſſively.

Light is of a tenuity and ſubtlety ſurpaſſing thoſe of every other matter; it penetrates and fills all ſpace. A 14th grain of light enlightens a ſphere of a league in diameter; and from ſeveral ſhips the ſame lamp is diſtinguiſhed at the diſtance of a league. The celerity of its motion is incomprehenſible. It moves 968,722 quicker than ſound. A proof this of the difference between it and calorific matter, whoſe motion is progreſſive and ſlow. Light has no ſenſible gravity; the rays of the ſun could not reach us, if in the ſun they were endued with any force of gravitation.

It has probably no force of attraction, unleſs it be towards the moſt ſubtle, inflammable, and calorific matter, as moſt analogous to its nature, and containing in themſelves ſomething of light.

It is the ſource of primitive colours.

Light

Light enlightens without changing the parts of the body enlightened, but it re-eſtabliſhes and vivifies it;—an effect directly contrary to that of fire, which changes or deſtroys.

From all theſe qualities one may conclude that the matter of light is neither inflammable, nor calorific, nor aerial, nor terreſtrial, but of a particular nature diſtinct from that of either.

Mr. Wallerius conjectures, though light itſelf has no elaſticity, that, combined with a very ſubtle elaſtic matter, it perhaps conſtitutes calorific matter; from this calorific matter, ulteriorly combined with certain terreſtrial principles, it forms perhaps the inflammable or phlogiſtic principle.

Having firſt eſtabliſhed theſe principles, Mr. Wallerius riſes to the conſideration of the ſun and of its rays. He gives a glance on thoſe ſyſtems which contend that the earth was originally a ſun, and particularly on that of Mr. de Buffon which makes it a detached portion of the ſun. Before he expoſes his own ſyſtem on the ſun itſelf, he remarks in anſwer to theſe hypotheſes, that no veſtige of univerſal fire is diſcoverable in this globe, whilſt many indications of water ſhew themſelves every where; that the nature and compoſition of our earth demonſtrate that it never could nor can entirely burn. Its mountains and rocks may be heated and even put in fuſion, but they cannot burn or be conſumed.

Our

Our author on the contrary maintains, that there is no inflammable fire in the ſun or in its rays. The fire excited by the effect of burning glaſſes has cauſed it to be believed, that his rays were ſcorching; but thoſe rays concentred occaſion not the detonation *of nitre*; *they kindle* gun-powder in free air, but not in vacuo. It is not to the rays we are to attribute its kindling in the air, but to inflammable particles contained in the air. Mr. de Luc obſerves, that if a burning glaſs is held at ſome diſtance from a fire in a room in which the air ſhall have the ſame warmth as that expoſed to the ſun, in order to concentre the cauſe of heat, it will produce ſcarce any effect; but if with the ſame glaſs the cauſe of heat in open air, or the ſun's rays are concentred, the greateſt effects will be produced. From whence he concludes that the focus of ſuch glaſs is not a concentration of the fiery fluid, but the concentration of an agent which has the faculty of diſengaging the fiery fluid contained in the ſubſtances on which it acts, proportionably to the quantity contained, or to the greater or leſs force of its adheſion in ſuch body. Mr. Wallerius remarks, that the focus of a burning glaſs, falling not on a ſolid body but on free air, produces not the ſmalleſt rarefaction, nor occaſions conſequently the leaſt heat. In the ſolar rays conſidered in themſelves we find no trace of fire, nor do they produce it but when they meet inflammable matter. The fire excited by the concentration of the ſolar rays, conſidered apart from the matter expoſed to thoſe rays, is of a different nature to common fire. The ſame burning glaſs kindles, without ceaſing, all inflamma-

ble matters, without loſing any thing of its force, becauſe it has no need of food; whilſt common fire cannot exiſt without aliment, and is always accompanied by ſmoke and vapour.

Common fire is never apparent without the concurrence of ſolid bodies or of inflammable particles; but the nearer ſpace is to the ſun, the more it is diſengaged from exhalations and vapours, the more brilliant is its appearance. To conceive the ſun burning, we muſt ſuppoſe it ſupplied with thoſe particles which are neceſſary for the food of fire. The heat occaſioned by the ſun is in no wiſe proportionable to the terreſtrial climates, or to the perpendicular or oblique incidence of its rays falling upon the earth, nor to its elevation or declenſion, nor even to the quantity of rays. That heat varies in the ſame climate according to the ſtate of the air, the nature of the land, or its elevation above the level of the ſea. Before thunder ſtorms the air is filled with inflammable particles, and in conſequence the heat is greater. In Siberia, a very high country, the cold is greater at 50 degrees than at Upſal at 59 degrees of latitude. Ice is found at 45 degrees of ſouthern latitude, in ſimilar ſeaſons in which it is not ſeen at 67 degrees of northern latitude. I ſhall alſo obſerve, that the Bay of Cheſapeak, in latitude 38, is frequently covered with ice, whilſt nothing like it happens in ſimilar climates in the old continent. Convex mountains receive and reflect more ſolar rays than plains, their rocks are more proper to concentre them, but the general heat of their atmoſphere is pro-

portional

portional to their height, even under the equator. Mr. de Buffon will tell us, that it is becauſe thoſe mountains are ſo much farther from the central fire; but can ſome hundreds of toiſes make this difference? In that caſe, we ought to burn ſome hundreds of toiſes under the earth, and the waters ſhould boil in the deep and unfathomable ſeas of Norway. Mr. de Luc ſhews by the new experiments of Mr. Pictet, that the earth warms not more the air at five feet diſtance from it than at 50.

From all theſe obſervations and reaſonings, both Mr. Wallerius and Mr. de Luc conclude, that the ſolar rays have neither fire nor heat, nor are they the immediate cauſe of heat. That immediate cauſe is to be found in the ſolid particles of calorific and inflammable matters exiſting in leſs or in greater quantities in the air, and in all ſublunary ſubſtances; hence it is that phyſical climates very frequently coincide not with geographical climates. The ſolar rays are only the mediate cauſes of heat; they are the active agents which give the motion to inflammable or calorific particles neceſſary to produce heat. For this reaſon, *cæteris paribus*, heat depends on the ſun, in ſo much as it can excite a ſtronger or weaker motion, more or leſs durable, in the inflammable particles diſſeminated in the air.

Mr. Wallerius concludes that the ſun is not a burning body, but a luminous and moſt ſimple body, part of that light which God created in the firſt day, compoſed of particles infinitely minute, ſub-

tle, and active; on which all light, all terreſtrial motion, and the vigour of all organized bodies, depend.

This abridgment of the ſyſtems of Mr. Wallerius and of Mr. de Luc on the ſun, and on the cauſes of heat, will give you, Sir, a ſufficient inſight into their opinions on theſe difficult ſubjects. Certain it is, that by conſidering the ſun and its rays not as immediate but as ſimply mediate cauſes of heat, we may explain its phænomena as eaſily as by the contrary ſyſtem, and that by ſo doing we may give reaſons for many of its phænomena which remain inexplicable by the laſt: time and experiments muſt decide the opinion of the learned. Some late experiments of Mr. Marat favour the above ideas of theſe gentlemen. How many years were required to root out the prejudice founded on appearances, that the ſun turned round the earth!

The Count de Treſſan, who has very ingeniouſly explained all the phænomena of nature by electricity, lays it down as a principle, that vivid or active matter and inert or paſſive matter are the only two abſolutely diſtinct elements in nature. From matter eſſentially active flows all motion, which it alone communicates to paſſive matter in proportion to its combination with it. He contends that this vivid matter is no other than the electric fluid: combined in large proportion with inert matter, it forms phlogiſtic and inflammable matters. The ſun he imagines not, with Mr. de Buffon,

to

to be a maſs of glaſs in fuſion, but to be a ſolid maſs of poliſhed glaſs, interiorly quieſcent, but whirled round its centre with incredible velocity; it is the ſource of electricity from whence the electric fluid is conſtantly effluent and refluent, and whoſe affinity with terreſtrial bodies, already imbibed with the ſame matter, cauſes heat and fire.—This idea of the ſun's being a ſolid maſs of poliſhed glaſs is apparently taken from the glaſs globes firſt employed to excite electricity, and muſt be looked upon as a mere fanciful analogy; but, whether the pure active element be light without heat, and only by its combinations with paſſive matter producing phlogiſtic or inflammable ſubſtances, and thence heat and fire, or whether it be in its own eſſence the pure element of fire, I apprehend that both the electric and magnetic fluids ought to be conſidered only as combined and ſecondary fluids, and not as the primary active element. If the rays of the ſun were the pure electric fluid emitted from it, they would be the ſtrongeſt electrifiers; yet their moſt forcible percuſſion does not electrify either the human or other terreſtrial bodies. I ſhould on the contrary be apt to think, that the primary active fluid, combined either with ſalts or ſome other the moſt ſubtle already compounded ſubſtances, prepares and forms more or leſs of theſe ſecondary fluids, which are occaſionally and locally generated. However it may be of this difference in our opinions, it appears to me that the effluent and refluent forces which the Count de Treſſan attributes to pure active matter—whatever is its eſſence—whoſe particles ever in motion and repulſive of each other are in

conſtant equilibrium, and which, though penetrating throughout all ſpace, has in our ſyſtem, from the extremities of which it is conſtantly returning, its principal centre and focus in the ſun—explain, in the moſt probable and ingenious manner, the firſt cauſe of that attraction and repulſion which ſuſtains all the celeſtial bodies in juſt equipoiſe and keeps alive all motion in the univerſe. This idea ſeems both grand and luminous; and it is from this inexhauſtible and fruitful ſource of generative, preſervative, and renovating motion, that the Count, with great ingenuity and apparent facility, deduces all that variety of phænomena which we admire in the heavens and on the earth.

Mr. de Sauſſure contradicts the aſſertion of Mr. de Luc, that obſcure heat cannot be concentred in the focus of a burning glaſs, on the plea of an experiment made by him and Mr. Pictet, which ſhewed that the heat of a cannon ball, no longer luminous even in the dark, concentred between two burning glaſſes, raiſed the thermometer placed in the focus of one of them eight degrees (*a*). He eſteems, with Mr. Bouger, light to be the pureſt matter of fire, and that the rays of the ſun are in themſelves eſſentially hot. He thinks the heat of plains to be owing to the reverberation of the heat of the earth and of ſurrounding objects, and to the thick atmoſpheric vapours eaſily heated by the rays of the ſun; whilſt the cold experienced in the higher regions of the air, and eſpecially on iſolated points of mountains, he deems to be due to the thinneſs and tranſparency of

the air, which the rays of the ſun eaſily pervading paſs through without heating.

The cold temperature of the elevated regions of the atmoſphere is a phænomenon the explication of which is attended with no ſmall difficulty, and has been diverſely accounted for according to various opinions on the cauſes of heat. Mr. de Buffon aſſerts, that the cold experienced on high mountains and in the upper regions of the air is entirely due to the greater diſtance from the yet-burning centre of the earth. Mr. de Luc attributes it to the abſence or rarity of calorific particles on which the rays of the ſun can act. Mr. de Sauſſure thinks it proceeds from the diminution of the reverberation of the heat of the earth and of the reflection of the ſolar rays, and from the tranſparency of the air, which theſe can but ſlightly heat. He alſo thinks it greatly owing to the cold winds blowing in thoſe ſuperior regions; but it will ſtill be neceſſary to give a reaſon for the extreme ſharpneſs of thoſe winds.

In the attempt made ſome years ago by Mr. de Sauſſure to attain the ſummit of Mount Blanc, which did not then ſucceed, but which has ſince been effected both by him and others, a circumſtance occurred to his obſervation which he looks upon as a new phænomenon, the attentive conſideration of which may perhaps lead to ſome future deciſion on the difficult ſubject before us. I ſhall here ſubjoin the fact as related by that philoſopher, together with the explication he gives of it.

From

From the elevation of 1422 toiſes above the level of the ſea to that of 1907 to which that gentleman and his companions attained, they felt when expoſed to the ſun in a calm day a heat almoſt inſupportable, even when they were motionleſs, though the thermometer in the ſhade roſe only to 2 : 5, and when expoſed to the direct rays of the ſun was not raiſed higher than 4 : 7, above the freezing point on De Reaumur's ſcale. The moſt robuſt of his companions, inured to the heats and colds of mountainous regions, when once they had attained this great elevation, found themſelves totally enervated, weak, and feeble, and ſcarcely able to ſtand or proceed through exceſs of heat, though ſurrounded by eternal ſnows.—Such is the fact.

This learned obſerver thinks, that this extraordinary ſenſation of heat is peculiar and proper to theſe very high regions. He is perſuaded that the heat there excited in our bodies by the ſolar rays, the extenuation of ſtrength, the beating of the arteries, and other ſenſations which different perſons experienced in this rarefied air, proceed from the conſiderable diminution of the preſſure of the air on the body. This diminiſhed preſſure muſt produce a ſenſible relaxation in the vaſcular ſyſtem; whence it muſt follow, that the direct heat of the ſolar rays, tending to dilate the liquors contained in theſe veſſels, and even to detach from them all elaſtic liquors, muſt have a very great effect on very high mountains. "We ſee," purſues he, "water boil; we ſee air expand and diſengage itſelf from the blood, under the recipient of the air pump, at a degree of heat much

much leſs than that which would be required to produce the ſame effects when theſe liquors are ſubjected to the whole preſſure of the atmoſphere. When then we are elevated to ſuch an height that that preſſure is diminiſhed more than one third from what it would be in the plains below, is it not evident that the diminution of preſſure muſt act upon our organs, render their fluids ſuſceptible of greater dilatation, and by theſe means greatly increaſe the effects of heat on our frame?"

Notwithſtanding all the deference which I have for this able and cautious naturaliſt, whoſe deciſions ſeem never influenced either by prejudice, vanity, or the love of ſyſtem, he will give me leave to diſcuſs this explication with him.

If the diminiſhed preſſure of the atmoſphere is the ſole cauſe of this diſpoſition of our bodies to be extraordinarily heated by the ſolar rays at the above-mentioned height, it ought to have an effect, leſs ſenſible it is true, but yet proportional, at leſſer elevations. But Mr. de Sauſſure, on the contrary, ſuppoſes cold to affect us very ſtrongly ſome hundred toiſes lower. Our bodies, however, muſt at a ſomewhat leſs height have the ſame tendency, though in a leſs degree. Some other cauſe muſt then co-operate to make us feel this extraordinary heat at 1900 toiſes of elevation, according to his account, beyond all proportion with that which is felt at the height of 1200 or 1400 toiſes.

Mr.

Mr. de Sauſſure certainly choſe a fine day, calm and ſerene weather, for his expedition. If he complains not of any remarkable heat the firſt day, it was becauſe he began his aſcent in the cool of the evening, and arrived late at the cabin where he paſſed the night. At mid-day he certainly would have felt ſome inconvenience from the ſolar rays even on the lower Alps, unleſs particularly counteracted by cold winds. The night was intenſely cold; and, for fear of the great cold formerly experienced by Mr. Bourrit by ſetting out too early, the company ſet not forward the next day till ſome time after ſun-riſe. The preſence of the ſun was then the principal cauſe of the ſtrong effects of heat produced on the bodies of the travellers, whilſt the earth, ſcarcely warmed by his rays, remained frozen. A reaſon muſt be given for theſe two oppoſite effects.

To ſhew that it is not, as Mr. de Sauſſure ſuppoſes, the leſs preſſure of the atmoſphere which alone gives that efficacity to the ſolar rays on our bodies in ſuch high elevations, I will appeal to the heat equally excited by the ſun on organized bodies in the plains whilſt the ground is frozen. This even is felt when the agency of that luminary is counteracted by that cauſe of cold to which this philoſopher attributes the impreſſion of cold felt on the lower Alps. In Provence, during the months of March, April, and May, the north-eaſt winds deſcending from the Alps bring with them the moſt intenſe and penetrating cold, which often in April occaſions very

very ſtrong froſts. It is commonly ſaid that theſe winds are loaded with the icy particles derived from thoſe mountains. They, however, produce neither ſnow nor hail, and are remarkably dry. Nay, if any moiſture is in the atmoſphere, theſe winds immediately precipitate it in rain, which always precedes them. To ſpeak more philoſophically, as cold is only the abſence of heat, it ſhould be ſaid that theſe currents of air deſcending impetuouſly from theſe high regions are extremely pure, and little charged with terreſtrial, aqueous, or fiery particles; they ſubſtitute to the common air of the country an air deſtitute of phlogiſton, and which thence freezes the earth and its plants, which they rob in their paſſage of whatever heat they poſſeſſed. But the ſun of this climate ceaſes not to warm very ſtrongly animal bodies expoſed to its rays. Sheltered from the wind, we experience a great degree of heat, and even when expoſed to it, if we walk not againſt it, heat is rather felt than cold; but in the ſhade and in the houſe the cold is full as intenſe as in more northern climates in the midſt of winter. There, as well as in all ſouthern countries expoſed to currents of air from elevated frozen regions, the paſſage from the ſhade to ſunſhine makes a greater difference on the feelings of the human frame than is produced by ſeveral degrees of latitude. The extreme difference between the cold in the ſhade, and the burning heat of the ſun both on mountains and in plains, is exemplified with ſtill greater evidence by the obſervations of Don Juan d'Ulloa on the climates of America. On the extenſive platforms of Peru, elevated to 1940 toiſes above the

level of the ſea, ſituated under the Cordeleras, and which in the country receive the name of Punas, the rays of the ſun exeite not only violent but burning heat in the human body, ſo as even ſometimes to cauſe ſudden death; whilſt the cold of the air in the ſhade is capable of cauſing effects not leſs dreadful. The ſun burns and the ſhade freezes on the ſame ſpot and at the ſame inſtant. The ſame author, on the climate of New Orleans, obſerves that the heats of ſummer are more violent and more perſeverant than thoſe which are felt under the line or under the tropics. In this ſame country the rapid ſucceſſion from heat to cold in winter is not leſs ſingular. When the winds blow from the Apalachian mountains and the frozen lakes of the north, the liquor of de Reaumur's themometer deſcends to ſeven degrees below the point of congelation; but, if it changes to the ſide of the great watery or woody plains of the north-weſt, it riſes the very next day to 17 degrees above that point. Thus the change of the wind in winter produces the enormous variation of 24 degrees in the heat of the atmoſphere. Don Ulloa, agreeing with Mr. de Sauſſure, attributes the cold of the ſhade in the Punas of Peru, and the ſudden changes from warmth to froſt in the plains of New Orleans, to the thinneſs and tranſparency of the air incapable of retaining the heat of the ſolar rays. This thinneſs and tranſparency of the air he ſuppoſes to reſult on the Punas from their elevation, and in the plains of Louiſiana from the cold nature of the eaſterly winds derived from froſty regions. In this laſt ſouthern country as well as in Provence it is made evident, that winds blowing

blowing from high uncovered and dry regions freeze the air and earth in the plains as well as on the mountains, whilſt the intenſity of the ſolar rays has a contrary effect on the human frame; and hence it appears that the heat excited in animal bodies, whilſt the air and earth continue frozen, is a circumſtance in no wiſe peculiar, as Mr. de Sauſſure imagines, to very high ſituations. Perhaps the difference of their ſenſations in the ſun-ſhine and in the ſhade may, for obvious reaſons, be greater in high and iſolated ſituations; but the effect is only varied in degree.

Both on the mountains and in the plains the ſmall effect of the ſame ſolar rays on inanimate bodies, on the earth and air, and their very ſtrong effect on animal bodies, ſeem to demand a more decided explication. Is it not that heat is more dependent on the quantity of calorific or inflammable particles contained either in the atmoſphere or in the bodies ſtruck by the rays of the ſun, than on any intrinſic warmth conveyed by thoſe rays? On high ſituations, particularly on iſolated points, the earth and air remain frigid under the moſt direct rays of the ſun, becauſe they contain few calorific particles in themſelves, and have few to receive from other bodies. But animal bodies expoſed to the ſun in the ſame ſituations feel exceſſive heat, becauſe the abundance of calorific particles they carry with them is ſtrongly excited and put in motion by its rays. Such bodies experience a gradual deperdition of vital warmth, and conſequently of ſtrength, not only becauſe it is violently pumped from

them by the activity of the ſolar rays, but becauſe the heat they contain is conſtantly tending to place itſelf in equilibrium with the circumambient air. The higher the ſituation, the more certainly will this effect be accelerated by the diminiſhed preſſure of the atmoſphere. The moment theſe bodies are removed into the ſhade, their internal heat is re-concentred, and their external pores are cloſed by the cold of the air. In the plains of Provence and Louiſiana, whilſt the direction and activity of the ſolar rays remain the ſame, the heat of the atmoſphere varies exceedingly, according to the quarter from whence the wind blows. If from the eaſt, from whence, owing to the nature of the country from which it deſcends, it is fraught with few calorific particles, the air is cold; if from the weſt, bringing with it, from low, marſhy, or woody grounds, abundance of calorific and phlogiſtic matter, thoſe ſame rays putting them into motion and activity excite a conſiderable degree of warmth. But even during the prevalence of cold air and cold winds, the difference between the ſhade and ſunſhine is ſtrongly felt by human bodies as well in theſe plains as on the mountains. That the effect of the ſolar rays on theſe in the ſame climates will be more conſiderable in high ſituations, I will readily admit. In a purer medium, the force of the rays themſelves will be greater, and the diminiſhed preſſure of the atmoſphere muſt certainly dilate the pores and diſpoſe the internal heat to evaporate more quickly; and thus what in plains only creates inconvenience may, on very high mountains in climates where the rays are very direct, as in Peru,

occaſion ſudden death. The pores and veſſels, contracted by the coldneſs of an air devoid of calorific particles during the night or in the ſhade, may be lacerated by the ſudden effect of the ſolar rays violently exciting and attracting all the interior heat of the body. The inhabitants of the plains of Peru, not uſed to the ſtrong viciſſitudes of temperature on the Punas, experience violent head-achs and vomitings, ending ſometimes in death; whilſt thoſe who are born on them, being from infancy uſed to theſe ſudden contractions and expanſions, are not affected to that degree.

The ſenſation of cold frequently experienced on the lower Alps at or under 1400 toiſes of elevation, notwithſtanding the activity of the ſolar rays, remains to be accounted for. Mr. de Sauſſure attributes it to the cold winds; and it is certainly owing not to the particularly cold temperature of the air, but to the violence of thoſe winds greatly increaſing its natural ſharpneſs. Thoſe mountains are in the regions of violent and partial currents of wind which obtain not in higher ſituations. Under 1400 toiſes the Alpine mountains are yet in groups. The deep and winding valleys which interſect them in all directions occaſion eddies, drafts, and currents of air, which by their impetuoſity greatly increaſe the impreſſion of cold. It is well known that even warm air expelled with violence from the mouth or from bellows has the effect of ſudden refrigeration. Under this height, below the region of eternal ſnows in that climate, the natural temperature of the air is certainly not ſo cold

as

as on more elevated points where ice and ſnow perpetually prevail. But on the latter, above all valleys and above the reach of the violent currents of air they occaſion, the uſual though colder temperature of the air is not adventitiouſly increaſed. In the lower Cordeleras the cold currents of wind, ruſhing impetuouſly from their narrow, deep, and winding valleys, frequently occaſion the inſtant death of travellers; yet the general temperature of thoſe parts where ſnows never lie is very far from being ſo cold as that of their higher regions eternally covered with ice and ſnow, though ſituated directly under the line. On lower mountains the penetrating cold of ſtrong currents frequently overcomes the influence of the ſolar rays on human bodies. On mountains iſolated by their ſuperior height the air, though really colder, is calm, whilſt the rays in a purer medium are more active, and conſequently have their full effect on our frame.

On the whole it ſeems difficult to pronounce, whether the rays of the ſun are eſſentially hot and the conveyers of heat, or whether they are only the exciters of heat, by giving motion to dormant calorific particles, or accelerating that of ſuch as are already in action. Thoſe rays are indeed eſſentially luminous and the conveyers of light; but the very material differences eſtabliſhed by Mr. Wallerius between light and heat make it doubtful whether heat is the neceſſary concomitant of light proceeding from thoſe rays. In particular, the propagation of light and heat ſo diametrically oppoſite moſt aſſuredly

aſſuredly favours the idea of their being diſtinct elements. All the phænomena of heat may in all caſes be as eaſily, and in many caſes more eaſily, (*b*) explained, by ſuppoſing the ſolar rays not the real conductors but the exciters of heat; and conſequently it may be doubted whether light and heat are eſſentially united.

All terreſtrial bodies have more or leſs active matter, uſually called fixed fire, united in their texture. It is perhaps to the pureſt particles of this element, eſſentially the ſource of colours, that every ſubſtance owes its colouring. But the greateſt part of this active matter is found in them in an already compoſed ſtate, forming calorific, inflammable, or phlogiſtic matters. When pure, I take this active matter to be the element of light, whoſe great repoſitory in its original ſtate in our ſyſtem is in the ſun, but which in a combined ſtate is ſcattered throughout all nature. When fixed and impriſoned in inert ſubſtances, it produces no heat; but when put in motion by the ſtrong attraction or by the contact of its external correſpondent matter, it communicates more or leſs motion to the inert matter to which it is united, and thence produces fermentation and heat. Calorific and inflammable matters contain a much greater abundance of active matter, much more eaſily diſengaged and put in motion; and, when theſe are ſtrongly acted upon, they produce extreme heat, and eventually fire and flame, till they are exhauſted. This will, I think, account for all the proceſſes of heat, and for the part the ſolar rays have in exciting it. I will not however,

however, with Meſſrs. Wallerius and de Luc, aſſert that there is no degree of heat in the ſun's rays. They are active, and therefore in the colliſion of their particles may produce ſome heat; but from their extreme tenuity I take that heat to be very ſmall. Hence I am apt to conjecture, that by far the greateſt part of the heat produced by thoſe rays is to be attributed to the attraction and repulſion between matter eſſentially active emitted from the ſun its great ſource, and that portion of the ſame matter originally or adventitiouſly incorporated with terreſtrial inert matter, which is thereby put in motion and fermentation. The heat thence reſulting will be more or leſs conſiderable, on one hand, in proportion to the more or leſs direct, divergent, or concentred incidence of the ſolar rays, and the purity of their emanations—and on the other hand in proportion to the quantity of that ſame active fluid contained in the atmoſpheric particles, or in the bodies acted upon by thoſe rays. Viſible terreſtrial fire I take to be occaſioned by this active matter, more or leſs firmly united to and impriſoned within inert matter, producing an exploſion by the ſtrong attraction of its external correſpondent matter. When produced, it carries off with it all inflammable, oily, humid, and aërial parts containing an abundance of active matter, and leaves behind it, in aſhes or reſiduum, ſuch earthy particles only as contain very little, and are not ſuſceptible of expanſion and ſublimation. I muſt obſerve that the diamond, which ſeems not to contain much inflammable matter, but apparently a great abundance of the element of light, neither flames

nor

nor appears in a ſtate of ignition or incandeſcence in the furnace, but is at length entirely diſſipated in the fire by ſublimation, without leaving any viſible droſs behind it. The ruby has yet proved inattackable by fire. Fire has no other effect on it, but that of ſomewhat ſullying its luſtre. Its red rays or colouring principles are too ſtrongly fixed to be diſperſed by its force.

Whatever may be decided on the queſtion, Whether the ſolar rays are or are not the immediate cauſes of heat, the great Sir Iſaac Newton has ſhewn to demonſtration that they are not only the cauſe of colours, but are ſeparately of diſtinct colours. Light excited by fire and flame has the ſame quality in that reſpect apparently, becauſe the element of light in that caſe ſhews itſelf in its original pure ſtate. Light ſeems to be the pure active element, the ſource of all motion and life. Earth, air, moiſture, and heat, are not ſufficient to bring plants to perfection. Light is neceſſary to invigorate them, and to beſtow on them their proper colours. Experience ſhows that the ſickly flower nurſed in obſcurity will want its varied hues. Light muſt either impart the colouring principles, or it muſt prepare and elaborate its texture to receive or reflect ſuch of its rays as will produce to the eye the genuine and vivid colours of its ſpecies.

From all that I have ſaid, you will, Sir, perhaps rather perceive the difficulty of the ſubject than be able to form any decided opinion on it. Philoſophy has not yet attained any ſatisfactory explanation, and to its future inveſtigations I muſt leave it.

NOTES AND ILLUSTRATIONS

TO

LETTER V.

(a) Page 436.

WITH reſpect to this experiment of Meſſieurs de Sauſſure and Pictet, I perfectly agree with Dr. Hutton, in a diſſertation juſt publiſhed, that it could not be heat which was thus irradiated, reflected, and concentrated. We know from conſtant experience, that heat is circularly and progreſſively expanſive in all directions, tending to put itſelf in equilibrium in whatever ſpace it gradually fills, and to place all bodies which it meets in its progreſs in equilibrium with reſpect to that quality. Light, on the contrary, we know from every other experiment to move in a direct line till repelled and diverged by ſome intervening object, from which it again moves in ſome other direct line, and is thus capable of being concentrated in a focus. Are we from this ſolitary experiment to conclude that heat in this inſtance has deviated from its general mode of propagation, and taken up the direct contrary one of light?—Is it not more reaſonable to ſuppoſe, with Dr. Hutton, that it was not obſcure heat which was here reflected and concentrated, but the element of light ſtill exiſting in its active ſtate on the ſurface of the cannon ball no longer incandeſcent, but ſo weakened as not to affect our viſion with the ſenſation of light? As he obſerves, light affects not every eye alike: to the perſon coming out of broad day-light,

objects in a darkened room are invisible, which to others who have been long in obscurity, and to the same person after staying some time in it, are perfectly discernible. Light is, in my opinion, the sole essentially active matter, as I shall hereafter observe, effluent and refluent from and to the great body of the sun. Absorbed and imprisoned in terrestrial matter, it becomes a constituent part of all other substances, to which it imparts the colouring principle, but is probably without gravity. Its laws, as well as those of elective attraction and repulsion and of gravity in all terrestrial matter, cannot be resolved but in the will of the Creator. Dr. Hutton judiciously observes, that the different coloured rays into which light is divided are wisely endowed with different powers with respect to exciting vision or heat. The combination of all is the most forcible on vision, but has the least power to excite heat, whilst the properties of the separate rays are inverse as to these two purposes. Its power of exciting heat I take to proceed from its attraction of congenial particles absorbed by terrestrial substances, which by their revived activity give motion to such elastic bodies as are compounded of a considerable proportion of its own principle. By the primary laws of nature which we can discover, but which we cannot further investigate, the pure element of light invariably moves in a direct line with inconceivable rapidity; but elastic bodies, though containing the greatest quantity of its principles, obey a different law, whence the propagation of heat is circular and progressive. It is with great pleasure that I find my general ideas on light so consonant to, and supported by, those of this author, whose late publication will, I hope, further excite the attention of all philosophers to this important subject.

(*b*) Page 447.

The human conception never appears so finite, the proud lord of this little earth never seems so truly to shrink into an atom, as when he raises his thoughts to the immensity of creation. From the microscopic insect to those innumerable luminaries rolling in that space to which we can assign no limits, all is wonder and astonishment. The essence of even the minutest

particle is beyond the utmoſt ſagacity and penetration of man. Struck with ſo much of the admirable ſtructure both of the whole and of each part as he is permitted to ſee into, he muſt confeſs that more remains behind above his feeble comprehenſion, and his final exclamation muſt be:

Theſe are thy glorious works, Parent of Good!
Almighty, thine this univerſal frame,
Thus wondrous fair!—Thyſelf how wondrous then!

Thoſe innumerable ſtars which our weak ſight can diſcern, thoſe which the curious aſtronomer has been able to diſcover by the help of teleſcopes, and thoſe, perhaps in ſtill greater number, which even Mr. Herſchel's inſtruments have not been able to draw within our ken, are all ſo many ſuns, many of as great, and poſſibly many of much greater, magnitude than ours. Reaſonable and juſt analogy pronounces that each of theſe is probably accompanied by as many attendant planets as our ſun. In our ſyſtem the ſize of this our globe is not even a medium with that of other planets. Whilſt the diameter of the Earth is about 6700 miles, that of Mercury is indeed only 2748, but that of Jupiter is 120,650 miles. Can it be ſuppoſed that bodies of ſuch magnitude, and ſtars not inferior to our ſun, were created merely to regulate our ſeaſons, to guide our ſteps or our navigation, or to ornament the canopy of man's reſidence as with ſo many lamps? Much leſs bodies placed at ſmaller diſtances would have equally anſwered theſe ends. No; ſuch immenſe bodies, and ſo many ſuns, many of which are imperceptible to the naked eye, muſt have had more immediate and more important purpoſes. Reaſon muſt aſſure us that the planets of our ſyſtem, and thoſe attendant on other ſuns, muſt have been deſtined for the habitation of other creatures, of whoſe natures we are indeed and muſt remain for ever ignorant, but whoſe exiſtence ſeems not problematical. The ſatellites of ſome of our planets, ſo wiſely increaſed and diſtributed to ſupply light at their great diſtances from the ſun, proclaim it beyond a doubt. If heat, however, is entirely dependant on proximity to the ſun and on the intenſity of its rays, we can have no conception that any living creature can exiſt in Mercury, from the violent heat occaſioned by the

vicinity

vicinity of that body to the ſun; or in Saturn, from the extreme cold ariſing from its prodigious diſtance from that ſuppoſed ſource of heat. But if heat is really more dependant on the nature of the materials of which animal or inanimate bodies are compounded, and the aptitude of their compoſitions to be acted upon by the ſun's rays, than on any real warmth conveyed by them, we can then conceive that the inhabitants of Mercury may not be more ſcorched by their proximity to the ſun, or thoſe of Saturn more frozen by their diſtance from it, than we are on this earth. The denſity of all the planets exactly proportional to their diſtances from the ſun ſhews that this is really the caſe. If the rays of the ſun are only mediate cauſes of heat, if they are only agents capable of bringing it forth, the difference of their intenſity at the ſeveral diſtances of the planets may be fully compenſated by the more immediate cauſes, the quantity of calorific particles contained in thoſe planets and the force of their adheſion. The univerſal and all-foreſeeing providence of the Supreme Being extends itſelf with equal bounty to all and every part of the univerſe. Under his powerful hand, one ſingle agent operates all the wonders of his beneficent intentions; and at ſuch unequal diſtances the ſame ſun animates the ſoil and inhabitants of Saturn without ſcorching thoſe of Mercury. Light alſo is weakened by diſtance. The compoſition of the moon is ſuch as to reflect to us a moſt benign light during the night, but it is probably inviſible in Saturn. The compoſition of that planet's moons and ring muſt be exceedingly different; for they not only reflect ample light on that planet, but, notwithſtanding their immenſe diſtance, are viſible, and make it more viſible to us.

THOUGHTS

ON THE

STRUCTURE

OF THIS GLOBE.

LETTER VI.

Abſtract of the Syſtem of Profeſſor Wallerius on the Formation and Structure of the Earth.

BEFORE I venture to expoſe to you, Sir, my own ideas on the original formation and ſtructure of this globe, and on the changes which have reduced it to its preſent ſtate, you will give me leave to introduce you to the knowledge of the opinions of Mr. Wallerius, who not many years ſince publiſhed a regular ſyſtem on thoſe ſubjects. That learned profeſſor has been ſtyled by the Swedes the father of mineralogy, as they had before given to his countryman Linnæus the honourable name of father of botany, fully confirmed by the univerſal ſuffrage of all Europe. This philoſopher

diſplays

diſplays not perhaps that vivacity of imagination nor that ſeducing eloquence which diſtinguiſh Meſſieurs de Buffon and Bailly; he will not captivate ſo many readers, nor obtain ſuch rapid conqueſt of opinions; but profound, clear, and conciſe reaſoning will, when his work ſhall be better known to the learned of Europe, ſecure to him a more ſolid reputation of real ſcience. Suppoſe him not, however, deſtitute of imagination; his, it is true, is not exhaled in the flowers of ſtyle; but that chapter of his work in which he calls into order the confuſed abyſs of fluid matter, and in which he combines, arranges, and develops the ſucceſſive origin of the various ſubſtances of which the earth is now compoſed, will ſhew him to have poſſeſſed that vaſt conception and that quickneſs of ſeizing the moſt diſtant connection of things which truly characterize the great genius. Mr. de Luc of Geneva, already mentioned, publiſhed about the ſame time his ſentiments on the ſame ſubjects, and, though probably uncommunicated, their opinions coincide on moſt points. As of a more conciſe and regular ſyſtem, I ſhall chiefly confine myſelf to an abſtract of the work of Mr. Wallerius. You will be ſurpriſed, Sir, to find him cloſely following ſtep by ſtep, and in fact confining himſelf to the explication of that moſaical narration which the philoſophers of your nation have accuſtomed you to look upon as a confuſed tale, inexplicable by nature, and unworthy of the attention of the man of ſcience; or at leaſt as the diſguiſed and veiled account of the creation, meant not to convey phyſical truths, but calculated to ſuit the prejudices and underſtandings of an illiterate and

and ignorant people. Here you will ſee the ſucceſſive progreſs of creation delineated, however briefly, by Moſes, not only connected with but ſupported and confirmed by the ſucceſſive application of the only well known fundamental laws of nature. In fact, if that narrative is true, and, as chriſtians ſuppoſe, inſpired by the Divinity himſelf, nothing in it, though certainly not intended directly to inſtruct us in the arcana of nature, ſhould be found incompatible with her poſitive and immutable laws. When the ſun is ſaid to ſtand ſtill in Gibeon, or to retrograde on the dial of Ezechias, ſcripture talks only of appearances as theſe really were, effected not by any alteration in the rotation of the whole earth, but by ſome partial refraction of its rays, as yet happens in ſome mornings or evenings before that body really appears in ſight, or after it has in fact diſappeared. It talks the language then alone comprehenſible, as we yet do, though we know the contrary, in common converſation: but here it relates facts without attending to their being perfectly comprehended or not; its only object is to inſtruct us that God was the ſole creator and diſpoſer of all that is. This idea of the neceſſary truth of facts aſſerted in Geneſis will both account for the anxiety of Mr. Wallerius and myſelf to ſhew that no part of theſe facts is really inexplicable by true philoſophy, though for want of more certain knowledge our explications may yet be defective.

You have ſeen, Sir, that I have already endeavoured to ſhew, from the moſt authentic documents of the hiſtory and gradual pro-

greſs of mankind, that the time elapſed ſince a general deluge, the tradition of which has been from time immemorial preſerved by all nations, cannot be of much longer duration than what may coincide with ſome of the various chronologies of ſcripture; and that probably the firſt exiſtence of mankind is not of much older date than what theſe will warrant. I have alſo, I think, demonſtrated that the arguments adduced by Mr. de Buffon and others to prove a very high and almoſt indefinite antiquity to the globe itſelf are both inconcluſive and fallacious; and I have ſhewn againſt thoſe who reclaim the unerring teſtimonies of nature herſelf againſt hiſtory and the narration of the firſt of hiſtorians, that theſe pretended teſtimonies are in ſo much more doubtful as their adducers diſagree amongſt themſelves; and that the jarring ſyſtems hitherto ſubſtituted to the moſaical account, ſo far from according better with the laws of nature, or being a clearer explication of her paſt and preſent ſtate, are generally founded on abſurd or ideal hypotheſes, and often in direct oppoſition with the moſt certain principles hitherto deduced from her. By the following expoſition of the opinions of Meſſieurs Wallerius and De Luc, you will perceive that in what I may hereafter offer as an explication of Geneſis and of nature I am not ſingular, but ſupported by the ſentiments of ſome men of high reputation and of profound learning, amongſt whom I may alſo reckon my countryman Mr. Whitehurſt. To Mr. Wallerius I with pleaſure own that I owe not only a confirmation of my before pre-conceived ſentiments, but a much clearer arrangement of them, and a more regular connec-

tion with, and application of, the fundamental laws of nature. A ſhort abſtract of his ſyſtem will, therefore, be a proper and leading introduction to the more detailed opinions which I ſhall hereafter preſume to offer to your conſideration.

* "In principio creavit Deus cœlum et terram;" that is to ſay, the original matter or ſubſtance of all things—the pure elements of celeſtial or luminous matter, and the pure elements of terreſtrial matter and of all ſolid bodies. The firſt conſiſts of particles infinitely ſubtle, light, and qualified for motion and activity; the ſecond, of particles fixed and motionleſs of themſelves, very hard and incapable of flaming or ſhining.

"Terra autem erat inanis et vacua, et tenebræ erant ſuper faciem abyſſi." According to the Septuagint verſion, the earth was as yet ſimple and unprepared. Theſe matters were yet inert, without life or motion, and the maſs of this abyſs by their confuſed union was as yet dark; but ſoon the ſpirit of God, which neither means wind nor air not yet exiſting, acted upon them, and communicated to theſe two primordial principles attraction and re-action, cauſes of all motion, of coheſion and of all combinations. This immediate action of the ſpirit or power of God, efficient and creative force of all things, by theſe new properties impreſſed on theſe

* The following quotations made by Mr. Wallerius are not taken from the Vulgate, but from ſome Latin tranſlation uſed in Sweden.

elements, occaſioned the earthy principle to combine with the luminous principle, and gave birth to calorific and to inflammable matter, which, giving neceſſarily an intrinſic motion to the whole maſs, put it into a ſtate of fluidity, or, according to Moſes, changed it into water; for it is only after the action of the ſpirit of God that he calls it by that name. The celeſtial matter or the matter of light, the active principle, was neceſſary to impreſs motion, to produce calorific matter, heat and the inflammable principle; and it was by the means of theſe laſt that the terreſtrial particles became fluid. The active principle or the principle of light, as well as the paſſive or terreſtrial principle, exiſted then before theſe combinations; but light was produced when God ſaid, "Fiat lux," and ſeparated the light from darkneſs. According to St. Paul, "Deus juſſit lucem de tenebris lucere:" whence it follows that the matter of light was already preſent in the darkneſs, though it only began to ſhine when God impreſſed on it a new activity neceſſary to produce that effect. "Diviſit Deus lucem à tenebris:"—he made a local ſeparation of them by withdrawing from the great maſs of the abyſs the ſuperabundant matter of light no longer neceſſary for the firſt combinations. By the action of this moſt powerful and active matter of light, thus ſeparated and diſengaged from the great maſs, God gave to the watery terreſtrial matter a motion of rotation on its axis; and hence the diſtinction of night and day, the firſt of which muſt, as Moſes ſays, have neceſſarily preceded. This rotation and the new motions which it cauſed in the watery maſs gave room for an infinity of

other

other combinations of nature. Thus attraction and re-action productive of a beginning of intrinsic motion, the heat thence resulting, effects of the spirit of God, and the accelerated motion impressed when he said "Fiat lux," co-operated with this motion of rotation to combine terrestrial bodies under the water. No central gravitation which could counteract or retard these combinations as yet existed. Centripetal and centrifugal forces were a consequence of rotation, and contributed to them.

The second day God made the firmament and divided the waters; that is to say, he said, Let there be an extent in the midst of the waters. He extended space, or the firmament, or the heaven, as it is yet called; he drew all the opaque planets, all as yet in a fluid state, from out of the great watery mass, and fixed each of them in its place. They are, or seem above with respect to us, and are consequently justly called waters above the firmament, in opposition to those on this earth which are under our feet. St. Peter agrees with Moses in saying: "Latet illos hoc volentes, quod cœli fuerint olim et terra ex aquis et per aquas subsistens Dei verbo." The rotation already impressed on the whole of the great mass or abyss became accelerated in each planet formed from it in proportion to its axis.

The third day God separated the waters of our earth from its solid matters already combined by coagulation and concretion under the waters. This was effected by the force of gravitation to the centre now first impressed. The like no doubt took place in all the other

other planets. The flux and reflux contributed not to it, becauſe the ſun exiſted not as yet. The motion occaſioned by the precipitation of all matters towards the centre cauſed an increaſe of heat, which volatilized part of the waters, and produced air neceſſary for the vegetation of plants whoſe ſeeds were produced this ſame day. It is in this article of the conſolidation of the globe and the firſt formation of mountainous chains that Mr. Wallerius diſplays all his genius. It is too full of matter to bear an analyſis, and muſt be followed in the original.

The fourth day God from the great luminous maſs, which he had ſeparated on the firſt day from the liquid terreſtrial maſs, drew forth the ſun and the ſtars and placed them in their order. It was then that univerſal gravitation towards theſe bodies took place, and the conſequent revolutions of their planets round them. The moon and other planets became luminaries to us, and, whilſt each ſerved its particular end, they all became uſeful ſigns to us. Univerſal gravitation ſet the whole univerſe in motion. It is to the placing the ſun and ſtars that Moſes attributes the annual motion of the planets, as it in fact depends on it. Having thus deſcribed the arrangement of the whole univerſe, Moſes occupies himſelf ſolely with what relates to man, the only living being in which we are eſſentially intereſted.

Hitherto we may conſider Mr. Wallerius merely as the interpreter

of

of the moſaical account of the creation. His explication is ſurely not leſs eaſy and ſimple than ingenious. But, Moſes apart, ſhould we examine what he has here advanced purely as a ſyſtem of coſmogony, it will, I think, appear truly philoſophical. It claſhes not with any of the well known laws of nature. In the proceſs of firſt formation, the operation of thoſe laws is indeed admitted only ſucceſſively as the work goes forward and their aid becomes neceſſary. The union of all is requiſite to preſerve the regularity and equilibrium of the whole machine when completed; but they might have counteracted each other whilſt forming. The artiſt who ſhould ſet his clock in motion whilſt the wheels were yet rough and incomplete could only produce an uſeleſs work. In this ſyſtem the Supreme Being begins by the creation of the firſt ſimple elements of all things, conſiſting of only two diſtinct principles. Attraction and re-action communicated create the firſt motion, give birth to heat, and produce the firſt combinations between theſe primordial elements. The exceſs of the element of light no longer required for theſe combinations is withdrawn from the common maſs; diſengaged, it acquires a new activity, which beſtowed on it the faculty of ſhining. Thus collected, it acts upon the terreſtrial maſs, and communicates to it a motion of rotation on its axis, from which are deduced the centripetal and centrifugal forces. Theſe new motions are ſources of new combinations in that body. This great terreſtrial maſs is now divided into ſeveral portions to form the numerous planets diſperſed and placed in ſpace. Each of theſe acquires an accelerated motion of rotation on its

its axis in proportion to its ſize or denſity, which increaſes combinations within it. All the variety of ſubſtances of which the earth and planets are compoſed are now prepared under the waters, and God communicates to each the motion of gravitation to a centre. The ſolids, which hitherto were confuſedly agitated without having any particular attraction to the centre, are precipitated towards it in ratio of their diſtances and ſpecific gravities; part of the waters run off into the interſtices left unfilled by theſe ſhapeleſs falling ſolids; the dry land appears, and the remaining waters find their bed on the uneven ſurface. This new agitation increaſes heat; which volatilizes another part of the waters, and produces the atmoſphere neceſſary for the vegetation of plants, which are to clothe the land, and whoſe ſeeds are now formed. Having thus prepared the opaque planets, God determines to give them a more efficacious life and permanent motion; and from the great maſs of light he draws our ſun and the ſtars, which he places each in the centre of its ſyſtem. From that moment univerſal gravitation and repulſion take place; the whole univerſe is in motion; and innumerable globes, whether opaque or luminous, roll in beautiful and durably-connected order in the immenſity of ſpace. All nature becomes animated, and the future habitation of man is prepared to receive him. All ſurely is ſimple in this ſyſtem. Abſolute creation is only for the ſimple elements of all that exiſts. The great acknowledged moving forces of nature impreſſed ſucceſſively, each as its activity is required, combine and animate all things, and finally eſtabliſh for ever that beautiful

beautiful order we admire. Whether as an interpretation of Moſes, or ſimply as a philoſophical ſyſtem, it ſurely demands the attention of the learned. It is more eaſily comprehended, and is, in my mind, greatly ſuperior to the complicated devices of Mr. de Buffon, or to any other ſyſtem of formation which has as yet been broached. We ſhall ſoon ſee many other objections and difficulties which have been reproached to Moſes cleared up with equal ſagacity.

Mr. Wallerius repreſents to himſelf the aſpect of the antediluvian world as very different from that which it now wears. The proportion of land to that of ſea was much greater. Great part of the waters were hid under the great caverns which ſuſtained the antediluvian earth. Mr. de Luc ſuppoſes that of theſe there were generally three different ſtages, one above the other. The land, diſpoſed with greater ſymmetry, though diverſified, was not lifted into high and inacceſſible mountains; the ſeas, leſs deep, occupied not ſuch immenſe ſpaces, but, divided into ſmall mediterranean ſeas, ſeparated and varied the habitations of men without rendering their communications very diſtant, difficult, or dangerous. There reigned neither ſtormy winds, nor clouds, nor rains; becauſe the inequalities of the earth were much leſs conſiderable, and all its hills ſuſceptible of cultivation, and that the dews and rivers ſufficed to water the earth; and, as it is ſaid in Geneſis, the Lord God cauſed it not to rain upon the earth, but provided that the dews which roſe from it ſhould ſuffice to humect its whole ſurface. The firſt rains men-

tioned by Moſes are thoſe of the deluge itſelf, and the firſt winds thoſe that God cauſed to blow to make the waters retire. In very limited ſeas there was neither ſenſible flux nor reflux. The poles of the earth were perpendicular to the equator, nights and days were every where equal, and every climate of the earth was temperate. To operate the deſtruction of that earth and of man, God changed the centre of gravity a little nearer to the ſouthern pole; the axis of the earth became inclined, and, in conſequence of this motion, all was overturned; the ſeas overwhelmed the lands; the ſources of the abyſs or of the interior waters were opened by the rupture of its caverns, and thoſe waters ſpouting from the bowels of the fractured globe covered its ſurface; the valleys were ſunk, and the mountains were elevated; as the pſalmiſt ſays: *Aquæ ſupra montes eminent, ſed increpatione tua fugiunt, et tonitrui tuo abeunt; montes aſſurgunt, & valles ſe deprimunt in locum ſibi deſtinatum: limites ipſis poſuiſti quos tranſgredi illis non datum eſt ut terram ulterius contegant.* By this great change the atmoſphere was diſturbed and climates altered. Impetuous and variable winds, clouds, and rains, obſcured the face of heaven and deſolated the earth. By ſuch viciſſitudes the vigour of plants and of all living creatures was weakened, and the age of man was ſhortened:—circumſtances which Moſes relates concurrently with the traditions of all ages. If before the deluge there were neither rains nor clouds, the rain-bow muſt have appeared for the firſt time to Noah on leaving the ark. The retreat of the waters, very rapid in its commencement, during 225 days whilſt Noah yet remained in the ark was ſufficiently

great

great to lay dry the mountainous parts of interior Aſia, where Noah and his children deſcended. A more conſiderable ſpace was not yet neceſſary for them. Mr. de Luc thinks that the moſt inferior caverns did not totally give way at firſt to deepen the bed of the preſent ſea, but ſucceſſively, and poſſibly during ſome years; and the caverns yet exiſting in the bowels of the earth received gradually, perhaps during ſome ages, the exceſs of waters not compriſed in our preſent ſeas. In proportion as theſe ruptures and ſinking of the land took place, the waters ran off into them, and the general level of the waters on the earth became much lower than before the deluge. The atmoſphere neceſſarily followed them, and the mountains in conſequence became much more elevated into the airy regions than before; thence their temperature was changed, became cold, ſterile, and covered with ſnows. The branch of olive furniſhed to the pigeon from mount Ararat, where the cold now permits none to grow, has been objected to Moſes. But if the waters were yet retiring but not ſunk to their preſent level, which they only gained ſucceſſively and after the lapſe of many years, becauſe it was unneceſſary to uncover the whole ſurface of the earth for the ſubſiſtence of eight perſons, and the very limited number of animals preſerved with them, the atmoſphere would only ſink gradually with them, and the ſummits of mount Ararat would ſtill enjoy for ſome time a warm climate. Mr. Wallerius aſſerts, that the great eminences were yet only iſlands, and remarks that the firſt great plain mentioned is the plain of Senaar, where men arrived not, according

to the moſt probable computation, until 400 years after the deluge. By the falls of earth and accumulated depoſitions during the retreat of the waters, the outlets of many valleys would be ſtopped up, where many great interior lakes muſt have been formed; many of whoſe waters have ſince run off either by undermining or burſting thoſe oppoſing mounds by their increaſing weight, or by their accidental ruptures cauſed by volcanos or earthquakes, more frequent in the then ſtate of the earth. It was during the long continued retreat of the waters, and the various accidents thence enſuing, that many iſlands were torn from the continent, and that ſecondary mountains were formed in ſucceſſion of time and during ſeveral ages after the deluge.

But the great reciprocal changes of lands into ſeas, and of ſeas into lands, were primarily effected by the inclination of the axis of the globe. From hence the accumulation of ſea ſhells in the midſt or on the ſummits of our mountains, or deep buried in the bowels of the earth, is to be accounted for. The change of climates operated by this ſame inclination of the axis, explains various ſpecies of thoſe belonging to hot countries now found in our northern climates. Kinds entirely foreign, found on the very ſhores of ſeas in which none ſuch now exiſt, prove, according to Mr. de Luc, that the pretended ſlow ſucceſſive change of lands and ſeas by the perpetual motion of the ſea from eaſt to weſt is totally unfounded. The laſt depoſites of ſuch ſlow retreat could only be of fiſh ſtill

exiſting in the bordering ſea, and ſhells entirely foreign to the climate could only be found at conſiderable diſtances from the actual coaſts. The ſlow and gradual retreat here ſuppoſed could never form any other than gently-inclined plains; whereas the ſea ſhores in one part exhibit ſteep rocks and mountains, and in another preſent even plains almoſt on a level with its waters. Holland ſhews that the level of the ſea has been the ſame for a great number of years and ages paſt, and that the land only gains ſlowly by the depoſites of rivers. According to him alſo, the ſmall quantity of vegetable earth proves that the globe cannot be of very ancient date. The bones of elephants found in the north belong to the antediluvian world, all whoſe climates were temperate. Mr. de Luc juſtly obſerves, that their being yet found in a ſtate of preſervation is an evident proof that the date of their depoſition is neither infinitely removed, nor ſo diſtant as to be reconcileable with thoſe times when Siberia could have been a hot climate, reduced to its preſent ſtate of extreme cold by the progreſſive and ſlow gradual cooling of the earth from the diminution of central heat (*a*). In the idea of the former antediluvian ſtate of the earth, and the great changes cauſed in it by the inclination of its axis at the deluge, the learned Mr. Whitehurſt perfectly agrees with the two above-named gentlemen. You will find my ideas, which I ſhall further develop to you in my next letter, ſo perfectly coinciding with thoſe of Mr. Wallerius, that you will juſtly think them little better than a repetition. Immediately on our return from Switzerland, and before I had

had had the advantage of perusing the work of Mr. Wallerius, I briefly had the pleasure of stating to you the heads of my opinion. These are confirmed and greatly improved by the new lights which I have derived from him. If the principle on which we both found our systems be true, it must be one and the same; and its development can only be varied by such additional proofs and details as may occur in its further investigation. Without any further preface, I shall therefore in my subsequent letters lay before you the whole suite of my ideas on the same subjects.

NOTE

NOTE AND ILLUSTRATION

TO

LETTER VI.

(*a*) Page 469.

MR. PALLAS, who had formerly eſpouſed the opinion of Mr. de Buffon, that Siberia was once the abode of elephants, is now convinced by his later obſervations that ſuch, whoſe remains are there found in conſiderable numbers, muſt have either fled to thoſe high grounds to avoid an increaſing deluge, or that their carcaſes had been wafted thither by its waters. In his obſervations on the formation of mountains this author ſays, that the relics of thoſe large animals inhabitants of Indoſtan, the elephant, rhinoceros, and monſtrous buffaloes, are to be found in great quantities near the courſe of rivers, and chiefly wherever there is any conſiderable opening in the chain of the Oural mountains, which bound Siberia to the ſouth. They are depoſited at no great depth under beds of ſand or ſlime, accompanied with various ſea-ſhells, bones of fiſh, and wood covered with ochre: an evident proof of their having been tranſported thither by water. A rhinoceros, ſtill covered with its ſkin entire, found in the frozen ſoil of the borders of the Viloûi, is a convincing proof, ſays he, that it muſt have been the moſt rapid inundation which could have hurried this carcaſe to thoſe frozen countries before corruption had time to deſtroy its tendereſt parts. He adds that, according to the report of hunters, elephants and

other monſtrous animals are found as yet covered with their ſkins at the foot of the mountains which occupy the ſpace between the rivers Indighirka and Kolyma. We may here with Mr. de Luc obſerve, that the perfect ſtate of preſervation in which are found the bones of ſuch animals, ſo far ſouth as the Oural mountains, is alſo a proof that the inundation which carried them thither cannot be of older date than that which may be reaſonably aſcribed to the moſaical deluge. Dr. Hutton remarks, that if the ſhells accompanying theſe relics are petrified, as he has ſince heard they are, it is a proof that they ſimply proceed from the decompoſition of ſolid ſtrata, in which they had been encloſed, formed under the ſea and travelled in the running waters of the earth. But he will not thus ſubvert this ſtrong evidence of a deluge, till he can bring naturaliſts to believe with him that no petrification can take place but under the ſea.

THOUGHTS

THOUGHTS

ON THE

STRUCTURE

OF THIS GLOBE.

LETTER VII.

Further Attempt to explain the Moſaical Account of the firſt Formation of the Univerſe by the ſucceſſive Application of the Fundamental Laws of Nature.

BUT it is my own ideas on this philoſophical part of our reſearches that you require, Sir, and hitherto I have entertained you with the opinions of others. The writings of authors of ſo much ſuperior authority and of ſuch merited reputation, which I have laid before you, ſhould perhaps condemn me to ſilence; but I have promiſed you my own particular thoughts on the ſubject, and I will now endeavour to collect in order to ſubmit them to your judgment.

When I firſt took pen in hand in obedience to your requeſt, the

works of Meſſieurs Wallerius and de Luc had not yet fallen into my hands. I have now given a previous abſtract of their ſyſtems, and particularly of the firſt gentleman's, both that you may be inclined to give ſome little more credit to my ideas as ſupported in great meaſure by the ſentiments of philoſophers of ſuch weight, and becauſe their writings have greatly aſſiſted me in developing my own thoughts. Neither will I conceal from you that, wherever I have found their explications conſonant to, or ameliorating, my plan, I have adopted them without ſcruple. With the ſame frankneſs I ſhall endeavour to refute their opinions wherever they happen not to coincide with mine. In a career where it behoves to tread with caution and diffidence, always ready to liſten with candour, and to adopt truth wherever I may find it, my motto will ſtill be, "Nullius jurare in verba magiſtri."

Little ſatisfied with the ſeveral ſyſtems I had read before our journey into Switzerland, I naturally turned my thoughts to a more ſerious conſideration of an antient author, often noticed by theſe, though viewed in various lights and with various ſentiments. To him I reverted with ſo much the greater earneſtneſs, as I already perceived his hiſtory of mankind immediately preceding and ſubſequent to a deluge wonderfully confirmed by the teſtimonies of all antient traditions in all parts of the world. All of theſe agree with him, that ten generations of men, of a longevity no longer known to us, preceded a general deluge, in which, excepting a very ſmall number who alone re-peopled the earth, all that former

race of men perifhed in punifhment of their depravity. All the moft antient inhabitants of the prefent earth profefs to derive their origin and pedigree from fome one of thofe men, whom he has noted as the fathers of nations, and of almoft every one of them fome veftige is fomewhere or other to be found on record. As a further proof that fome fuch general and not very remote catafrophe had happened to mankind, all hiftory concurs in fhewing, not fifteen centuries before the chriftian æra, as yet feeble colonies emigrating to, and gradually peopling countries the moft fertile, and in the procefs of a very few ages the moft populous and the moft renowned. Thefe facts, if true, difconcert indeed not a little the ground-work of moft modern fyftems. But this fingular combination of traditions derived from the higheft antiquity giving, if not proof, at leaft a greater degree of authority to thefe points than can be affumed by mere negatives grounded purely on their incompatibility with hypothetical fyftems, it feemed equitable to examine without prejudice, whether nature herfelf was really, as thefe philofophers pretend, in direct oppofition with thefe or other articles of his narration, or whether all of them might not be explained without the violation of her known laws.

Many modern philofophers, whofe fyftems might be fhaken amongft chriftians by the authority of Mofes, content themfelves with anfwering to the objections which may be made to them from thence, that the Jewifh legiflator, though verfed himfelf in all the Egyptian

ſciences, yet, writing for an ignorant people, was neceſſitated, in order to make himſelf underſtood, to deviate from exact phyſical truths. Mr. Ferber, in a late publication, ſays with truth, that it was no part of the purpoſe of Moſes to inſtruct us in that ſcience, and that, content with indicating the effects and ſucceſſive operations of the creation, he attempts not to expound the cauſes nor the phyſical means which gave birth to them. But if his expoſition of effects and of ſucceſſive operations is founded in truth, or even ſanctioned by an authority in itſelf reſpectable, it will not be, as he pretends, uſeleſs to meditate it. This very ſucceſſion of operations and effects at the firſt creation or formation of all things may indicate the true ſecrets of that nature we ſeek to unveil.

Without philoſophical diſcuſſion or ſcientific pretenſions, Moſes is the plain and ſimple hiſtoriographer, either of thoſe real effects which took place at that epocha, or at leaſt of the moſt antient traditions tranſmitted on that ſubject from the earlieſt known antiquity. The order of creation which he deſcribes, and the moſt eſſential circumſtances that accompany it, are confirmed by all the moſt antient coſmogonies, Roman, Greek, Phœnician, Phrygian, Egyptian, and Chineſe: precious remains, not of philoſophical ſyſtems, but of original traditions. Like him, their authors aſſume not the tone of learned diſſertators, but of ſimple narrators of facts tranſmitted to them by ſtill more antient records or traditions. Whatever the Jewiſh writer tells us of the deluge comes equally confirmed by a like

like concurrence of antique teſtimonies. It will not ſurely appear extraordinary if many circumſtances in theſe different relations are conſiderably altered, and variouſly accommodated to national prejudices or theological opinions; but, without noticing the Arabs and Tartars, who, though ſeparated by immenſe regions, adopt almoſt without deviation the Jewiſh account, it is ſurely no leſs ſingular than ſtriking, that all the eſſential points and ground-works ſhould be every where the ſame, notwithſtanding the differences of ages, countries, and religions. The ſuperior merit of candour, ſimplicity, and perſpicuity, above all others, muſt be allowed to the moſaical narration. Shall ſuch concurring teſtimonies be rejected without examination? No:—abſolute incompatibility with known and aſſured phyſical truths can alone outweigh authority ſo corroborated. It becomes the province as well as duty of philoſophers, to give this moſt antient account the moſt impartial diſcuſſion in a phyſical as well as in an hiſtorical light. Having already conſidered it in the laſt, let us now ſee in what manner ſuch parts of it as relate to natural philoſophy ſhould be diſcuſſed.

Hitherto moſt authors who have written upon the ſubject ſeem to have firſt framed their own ſyſtem, and then to have endeavoured to ſtrain the text of Moſes in its ſupport, or to explain it away when that could not be effected. Others have rejected him with ſlight, becauſe he ſtood in the way of their own particular ideas: few or none have examined him candidly without retroſpect to ſome pre-adopted ſyſtem. The ſole object of that venerable author

was

was indeed to inſtruct mankind, who had already miſtaken, or were prone to miſtake, the creature for the creator, that God alone was the author of all that exiſted, and had modelled at will, and at no very diſtant period, thoſe great objects to which they were inclined to attribute powers which belong only to him. For this purpoſe he gives an account of the creation of all viſible matter, and of the formation of the earth, ſun, and celeſtial bodies, and of the order in which they were ſeverally produced. But he informs us not of the more immediate means by which theſe ſeveral arrangements were accompliſhed. Theſe are mere objects, though great ones, of curioſity, and as ſuch are left to the diſquiſition of man. The ſimple facts are given, either as truths immediately revealed by the divinity, or handed down by authentic tradition. He tells us that it pleaſed the Almighty, after creating the rude elements of this material world, to arrange and call them forth into order ſucceſſively and at diſtinct periods. Beginning from the firſt exiſtence of formleſs and inert matter, and following it through ſeveral ſtages to the completion of the preſent regular and moſt beautiful order of things, he has enumerated the diſtinct commands of the creator at ſeveral periods, and has aſcribed to each diſtinct general effects produced in a ſucceſſion pointedly marked and defined. How far, and what natural means or phyſical laws of nature were employed to execute theſe ſeveral commands, will be the province of philoſophy to inveſtigate.

All

All philoſophers agree that there are certain primary laws which actuate all nature. Few in number, they are looked upon as primary, becauſe ſeemingly arbitrary, and underived from other natural cauſes. If this be, as I believe it is, the definition of primary, they muſt be conceived the firſt great agents of the divinity, and each of them dependent on his will alone. Whatever is not independent of all other cauſes ought to be rejected from this liſt. The philoſopher muſt duly examine what theſe laws are, and what their diſtinct properties. Let him then figure to himſelf a confuſed congeries of paſſive matter (the firſt as yet unconnected elements of organized bodies) without motion or impulſion of any kind. To this he will in idea apply theſe forces. Motion, abſtractedly conſidered, muſt have been the firſt means of organization. He will examine whether it belongs to all matter indiſtinctly, or to one or more ſpecies of matter. Whether impreſſed on the whole or part, motion is apparently regulated, not by one, but by ſeveral diſtinct laws. To it alone in fact all primary laws apply. Are all theſe laws of motion neceſſarily co-exiſtent, or can they be conceived at any period to have acted ſeparately? It is by their action and re-action, and by their mutually balancing each other, that they maintain the preſent order of things; they all appear neceſſary for the perfect completion and preſervation of the whole work: but were they all in fact requiſite for its firſt organization and arrangement? He will conſider whether, for the formation of the firſt elements into various and diſtinct ſubſtances, or for the aggregation of thoſe ſubſtances.

ſtances into larger bodies, the whole combination of theſe oppoſite forces ſhould have acted upon them ſimultaneouſly *ab initio*, or whether ſome of them might not have been impreſſed ſeparately and progreſſively as the proceſs of formation might require their aid. To elucidate the queſtions here offered to conſideration, it may not be improper to obſerve that proceſſes, ſomewhat analogous, are daily repeated in our cabinets. In the chemiſt's laboratory various ſubſtances, poſſeſſing different qualities or forces, are mixed to cauſe fermentation or diſſolution; and, when theſe have ſubſided or had their effect, others are added to precipitate or fix. In the firſt great laboratory of nature, might not the forces themſelves have been infuſed or impreſſed at different periods to execute ſimilar operations and changes? Having, without retroſpect to ſcriptural account, ſettled theſe points in his own mind, the philoſopher will then proceed to compare the reſults with the ſeveral parts of the narration of Moſes. He will find that the firſt elements of all material ſubſtances are there repreſented in one confuſed maſs, called the abyſs, without motion or animation; and that the preſent order of things was gradually and at diſtinct periods drawn from it. In the commencement of each of theſe periods, diſtinct commands are given by the creator, and diſtinct effects are produced before its cloſe. May he not conſider theſe commands as diſtinct laws impreſſed on nature, by whoſe operation theſe effects were generated and completed within the appointed time? In that idea he will apply to each command ſome one or more of thoſe well known

laws,

laws, and compare the effects which ſuch might have produced with the effects ſaid to be produced by that command: and in like manner progreſſively, until by their ſucceſſive application and reunion all material bodies are brought into that arrangement and order we now ſee exiſting. Theſe primary laws I think may be reduced to general and elective attraction—repulſion and reaction—gravity ſpecific or general—centripetal and centrifugal forces, nearly but not entirely balancing each other, ſo as to form ſpheroids inſtead of perfect globes, and to deſcribe ellipſes inſtead of circles—gravitation central and univerſal. If the progreſſive formation which Moſes deſcribes could be produced by the ſucceſſive application of theſe known means in ſome one order which may be imagined and deviſed, the greateſt poſſible weight will certainly be given to his account of the creation; and the real ſecret of nature, as far as human underſtanding can dive, will be nearly diſcovered. Whatever is beyond, that is, the cauſe of theſe fundamental laws, muſt be reſolved into the will of the Creator. The greateſt difficulty will be to aſcertain the order and application of theſe laws. It may probably require the united ſtudy and ſagacity of the greateſt philoſophers to bring the whole to perfect agreement. It will not be ſurpriſing if the firſt enquirers commit important miſtakes in this reſearch. Preciſion in ſuch high matters appertains not to one man. It will be ſufficient praiſe if, by indicating ſuch method, he creates a general perception that by repeated efforts the truth may at laſt be aſcertained.

This patient review of the gradual progreſs of creation indicated by Moſes, compared with the effects which might be in like circumſtances the reſult of the known means and forces exiſting in nature, I apprehend to be the only method of bringing this great queſtion to a fair and philoſophical trial. However unequal to the taſk, I have ventured to examine the Moſaical account on this plan, rather with a view to point it out to more able enquiry, than hoping to bring it to real perfection. In this difficult enterpriſe I am far from pretending to have always gueſſed aright; that would require an extent of ſagacity and knowledge far above my ſtrength. I may have erred and often erred, but I am apt to think I have at leaſt hit upon the road which may lead to truth. To aſcertain it, I moſt ardently wiſh that ſome more enlightened perſon, maſter of the higher ſciences, of chemiſtry and the whole circle of natural hiſtory founded on experiment, would take the trouble to purſue the ſame clue. It would, I firmly believe, lead to a general ſyſtem leſs imperfect than the ideal reveries by which philoſophy has hitherto been more embarraſſed than enlightened. In this arduous undertaking I depend much, Sir, on your indulgence. An approach, however diſtant, would ſtill be no inconſiderable point gained.

In the moment predeſtined by his wiſdom, the ſupreme, ſole, ſelf-exiſtent Being created by his all-efficient will the firſt principles of all things in the heavens and on the earth. To the aſſem-

blage of theſe as yet inert elements, Moſes, if not the inſpired writer, at leaſt the moſt antient recorder of any tradition on the creation, gives the name of abyſs: prophane authors have called it chaos. All ſeem to mean the ſame thing, the chemical laboratory of univerſal nature, the general depoſite of the embryos of all exiſting material ſubſtances. Of all theſe we can only examine ſuch as conſtitute this earth and what immediately ſurrounds it. We can only make conjectures from analogy on the materials of other planets. They may be infinitely various and peculiar to each. The compoſition of the ſun too, whoſe influence is ſo great on this our earth, is unknown to us. All we know is, that it either tranſmits light to us, or occaſions it to ſhine by acting upon it. The matter of light, called celeſtial becauſe the ſun and the ſuperior regions ſeem to be its ſource, and terreſtrial matter, ſo called becauſe it is the foundation of our earth and of all opaque planets, are the two principles of all things. Whether the element of light, and of fire, and heat, is diſtinct or identical, is yet and may long remain undetermined by philoſophers. I am apt to believe light to be the pure principle of fire, and of the electric matter of which theſe are modifications. The two primitive matters, the only as yet diſtinct ſubſtances, were confuſedly mixed in the abyſs. Both were yet inert and without activity. But ſoon the power of the Creator acting anew upon the abyſs gave motion to the infinitely ſubtle elements of light. From that moment, this fluid, penetrating the terreſtrial elements inert of themſelves, and uniting itſelf to them in various degrees,

communicated to them ſome portion of its motion: or, to ſpeak more properly, by mixing variouſly with lifeleſs matter modified its own motion. From thence a general fermentation prevailed in the abyſs, which by attrition produced heat. The whole was put into a ſtate of diſſolution or liquefaction; and it is under this aſpect that the ſacred author immediately after gives the name of waters to the abyſs. But the active matter inveloped and incumbered in paſſive or inert matter could not yet exerciſe that full liberty of motion which ſoon after gave it the faculty of ſhining: in conſequence, all was as yet darkneſs.

It was during this period, to which the ſacred writer aſſigns no definite duration, that the two firſt principles united to form, by their intimate connection in infinitely various proportions, new ſubſtances which may not improperly be called ſecondaries. Amongſt theſe may be ranged water, oils, ſulphurs, ſalts, acids, alkalis, and all the variety of airs. The various combinations of theſe ſecondary principles form perhaps the minuteſt particles of earthly matter which we are able to diſcover or appreciate. From theſe ſprang a great variety of groſſer ſubſtances. It was the effect produced by the two firſt laws impoſed on matter, relative or elective attraction (*a*) and repulſion. From the inſtant motion was impreſſed on the elements of light, this fluid, intimately mixed with the elements of earth, conſtitutes part of all bodies. This impregnation of inert matter by active matter in diverſe proportions gave to the firſt compoſed ſubſtances

ſubſtances various reciprocal tendencies towards each other, as far as certain points or degrees where repulſion commences. Theſe laws produced a ſtill greater variety of combinations. I conjecture that it is by the thus limited affinity which active matter diffuſed upon and in the earth preſerves with its purer ſuperior correſpondent, that motion is kept alive on our planet; by this our earth is warmed and vivified, and terreſtrial nature diſplays to our eyes all that variety of colours which ſo magnificently adorn it. Theſe two primary laws of attraction and repulſion, or of action and reaction, are known to us by their effects. But it is impoſſible for us to aſſign any other cauſe of their operations, or of their reciprocal limits, than the will of the Creator. All we can ſay of them is, that they are means adopted by the firſt great architect, which to us appear primary. Their viſible end is not only the firſt organization, but the re-production of all nature, and the preſervation of the whole work by their equilibrium.

As ſoon as terreſtrial matter was ſufficiently impregnated and ſaturated with celeſtial matter, God withdrew from the abyſs, and locally ſeparated, the ſuperabundance of this laſt. The element of light, diſengaged and depurated, acquired the full exerciſe of all that activity with which it had been endowed. It ſhone in all its native ſplendour. Hitherto night or darkneſs had overſhadowed all creation; but in the inſtant of this local ſeparation the univerſe was enlightened, and the firſt day (not of our ſun, which exiſted not as yet, but) of univerſal light pierced through ſpace.

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The retreat of the great body of ethereal vivid matter flackened the interior fermentation of the abyſs from which it had eſcaped. But acting upon it exteriorly with its whole collective force, it impreſſed on it a new motion of rotation on its axis; and, in conſequence of this rotation, communicated to all ſubſtances contained in it the centripetal and centrifugal forces. Theſe new motions, no doubt, gave riſe to further combinations of ſubſtances. But yet a greater degree of interior tranquillity prevailing in the abyſs, ſince the extraction of the great body of light, gave room to the ſubſtances already compoſed to cryſtallize, to coagulate and cement together in larger maſſes, accordingly as they were determined by their affinity or proximity; whilſt other particles more minute or more homogeneous were yet ſuſpended in the waters. Another effect of the rotation on the axis was to give to the abyſs (as ſince to all planets compoſed from thence) the figure of a ſpheroid flattened towards its poles. From thence alſo the ſucceſſion of night and day on all its parts.

The primitive ſubſtances having been prepared in the abyſs by the ſucceſſive application of theſe laws, the powerful hand of the Divinity divided the great terreſtrial maſs into ſeveral planets of various dimenſions, compoſed of ſubſtances probably differing in many points from each other: a difference ariſing, no doubt, from the various proportions of the two firſt principles. Perhaps this diviſion of the abyſs was more immediately produced by the exploſion occaſioned

occaſioned in it by the ſudden eſcape of the great body of light. However that may be, the planets were projected into the extent of ſpace prepared at the ſame time to receive them, each in its deſtined order. The forces of projection, proportioned to the reſpective denſities of theſe bodies, regulated the velocity of their ſeveral rotations on their axis. As I ſuſpect too, that the fluid of light has alſo an action in this motion, the great maſs of it re-united in one body muſt have given to theſe leſſer bodies a rotation far more accelerated than it could impreſs on the enormous volume of the abyſs of which they were only parts. The acceleration of this motion was probably a new ſource of combination and aggregation of the ſeveral ſubſtances contained in the yet liquid maſs of our earth, now become a diſtinct body, and of all the opaque planets.

The time was now at hand for conſolidating theſe planets, and our earth in particular, which from this moment becomes either as to itſelf or its relations the ſole and peculiar object of Moſes. As the ſame arrangements probably took place in all other opaque planets, we too ſhall confine ourſelves to it. He whoſe will is law impreſſed on all the terreſtrial ſubſtances of which it was compoſed the force of gravitation towards its centre. From that inſtant thoſe ſubſtances, already cryſtallized or coagulated in all proportions and in all forms, which hitherto floated confuſedly in its liquid circumference, were precipitated towards the centre with a velocity proportional to their ſpecific gravities and in double ratio of the

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ſquare of their reſpective diſtances. Theſe bodies, tending with unequal forces towards the ſame point, muſt have frequently broken and deranged each other. In the precipitate and fortuitous fall of ſuch various maſſes, of different ſhapes and unequal ſizes, great vacuities muſt have often been left between them. Water and air flowed into and filled up thoſe cavities. Theſe are the ſubterraneous caverns filled with waters, which Moſes on another occaſion calls the abyſſes of the earth. All authors, with him, ſuppoſe ſuch in the interior of our globe; and the little knowledge we have of it confirms it. I ſuſpect theſe cavities to have been much more capacious and more multiplied at the firſt formation than they are at preſent. The revolution which has ſince happened in our planet greatly diminiſhed their number and ſize, and cauſed the waters to burſt out from them again to cover the earth anew. But to return: Matter cryſtallized and coagulated in great maſſes conſtitutes the granite rocks, and all the varieties which may be claſſed in that genus. By their weight they muſt have been the firſt precipitated towards the centre, and muſt have generally formed the great baſis of the earth. Particles, however, of the ſame nature, pulverized in the ſhock and attrition of the larger maſſes, longer ſuſpended in the waters by their tenuity, ſometimes ſerved as gluten to large bodies, and at other times commenced new aggregations. Such as were the longeſt ſuſpended are the origin of ſands and clays, diſſeminated on the ſurface of the earth. Other ſubſtances, more homogeneous, of a lighter and finer texture, concrete in layers of ſmaller volume, were

were next precipitated to form on the exterior parts of the globe calcareous ſtrata or mountains, which may be termed, equally with the former, of primitive formation. Theſe are indifferently horizontal, inclined, or perpendicular to the ſurface. Other particles of the ſame kind, by their tenuity almoſt in equilibrium with the waters, were yet ſuſtained in them, to be depoſed more gradually in beds either horizontal or inclined according to the baſis on which they reſted. Theſe either filled up vacuities, or accumulated upon the firſt foundations already ſettled. All ſuch formations as can with real propriety be called ſecondary, belong to the deluge or to its conſequences. The new acquired ſolidity of the globe would naturally accelerate its rotation on its axis.

As the earth grew conſolidated towards the centre, thoſe waters which could not inſinuate themſelves into the interior crevices, expelled by the fall of ſolid bodies, were forced upwards to the ſurface. They continued to depoſe matters of divers kinds with which they were yet charged. Sands, clays, calcareous ſubſtances, gave riſe to new accumulations, homogeneous or heterogeneous, according to circumſtances or the accidental abundance of theſe ſubſtances in this or that point. Towards the ſurface of the globe, large maſſes, which had not been able to force a free paſſage lower, formed fortuitous excreſcences and conſiderable inequalities. The tendency of the globe itſelf to ſwell out towards the equator in con-

ſequence of its rotation carried many of them more particularly towards thoſe parts, and the higheſt hills would be found there after the firſt formation. Other multiplied accidents gave riſe to them on every part of the circumference. Between theſe ſalient parts, level or inclined plains and ſometimes deep hollows were formed; theſe laſt became the beds of the ſeas. I am inclined to think that theſe ſeas were more multiplied, though of far leſs extent, on the primitive earth than they are at preſent. The deluge, I am perſuaded, operated the moſt important changes in this reſpect. The remaining waters which could not find place in the ſubterraneous caverns, of courſe precipitated themſelves into theſe receptacles, and left the more elevated parts dry. The ſeparation of earth and waters took place on the exterior ſurface of the earth; the dry land appeared, and the ſeas found their beds. God then created the ſeeds of all the plants which cover and embelliſh the earth or grow in the waters, and which were to be the aliment and food of living creatures; and he confided each to the ſoil moſt congenial to its future growth.

But to expand theſe ſeeds, to give new life to all nature, a more powerful agent was yet neceſſary. Whether by the ſole act of his will, or by the ſubordinate action of laws already impreſſed on matter, God ſeparated and divided into ſeveral portions the great maſs of light, deſtined to compoſe innumerable ſuns, which might henceforward more directly animate and vivify a ſtill greater num-

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ber of planets already formed in the extent of ſpace. At his voice theſe new globes, full of the moſt active matter, came and occupied each the centre of the ſyſtem aſſigned to it. All the wheels of the great machine were now mounted and put in motion, and at that moment univerſal reciprocal gravitation as it now prevails was eſtabliſhed amongſt all thoſe great bodies. Till deranged or altered by the ſame ſuperior power, it will ever animate and preſerve the order once eſtabliſhed. The completion of the divers ſyſtems by the aſſignation of peculiar centres accelerated probably the rotation of each planet on its own axis, further conſolidated its materials, and determined all to deſcribe concentrical orbits round their particular ſun and centre. There is probably a general centre; but to what ſyſtem it belongs appertains not to us to know. A part of the air, fire, and water, and of many other volatile ſubſtances, were now rarefied to form the atmoſphere of each planet by the action of its ruling ſun.

To confine ourſelves to our own planet:—The Creator next cauſed the waters to produce every kind of fiſh that ſwims, and every kind of bird that flies in the air; and the earth to produce every kind of animal and reptile that walks or crawls on its ſurface; and communicated to them a more perfect animation. Our planet waited only for him whom he created the ſixth day to be its ſovereign. The abode which he had prepared for him, furniſhed and adorned with

magnificence, and already peopled by an infinity of inferior living beings, was ready to receive the firſt man and the numerous progeny he was to procreate from the woman whom he ſoon after gave him to be the crown and completion of all his other gifts.

I have already enumerated the primary laws of nature, to the ſucceſſion of which I have in this account attributed the gradual formation and completion of the univerſe. They may all perhaps be reduced to motion—attraction and repulſion—gravitation to a centre. The firſt impulſion of motion muſt have been given by the hand of the Creator. He endowed with eſſential activity that portion of matter which is alone capable of perpetuating it. To all theſe forces diſtinct and peculiar laws belong, which muſt finally be reſolved into the will of the Almighty; but to me it ſhould ſeem that he has made them all dependent on the various combinations of active with inert matter. Two circumſtances occur which ſeem to demand a further diſcuſſion, and perhaps to be accounted for by ſome one of the above-mentioned primary laws, viz. the forces by which firſt the terreſtrial maſs, and afterwards the great body of light, were divided and ſeparated into diſtinct ſpheres, and theſe at the ſame time projected to various diſtances in ſpace.

As many perſons may think that God, even in this moment of the plenary exertion of his power, employed, wherever poſſible, the agency

agency of laws already eſtabliſhed, and that, in the attempt to explain nature, recourſe to the direct action of the Deity is only to be had when other means ſeem inadequate to the effect, I ſhall venture to hazard a few conjectures on the poſſibly more immediate cauſes of the diviſion of the terreſtrial abyſs, and of the ſubſequent diviſion into ſeveral parts of the great body of light, which, according to Moſes, happened at diſtinct periods of the creation. It ſhould ſeem, indeed, that the firſt extraction of light from darkneſs, or the local ſeparation of the great body of light from the terreſtrial maſs, muſt be attributed to the ſole will of the Creator. But the diviſion of the latter into ſeveral portions, and their projection into ſpace, may perhaps be looked upon as its conſequence, and accounted for by laws which yet ſeem to obtain in nature, and were then no doubt already impreſſed. The diviſion of terreſtrial matter into various planets was perhaps effected by the exploſion which the ſudden eſcape of the great body of light occaſioned in the abyſs. This exploſion may be aſſimilated to, and accounted for in the ſame manner as, the exploſion which takes place in the Leyden bottle when the electric matter diſengages itſelf from it, or may be compared to the exploſion cauſed by the fiery fluid eſcaping from gunpowder as ſoon as it is in contact with exterior fire. This great exploſion of the abyſs diſperſed to various diſtances its ſeveral particles, from whence the ſeveral planets were formed by the attraction, within certain diſtances, of ſmaller to larger particles of matter. But this force of projection was inſtantly moderated by the gradually

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overcoming attraction of the immenſe body of light; and the planets, as ſoon as formed, were arreſted at ſeveral diſtances in their progreſs, and forced to turn round this great centre. So much in explanation of the diviſion of the great terreſtrial maſs. Let us now turn to the poſſibly more immediate cauſe of the diviſion of the great body of light, which did not take place till the fourth day.

On the third day of the creation, the various ſubſtances of which the planets are compoſed received the law of gravitation towards their reſpective centres. The ſpecific denſity in proportion to the diameters of theſe planets was neceſſarily much increaſed by their conſolidation. The action and re-action between them and the luminous body became ſtronger: from their increaſed denſity the planets fell nearer to this laſt; and thence the near preſſion of this multitude of denſer bodies became at laſt preponderant, and cauſed the globe of light to burſt and fly off in all directions. The great affinity of its parts ſoon rallied the ſcattered elements in various points, and formed them into ſo many ſuns. Projected with prodigious force into ſpace, each of theſe globes drew after it in its courſe ſuch planets as lay in its way: ſoon, however, the united attraction of theſe very bodies which it had carried off in its ſuite producing its full effect on it retarded and finally ſtopped the force of its projection. Limited and repelled alſo by the ſphere of activity of other ſimilar bodies forming at the ſame time in its neighbourhood, this ſun became fixed, preſerving only of its firſt

impulſion internal motion and rotation on its axis. In other reſpects each ſun became ſtationary and centre of its particular ſyſtem. It is from thence that from that moment, by its attraction and repulſion, or by the conſtant flux and reflux of that vivid matter of which it is the ſource and centre, each of theſe ſuns regulates the courſes and revolutions of the planets ſubjected to its rule; from thence each maintains the equilibrium and balance with all the other luminous bodies and their divers ſyſtems which ſurround it in the whole extent of ſpace. Such or ſome ſuch explanation may perhaps, without conſtant recurrence to new exertions of the Divine power, account for the diviſion and projection of the terreſtrial abyſs and of the great body of light, by the application of laws which ſeem to have been eſtabliſhed immediately before the diſtinct epochs aſſigned to theſe events by Moſes.

I have now, Sir, laid before you the explication which I think may be given of the Moſaical narration, and the ideas which I have framed to myſelf from thence of the work of the creation. It appears to me, that the proceſs I have here deſcribed may be fairly deduced from the plain meaning of that text maturely weighed; and, as far as I have any knowledge of nature, that it is in no part incompatible with her known and certain laws. In particular points I may be miſtaken; but I am perſuaded a proper ſucceſſive application of thoſe laws to the effects deſcribed by the ſacred author would both be a full explanation of him, and the ſureſt clue to the

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diſcovery of the moſt important truths. Yet I am ſtill aware that, however probable any explication of this chapter of Geneſis given or to be given may be, it will by ſome be peremptorily rejected upon the old plea that, its language being adapted to the intelligence, or, in other words, to the vulgar prejudices of an ignorant people, we are not there to look for that exactneſs and preciſion required in philoſophical diſcuſſions where that ſcience was never meant to be inculcated. But I will venture to aſſert that the veracity of its author cannot be ſcreened under the ſubterfuge of condeſcenſion to vulgar errors. He announces facts as poſitive truths: theſe are not alterable in compliance with language or opinions: if they are true, they may as yet be unreſolved, but cannot be irreſolvable by the real laws of nature. Let us, by examining more minutely the text, ſee how far the accuſation of adopting without ſcruple erroneous modes of expreſſion is founded in truth. It will be at the ſame time a further illuſtration of the foregoing doctrine, and of its conformity to the Moſaical account. Where truth or the honour of God is not concerned, the falſe notions of nature which might have been entertained by the Jews are not indeed therein meant to be ſcientifically combated: but does Moſes in any part of it expreſsly confirm the miſtaken ideas of ignorance? Is he not on the contrary often in direct oppoſition with vulgar prejudices? Theſe two points will beſt be reſolved by following the plain and literal words of Geneſis according to the moſt uſual Engliſh tranſlation.

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"In the beginning God created the heaven and the earth." Both are hereafter to be brought into form and order, and therefore theſe words muſt mean the rude elements of both. With reſpect to the terreſtrial part they certainly do ſo mean; for immediately after follows:

"And the earth was without form, and void." Ovid, not improperly perhaps, expreſſes it—"rudis indigeſtaque moles." The Latin word "vacua" in the Vulgate, and the Engliſh word "void," would perhaps, as ſome interpreters and tranſlations expreſs it, be better tranſlated by "inert." "And darkneſs was upon the face of the deep." The Vulgate, I think, more properly calls it "abyſs." The elements of light were either yet uncreated, or had not received the faculty of ſhining. "And the ſpirit of God moved upon the face of the waters." Other interpreters tranſlate it "the breath of God ſtirred up or agitated the waters." The ſpirit or breath of God (*b*), metaphorically taken for his power, is here adopted with peculiar propriety to expreſs the firſt impreſſion of motion, which the whole ſentence ſeems to imply. "Waters" is here made uſe of for the firſt time, no doubt to ſhew that the abyſs then became liquid.

"And God ſaid, Let there be light: and there was light." The light was now either firſt created, or more probably, ſince the elements both of the earth and of the heavens were already in exiſtence, firſt received the faculty of ſhining. Inflammable matter, compoſed of a

large proportion of its elements, then only kindles into viſible fire and flame when, more diſengaged from groſſer particles, it has acquired a new acceleration of motion. Light was now firſt enabled to exert that full and free activity with which it was already endued by the breath of God, when depurated at this command from lifeleſs matter by local ſeparation, which we find effected at the ſame inſtant.

"And God divided (*c*) the light from the darkneſs. And God called the light day, and the darkneſs he called night: and the evening and the morning were the firſt day." The real and local ſeparation of thoſe elements that have the faculty of ſhining from thoſe that are of themſelves dark is here pointedly expreſſed; and by that very ſeparation it may be fairly implied that light then ſhone out for the firſt time. Here it muſt be obſerved that the text is in oppoſition with common ideas. The matter of light, though not yet formed into ſuns or ſtars, is ſeparated from dark matter. A night and a day are eſtabliſhed, whilſt, according to the ſame author, the ſun was not yet made, or at leaſt did not ſhine upon the earth. According to vulgar and even philoſophical opinions, the ſun is either the ſource or cauſe of light to the earth. It either did not then exiſt or did not ſhine upon it, and yet a night and day are boldly aſſerted. Some philoſophers, unwilling to ſuppoſe that the great and glorious body of the ſun ſhould not have a more early date than this ſpot of earth (an opinion, if the ſun was at any time

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created, unfounded on any valid reaſon theological or philoſophical), have indeed aſſerted that the ſun already exiſted, though obſcured by a thick atmoſphere. Such an obſcure light could not have been ſaid to be good, that is to ſay, perfect in its kind, which is certainly the meaning of "good" throughout this chapter. But if, as both the preſent literal words and the ſequel imply, not the ſun and ſtars in particular, but the great maſs of light from whence they were afterwards made, was then locally ſeparated from the waters, and by its influence cauſed the latter to turn upon its axis, then a night and day (though not ours, which we ſhall find hereafter to make a ſecond eſtabliſhment) are eaſily conceived to have perfectly taken place on the ſurface of the liquid abyſs.

"And God ſaid, Let there be a firmament in the midſt of the waters: and let it divide the waters from the waters. And God made the firmament; and divided the waters which were under the firmament from the waters which were above the firmament; and it was ſo. And God called the firmament heaven: and the evening and the morning were the ſecond day." The whole of this is unintelligible to vulgar underſtandings, and ſeems to have no leſs puzzled the learned. Let us firſt premiſe that the Latin word "firmamentum" in the Vulgate, which the Engliſh verſion has copied, a tranſlation founded perhaps on the prejudices of the times, is not to be imputed to Moſes as favouring them. That word certainly conveys to the vulgar the idea of a ſolid maſs: but the Hebrew word made uſe of

literally means expanſe or extenſion ; and ſurely this is as philoſophical a definition as can be given of the heavens, or of that immenſe ſpace we ſee above us in which the heavenly bodies are placed. By "waters," as we have already ſeen, is meant the whole liquid maſs of the terreſtrial abyſs ; and it is of its ſeparation that it is here queſtion, and not of the ſeparation of the ſeas from dry land, which is a ſubſequent operation reſerved for the third day. The literal explanation will then be, that God then divided the great fluid maſs, and placed ſeveral parts of it in local ſeparation above the fluid globe of this earth in the expanſe which he prepared for them. In other words, he then from the great fluid maſs formed and locally ſeparated from each other the earth and all the other planets compoſed of it, all of which continued as yet in a fluid ſtate, and are therefore called "waters."

"And God ſaid, Let the waters under the heaven be gathered together unto one place, and let the dry land appear: and it was ſo." This is a diſtinct operation, and the work of the third day, and thence evidently ſhews it to have been of a quite different nature from the work of the preceding day. A ſimilar operation no doubt took place on all the other opaque planets ; but Moſes confines himſelf entirely to this globe, as its diſtribution is the only one intereſting to man.

"And God ſaid, Let there be lights in the firmament of the heaven,

to divide the day from the night. And let them be for ſigns, and for ſeaſons, and for days, and for years. And let them be for lights in the firmament of the heaven, to give light upon the earth: and it was ſo. And God made two great lights (*d*); the greater light to rule the day, and the leſſer light to rule the night. He made the ſtars alſo. And God ſet them in the firmament of the heaven to give light upon the earth; and to rule over the day and over the night, and to divide the light from the darkneſs: and God ſaw that it was good."

Let us obſerve that God is here ſaid not only to have then firſt formed, but to have then firſt placed theſe bodies, amongſt which the ſtars are included, in the heavens. This is indeed contrary to the opinion of many philoſophers, but is eaſily explained if we ſuppoſe the great body of light to have been then firſt divided into ſeveral bodies. Let us alſo take notice that here is a ſecond diviſion of night and day, and here for the firſt time the ſun and moon are ſaid to regulate them; that is to ſay, our preſent nights and days, which are thereby literally diſcriminated from the firſt days and nights, which belonged not to our earth and our ſun, but to the abyſs and the firſt created body of light, as ſoon as locally ſeparated towards the end of the firſt period of creation. Though the author only mentions the utility of theſe bodies to the earth as luminaries and ſigns, he does not exclude other purpoſes for which they may be deſigned. Theſe are the ſecrets of the Moſt High, which

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man may reaſon upon but cannot penetrate. In like manner, though the ſun and moon are diſtinguiſhed as the two great luminaries, (N. B. it is not ſaid "bodies") yet he enters not into the diſcuſſion whether either of them is larger or leſs than the ſtars, which appear ſo much leſs, and whoſe formation is ſimply mentioned as happening at the ſame time. As luminaries to the earth, the ſun is ſaid to be the largeſt, and the moon the next, though leſs; and in that light they certainly are ſo. The real comparative magnitude of theſe bodies and the ſtars, and the diſcrimination of the ſun, being a luminous body, from the moon, an opaque reflecting body, he was not ordered to inform us of. Theſe too are objects left to the diſquiſition of man. It is but lately that the ſun was found to be the ſtationary body round which the earth and planets depending upon it move; yet, without offence to ſcience, even philoſophers talk familiarly of the riſing and ſetting of the ſun. But in all this chapter, where nothing but exact truths were to be delivered, Moſes ſays not a word that may either favour the old or new opinion. In the poetical parts of ſcripture, the apparent motion of the ſun is often alluded to: it is yet, and ever will be, the language of poetry and of common converſation; but here nothing is ſaid of it. The ſun is ſimply mentioned to divide light from darkneſs, and to regulate the day on earth. To declare his formation to be the work, and his functions to be the appointment of God, to ſhew his particular utility to man, was the office of the ſacred legiſlator. Beyond that, his charge extended not.

Upon the whole it will appear, that though Moſes, confining himſelf barely to ſimple facts, diſcuſſes no philoſophical queſtions, yet, where truth and theſe require it, he heſitates not to run counter to received prejudices, or to more learned opinions. On the other hand, not a ſingle word can be ſaid to be in contradiction to any certain rule or fact in nature, however they may be at variance with particular hypothetical ſyſtems.

Having now, I hope ſatisfactorily, ſhewn the impropriety of rejecting every attempt to explain the Moſaical account, under the general pretence of its not affording a fair and ſufficient groundwork for philoſophical enquiry, I ſhall next advert to general or particular objections which may be made againſt the explication I have adopted.

As I have given it, not as a certainty, but as my opinion founded upon the words of Moſes, that the beginning he ſpeaks of was the real era of the firſt exiſtence of this viſible material world, I muſt obſerve that it is pretended by many, that it would be abſurd and even impious to ſuppoſe that the power and goodneſs of God were never exerted before the appearance of this world of yeſterday.

I muſt firſt premiſe, that it is not in my thoughts to reſtrict to this very limited date the creation of ſpiritual beings. The knowledge of their exiſtence muſt depend on revelation. The ſame au-

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thor gives us clearly to underſtand, that many ſuch beings preceded the creation of man. How many thouſands or how many millions of years before, or whether the creation of all theſe took place at one or at ſeveral epochs, we are not told; nor does it belong to us to know. But, however diſtant, they too, if they were created, muſt have had a beginning; and that beginning muſt have had an anteriority in the depth of eternity.

But it is not to ſuch creations that this argument is directed. By it, it ſhould ſeem to be inſinuated that the act of creation, even of material bodies, is fitting, or, what is in this caſe the ſame thing, neceſſary to the Divinity, and to the attributes which belong to it: but if the exiſtence of any other beings whatever is neceſſary to it, they are then co-exiſtent and co-eternal with it—they are God. If there are ſpiritual beings, as is generally believed, as well as material ones, of whoſe exiſtence we are certain, all are neceſſary to him and a neceſſary part of his eſſence. God would be a compoſition of the one and the other; which is incompatible with the unity of his eſſence: or he would be matter only. In either caſe a part of the Deity would be inert and without intelligence. There would be in reality no God: and thoſe works which diſcloſe the moſt perfect combinations would be without an intelligent architect. By endeavouring to fathom beyond his depth, man may eaſily confound and inextricably puzzle his limited underſtanding: but this abſurdity will always be manifeſt to all who do not purpoſely ſeek to blind themſelves.

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If exterior production is a neceſſary and eſſential quality of the Divinity without which it would be leſs, or leſs perfect; it is not one, or ſeveral acts of production, that could ſatisfy it. Productions from it would have been inceſſant from all eternity paſt, and muſt be inceſſant for an eternity to come. Every inſtant would be productive of new worlds or new beings. The perpetual motion of matter ſeems the pretence for this argument. Matter, indeed, on this earth is perpetually new-modified; it is conſtantly changing its forms. It is a law of preſervation and reproduction. It has on this earth a conſtant rotation; but its limits are fixed, beyond which it cannot ſwerve. The earth itſelf in its totality, and all the ſubſtances it contains, are unalterable: we ſee neither new worlds nor new beings ariſe. The ſame beings, without eſſential changes, are inceſſantly reproduced on its ſurface. Nothing is new under the ſun, who himſelf ſuffers no change.

If matter is not co-exiſtent and co-eternal with the Deity; if God created it without neceſſity at the moment which beſt pleaſed him; it imports little whether it had its firſt exiſtence ſeven thouſand or ſeven millions of years ago. The one and the other are equally points in eternity. If matter might have been created or not created, annihilated, or preſerved, with perfect indifference to the power or grandeur of the Deity, it belongs not to us to fix to the Creator the times of thus manifeſting his glory. Man, who cannot diſſemble to himſelf the narrow bounds of his own intelligence, ſhould adore

in ſilence. If God reveals it not, it is utterly impoſſible to him to aſſign the moment; but, if there was a ſuſpicion that his goodneſs had deigned to intimate it, I will dare to ſay, that even ſuch intimation, though not poſitive, ought to have more weight than all our ideas of fitneſs. Why ſhould the earth have been preexiſtent under another form? Why ſhould the ſun have been made before the earth? Is it a more difficult work to the Almighty to create abſolutely, than to faſhion and mould anew? Are we not here meaſuring the powers of the Godhead by thoſe of man? Is the ſun, becauſe of greater magnitude and of a nature which appears to us more noble than that we tread under our feet, a more complicated work? Did it require a longer time to be brought to perfection?—I have already demonſtrated that the date of the exiſtence of creatures adds or diminiſhes nothing in the grandeur of the Creator. In vain will it be ſaid that the long duration of exiſtence, and the frequent renewal of the ſun, the ſtars, of the earth and planets, give a more becoming idea of the majeſty of God. Whatever he creates will remain perfect as long as it pleaſes him, and wants no repairs or renovations. I own, in my conception, nothing more magnificent than to imagine all this vaſt viſible univerſe drawn from nothing, at one and the ſame time, at his voice: all theſe globes whoſe magnitude and whoſe numbers aſtoniſh us, ſpringing forth at once at his command to take their deſtined places, to compoſe divers ſyſtems ruled by invariable laws which there retain them, and to form by their union and reciprocal

connection one great whole, whoſe perfect harmony reaſon ſhews us, but whoſe limits the moſt exalted imagination cannot meaſure.

Again, it is ſaid to be an abſurd and grovelling idea to imagine that the majeſtic body of the ſun *ſhould not* have been formed till the fourth day, or that he ſhould have been placed in the heavens merely to illuminate this little ſpot. To be juſt, however, theſe objectors ſhould join to the earth all the other planets of this ſyſtem; and I think that luminary can ſcarcely be preſumed not to have been formed for the utility of theſe and the earth conjointly. Though not ſole proprietor, our globe will ſurely be allowed to have ſome little claim in the ſervices he renders to all. The moon confeſſedly belongs more particularly to the earth, as their ſatellites to Jupiter and Saturn; but even this does not exclude the moon from ſerving other purpoſes, or being uſeful to other creatures beſides man. Reaſon and a juſt idea of the grandeur of the deſigns of the ſovereign architect may tell us, that it is not probable that thoſe other immenſe planets, which the ſun too illumines and directs, and whoſe ſituation or magnitude ſeems to give them real ſuperiority over this our globe, ſhould have been created merely to ſerve as lamps to direct the traveller or the huſbandman on this ſpot—purpoſes which might have been attained with leſs expence of matter: but the miſſion of Moſes was ſolely to declare to man, what more nearly concerned him, the benefits which in the comprehenſive wiſdom of the Creator he adventitiouſly received from theſe great bo-

dies, though formed to anſwer at the ſame time other and ſtill greater purpoſes. If what he does ſay is true, we are not to cavil with him, if beyond the limits of his avowed ſubject he tells not all that is ſo. Not all the ſciences of Egypt could have taught him the facts he does diſcloſe. Here is no diſplay of ſcience. He is either the plain reciter of the moſt authentic traditions handed down to him through a ſmall number of long-lived generations which he afterwards enumerates, or he is the meſſenger of God to inſtruct his people in thoſe truths only which were neceſſary to them to guide their religious principles or their conduct through life.

To thoſe who with me give the higheſt credit to Moſes, though they may differ from me in their interpretation of him, I will obſerve, that although his province was ſo limited that he may have left truths of curioſity behind, yet his words, in their natural acceptation, ſeem to fix to that moment the abſolute creation and not the renewal of the earth, and that not only the earth was then firſt created, but the ſun, moon, and ſtars alſo. After having enumerated the ſeparate works of the ſix days or periods of creation, the author ſays: "Thus the heavens and the earth were finiſhed, and all the hoſt of them. And on the ſeventh day God ended his work which he had made (*e*): and he reſted on the ſeventh day from all his works which he had made. And God bleſſed the ſeventh day, and ſanctified it: becauſe that in it he had reſted from all his work, which God created and made. Theſe are the generations

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of the heavens and of the earth, when they were created; in the day that the Lord made the earth and the heavens." No language can ſurely expreſs more clearly or explicitly, that within the aforementioned periods the earth and the heavens with all their hoſt, by which we know in the language of the eaſt was meant the ſun, moon, planets, and ſtars, were then firſt generated and completed.

A very great number of philoſophers peremptorily aſſert, that the who ſtratification of this earth, the aggregations of variegated ſubſtances, the cryſtallization and concretion of granitous bodies, and ſtill more the ſedimental depoſition in beds of calcareous ſubſtances, evidently require for their formation a ſlow ſucceſſion of ages, inſtead of that limited time which ſeems to be allowed in Geneſis. Hence they infer that what they call the carcaſe of this globe, which had been wrecked and diſlocated before the time the ſacred author fixes for its re-appearance under its preſent form, had already gone through not one but ſeveral revolutions in an infinite ſucceſſion of ages anterior to its preſent mode of exiſtence. Others, who think it neceſſary to adhere ſtrictly to what they deem the letter of ſcripture, will perhaps be no leſs offended at the extenſion I have given to ſome of thoſe periods of the creation which Moſes indiſtinctly calls days, and which they therefore think are common days of 24 hours. But does Moſes really reſtrict them to theſe? Have they an abſolute coincidence in duration with our ſolar days, or only a relative conformity, as equally founded on a revolution of light?

If the former, they could only be ſo called by anticipation, as the ſame author, as I have already obſerved, poſitively ſays that that ſun was only formed and placed in the heavens on the fourth day, and takes notice of his then appointed functions to illuminate the earth and to regulate its days. Even if that body had exiſted before in its preſent form, it confeſſedly had not till then ſhone upon the earth, and therefore could not be the regulator of its days, to which it was then for the firſt time appointed. To thoſe who ſeem to demand a ſucceſſion of many ages for the formation of this earth and of its various ſubſtances, I will anſwer—Who ſhall meaſure the days of the Eternal, before whom a thouſand years are as one day? Who ſhall determine time to Him, whoſe will is equally ſufficient to combine the formation of a thouſand worlds in the twinkling of an eye as in hundreds of ages? The will of man puts into motion every part of his body, or ſuch part only as he thinks proper: it ſets into action, without even his knowledge, a variety of liquors and of complicated ſprings, a multiplicity of muſcles, nerves, and fibres, which he cannot count; or it confines this activity to ſuch only as are neceſſary to accompliſh its preſent purpoſe. The will of man arbitrarily directs, without his being himſelf able to follow the rapidity of his determination, the time he wiſhes to employ in the execution of theſe motions; and ſhall we dare to reſtrict to ſuch ſlow ſucceſſion as may ſuit our ideas the operations of that will which is itſelf complete action? The actual forces of nature operate with a rapidity which the eye cannot follow. In chemical experiments

experiments we daily ſee thoſe forces, which now ſubſiſt only for its preſervation and reproduction, put in motion by man, compound or decompound the conſtituent parts of various ſubſtances, and again depoſe them with admirable regularity and preciſion in the ſpace of a few hours: and ſhall we ſuppoſe that the ſame forces employed for the firſt combination, or, in the idea of theſe philoſophers, for the renewal of this world, would require ages for the completion of the work? But let us leave to preſumptuous man thoſe little ideas which ſuit the weakneſs of his conception. Though he cannot, nor ever will be able to define or comprehend that action which he himſelf exerciſes by his will at every inſtant, let us yield all to the depths of his views, to the juſtneſs and preciſion of that balance whch he dares to hold up to weigh the powers of the Almighty.

Concurrently with all ancient coſmogonies, Geneſis informs us that it pleaſed the Creator, for reaſons beſt known to him, to draw forth the univerſe into its preſent order, ſucceſſively and gradually, at diſtinct periods which Moſes calls days. Let us examine whether thoſe days were neceſſarily coincident in duration with our ſolar days, or whether, not only without offending but even in ſtrictly following the meaning of the text, the three firſt of theſe (for the conſolation of thoſe who demand a longer time for the combination of matter) may not with propriety be ſuppoſed to have had a much longer duration, though probably not of ages as ſome of theſe pre-

tend. Moſes ſays, that night or darkneſs covered the abyſs till ſuch time as God by his ſpecial command drew forth the light to illuminate it, by a ſeparation of thoſe elements to which the property of ſhining was given from thoſe to which that quality was denied. This clearly ſeems to be underſtood of what he calls the heavens and the earth, or their elements, which, in the preceding ſentence, he tells us were already created. The cloſe of this day, formed by the firſt rotation of the abyſs round its centre, finiſhed the firſt period of creation; but to the preceding night or darkneſs no definite duration is given. Why not refer the combination and aggregation of various ſubſtances, for whoſe confection philoſophers are ſo much in pain to find time, to this abſolutely and neceſſarily undetermined ſpace? During this night, as the author tells us, "the breath of God ſtirred up the deep;" or, to make uſe of the interpretation of Milton, "the ſpirit of God, dove-like, ſat brooding on the vaſt abyſs and made it pregnant." If a longer time is wanted for the execution of that ſupreme will which can produce without time or effort, years or even ages may be taken in this indefinite ſpace for the gradual cryſtallization or concretion of the ſeveral ſubſtances of which this earth is compoſed. It was not, in my idea, until the combination of all terreſtrial ſubſtances was completed by the active co-operation of ethereal matter, that the great body of this laſt, no longer neceſſary for that purpoſe, was drawn from out the abyſs, and, thus diſengaged and depurated, acquired that acceleration of motion which cauſed it to ſhine forth in native ſplendor.

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It was this ſeparation which produced this firſt day, which apparently belongs to the abyſs and univerſal light, and not to our little earth and to its ſun, which are only ſmall portions of them; the eſtabliſhment of our nights and days is actually referred to a diſtinct and yet diſtant period. It was on this firſt ſeparation of light from darkneſs, that the abyſs received a motion of rotation on its axis, which produced the ſucceſſive variation of night and day on its ſeveral parts. As the abyſs as yet contained not only the whole ſubſtance of this our little earth, but alſo that of all opaque planets diſſeminated through this and every other ſyſtem which fill ſpace, the revolution of this enormous globe upon itſelf, deſcribing a larger circle, muſt neceſſarily have taken a proportionably longer time than is required by our earth. To this immenſe maſs of matter, containing the ſubſtance of comets as well as planets, we may reaſonably at a medium attribute a denſity at leaſt equal to that of our earth; and therefore the difference of the duration of its rotation round its own axis would be to the time of the diurnal revolution of our earth in proportion to the difference of their reſpective diameters. We may then not only believe, but analogy will lead us to conclude, that this firſt day of creation cannot be meaſured by our ſolar days, and that it may poſſibly be divided by years inſtead of hours.

Reaſons no leſs ſtrong authoriſe us to believe, that twenty-four hours ſhould not limit the ſecond day, when the opaque planets

were drawn out of the great terreſtrial body to take their aſſigned places, and to receive a rotation proportionable to the force of their projection and their reſpective maſſes. Neither ſhould the third day, which equally preceded the placing of the ſun and ſtars in the heavens, be thus limited. Theſe days belong to the univerſe, to all ſyſtems, and not to one only. There is no more reaſon to reſtrict them to the duration of the rotation of the earth than to that of any other planet, ſhorter or longer. Who can aſcertain that the velocity of rotation of the planets was then the ſame as at preſent? Our ſun, and the ſtars which compoſe the heavenly hoſt, had not yet received the order to take their ſtations in the centre of their reſpective ſyſtems, and to fix by their more immediate influence the particular rotation of each of their planets. The influence of gravitation towards a nearer centre would certainly have an effect upon the whole maſs, as well as upon the conſtituent parts of each planet.

The ſacred writer fixes the fourth day for the time of the ſun's taking his preſent ſtation in the centre of our ſyſtem, from whence he firſt began to regulate the days of his ſubordinate planets, each differing in duration from the other. This then is the firſt of our whole ſyſtem, though various on each of its planets. It is the firſt that can be appropriated to the earth: the firſt which on this globe, and on this globe only, is meaſured by the preciſe time which it takes to complete its diurnal rotation, and which is divided to us into night and day by the ſucceſſion of the ſolar light on all its parts.

The preceding days, analogous but not coincident with ours, belonged to a different order of things. They were properly, however, to be ſo termed, becauſe they were the real days of the univerſe and of univerſal light. Every particular planet has a like ſucceſſion, which we with propriety call its day: but in none of them is the duration the ſame as on this earth.

One more objection it will be proper to take notice of. Mr. de Buffon, who pretends that the planets are portions, cooled by ſlow degrees, of the ignited vitreous fluid of the ſun, maintains that all terreſtrial matter could never have been diſſolved in water, becauſe ſeveral ſubſtances are not by our chemiſtry diſſoluble in it. This argument may be retorted againſt him, becauſe there are likewiſe many which are not fuſible by fire. But this ſame chemiſtry teaches us, that ſeveral ſubſtances, which by themſelves are refractory in fire or indiſſoluble in water, yet become eaſily fuſible or diſſoluble by the addition of a third ſubſtance. Conſequently, in the great recipient of univerſal nature, where every force and every kind of ſubſtance were united and mixed, it is eaſy to imagine that by their combined powers all terreſtrial matter may have been reduced into a watery fluid ſtate. Chemiſtry is certainly much improved and improving, but it never will be able to dive into all the powers of nature. A variety of ſubſtances and liquors is by the digeſtion of man and animals diſſolved and tranſmuted into blood, chyle, bile, and all the ſeveral fleſhy parts; at proper times, milk is from the

ſame alſo generated in the female ſex alone: in infancy part is diverted to the gradual increaſe of bones to a fixed degree and term, when this part of the operation ceaſes:—proceſſes theſe which all the art of man will never be able to imitate. Earth, water, air, ſulphurs, ſalts, are elaborated by light and heat, through the fibres of trees and plants, to produce an infinite variety of barks, woods, leaves, flowers, and fruits, of different textures, hues, taſtes, and flavours, each according to the ſeeds or roots from which they ſpring. Even from the ſame roots their products are altered by budding or grafting: ſtems, leaves, flowers, and fruits, are formed and developed in a few days: all theſe proceſſes the philoſopher daily obſerves; but all his ſagacity will never be able to deſcry in what manner from the ſame apparent principles this variety, conſtant in each kind, is produced; and ſhall he dare to fix times and bounds to the Almighty in the very act of exerting his creative powers? In ſpite of his preſumption, man ſhall never add one cubit to his height, nor one hair to his head, nor ſhall he ever penetrate beyond a certain depth into the ſecret laws then inſtituted for the organization, preſervation, and reproduction of all nature. In the humble inveſtigation of thoſe wonders which may exalt his ideas of the ſupreme wiſdom, or expand his ſentiments of gratitude for the benefits of the creator; in the purſuit of diſcoveries uſeful to his welfare, the labours of man will be rewarded with gradual ſucceſs; but whenever he ſhall attempt to paſs the limits preſcribed to his province and underſtanding, doubt, error, and confuſion, will ever be the final reſult of his temerity.

NOTES

NOTES AND ILLUSTRATIONS

TO

LETTER VII.

(a) Page 484.

THIS attraction is called elective by Mr. Whitehurſt, in contradiſtinction to the attraction or gravitation towards a centre. By this elective or relative attraction, ſubſtances compoſed of various conſtituent parts, but more or leſs connected by affinities, were coagulated, concreted, or cryſtallized into maſſes of different dimenſions. It was neceſſary for the formation of all terreſtrial ſubſtances; for none, as all have ſome proportion of the element of light, can be deemed perfectly ſimple or homogeneous. Had the general attraction to a centre been coeval with it, the various ſubſtances would not have had time to coaleſce by affinity, but would have all been inſtantly precipitated to the centre in ratio of their ſpecific gravity and in double ratio of the ſquare of their diſtances. Neither was this central gravitation proper during the exiſtence of the great terreſtrial watery and chaotic maſs. It would have been an obſtacle to that diviſion into parts which took place in the ſucceeding period or day, in order to form from it the earth, the planets, and comets, not only of our own but of every other ſyſtem. To this diviſion of the watery maſs, and the diſtribution of its ſeveral portions in the extent of ſpace, I think the expreſſions of Moſes to deſcribe the operations of the ſecond day can alone relate.

late. The conſolidation of this earth, and no doubt of all other planets, and the ſeparation of the dry land from the waters on their ſurface, were the diſtinct operation of the third day; and this was evidently effected by the impreſſion of central gravitation. But though this central attraction muſt be excluded from the watery maſs, the centrifugal and centripetal forces need not; as theſe were no obſtacles to the formation of ſubſtances into various maſſes within it. They counteracted each other; and, if the former tended to throw off, the latter withheld within certain limits; by which means all matter, whatever might be afterwards its ſpecific or central gravity, was kept floating and in motion within the bounds of the liquid maſs. Theſe conſiderations convince me that the laws of relative attraction, and the centrifugal and centripetal forces, were impreſſed on the great watery maſs of terreſtrial matter, but that the law of gravitation to a centre was reſerved to the planets when extracted from it. From the to me apparent incompatibility of the law of gravitation to a centre with the regular formation of ſubſtances into a variety of aggregate maſſes, I think it evident, that the fundamental laws of nature and motion were not in the firſt formation of things all ſimultaneouſly impreſſed, though all are equally neceſſary for the preſervation of nature fully eſtabliſhed and completed. As ſoon as this law of gravitation to a centre was impreſſed in each planet, all the ſubſtances of which it was compoſed, already formed into various bodies, were according to its rules precipitated towards its centre; by which means that centre became conſolidated and compact; whilſt the ſurface of each globe, by the natural confuſion of a variety of different maſſes, of different ſizes and figures, preſſing towards the centre with very unequal velocities, became irregular and uneven. Hence were formed on it in ſome parts eminences, and in others hollows and cavities. From the former the waters, which had not penetrated into the crevices cauſed by the irregular fall of maſſy ſubſtances of every poſſible ſhape, ran off to fill up the latter. Thus the dry lands appeared, and the ſeas found their beds.

In

In this place I ſhall obſerve, that the element of light, or the celeſtial matter, is an immutable ſubſtance, but capable of being incorporated with, and united to, and by that means becoming a conſtituent part of, all terreſtrial ſubſtances. It is alone eſſentially indued with motion, which it communicates more or leſs to naturally inert matter; but it may be ſo impriſoned and fixed as to become motionleſs, till actuated upon either by the touch or near approach of its correſponding matter, or releaſed by violence from its priſon. Thus the latent fire, which yet I take to be not the pure element of light, but a mixture of it in a very large proportion with inert matter, thence called phlogiſton, contained in a cold flint, is diſimpriſoned by the ſhock of any hard ſubſtance, and regains that activity which it derives from the large proportion of elementary light contained in it. Earth, water, and air, though generally looked upon as diſtinct elements, I conjecture to be tranſmutable *inter ſe*. Several late experiments ſeem to give weight to this ſuppoſition. I think too that there is reaſon to imagine that vitreous matter, by a new combination with fire, air, water, and ſalts, may be tranſmuted in the laboratory of nature into calcareous matter; and, *vice verſa*, the latter into vitreous. Hence, as we have already obſerved, ſtalactites and marbles are formed by exſudation through vitreous rocks, and vitreous cryſtallizations under calcareous rocks. Appearances, however ſtrong, may yet be deceitful; and on theſe laſt conjectures the explication of the Moſaical ſyſtem of firſt creation is in no wiſe dependent.

(b) Page 497.

What the Vulgate tranſlates "ſpiritus Dei ferebatur ſuper aquas," and the Engliſh verſion, "the ſpirit of God moved upon the face of the waters," Dr. Geddes has thought proper to render by "a mighty wind blowing on the ſurface of the waters." It is poſſible that inſtead of "ſpiritus Dei," "the ſpirit of God," the more literal tranſlation may be "flatus Dei," or "the breath of God," the meaning of which muſt be allowed to be the ſame. But the rendering the "breath" or, if he pleaſes, the "wind" of God by

by "a mighty wind," is totally unſupported by any valid reaſon. The one he alledges is, that "*of God*" frequently occurs in ſcripture, merely to convey the idea of great and extraordinary. In ſome inſtances it may be ſo, but it is more frequently applied to beings or places which God had particularly adopted, as, "children of God;" "Sion, the mountain of God;" though this hill is far from being remarkable for magnitude. In this place there ſeems no kind of reaſon to convert it into "mighty." In the inſtant when the power of God was particularly exerted, whether wind or any other means were employed by him, their attribution to him ſeems peculiarly proper. The "breath of God," by the moſt eaſy of all metaphors expreſſing his power and virtue, is moreover particularly conſonant to the great ſcope of the author, whoſe aim was to inculcate and declare God to be the creator and founder of the world. "A mighty wind" is therefore here totally inapplicable to the ideas of Moſes: to thoſe of a Sanconiatho, or of materialiſts, who attribute all things to chance or to the ſole powers of nature, it may be congruous. Scripture is beſt interpreted by itſelf, and that with the greateſt propriety where the ſame ſubject is treated of. In the 33d Pſalm it is ſaid, according to the Vulgate tranſlation:—"Verbo Domini cœli firmati ſunt, et ſpiritu oris ejus omnis virtus eorum." Here ſurely there is no queſtion of a "mighty wind," but of "the breath of the mouth of God" allegorically taken for his power. Here the Latin expreſſion "ſpiritu" is not made uſe of in its more uſual acceptation, or in that of the Engliſh word "ſpirit," but certainly denotes the "breath of the mouth of God." The Engliſh tranſlation is, "By the word of the Lord were the heavens made, and all the hoſts of them by the breath of his mouth." Here there can be no doubt but that it is meant to declare that all the powers and laws of nature are derived from him; and it is certainly the beſt and ſureſt interpretation of the words of Geneſis.

(*c*) Page 498.

In his proſpectus, Doctor Geddes rendered the word here tranſlated by "divided,"

" divided," by " ſevered" the light from the darkneſs. In the work itſelf ſince publiſhed, he has altered it to " diſtinguiſhed" the light from the darkneſs. What propriety or uſe there can be in this alteration, I cannot divine. Light and darkneſs are neceſſarily diſtinguiſhed, if I underſtand that Engliſh word; therefore the Hebrew word muſt ſignify ſomething more.

(d) Page 501.

In this place Dr. Geddes had ſaid, in his Proſpectus, " For God made two great luminaries; a greater luminary to regulate the day, and a leſs luminary to regulate the night; and the ſtars. All theſe God placed in the expanſe of the heavens, to illuminate the earth, to regulate the day and night, and to ſever the light from the darkneſs." In the work itſelf he has thus rendered this paſſage: " For God having made the two great luminaries (the greater luminary for the regulation of the day, and the ſmaller luminary for the regulation of the night), and the ſtars; he diſplayed them in the expanſe of the heavens to illuminate the earth, to regulate the day and the night, and to diſtinguiſh the light from the darkneſs."

Not being verſed in the Hebrew language myſelf; to thoſe who are learned in it I muſt refer to decide, whether this new verſion, ſo eſſentially different from his firſt and from all the tranſlations which have hitherto appeared in any language, is more juſt and correct; or whether it is merely adopted to ſupport the private opinion that the ſun, moon, and ſtars exiſted before, and that Moſes only meant to ſay that they were now for the firſt time made apparent to the earth.

(e) Page 508.

In his Proſpectus, Dr. Geddes's tranſlation runs thus: " And on the ſeventh day he reſted from all his creative operations: therefore God hath bleſſed the ſeventh day, and made it holy, becauſe on it he reſted from all his works which he (then) created into exiſtence." Notwithſtanding the interpolated palliative *then*, nothing could more ſtrongly militate againſt

againſt the author's declared opinion, in his critical remarks already inſerted into that ſame proſpectus, that Moſes talks not here of an abſolute new creation of the earth, but ſimply of a renovation or new conformation of its already long exiſting principles. In this idea, he ſays, he is confirmed by the opinion of the learned Origen. That Origen, who believed that this earth after its propheſied diſſolution by fire would be again renewed, that the ſaints might reign on it 1000 years under a happier form, ſhould adopt this opinion of the paſt, is not to be wondered at. I preſume the Doctor has ſcarcely embraced his opinion of what is to come. At all events, to confirm his ſyſtem of an anterior earth, he has thus corrected his former tranſlation of this paſſage: "God completed all the work which he had to do: therefore God hath bleſſed the ſeventh day, becauſe on it he ceaſed from all his works which he had ordained to do." Whether the new corrections which I have noticed are really more literal and correct tranſlations of the Hebrew, or whether they are interpretations of it, the learned in that language muſt decide. If it ſhould prove the latter, it muſt be owned to be the boldeſt method of ſupporting private opinions ever yet purſued. To give a new interpretation in a note or remark to any paſſage may be allowable; but to give a new conſtruction to the text itſelf is not ſo fair. In one of the above-mentioned paſſages, to ſay, "God made the ſun, moon, and ſtars, and ſet or placed them in the heavens," is very different from ſaying, "God having made the ſun, moon, and ſtars, diſplayed them in the heavens." From the one it may be doubtful whether thoſe orbs were then firſt created; from the other the queſtion is poſitively decided.

THOUGHTS

THOUGHTS

ON THE

STRUCTURE

OF THIS GLOBE.

LETTER VIII.

State and Aſpect of the Antediluvian World, and Changes operated by the Deluge. Curſory Obſervations on Doctor Hutton's New Theory of the Earth.

LET us not judge of this earth, ſuch as it came out of the hands of the beneficent Creator, by the wreck permitted to eſcape from his avenging arm. Scripture informs us, and the account ſtands confirmed by the traditions of all nations, that the longevity of our antediluvian anceſtors extended to the to us aſtoniſhing term of more than 900 years. Such vigour could only proceed from a more benign temperature of the air, and aliments of a more invigorating nature, leſs apt to create diſeaſe and jarring humours in the human body.

Theſe were every where fruits and vegetables; for it was not till after the deluge that animal fleſh was permitted, or perhaps thought of. In the preſent variable and often cold climates of the earth, where vegetables are frequently ſcarce and always flaccid, this food is become neceſſary to preſerve ſtrength and vigour. Some great alteration in the poſition, ſtructure, and temperature of the earth, ſeems the only rational manner of accounting for the preſent ſo marked decay of human nature. Let us then conſider what different ſtate of theſe would conſtitute a more perfect equilibrium in the air, a more equal temperature, leſs productive of thoſe ſudden viciſſitudes which ſo ſtrongly affect both animal and vegetable powers, and life; let us imagine every circumſtance which might contribute to create a more conſtant and ſalubrious climate; and we ſhall probably have divined the cauſe of this ſtronger conſtitution of man in the antediluvian ages.

With Meſſrs. Wallerius, de Luc, and Whitehurſt, it appears to me, that the axis and poles of the earth muſt have been before the deluge, perpendicular to the equator. It is not only the moſt natural, but, in caſe the centre of gravity was placed in the centre of the earth, ſeems alſo the neceſſary poſition. Aſtronomers have not been able to diſcern the ſmalleſt inclination in the axis of any other planet; if there is any, it is at leaſt ſo ſmall as to have eſcaped their obſervations. The great inclination of ours is inconteſtably the ſource of inceſſant conflicts in the atmoſphere, and of many con-

ſequent diſorders on the ſurface of the earth. When the centre of gravity was in the centre of this globe and its axis perpendicular, the attraction of the ſun being equal on all its parts would keep its courſe ſteady and without deviation in the track of the equator. It would perform the ſame journey of one degree exactly in the ſame given time of 24 preciſe hours, and its whole revolution in 360 days. The moon in like manner equally attracted by the earth would perform its rotation round it in 30 days without fraction. Hence, as we before obſerved, the moſt ancient computation of years of 360 days, and of months of 30 days, though totally inapplicable to the preſent months, or to years either ſolar or luniſolar. It is no ſmall preſumption of the once exiſtence of ſuch a year, preſerved by ignorance of the reality and reverence for antiquity, till ſuch times as the error was perceived to be too groſs, and was by degrees more or leſs accurately rectified by ſucceeding generations. The few who ſurvived the change, and their immediate progeny, confounded to find their ancient diviſion and duration of the year inadequate, tried, as we find in hiſtory, a variety of expedients to conciliate their traditional computation with reality; and the firſt ſomewhat ſucceſsful attempt was the addition of five intercalary days at the expiration of the old year. Preciſion was certainly become extremely difficult, and has not been aſcertained above two centuries. When the centre of gravity was changed, the motions of the earth and of its attendant planet became tremulous and irregular, and no longer kept exactly pace with time. The nutation

tion of its axis became at leaſt more conſiderable, and its rotation round it ſomewhat variable; the poles were diverged, and in conſequence the track of its orbit became equally oblique to the equator. So long as the poles of the earth were perpendicular to the equator, and that its courſe varied not from that line, the days and nights were equal throughout the year; perpetual ſpring reigned all over this globe, and its temperature was every where moderate. After the change, God finds it neceſſary to fore-warn Noah that he muſt expect ſucceſſive changes of ſeaſons, and viciſſitudes of heat and cold, ſuch as he had never yet experienced.

In the former world, the nature of the ſurface and the diſpoſition of the lands and waters probably aſſiſted not a little, with the poſition of the globe, to moderate both heat and cold in every quarter of it. Leſs prominent inequalities on the face of the land, a more equal proportion of land and water, and a more general intermixture of theſe, would contribute to this, and were no doubt the means. The conſtant vicinity of ſeas of very moderate extent would from the vapours exhaled from them inceſſantly moiſten the dry land without the help of rains; and Moſes expreſſly tells us, none were neceſſary to water the earth: and hence the rain-bow, firſt appearing to Noah after the deluge, was literally to him a new phænomenon. In theſe limited ſeas the flux and re-flux were ſcarcely ſenſible, but ſufficient to freſhen and ſweeten the waters by gentle agitation, and the air by moderate breezes. In the preſent ſtate of things, vaſt tracts of deep

deep and extenſive ocean, with little or no intervening lands, cover two-thirds of the globe, are expoſed to the whole influence of the moon, riſe into mountainous waves, and by their mutable and tumultuous agitations raiſe equal conflicts in the ſurrounding atmoſphere. On the coaſts, far-extended capes and promontories create ſtrong and violent currents, and increaſe by oppoſition the fury of waves rolling to them from immenſe diſtances and ſtirred up from unfathomable depths. To this the great irregularity of the bottom of many ſeas, either by the accidents of the deluge, or by theſe currents ſcooped out into deep valleys or into abyſſes creating whirlpools and tornados, contributes not a little. It appears that the uneven bottoms and depth of ſeas, ſtill more than their immenſity, render them boiſterous. The vaſt Pacific Ocean from being ſhallow is ſeldom heaved into high waves. Elevated ranges of mountains on the land, whoſe freezing regions are ever in conflict with the inferior atmoſphere, interſecting each other in various angles, and divided by deep valleys acting as ſo many ſuckers, raiſe tempeſts and hurricanes in the air, which rouſe an equal tumult in the adjoining ſeas; and in their turn the agitations of the waves diſturb the air anew. Where mountains riſe near or from the coaſts themſelves, the ſea is ſo much the ſooner and more terribly affected. The deep Atlantic Ocean and the Northern Seas between Aſia and America, forced alſo into ſtrong currents by numerous far-projecting lands, are in conſequence for ever agitated by dreadful ſtorms and tempeſts.

To preclude ſuch violent and ſudden changes, both in the ſeas and in

in the atmoſphere, which by the preſent diſpoſition of the earth affect the health and vigour of every thing that has life, we muſt neceſſarily preſume it to have been very different when life could be protracted ſo much beyond its preſent ſpan. Inſtead of immenſe uninterrupted oceans, and extenſive continents without ſeas diverſely traverſed with chains of high mountains, the lands, more equally diſtributed on every part of the globe, were no leſs beautifully than uſefully interſected by ſeas of moderate depth and extent, communicating with each other by ſtreights which further facilitated the intercourſe of their inhabitants (*a*). More frequent and extenſive perhaps towards the equator, they would ſoften and refreſh the hotter air of that climate lying directly under the courſe of the ſun, and in parts more diſtant they were ſo diſpoſed as to moderate increaſing cold. Every where the vapours riſing from them would furniſh dews, proportionable to the wants of the ſomewhat varied climes, to irrigate the earth. On the ſurrounding lands no towering mountains reared their heads into the cold regions of the air to accumulate ſnows and ice, to chill the atmoſphere, or gather round them ſtorms and tempeſts; but hills of ſmall elevation, perhaps under the equator ſomewhat higher to moderate the heat, afforded gentle breezes to fan the air, and diverſified the habitations of mankind. This diſpoſition of the lands and waters would entertain a mild and benign temperature as well under the ſun's courſe as in parts more removed from its influence, and, conjointly with the conſtant equality of days, nights, and ſeaſons, would afford perpetual

ſpring

ſpring to all parts of the whole ſurface of the earth. No cold or burning varieties of temperature would freeze or ſcorch the earth, or alternately chill or boil the blood of living animals, check or dry up the ſources of vegetation. It was not till after the deluge that God ſaid to Noah, " that winter and ſummer, heat and cold, ſeed-time and harveſt, ſhould alternately ſucceed each other;" proof that it was not ſo before, and that he then forewarned him of a new order and diſpenſation of things hitherto unknown to him. If there are yet ſituations on the earth where fruits and flowers appear together, men pay dearly for this advantage by peſtilential heats and deluges of rain, equally trying and deſtructive to the human frame. Meſſieurs Wallerius and de Luc allow not more than 50 toiſes to the higheſt antediluvian hills, and Mr. Whitehurſt reduces them to as many feet. I ſhall not preſume to fix their utmoſt elevation; but I imagine that, higher under the direct rays of the ſun, and lower at greater diſtances, they no where were of ſuch height as to be the repoſitories of ice or ſnow, or to chill to froſt either their own or ſurrounding atmoſpheres. Perhaps the elevation of ſome iſlands under the equator might conſiderably exceed their higheſt computations. Such might perhaps be neceſſary to draw more forcibly the vapours of the ſea during the day, thence to be gently wafted by ſomewhat ſtronger breezes during the night, to irrigate with more plentiful dews adjacent continents expoſed to the full ardours of the ſun. But ſtorms and thunder were no where engendered, becauſe the air, whoſe temperature was almoſt equal in all parts, was not over-

charged in one place to diſburden a ſuperabundance of moiſture, electricity, or heat, in deſtructive torrents on another. By the favour of this ſo happily tempered equilibrium of the air, the earth throughout all its climes produced with little labour in every ſeaſon the moſt ſalubrious fruits and vegetables, and men arrived to the higheſt perfection of their organization. Intemperate changes altered not or ſhook the ſprings of life; and man, if his own exceſſes or accidents haſtened not his end, ſunk gently, at the expiration of many centuries, into the arms of death pronounced againſt him ſince his fall. Thoſe animals which at preſent cannot range beyond the torrid zones wandered with impunity into the middle circles; and if any required a cooler climate, they found one more ſuitable to their natures under the poles: to the preſent ſharp air of thoſe ſituations they have ſince been gradually inured and fitted.

Such a poſition of the globe and ſuch a diſtribution of its lands and waters as I have here deſcribed, we may, I think, conceive adequate to the maintaining of a never-fading ſcene of fertility, and of a mild and nearly equal temperature, over the greateſt part of the earth; and ſome ſuch cauſes muſt have exiſted to have given that conſtant ſalubrity of climate which protracted the life of man ſo far beyond its preſent limits. Some few of the conſequences of ſuch a different order of things—an invariability of temperature, ſubject to no changes from heat to cold, or to the viciſſitude of ſeaſons, and the ſufficiency of dews to water the whole earth without the intervention

intervention of clouds or rain—are clearly, through briefly, indicated by Moſes. That the preſent conſtitution and aſpect of this globe are very different is no objection; for God declared in his wrath "that he would deſtroy the then earth itſelf, along with its inhabitants." Conſequently we may with the utmoſt propriety look upon both its climates and the preſent diſpoſition of its ſurface as entirely altered from the primitive ſtate: that its outward coat has been broken and diſlocated, we ſhall preſently ſee that the moſt convincing evidences every where proclaim.

The original happy ſtate of the world and of mankind, the every-where commemorated golden age of antient tradition, was ſoon to finiſh. The very diſtant proſpect and ſlow approaches of death had ſteeled the heart of man againſt all fears of ſucceeding eternity; and the very happineſs, eaſe, and abundance of his ſituation had by degrees obliterated all remembrance of his creator and munificent benefactor. Though it appears that private murders ſometimes happened, it does not ſeem that rapine and war, where every ſpot was abundantly fruitful without much toil or labour, were yet to be numbered amongſt his crimes; but to irreligion, luxury, and debauchery, he had abandoned himſelf. Murder may perhaps appear to us the worſt of crimes; but the real abnegation of a God, from whence every poſſible crime may and will flow, as we have unfortunately witneſſed in a neighbouring kingdom, may juſtly be deemed the moſt heinous in the eyes of the Supreme

Being; and it is in conſequence that which has in all ages moſt viſibly drawn down his pointed vengeance, not always indeed upon individuals in this life, but upon whole nations whenever contaminated with it: at length the meaſure of the crimes of men was full, and God determined to deſtroy the whole race, one ſingle righteous man and his family excepted. As a future check to the depravity of the heart of man, and as a conſtant admonition of his dependant and uncertain ſtate, the earth was thenceforth to be condemned to a degree of ſterility, from which he ſhould draw his ſubſiſtence by hard labour expoſed to the inclemency of ſeaſons, and his life was to be ſhortened from 900 to 90 years. It was not men alone who were to periſh in the flood, but the whole earth with them; its whole face was to be ſo altered as to leave ſcarce any trace of their former habitation. To work a total change for ever in the conſtitution of man, the temperature and the whole diſpoſition of his future abode were to be altered. To effect this, no ordinary means could be ſufficient. All the water contained in the atmoſphere precipitated at once could not have covered the lands to the depth of a few yards, even for a ſhort time, much leſs for a twelvemonth; not only the then ſeas muſt have been overturned upon the lands, but the waters concealed in the bowels of the earth muſt have been called forth to inundate the whole ſurface above its higheſt eminences, however leſs conſiderable than at preſent, and to plunge once more the whole globe under one univerſal ſea without ſhore or limit: and theſe are in fact the means which Moſes deſcribes.

deſcribes (*b*). The mediate cauſe was the will of the Moſt High to puniſh the ſins of men; and this cauſe, as well as the fact, is recorded in all the moſt antient traditions of mankind. The immediate cauſe, or the natural means employed by God to effect his purpoſe, is left to the diſquiſition and conjectures of philoſophy. To diſcloſe it was probably not in the power, nor certainly in the purpoſe, of the ſacred writer. The will of the Almighty who had formed it was alone ſufficient to disjoint and break up at once the antient frame of this globe, without the intervention of any ſecondary agent: but as the employment of intermediate agents as miniſters of his will ſeems moſt conſonant to the uſual diſpenſations of the all-preſcient Being, we may be allowed to ſuppoſe one, the idea of which ſeems forcibly to have ſtruck many philoſophers. As yet unknown numbers of comets, whoſe erratic courſes and eccentric revolutions aſtronomy has never been able to fix or calculate, muſt in their near approaches to the ſun paſs through the orbit in which the earth moves round that luminary. Should God have directed a comet of the firſt magnitude to paſs at a fixed time very near our planet, the firſt effect of that great body, frozen in its long aberration and intercepting the rays of the ſun, would be to condenſe and precipitate in hail, ſnow, or rain, the whole waters of the atmoſphere. In its nearer approximation, its attraction, acting with irreſiſtible force on the ſeas and on the frame of the earth, would heave up to great height the waters of thoſe, and forcibly break open the vaults of the exterior ſurface of the globe. The outward coat once fractured, the

waters

waters of the abyſs, hitherto confined under it, would with violence ſpout out from all its crevices. Hence all the waters below the earth, as well as thoſe contained in the former ſeas and thoſe in the atmoſphere, would re-unite to cover the dry land. The globe itſelf would probably be drawn from its uſual track; and, had not the paſſage of the comet been inconceivably rapid, its attraction might have entirely diſſipated it, or carried off its fragments in its train. The inſtantaneous effect of the tranſitory near approach of ſuch a body would be ſufficient to diſlocate the exterior frame of this little planet, and by its conſequences drown the whole under water. The force of ſteam and of dilated air we know to be immenſe; and the dilatation cauſed by theſe great motions, and by the conflict of fire, water, and air in the bowels and great interior caverns of the earth, much more capacious in the former globe than in the preſent, would for a certain time yet uphold the ſtructure of its exterior fabric: but as frequent exploſions gave paſſage to this ſtrongly dilated air, and as the conflict of the contending elements began to ſubſide, the vaults which had hitherto ſupported the exterior frame of the antient globe gave more or leſs way, and left deep yawning chaſms. Wherever theſe abyſſes opened, vaſt portions of the adjoining lands with all their rocks and varied ſtrata ſunk into them on one ſide, whilſt, violently torn by the ſhock from their contiguous parts, they were uplifted into the air on the oppoſite ſide far above their antient level. Theſe, however, by their ſlanting fall left ſuch ſubterraneous caverns as ſtill ſubſiſt, into which the waters began to run, to uncover by degrees

the face of the earth. This oblique fliding of great portions of the land into the caverns opened to receive them is the cauſe of the preſent formation of our mountains, preſenting on one ſide ſloping banks, and on the other high uplifted and rugged precipices (*c*). Theſe mountains are by naturaliſts termed primitive, though in fact their origin is ſolely to be dated from the era of this great convulſion. On many parts of the globe, the whole land with all its ſeas and eminences ſunk perpendicularly down into former caverns, whoſe vaults were entirely cruſhed, there to form the deep baſons of our preſent extenſive ſeas. The tract between Europe, Africa, and America, gave place to the great Atlantic Ocean. Towards the north, where this ſea is narroweſt, it ſeems to have ſunk the moſt unevenly and in many parts the deepeſt, and to have left in conſequence the higheſt and moſt rugged ſhores. The ſame appears to have happened to the narroweſt and moſt northern part of the tract now forming the ſea between north-eaſtern Aſia, and north-weſtern America. Very unequally ſunken in thoſe parts, where numerous iſlands are ſtill left ſtanding, theſe ſeas are in conſequence very unequally deep, and vaſt currents and eddies are formed in their uneven bottoms. The immenſe tract between ſouthern America and Aſia ſeems to have ſunk more regularly, and conſequently the Pacific Ocean poured into the void is generally ſhallower, and its baſon, leſs interſected by deep valleys, forms a calmer ocean. Towards the northern pole as far as latitude 70 north, by much the greateſt part of the globe's circumference is land ſtill ſtanding on its antient

vaults,

vaults, which ſuffered not the total ruin which entirely broke in thoſe of the ſouthern pole. On the contrary, the whole extent of the antarctic circle is probably ſea to the ſouthern pole itſelf; but that whole ſea is very ſhallow, and is from that circumſtance conſtantly covered with ice (*d*). This difference between the two hemiſpheres is indeed moſt ſtrongly marked.

In the whole northern hemiſphere, by much the greateſt portion of the circumference is land; in the ſouthern a ſtill greater proportion is ſea. In this the narrowing continents, and even all their conſiderable adjoining iſlands, with the exception of a ſlip of South America which reaches to latitude 56, finiſh about the latitude 38 ſouth, to which are extended the ſouthern points of Africa and New Holland. All former lands have ſunk to give place to a very ſhallow ſea. From this more perfect conſolidation of the earth towards this ſouthern pole, the centre of gravity of the globe became changed, and removed a good deal nearer to it. From that moment the axis of the globe, formerly exactly perpendicular to the equator, became diverged; from thence the rotation of the earth round the ſun became tremulous, and its courſe was altered from the exact track of the equator, and became in like proportion oblique within the precinct of the zodiac. From hence to the new world, which was to riſe from the ruins of the former, the viciſſitudes of ſeaſons, the irregularities of the year, of months, of nights, and days (*e*). Whether theſe firſt great changes in the outward

ward frame of the globe, the conſequences of which were the deluge and an alteration in its courſe, were cauſed by the ſole fiat of the Creator, or by the intermediate agency of a comet, is and muſt remain doubtful, and its deciſion very little material. I have, without attaching much importance to it, offered the intervention of ſuch a body as poſſible in the concatenation of things, or as moſt agreeable to the ideas of thoſe who wiſh to perceive the God of Nature conſtantly effecting his decrees by means pre-ordained, but not repugnant to the order of nature. What is of much more conſequence is, to ſhew that ſince the firſt formation of the earth ſuch changes have at ſome time or other taken place; and this the attentive conſideration of the preſent ſtructure of this globe will fully demonſtrate.

It is evident from the general teſtimony of the actual ſtate and ſtratification of the earth, that this globe has ſuffered a violent change, and that its priſtine ſurface has been broken up, fractured, and diſlocated, almoſt throughout its whole extent; that ſuch convulſions and ſuch general rupture of its outward coat, both by the diſplacing the waters of former ſeas, and by forcing out thoſe which we know are yet in great abundance in its bowels, muſt have occaſioned a very univerſal deluge, is no leſs evident; that this deluge did once take place is confirmed by all the united teſtimonies of hiſtory and tradition in all ages, and corroborated by the ſtill legible traces of water even on the higheſt mountains of the earth, to whatever date

we may reaſonably refer the epoch of this great convulſion. Well-known cauſes in the uſual courſe of nature have frequently occaſioned partial devaſtations; but it cannot be ſuppoſed that ſuch a general overthrow can have been frequently repeated. To ſome general revolution muſt we then attribute whatever marks of ruin appear univerſal.

From the obſervations of Mr. de Sauſſure on the Alps, and of every other naturaliſt in all mountainous countries, it appears, that innumerable ſtrata, which from the evidence of their internal texture muſt have been originally formed in horizontal poſitions, are now found in an upright or more or leſs inclined poſition. Not only particular ſtrata, but the whole diverſified ſtratification of entire mountains of the firſt magnitude, are frequently in this caſe. In the ſame regions the hardeſt rocks, containing exactly ſimilar ſtrata, and exhibiting faces and angles ſo preciſely correſponding that, if they could be again brought together, their fractures would fit ſo as to again appear one body, have been evidently torn aſunder. From theſe fronting precipices, forming by their chaſms the narroweſt valleys, the mountains on each ſide more or leſs gently ſlope off to form ſome other valley of a different aſpect. Theſe ſucceeding valleys are either formed on both ſides by the ſloping backs of mountains whoſe upper ſtrata there dip into the ground, or by the ſloping back of one mountain and the upright clifts of another. Such is the uniformly general ſtructure of all mountainous tracts, diverſified only

only by partial accidents, eaſily accounted for in ſuch convulſions. As a further proof that the actual appearances of theſe mountains have been occaſioned by ſuch ruptures and the overthrow of a formerly more level ſurface, Mr. Whitehurſt has ſhewn, that in mining we find all the ſtrata which have on one ſide been reared up into the air, dipping on the other into the bowels of the earth, with the ſame continued inclination and exactly in the ſame order, to the greateſt depths into which man has yet been able to penetrate. If in ſome caſes one or more of the ſuperior ſtrata are wanting under ground, their rubbiſh confuſedly mixed will be found forming to ſome depth the ſoil of the valley or plain under which they dip. Thus a multiplicity of fractures in the former ſurface of the earth, and the ſinking of great portions of it in various directions into its original deep and then wide-gaping caverns, have viſibly formed thoſe groups of mountains and thoſe deep valleys which interſect them, whoſe magnitude in ſome parts of the world ſtrikes us with aſtoniſhment. Notwithſtanding their at firſt ſight apparent confuſion, their ſeparate parts being of moderate extent, the undoubted veſtiges of diſlocation may be eaſily traced; and that it has been effected in the above deſcribed manner, every concomitant circumſtance will in my opinion teſtify beyond all probability of doubt.

But there are ſtill greater effects of a total ſubverſion of a former globe, which cannot be ſo eaſily carried in view. In ſome parts, whole countries have been uplifted on one ſide and half buried on the

other in vaſt gulphs which opened to receive them. One of the moſt ſtriking inſtances is that of Norway and the adjoining parts of Sweden. The coaſts of Norway are the moſt abrupt and the higheſt known on the ocean, elevated to the ſtupendous height of from 300 to 900 toiſes above its level. From theſe the general face of the country ſlopes till it meets the Baltic, under whoſe baſon part of its former ſurface lies deep buried. In the ſhock of the ſudden fall of ſuch extenſive tracts, vaſt fiſſures were opened in its uplifted parts, forming at preſent the moſt frequent, the deepeſt, and the narroweſt creeks yet known in any part of the world. The ſea, both in theſe creeks and under the high clifts of theſe coaſts, is of a depth at leaſt equal to their height. Various ruptures and breaks in this extenſive maſs of diſlocated land, occaſioned by the dreadful ſhock, have at the ſame time raiſed innumerable ranges of mountains on the falling face of the country looking to the Baltic. But even theſe ruins, great as they ſeem, are ſmall if compared to the total diſappearance of thoſe immenſe tracts which now form the beds of the oceans which ſeparate the two continents, or to that devaſtation which ſunk below the waters more than three-fourths of the whole ſouthern hemiſphere. As ſoon as this laſt event took place, the interior conſolidation of that part of the globe changed its centre of gravity, and with it diverged its poles. From the dreadful movement and ſhock which the whole globe received from this ſudden alteration of its centre of gravity, and conſequent change of poſition in the heavens, prodigious changes muſt have enſued in the remaining continents. As

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well the former ſeas with which they had been diverſified and interſected, as the yet unſubſided waters of the deluge, muſt have been poured over, and in irreſiſtible torrents have laid waſte, the lands already ſoftened by their long ſojournment. The ravages which theſe muſt have occaſioned in ſeeking the newly-ſunken beds of the preſent ſeas are ſcarcely to be imagined, much leſs are they capable of minute development. In their impetuous courſe, mountains muſt have been overturned, new chaſms and valleys excavated, and their ſpoils hurried to great diſtances to form new eminences compoſed of their ruins. Hence claim their origin, the irregular ſtratification of ſome mountains nearly obliterating all traces of their firſt formation, the correſponding angles of valleys viſibly ſcooped out by waters, and the confuſed aggregation of many iſolated eminences to which philoſophy has with ſome propriety affixed the name of ſecondary (*f*). The firſt ruptures of the original comparatively level ſurface of the antediluvian world, when vaſt portions of it were on one ſide ſuddenly ſunk into the bowels of the earth and were as ſuddenly elevated on the other, muſt have thrown off in torrents the then prevailing waters from theſe new heighis into the no leſs newly-created hollows. Part of theſe would filtrate through yet gaping crevices into the remaining ſubterraneous caverns, forming ſtill exiſting reſervoirs under the earth; and the remainder would either ſojourn and fill up ſuch baſons as it found incloſed on all ſides, or run off ſtill further till it found at various diſtances the beds of the ocean formed or forming to receive it. Hence it is that the

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moſt inland mountains carry on their faces the evident marks both of the temporary ſojournment of the waters on their higheſt ſummits, and of their precipitate retreat. The impetuous courſe of theſe waters, from the higheſt broken pinnacles of the mountain top through its torn flanks and torrent-worn valleys to the level of the plains or of the ſea, is yet as clearly to be diſtinguiſhed as thoſe ſmall furrows which ſudden rains occaſionally plough up on their ſides before our eyes. From this cauſe, and from the overturning of ſeas which formerly diverſified the moſt inward parts of the yet exiſting continents, the veſtiges of impetuous torrents are viſibly to be traced on almoſt every part of the ſurface of the preſent earth.

Such are the outlines—ſtrongly, I think, marked by univerſal nature—of the firſt great effects of that terrible convulſion which obliterated every feature of the priſtine world: for God had ſaid that "he would not only deſtroy the perverſe race of men, but with them alſo the earth they had inhabited." Its ſurface was overturned, its centre changed, its poſition and its courſe in the heavens altered: with theſe its fertility and its beneficent temperature were alſo loſt: the life of man was thence ſhortened in the very firſt inſtance to half its former period. Within a twelvemonth the great convulſion had ſubſided; and the ark, which contained the choſen few deſtined to be the fathers of a future race, guided by the hand of the Almighty amidſt this dreadful wreck, reſted on Mount Ararat, from whence the waters were ſhortly after withdrawn. It

appears that, from the time of its firſt reſting, the progreſs of their retreat was ſlow and gradual, taking up a ſpace of 61 days; and it probably continued, after the landing of Noah, no leſs ſlow on the general ſurface of the earth greatly below that high ſituation. The waters ran off by degrees from the continents as the ſucceſſive breaking down of ſubterraneous caverns deepened the deſtined bed of the ocean. A ſmall portion of the earth was ſufficient for the maintenance of the few inhabitants left on it; and, from the long abode of mankind on that mountain and its neighbourhood (for it does not appear that men ſpread themſelves into the plains of Sennaar till after the death of Noah), it is reaſonable to ſuppoſe that great part of the globe was yet covered with waters. The ſummit of Ararat, little elevated above their general level at the deſcent of Noah, yet produced the olive branch, though now by their receſſion condemned to bear eternal ſnows. In their firſt impetuoſity the waters had ravaged and ploughed up the ſurface of the broken earth, and were loaded with immenſe quantities of ſoil mixed with broken rocks rolled down with the torrent. Theſe ſpoils were frequently arreſted in their courſe by narrow paſſages, and threw up mounds which for a time formed vaſt lakes and inland ſeas, ſome of which ſtill remain, but the greateſt part of which, by the breaking down of theſe accidental mounds from the increaſing weight of waters, diſappeared in the firſt centuries ſucceeding the deluge. Over and above an infinity of interior lakes, many of whoſe traces may yet be diſcerned by the curious obſerver, we may claſs with theſe

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many great formerly-inland ſeas which are now gulphs of the ocean. Such were thoſe I have already noticed as probable; in the Atlantic, the Gulph of Mexico; in the Indian ſeas, the bays of Bengal, of China, and Corea, where ſtrings of iſlands, the Antilles and the Moluccas, are the only remnants of barriers which formerly upheld thoſe ſeas far above the preſent level of the ocean. At what time theſe were diſcharged into it, the records of mankind give no intimation; and it probably happened within the firſt four centuries, when the whole race was yet confined within the limits of Armenia, and the newly-uncovered plains of Meſopotamia. The Red Sea, called in early times the Lake of Reeds, probably burſt open the Streights of Babelmandel ſomewhat later. To the breaking down of the mounds which formerly ſeparated the Black Sea from the Mediterranean, and this from the Atlantic, probably at leaſt 1000 years after the deluge, tradition and hiſtory give formal and repeated teſtimonies. I conjecture that even the ocean did not immediately at the deluge ſink down to its preſent level. The rupture of ſuperior caverns may then have prepared its bed and limits; but the ſucceſſive weight of waters pouring into it from all parts may have at length, as Mr. de Luc with great probability imagines, cruſhed down other inferior vaults lying under theſe, and have finally ſettled its actual level. My reaſon for this ſuppoſition is, that I perceive the age of man ſtill protracted, during the firſt four centuries, to nearly 450 years; but when theſe laſt great changes were accompliſhed in the days of Phaleg, his courſe is again ſhortened

ſhortened to half that term, and continued ſucceſſively decreaſing in the enſuing centuries, till it reſted at its preſent ſpan. Cold is dependent on the elevation of the land above the level of the ſea: ſo long as this kept higher, the moſt elevated mountains of the globe ſtill enjoyed a more moderate climate: ſnows and ice could not yet there accumulate, and conſequently the viciſſitudes of heat and cold were much leſs ſenſible on every part of the earth, its climates were milder, and its produce more wholeſome and ſucculent: hence the conſtitution of man, though greatly impaired ſince the antediluvian times, ſtill preſerved a degree of vigour unknown to us. But as ſoon as the bed of the ocean was, by the increaſing weight of waters poured into it from the diſcharge of many hitherto inland ſeas, ſunken to its final level, the atmoſphere fell with it, and left all the eminences in much colder regions of the air. It was not, perhaps, till after this was completed, that the already diſplaced poles were diverged to the full extent of 23 degrees, thereby producing a ſtill greater variation of climates and ſeaſons. But no ſooner had theſe laſt great alterations taken place, than the ſummits of the higheſt mountains began to accumulate eternal ſnows and ice, and chilled the temperature of the whole earth, thenceforward becoming leſs and leſs ſalubrioufly productive. From that epoch, the vigour and age of men, animals, and plants, ſucceſſively decreaſed, till they became fixed at their preſent feeble and ſhort ſtandard. So long, however, as the mounds of the Baltic and Black ſeas were upheld, and that their waters conſequently covered great extents of northern Europe and Aſia, proba-

bly for 1000, poſſibly for a greater number of years after the deluge, the cold of the north was moderated, and the heat of the ſouth ſoftened by their influence. It was not till after that period that man felt the full and entire effects of the changes ſucceſſively taking place in his habitation, on his gradually altering conſtitution. The vigour and ſtability of his health are well known to be dependent on the equality or inequality of temperature, and the ſalubrious or diſtempered ſtate of the atmoſphere in which he breathes. The nature of his nouriſhment, equally affected by that ſtate, conſtantly ſupplies the ſeeds of invigoration or quick decay. Exceſſes, no doubt, ſhorten the lives of thouſands, but they limit not the general ſtandard of the age of man.

Some of theſe conjectures on ſeveral great changes, not all at once but ſlowly and gradually effected during ſeveral centuries ſubſequent to this great revolution, ſeem ſtrongly countenanced by the ſituation of iſlands in ſeveral parts of the world pointing out a once continued ſhore, the broken barrier of former interior ſeas now thrown into and levelled with the ocean; they are farther ſtrengthened by the original traditions of ſtill exiſting ſeas, much more extended in former times. All theſe ſucceſſive alterations on the face of the earth become probable as the moſt natural, and in reality the only aſſignable cauſes of the conſtitution of men, not ſuddenly but ſlowly and progreſſively, impaired during the courſe of ſeveral ages ſucceeding the deluge. From the immediate effects of that cata-

ſtrophe,

ſtrophe, his general age became reduced from upwards of 900 to under 450 years. To ſome new and no leſs ſudden alterations muſt be attributed its being curtailed 200 years more after the birth of Phaleg. From that time it gradually decreaſed until about 1500 years before Chriſt, when it became fixed and ſtationary under 100 years.

The breaking up and diſlocation of the ancient ſurface of the antediluvian earth, the evident marks of which are yet legible in its preſent both exterior and interior ſtructure, ſufficiently account for the appearances of its mountains and valleys, and for the diverſely-altered ſtratification of their parts. The conſequent violent diſplacing of the waters, which had in the firſt inſtance inundated it, no leſs evidently diſcloſes the cauſes of thoſe veſtiges of their ravages every where apparent. Their united effects amply ſolve the queſtion of elephants' bones and of the relics of aquatic animals, and particularly of the great abundance of ſhell-fiſh, of exotic foſſile woods and plants, found on the tops of mountains or deep buried in the plains, however diſtant from the only climates now congenial to their growth. The probability of a very different temperature in the priſtine ſtate of the whole earth, makes it ſtill leſs difficult to account for phenomena which muſt otherwiſe ſeem inexplicable.

If there are many mountains and parts of the earth which apparently owe their formation to, or have viſibly undergone the operations of, fire, the certainty that, during the war of contending elements

raiſed by ſuch convulſions, innumerable fires muſt have been kindled in the bowels of the earth, occaſioning the moſt dreadful earthquakes and volcanos in parts where theſe are unknown to the records of hiſtory, ceaſes to make ſuch appearances wonderful.

Upon the whole, the immediate or progreſſive effects conſequent to one great revolution, confirmed both by the ſubſequent infant ſtate of mankind, and by the conſentaneous traditions of all nations, ſatisfactorily account for every appearance of the viſibly at ſome time altered ſtructure and diſpoſition of the earth, without recurring to imaginary explications, frequently contradictory to one another, and not ſeldom to the general well known laws of nature. The principal aim and tendency of many of theſe ingenious ſyſtems have been, either to ſet aſide or explain away the Moſaical teſtimonies on the creation and deluge. But if it can be ſhewn, as I have no doubt it may, by purſuing the path, however faulty in details, I have ſketched out, that the teſtimonies of nature are not only not repugnant to, but are corroborative of, the narration of Moſes, there remains little doubt of the preference it demands over the unſupported reveries of modern philoſophy.

Whilſt theſe Letters were in the preſs, two volumes of Dr. Hutton's Theory of the Earth appeared. As the public has both our opinions before it nearly at the ſame time, that public can alone decide on their reſpective merits. Moſt of the ſubjects forming the baſis

baſis of his ſyſtem having been already diſcuſſed, I ſhall be ſhort in my obſervations on them.

This new ſyſtem ſeems to be chiefly drawn from Mr. de Buffon's, with the difference of perpetually renovating powers having no determinate commencement, inſtead of a once ſlowly forming and now gradually decaying principle. The French author ſuppoſes a beginning to the preſent ſtate of this terraqueous globe, and fixes it to a period of 75 thouſand years before the preſent times. His countryman and diſciple Mr. Bailly, in his firſt ſyſtem, only wiſhes for ſufficient time to derive all population from the northern pole, originally the only part of this earth on which man could reſt his foot: but too well verſed in hiſtory and antiquity not to have perceived every where the authentic teſtimonies of a general deluge, in his ſecond he barely contends for the prolongation of a few hundred years to its date. Dr. Hutton rejects all time. The operations of his living renovating nature ſcorn all limits. "Time," ſays he, "which meaſures every thing in our idea, is to nature endleſs and as nothing." Mr. de Buffon removes the firſt production of man to about 6700 years ago. This author ſays, if we are to take the written hiſtory of man for the rule by which we judge of the time when the ſpecies firſt began, that period would be little removed from the preſent ſtate of things. The expreſſion implies little reliance on its authority. Profane-written hiſtory is indeed modern and fallacious. The review of population in times more

recent ſhews its varied ſtatements of the firſt exiſtence of the preſent race of mortals too far removed. But both hiſtory and tradition mark the utmoſt ſtretch of its commencement, by much too limited for Dr. Hutton's ideas. What credit he gives to the Moſaical hiſtory, which places this beginning of man at a very ſhort diſtance, I ſhall not preſume to gueſs. He at leaſt allows, that we do not find in natural hiſtory any document by which a high antiquity might be attributed to the human race. But with regard to inferior animals, and to teſtaceous fiſh in particular, this is not the caſe; theſe indeed, if not eternal, muſt have exiſted according to the ſyſtem for millions of years. Dr. Hutton confeſſes that this globe was evidently made for man, who is by his intellectual faculties the ſovereign of all animals—the ſole being who can contemplate and enjoy the contemplation of Nature, who can in many caſes diſpoſe of, direct, and ameliorate her proceſſes: yet he here ſeems to admit, that he was but as it were of yeſterday, whilſt his creative teſtaceous fiſh had been millions of years forming and renovating the future theatre of his ſuperior powers. Surely his living, organical, and organizing nature might have found ſome earlier means of forming her chef-d'œuvre, fully to enjoy and to admire her works. Without it, they remained for ſo many ages incomplete and without end. As well as inanimate ſubſtances or leſs happily animated beings, man decays and revives in his poſterity. The means to be deviſed of his firſt ſpontaneous production may indeed require great ingenuity, and in the end prove fully as metaphyſical and as abſtruſe as thoſe

of

of Mr. de Buffon; but certainly this one more effort of genius is wanting to complete the ſyſtem.

For the formation of calcareous matter, Mr. de Buffon confines the quick propagation of teſtaceous fiſh, and the great depoſition of their exuviæ to 20 thouſand years. He had determined only a ſmall part of the ſurface of this globe to be compoſed of their exuviæ: this author on the contrary, contending from the ſurvey of a part of Scotland and England that a very great portion of its materials are compounded of them, requires an indefinite ſpace for the labours of theſe ſmall creative animals.

Having already diſcuſſed this ſurely extraordinary, though very generally adopted, formation of ſo conſiderable a part of the matter of this earth, I ſhall now only obſerve, that I cannot ſee any reaſon why God ſhould not have created, or nature have produced *ab origine*, calcareous as well as other ſubſtances, to make up the ſum of that variety ſuited to different purpoſes of which this globe is viſibly compoſed. Shells are found immixed in the texture of ſome, though certainly not of all marbles, even in the greateſt part of which no appearances of ſuch are perceivable. They are often met with undecompoſed in ſome calcareous earths; but they are not uncommon in ſands, in gravels, and in argillaceous earths, where whole beds of them have been diſcovered. If the deſcription Mr. Wallerius and I have given of the former ſtate of the earth, and of the

effects

effects preceding, attending, and following the deluge, are not only not repugnant to reason, but from many related circumstances highly probable; can there be any wonder in finding these shells dispersed in many places which may have been once covered with seas now disappeared? Without even attending to these antediluvian seas, whose bottoms are now perhaps elevated into mountains, if the whole earth was once submerged for one twelvemonth only under one general sea, whilst the waters on and under the earth were stirred up from their deepest recesses, transporting during that sufficient time from pole to pole whole tribes of these testaceous fish, together with the beds on which they then as well as now were bred and fed, can we be surprised to find them scattered on parts now distant from the ocean? Calcareous earths, as composed of the finest particles more easily triturated and immixed with the waters, would naturally be the first dissolved and the last deposited by them, when they abandoned our present lands; and in or under this matter these shells will consequently be most commonly found. But these substances together with their shells are often consolidated, and that could not have happened but under the sea. When Dr. Hutton, in opposition to the evidence of our senses, can prove that no consolidation or lapidification can take place but under its waters, we shall admit this reason. In fine, notwithstanding the authorities of Mr. de Buffon and of this learned author, I own I shall be rather apt to think that these shells are calcareous, because the animals who bore them received their chief nutriment from calcareous substances, and more especially perhaps

haps from the calcareous earth contained in ſea-ſalt and ſea-water, than be induced to believe that the whole maſs of calcareous matter is compoſed of their exuviæ.

But from every argument to be deduced from the ſuppoſition of a deluge, this author excludes us. In defiance of the general teſtimony of mankind to that event, not to interrupt the unceaſing proceſſes of his organical living nature, he at once diſcards it. To give that deluge no higher authority, it is certainly founded on the conſentaneous traditions of all ages and countries, and confirmed by the ſtate of mankind in times more recent and well known. To diſmiſs ſuch teſtimonies as undeſerving of attention is preſuming, beyond the bounds of permiſſion, on the infallibility of our knowledge of thoſe principles and operations of nature, which the very variety of the opinions of its expounders ſhews to be uncertain. If a deluge ever did happen, it muſt render nugatory all theſe philoſophic dreams explaining the preſent ſtate of the earth independent of the changes it muſt have wrought. A diligent examination of its probable natural cauſes and effects, though with leſs ingenuity, is more likely to account for actual appearances ſtrongly marked with the features of convulſion and diſorder, than fluctuating and ever-contradictory ſyſtems, which never can obtain in any degree the authority or credibility of that ſo well atteſted epoch of mankind. Following only the very natural effects of a revolution capable of producing a general deluge, I have thence endeavoured to account

for the preſent ſtate of the earth. That revolution, however great in itſelf and in its conſequences to this globe, is certainly within the reach of poſſible natural contingencies. For the accompliſhment of that and of every other change which may in future be wrought upon this planet, God had from the beginning pre-ordained agents to fulfill his will at the appointed time. Theſe, as well as the more uſual order of things, are in nature, and will have no leſs certain effects. The combuſtibles and other materials proper to produce fermentation had been ſilently forming and gathering in the bowels of the earth for ages before that great exploſion of Veſuvius which happened in the time of Pliny. In the detail of cauſes and effects producing or following the deluge, I may be often miſtaken; but that event, than which no fact in hiſtory is better atteſted, is certainly as adequate as likely to have produced that derangement which we now perceive in the outward ſtructure of this earth. If I have not ſucceeded, my deficiencies may be ſupplied by abler hands. Philoſophers delight in creations of their own. That deluge ſtands in the way of many an ingenious ſyſtem; but to refute it they muſt ſhew it to have been impoſſible. Whilſt partial earthquakes and volcanos occaſionally overturn great tracts of country, ſwallowing up whole mountains on one hand and raiſing new ones on the other, they muſt demonſtrate that an univerſal earthquake, as much more tremendous as more extenſive in its effects, is not within the power of cauſes which might have exiſted in nature.

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On the formation of all calcareous ſubſtances from ſhells, a propoſition neither proved nor probable though here taken for granted, and another poſtulatum no leſs controvertible, viz. that the whole matter of this earth has been in fuſion by fire, becauſe the greateſt part of it is ſaid to be indiſſoluble in water (*g*), the whole baſis of this ſyſtem is laid. As well as the former, this laſt I have already diſcuſſed in examining Mr. de Buffon's opinions. What is here added is, that it was ſo under the preſſure of the whole maſs of waters, and that by fuſion and under that preſſure only true conſolidation and petrification can take place (*h*).

The French philoſopher, knowing the natural impoſſibility of waters ſojourning on matter in a ſtate of fuſion or even of incandeſcence, gives this globe 25 thouſand years to cool in order to fit it to receive them. Our bolder author overlooks the difficulty. He obſerves that volcanic fires do break out from under the bottom of the ſea: therefore ſuch fires may not only there accidentally be kindled, but conſtantly exiſt. As if theſe partial fires, inſtantaneouſly kindled and as ſuddenly extinguiſhed when in contact with its waters, could in any degree prove the conſtant ſtate of fuſion of the whole interior frame of this earth under their immediate touch. Dr. Hutton indeed ſuppoſes that this fuſion is not, as in Mr. de Buffon's ideas, occaſioned by the ſtate in which this planet iſſued from the ſun, but by the effect of ſubterraneous (*i*) fires and furnaces coeval with it and ſtill exiſting undiminiſhed. From theſe fires pro-

ceed volcanos and earthquakes. He will however permit me to obſerve, that the cauſes of volcanos and earthquakes are pretty well known to naturaliſts, as, by the mixture of ſulphur and iron with water under factitious mounds, they can imitate them very perfectly without the aid of extraneous fire (*k*). No ſuch central furnaces are therefore neceſſary to account for them. Mr. *de* Buffon imagines this g lobe to have been expelled from its parent ſun in a ſtate of fuſion gradually cooling, but thence yet retaining a central fire, far below the bottom of the ſea, which will at length like all terreſtrial fire burn out. Dr. Hutton pretends this central fire to have burnt for millions of years, and to continue kindled for millions of years to come, notwithſtanding thoſe emiſſions which have formed our metallic veins, and thoſe which keep up our volcanos. It muſt either be that ſame fiery fluid which is ſuppoſed to burn in the ſun without fuel and without loſs, or he muſt ſupply it with pabulum. Unreſtricted as to time, he thinks proper to employ the combuſtible matters, not of one but of two or more anterior earths, to feed his ſubterraneous fire. This is pure imagination, but not philoſophy. The fire which he ſuppoſes to have been burning for ſo many millions of years muſt in that time have conſumed, calcined, or evaporated, the whole ſubſtance of this globe, and with it have expired. Notwithſtanding theſe untoward objections, this deviation from his original is not without its uſe. From the well-known effects of entire fuſion it has been demonſtrated, againſt Mr. de Buffon's theory, that the preſent ſtate of thoſe ſubſtances called primitive,

which

which he affirms to have been in fuſion, ſhews that their liquefaction by fire is abſolutely impoſſible. From the compreſſion of ſuperincumbent waters, Dr. Hutton endeavours to evade theſe natural and neceſſary effects of fuſion. This compreſſion modifies all thoſe effects. This he explains by the example of ſtones thrown up by volcanos which appear to have ſuffered little in their texture, though liquid lavas may be at the ſame time emitted. There ſeems no real analogy here. Whilſt the matter compoſing liquid lavas has felt the full effect of fire, and pumice ſtones are greatly altered, theſe ſtones appearing little damaged have undoubtedly been torn from the ſides of the mountain by the inſtant effect of the convulſion, and falling into the boiling caldron are thence immediately exploded. Dr. Hutton has to account for adventitious ſubſtances inſerted without change in the interior, or for a great variety of diſtinct ſubſtances forming, except the cement, the whole texture of ſolid bodies ſaid to have been in long and therefore perfect fuſion. Can theſe erupted ſtones which have barely touched the fire give the ſmalleſt explication of the heterogeneous appearances of immenſe ſtrata pretended to have been liquefied by that element, whoſe known operation in that caſe is to mix all ſubſtances ſo perfectly as to compoſe from them a new homogeneous matter? Satisfied, however, that he may elude the conſtant effects of his great agent by the imagined compreſſion of waters, which in the order of nature could not have reſted for a moment on matter in fuſion, the author determines that

all the various ſtrata of our preſent lands have been in fuſion under the bottom of former ſeas, and there conſolidated by refrigeration.

Meſſieurs Raynal and Pallas had imagined a ſucceſſive change of ſeas and lands: the one by the perpetual incroachments and derelictions of the ocean, the other by volcanic fires. Dr. Hutton, not ſatisfied with theſe expedients, having conſtructed the preſent continents from the decompoſition of former lands in the manner we have ſeen, aſſerts that nature, which is ever living, and by her perpetual changes of decay and re-conſtruction ever renovating this globe, is now preparing under the ocean new ſubſtances and new lands from the ruins of the preſent. How many millions of years ago our actual habitations were formed under its waters, we may judge from the very ſlow progreſs of their decay and the ſtill ſlower progreſs of their final depoſition in the deepeſt parts of the ſea. But to bring together the materials, and mould at will during thouſands of ages the preſent or future earths, is not the moſt difficult taſk of imagination; the moſt ſtubborn ſtill remains behind: the means of raiſing from the deep abyſs theſe lands, when formed, to their preſent height above the level of the ſea, and to maintain them there when ſo uplifted, are not ſo obvious. His ready central furnace furniſhes him with powers to accompliſh the former part. The force of fire and ſteam is incalculable, and therefore there is no maſs ſo ponderous which it may not raiſe to any height (*l*); but how

how to preſerve it ſteady for ſo many ages in that unnatural elevation, it ſhould ſeem the doctor has not yet found out. To him I ſhall certainly leave it.

In the mean time he will give me leave to examine that proceſs of decay and re-conſtruction which certainly takes place on this globe. He maintains that all our preſent lands will one day be waſhed away into the ocean, which, whilſt it overflows that part of the globe which we now inhabit, will raiſe up new lands from its boſom. To know whether this can ever happen in whatever ſucceſſion of ages, without a convulſion ſuch as we apprehend to have been experienced at the deluge, it will be neceſſary to attend to the effects of decay and diluvion which nature preſents before our eyes. The ſummits of our rocky mountains moulder away, however ſlowly, and the ſame thing happens in a leſs degree to lower eminences. Let us ſee what becomes of their broken and ſhivered ruins. By much the greateſt part of them falls at the immediate feet of theſe crumbling mountains, where it conſtructs ſloping banks extending their dimenſions at the expence of their height. Theſe new banks are in time covered with graſſes, plants, or wood, defending them in great meaſure from the attacks of rains, air, and winds; and thereby the baſes of perhaps originally upright rocks are both extended and conſolidated. By the ſame means deep valleys are gradually cumulated. Another part of theſe ſpoils is ſwept away by rains into torrents which take their riſe in mountainous tracts.

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There it in the firſt place elevates the beds of theſe torrents, and whatever is not arreſted in them (and that part is very conſiderable from the obſtruction of larger fragments) is carried by them into larger rivers: the beds of theſe are alſo heightened, and no inconſiderable part in every inundation is diffuſed over the adjacent plains, elevating their general ſurface. By the impetuoſity of the waters, ſome part is hurried down to the mouths of rivers, where it raiſes ſand-banks, and gradually extends the coaſts, or forms new iſlands, at no great diſtance from the land. A very ſmall ſhare of the whole is by high tides and tempeſts ſwept into the deepeſt parts of the ſea, there to fill its cavities, and by a ſtill ſlower progreſs by degrees elevate the general bed of the ocean. Hence its waters too will alſo at length be raiſed above their preſent level. The mouldering ſummits of thoſe high cliffs which overhang the ſea fall at their feet, and raiſe their baſes above its waves, and more immediately by ſuch incroachments on its limits extend the land. In time, thoſe actual boundaries of its waters will, inſtead of ſteep precipices, preſent ſloping banks, backing and ſtrengthening the new lands compoſed of the ruins of their former heights (*m*). Such are the real proceſſes and effects of the very gradual decay of our mountains and eminences wherever ſituated. Let us now ſuppoſe, no matter in what number of ages, all our higheſt mountains reduced in their height from 3000 to 100 toiſes. What will have become of their ruins? At leaſt two-thirds will have extended their baſes and raiſed in a ſmaller degree all the circumjacent country;

try: of the remaining third, great ſhare will have been arreſted in torrents and rivers, or have raiſed the ſurface of the loweſt plains: what is hurried down by floods to the ſea will have there raiſed new lands and iſlands; a very ſmall portion, not a hundredth part, will have reached the deep. The contraction of the ocean aided by theſe depoſitions will, no doubt, have ſomewhat raiſed the preſent level of its waters, but certainly not in any proportion with the prior elevation of the lands. The general ſurface of the earth, ſo much more raiſed by a greater ſhare of the ſpoils of its mountains than can have been the bed of the ocean, will have maintained a ſtill more conſiderable proportionable elevation above the level of its waters than it has at preſent. Our higheſt mountains, become very gently-ſloping hills, will be defended by graſſes, plants, and woods, from any further conſiderable depredation, whilſt the great cauſes of degradation will be diminiſhed. The contracted ſurface of the ſea will furniſh leſs to evaporation to charge the air with ſuperabundant moiſture: the clouds, no longer attracted and broken by the aſpiring ſummits of high mountains, will give leſs frequent and leſs violent rains. The boiſterous torrent and the impetuous river become gentle ſtreams will carry little to the ſea to raiſe new lands, and ſtill leſs to the deep to raiſe its bed. What may yet be waſhed away from one part of the land will only change place to raiſe it in another. Hence, from the unerring teſtimony of the courſe of nature, I will conclude with the ſcriptures that the waters of the ocean ſhall never riſe again to inundate the earth.

If Providence deſigns this globe to ſubſiſt a length of time ſufficient to effect all theſe changes (and, unleſs the great Diſpoſer of the univerſe direct it otherwiſe, no others can take place, becauſe ſuch alone are in the real proceſs of nature), it appears evident to me that the aſpect of this earth will gradually approach to that ſame ſtate which Mr. Wallerius and I have imagined to have exiſted before the deluge. When our mountains ſhall have been reduced to gentle hills, eternal ice and ſnow, even in northern climates, will no longer top their ſummits to chill the air and earth below. The loud tempeſt and the hurricane will be huſhed. The ſpoils of mountains will have enriched and fertilized as well as elevated the general ſurface of the earth. The high platform of Siberia and Tartary will have been waſhed down, to render the extenſive ſandy deſerts below it capable of culture. The habitation of man will be every where extended and improved. Iſlands contiguous to continents will be joined to them. Ireland will be united to Great Britain, and this laſt to France. Fear not, Britons: even to fill up theſe narrow channels at leaſt a million of years will be required. The ſtring of Maldivia and Molucca Iſlands will be by degrees joined to India and China. Thoſe in the Gulph of Mexico will, by a chain of land, be again united to America. The numberleſs iſles of the Adriatic and of the Archipelago will connect Italy with Greece, and this laſt with Aſia. But in all theſe caſes there will ſtill probably remain for ages interior ſeas and lakes. The ſtreights of Conſtantinople and of the Dardanelles filled up will again ſhut up the

the Black Sea, and that of Marmora. In like manner will the ſtreights of Gibraltar and of the Red Sea be again cloſed by the rubbiſh of the mountains now ſurrounding them. New iſlands will ariſe in the ocean, and the increaſed numbers of mankind will every where be provided with new lands. In ſhort, this globe will nearly reſume the features of the antediluvian world. Having brought, in imagination, the degradations of our lands to an almoſt ſtationary point, we muſt there leave them, to await the decrees of that power who can alone preſerve or deſtroy what his will created into exiſtence. Such are the changes warranted by the actual proceſſes of Nature, which no length of time can ever alter, unleſs by the ſpecial command of that Great Being from whom ſhe received all her laws; our continents can never be totally waſhed away and their places occupied by the waters, nor new lands raiſed from the bottom of the ocean, unleſs by hidden interior cauſes of convulſion which man can neither inveſtigate nor reaſon upon, or by ſome derangement in the courſe or poſition of this planet. Philoſophers have no right to prognoſticate for futurity, but from viſible actually-exiſting operations of nature.

But before I take my final leave of Doctor Hutton, I muſt obſerve, that his all-powerful, wiſe, and ever-living organical and organizing nature is a non-entity, a mere metaphyſical abſtract idea. By that word nothing can be underſtood but inanimate ſenſeleſs matter, and the aggregate of thoſe laws by which it is governed.

If a ſuperior intelligent Being formed at will the whole ſubſtance of this univerſe, and impreſſed on it thoſe laws by which it is with infinite wiſdom directed to the purpoſe of his deſign, it is immaterial whether he willed it ſix thouſand or ſix millions of years ago. The firſt opinion, with reſpect at leaſt to the preſent ſtate of this our planet, is ſupported by every evidence which reaſon can require: the ſecond is poſſible, and on that poſſibility only can be grounded.

NOTES

NOTES AND ILLUSTRATIONS

TO

LETTER VIII.

(*a*) Page 528.

THE learned Mr. Huet, biſhop of Avranches, pretends, in his Hiſtory of the Navigation of the Antients, that men had not built either great or little ſhips before the deluge, becauſe, ſays he, if navigation had been known, others than the family of Noah might have ſaved themſelves from the deluge. Mr. Wallerius is alſo of the ſame opinion, becauſe the ark, the deſcription of which reſembles rather a great box than a ſhip, appears to have had neither keel, nor ſtern, rudder, nor ſails. Both theſe arguments are equally inconcluſive. Had the antediluvians poſſeſſed ſhips equal to the largeſt of ours in the preſent perfection of ſhip-building, could they have reſiſted a continued tempeſt of many months, raiſed not by partial winds, but by the confuſion of the elements and the wreck of the globe itſelf? Not many years ago, we ſaw ſhips of war driven from their moorings in the beſt ports of the Weſt-India Iſlands and ſunk by a hurricane, and the Ville de Paris of 110 guns, with ſome other 74 gun ſhips, loſt in full ſea, by a ſtorm of ſomewhat unuſual duration. What ſhip or what art of navigation could have ſaved men from deſtruction, when the ſea roſe above the higheſt eminences and covered the whole earth without ſhore or limit, whilſt the whole earth under it was convulſed by dreadful earthquakes, and ſinking into vaſt abyſſes? Under ſuch circumſtances, neither conſtruction, rudders, nor

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ſails, nor the moſt ſkilful art of mariners, could preſerve the ſtouteſt ſhips from perdition, even had the tempeſt laſted as many days as it did months. The ark alone was under the guidance and protection of the Almighty, and God probably directed it to be built in an unuſual ſhape without art, that Noah might be ſenſible that in him alone he was to place his whole confidence and hopes of ſafety. The patriarch himſelf, ſhut up even from the ſight of the dreadful ruin which ſurrounded him, was totally paſſive and inactive. Navigation has ever been one of the firſt and moſt ſucceſsful attempts of the moſt ſavage people inhabiting ſea-coaſts; and for a ſmall number of perſons their boats and canoes have been ever found ſufficiently ingenious and well adapted to the nature of the adjoining ſeas. We can have no reaſon to ſuppoſe that the antediluvians were immerſed in ſavage ignorance. Adam was inſtructed by God himſelf, and he was ſoon ſurrounded by a numerous progeny. The longevity of his race not only was calculated to preſerve but to improve every knowledge that men acquired. The earth, though curſed after the fall, yet produced, with little labour: all its climates were moderate, and mankind had yet full leiſure to employ himſelf in arts and ſtudy. How happens it that in the new world we yet ſee ſo many nations profoundly ignorant? As I before obſerved, thoſe tribes who travelled not far from the place of ſeparation at the diſperſion forgot not their former arts, but ſat down in ſociety in fertile countries and in happy climates; but thoſe who wandered to great diſtances, eſpecially towards the north, ſoon got entangled amidſt vaſt foreſts and moraſſes, and ſeparated, in queſt of ſcanty food, into very ſmall parties. Many of them loſt their herds and flocks, and were reduced to live on ſpontaneous roots, or to earn their food by hunting, which ſeparated them ſtill more from intercourſe with each other. In ſuch a courſe of life theſe iſolated families ſoon loſt all remembrance of former arts or knowledge, and habit endeared this ſavage independence to them. In the antediluvian world, in which all exceſſes of heat or cold were yet unknown, where every clime was fruitful and benign, no ſuch cauſe of brutal degeneration could take place. If the lands were, as I have deſcribed, interſected by frequent but comparatively

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ſmall ſeas, undiſturbed by high tides or violent tempeſts, very little art in ſhip-building or navigation was neceſſary; and it ſcarce can be imagined that mankind could ſubſiſt above ſixteen centuries, without taking poſſeſſion of that agreeable and convenient part of his domains. In thoſe tranquil and leſs extenſive ſeas the ſimpleſt ſails would ſuffice. Though the air was unagitated by hurricanes or tempeſts, it was not ſtagnant; and both ſome kind of ſails and directing rudders would be neceſſary. In general, ſome ſort of galley with oars and ſails in the ſimpleſt form would be ſufficient for ſhort trips on calm ſeas. Even ſhould the picture both Mr. Wallerius and I have drawn of the aſpect of the antediluvian world be imaginary and falſe, it is not probable that the advantages of navigation ſhould have been ſo long neglected.

(b) Page 533.

It ſeems to me that the great features of the deluge are in general imperfectly conceived or little attended to. We judge of it from partial inundations, which may happen in particular countries. Inceſſant rains, attended with violent hurricanes, driving part of the waters of the ſea beyond their bounds, joined perhaps to the breaking down of the mounds of lakes, may, for a ſhort time, inundate the low grounds of extenſive tracts. But how ſhall we, with ſuch means, imagine the whole earth to have been overflown for 150 days, without any decreaſe in the inundating waters? Rains and the whole water of the atmoſphere are inadequate; and the waters of the former ſeas could not anſwer the purpoſe. They could not totally have deſerted their own beds and left them dry, to ſpread themſelves over the higher land, ſo as to overtop all the eminences of the earth, however diminutive in compariſon of our preſent mountains; much leſs could they maintain themſelves in that unnatural elevation, whilſt lower parts remained unfilled. But let us advert that the fountains of the great abyſs were at the ſame time broken up. The ſame quantity of water, no doubt, exiſted then as now; but the land was probably more extenſive in proportion to the ſea. Great reſervoirs of water ſtill remain under the earth; before the

deluge, a much greater portion was hidden under its ſurface. When this was rent by earthquakes and volcanos, thoſe waters burſt forth (as yet ſometimes happens during earthquakes) with a force which we ſee feebly imitated in water-works, and added to the flood a quantity of water perhaps not very unequal to that of the former ſeas. The waters had prevailed upon the earth during 150 days, when they were commanded to ſubſide. How was this effected? Where did they retire to? In my conception, new convulſions now took place, by which hitherto-untouched inferior caverns were burſt open, ſwallowing up vaſt portions of the former land, and thus gradually preparing new, deeper, and more extenſive beds in the preſent ocean, to receive their ſuperabundance. It was then that the waters were hurried backwards and forwards, as the ſcripture tells us, ruſhing this way or that, towards new gulphs and cavities, ſucceſſively opened to receive them in various parts of the earth's circumference. From the effects of ſuch tremendous agitations, can we be ſurpriſed to find the ſpoils either of the ſea or of former continents promiſcuouſly ſcattered over, and often deep-buried under, the ſurface of the earth? By the ſinking in of the whole land around the antarctic pole, to form one vaſt though ſhallow ſea, the globe became more conſolidated in that part; the centre of gravity was thereby changed, and the track of the earth diverged from the equinoctial line. The ſhock thence occaſioned muſt alſo have had mighty effects, and, though the lands of the northern hemiſphere ſtood firmer, it may have drawn after it the total diſrupture of its continents and the formation of the Pacific and Atlantic ſeas. The whole bed of the preſent ocean was at length completed. The cavities which had been opened by theſe repeated convulſions under our remaining continents and iſlands were filled up by the ſliding in of great portions of the ſurface on one hand, whilſt, on the other, it was in many places elevated far above all former level. New chaſms and caverns were formed amidſt theſe ruins, into which the remaining waters ran, to fill ſtill ſubſiſting reſervoirs within the bowels of the earth, and totally to liberate its ſurface.

(c) Page 535.

Whoever has travelled through mountainous countries muſt have obſerved them traverſed in ſome parts by narrow chaſms, where the rugged faces of impending rocks with correſponding ſtrata frown at each other, and in others, by valleys preſenting, on one ſide at leaſt, if not on both, the ſloping declivities of mountain-backs. There we ſee the fracture itſelf which rent thoſe rocks aſunder: the ancient level has there been high uplifted into air: here we behold them dipping into the bowels of the earth, to fill up ſome deep cavern burſt open under them. If in the plain a ſhaft is ſunk, we ſhall find the ſame ſtrata as appeared on the face of the precipice dipping under ground, in the very ſame order and with the ſame inclination as down the mountain's back. If one or more of the ſuperior ſtrata are wanting, either on the declivity or within the earth, it is becauſe they have ſlipped off in the fall; and their confuſed ruins will be found to form the ſoil at the point of junction between the hill and the plain. Mr. Whitehurſt, in his inquiry into the original ſtate of the earth, has given plates, in which are delineated theſe inclined ſtrata from the tops of the mountains, where they appear in open day, to the greateſt depths penetrated by mining in Derbyſhire and the north of Ireland. When the convulſion which occaſioned theſe effects was confined to ſmall corners of a country, the delineation is eaſily followed: but where vaſt portions of the earth have been at once affected—as, for example, the continent of South America, from the height of the Andes, to meet the bottom of the Atlantic ocean at ſeveral hundred leagues diſtance—the traces of the whole are difficult to be ſeized. The difficulty is ſtill greater, becauſe the general inclined plane is frequently interrupted by the effects of partial fiſſures incident to ſuch a ſhock producing a variety of intermediate breaks and inequalities. If the operations of partial accidents are diſcoverable on many parts of the inclined plane, the much ſtronger effects of the general ſhock which overturned the ſite of the whole country are ſtill more frequent and more viſible amongſt the ſtupendous mountains elevated by it on the weſtern coaſt of that conti-

nent, dividing them into various chains and fractured portions: Such ſeems to have been the convulſion which at once changed the whole face of the earth, excavating new, deeper, and more extenſive ſeas, ſhaking the foundations of remaining continents, and elevating plains or little eminences to the ſtupendous height of our preſent mountains. In the vicinity of mountains, there are other obſervations confirmative of this their origin frequently to be made. The waters, which at the deluge covered the whole earth and its comparatively low eminences, ran not quietly off towards the newly depreſſed and enlarged bed of the ocean. Innumerable exploſions on every ſide agitated them to a degree which imagination cannot picture. In thoſe parts where our mountains are now reared, whether former ſeas, plains, or hills, they were ſuddenly and violently thrown off from the riſing heights, and their impetuoſity and ravages were proportionably great. Wherever the ſoil was leſs firm, or fiſſures gave an opening, they tore up and excavated deep ravines. Where theſe are found, particularly in ſuch ranges as are overtopped by ſtill higher mountains, we generally ſee mounts formed in a conical ſhape at the foot of theſe hollowed clifts, ſideways indeed to leave a paſſage to the torrent towards the lower plains and the ſea, but always on the higher ſide. Theſe were formed by the rubbiſh torn from out of theſe channels, and, as would naturally be the caſe, are gradually leſſened towards their ſummits, as the muddy torrent ſubſiding furniſhed fewer materials. This obſervation ſeems to have been firſt made by Mr. de Maillet in his Telliamed. Remarkable inſtances of this are to be ſeen in travelling from Brough under Stanemore towards Penrith. On the right-hand ſide, where a leſſening chain of mountains are prolonged from Stanemore and from Croſsfell, which overtops them from behind, there are ſeveral ſuch water-worn ravines, having each on the ſide towards Brough its conic mount, higher towards Brough, and gradually leſs elevated towards Penrith and the ſea. That ſuch deep channels ſhould, as Dr. Hutton wiſhes to perſuade us, have been worn out through beds of rock by their preſent ſcanty rills, in whatever fancied number of ages, is too abſurd to think of. Whatever their waters do corrode is much more than compen-

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ſated by arreſted rubbiſh from the heights. A larger fragment of ſtone, or a branch of a tree falling acroſs, accelerates thiş operation ; ſo that in fact theſe chaſms, inſtead of being deepened, are daily cumulated. On the left hand of the road from Blandford to Shaftſbury, amongſt many indications of the retreat of the waters which had once covered thoſe high downs, is a remarkable ſemicircular baſon at the head of a ſmall valley beneath, which bears evident marks of having been either ſcooped out, or at leaſt ſhaped to its preſent form, by the impetuoſity of falling waters. One may diſtinguiſh on its ſides where the currents have been ſtrongeſt, correſponding to the greater declivity of the encircling eminences from whence they ruſhed. Inſulated mountains have been formed, either by the depoſitions of the impetuous diluvian torrents, by earthquakes and volcanos, or by the perpendicular ſinking of the earth around them, leaving them with all their ancient horizontal ſtrata in their original poſition. It is in very few parts that the original features of the earth remain undiſturbed. To the deluge we muſt look up to account for its actual exterior ſtructure and appearance. In every corner of it, viſible and not to be miſtaken marks of diſlocation confirm this truth.

(d) Page 536.

Captain Cook, in his repeated voyages round the antarctic circle, conſtantly found innumerable iſles and fields of ice obſtructing navigation in latitude 61 and 62 ſouth. Having, however, penetrated as far in ſome parts as latitude 72, he there found a firm and fixed continent of ice, on which he deſcried vaſt accumulated mountains. From repeated and judicious obſervations, he pronounces this to be owing, not to the proximity of lands, the iſlands which he called Sandwich in latitude 59 being the laſt which he deſcried towards that pole, but to the ſhallowneſs of that ſea. The accumulating ſnows and ice ſinking there to the very bottom, become immoveably fixed to it. In the northern hemiſphere it was not the proximity of land which ſtopped his progreſs, for he paſſed Behring's Streights ; but though the lands diverging from thence on each ſide open a more extenſive widening ſea, he was again ſtopped by an icy

continent in latitude 70 north, becauſe he perceived the ſea was there become ſo ſhallow as to ſuffer the ice to be rooted to its bottom. On the oppoſite weſtern ſide of the hemiſphere, it is well known that the ſea, though ſometimes covered with floating ice, is paſſable in the proper ſeaſon, and even becomes leſs obſtructed as far as latitude 88, to which by various accounts it appears that ſome ſhips have penetrated.

(*e*) Page 536.

It is very poſſible that ſome ſmall change may have happened in the diſtance of the orbit of the earth from the ſun. The circumference of this globe, whoſe outward frame was formerly ſupported on greater and more numerous vaults, or, as Mr. de Luc imagines, on three ſeveral ranges of theſe one above another, became generally ſomewhat leſſened in magnitude, though much more irregular, whilſt its interior became more compact and conſolidated. This leſſened diameter and increaſed denſity would draw it proportionably nearer to the ſun.

(f) Page 541.

To the higheſt mountains of the earth, generally compoſed of vitreous or vitrificable or what they ſtyle primitive matter, Mr. de Buffon and almoſt all modern philoſophers have given the name of primitive, or of firſt formation. Leſſer mountains, compoſed of calcareous ſubſtances or of viſibly poſterior aggregations, they have denominated ſecondary: to theſe laſt ſome have given the name of tertiary. According to the ideas I have ſuggeſted, the higheſt mountains, though they may have poſſibly been in part primitive or antediluvian hills, cannot truly be called of firſt formation. On the contrary, they have all been evidently diſlocated, uplifted far above their ancient level on one ſide, and ſunk on the other by that convulſion which occaſioned the deluge. I have already ſhewn that the diſtinction between primitive and ſecondary matter is imaginary. In the preſent altered ſtate of the globe, the really primitive antediluvian eminences are no longer to be diſcriminated. But if we date from the deluge only, the firſt mountains, great or ſmall, or of whatever matter compoſed, raiſed by the

convulſion which occaſioned it, may be called primary in the preſent ſtructure of the earth. To theſe may juſtly be deemed ſecondary thoſe mountains which have been formed from the depoſitions or ſediments of the waters which for near a year covered the whole earth, or of thoſe which for many ſucceeding years probably prevailed over a very great part of it; and finally of thoſe which for ſome centuries were contained in many great interior lakes or ſeas, long ſince wholly or in part run off. Mountains which are compoſed of confuſed aggregations cauſed by impetuous torrents in the retreat of the waters towards the preſent ocean, or by the ſudden rupture of the barriers of former lakes or ſeas, may with equal propriety be called tertiary. A fourth claſs may be reckoned of mountains raiſed by volcanos, either under the waters or where the land juſt uncovered was yet encompaſſed by them. Theſe in the firſt ages after the deluge would be much more frequent and more general over the whole ſurface, from the much more frequent and violent conflicts of the elements within the bowels of the earth after the great convulſion which had ſhaken it to its centre. The firſt kind of mountains will rarely contain any foſſile ſhells. Even if ſuch had been bred in former lakes or ſeas which may have covered part of them, they would be ſhaken off their falling backs when part of the former ſurface of the land ſunk into the caverns of the earth. The ſecond will often contain marine ſhells, frequently in large beds, or diverſely mixed with other ſubſtances whether vitreous or calcareous. In the third will be found a confuſed mixture of marine and fluviatile ſhells. In the laſt, where fire has reigned, few remnants of them will be ſeen, though they cannot be entirely excluded from ſuch as have been raiſed from the bottom of the waters. The firſt, though they cannot be called primitive mountains, have, however, the beſt title to the appellation of primitive earth, though torn and diſlocated. All other parts of the ſurface have probably undergone ſtill greater ravages and alterations.

(g) Page 555.

Siliceous matter, ſays this author, is not ſoluble in water. Yet he allows that the water of Giezer in Iceland contains that ſubſtance in ſolution,

and

and he agrees that the Chevalier Dolomieu had diſcovered a means of diſſolving it in water by the addition of an alkali. Notwithſtanding this fact, further confirmed by the analyſis of the Giezer water by himſelf and Dr. Black, he reſolutely perſiſts in aſſerting that the liquefaction of ſiliceous ſubſtances ſerving as a cement to conſolidated ſtrata could not have been performed but by fuſion in fire. Pure water is certainly not an univerſal ſolvent; but is there any want of acids or alkalis in nature by whoſe aid it may become ſo? As I have before obſerved, there are many ſubſtances, and theſe great component parts of the ſtrata of this earth, including moſt of what are called primitive, which may be calcined or evaporated, but are not, as far as we know, fuſible in fire. The cements which unite that variety of matters forming granites, &c. are generally either calcareous or ſiliceous, and both of theſe we ſee are ſoluble in water by the aid of acids or alkalis. Should the cements be of another nature, it is not ſurely unnatural to ſuppoſe that water or moiſture may be impregnated with various menſtrua, amongſt which phlogiſton will act no inconſiderable part, by ſome one of which every ſubſtance may be ſoluble. The author maintains that ſulphur and bitumens cannot be diſſolved in water. Whether ſulphurs are diſſolved in water, or its principles in the air which they contain, may be a point of diſpute amongſt chemiſts; but certain it is that many waters are the vehicles of both ſulphur and bitumens. Quite contrary to what it appears to Dr. Hutton, it ſeems to me, that, if all the various ſubſtances contained in a ſolid maſs had ever been in a ſtate of perfect fuſion, few of theſe could retain their primitive figure or interior texture; but if in general the cements only of theſe maſſes were in ſolution by water, and afterwards depoſited and concreted around theſe conglomerated ſubſtances nowiſe diſſolved, theſe ſo inſerted or ſo agglutinated will naturally appear in their original form and texture. Flinty bodies inſulated in chalk or ſand, ſo far from being proofs that the whole had been in fuſion, appear to me rather evidences that the exterior matters ſurrounding them were depoſited or ſuperinduced over them by water, as it will preſently appear. There ſeems no ſmall reaſon to ſuſpect that ſome flints are formed poſteriorly by the decompoſition of pyrites, or by other chemical operations

tions of nature within various ſolid bodies, and of courſe much more eaſily in looſe ſtrata. Coals originating, according to the Doctor as well as Mr. de Buffon and moſt other naturaliſts, from the decompoſition of the vegetable ſubſtances of former earths, though he allows that their texture ſhews no ſigns of ſuch origin, are to him ſtrong proofs of ſubterraneous fuſion. How the thin laminæ ſo viſible in their whole texture came to be ſo little diſcompoſed by even the moſt imperfect fuſion, ſeems to me inexplicable. In the mean time I ſhall ſtill think them more likely to be compounded of a ſlatey ſubſtance, which ſo frequently appears unchanged, or only half transformed in the upper ſeams, variouſly impregnated with ſulphurs and bitumens, and by that variety forming more or leſs perfect coals.

(h) Page 555.

Whilſt ſetting aſide ſtalactites, which Dr. Hutton cannot but own to be petrified by water, we ſee ſo many inſtances of petrification by its medium, it is ſurely extraordinary that he ſhould aſſert that petrification can only be formed by fuſion. Mr. Paw, who certainly is no advocate for the Moſaical ſyſtem, or for the ſhort duration of this earth, yet as impartially as juſtly ſays: "Of all the attempts to calculate the age of the world, the ſyſtem of petrifactions is the moſt unphiloſophical; it being impoſſible to aſcertain a proceſs depending on the quality and quantity of lapifidic juices and other circumſtances, varying *ad infinitum* in different places, according to the nature of earths, waters, and air, and even of the poſition of the bodies on which the experiments are made."

(i) Page 555.

Dr. Hutton in his reply to Mr. Kirwan ſays, he has not founded his theory upon the ſuppoſition of a ſubterraneous fire, but that this follows from the clear evidence of all mineral bodies and ſtrata having been in fuſion. So far, however, is this evidence from being clear, that, in order to reconcile the appearances of the great ſtrata of the earth with fuſion, he is obliged to counteract its known effects by a ſuppoſed compreſſion; and that compreſſion is water, which, according to the laws of nature, muſt

have

have been repelled, thrown off, and evaporated by a body in actual fuſion. We have never heard of the ſea being in any part boiling; yet, according to him, ſtill exiſting furnaces under it are actually there melting the ſpoils of our preſent lands for the formation of future earths. Were this the caſe, certainly not only its waters would be hot, but the whole ocean would be in the moſt violent fermentation of boiling. All this is clear evidence that it is not the conſtant effects of nature which compel the ſyſtem, but that it is the ſyſtem which ſtrains to compel unwilling and refractory nature. Taking always for granted the fuſion of all mineral ſtrata, he concludes there muſt have been and ſtill exiſts interior fire, for without its aid he would have no agent to raiſe the preſent or future earths after conſolidation. Here again it is the ſyſtem only which forces the neceſſity of a ſubterraneous fire; for if, as we are told in ſcripture, the waters ran off the earth into receptacles prepared for them by the depreſſion of ſome parts of the globe, there is no neceſſity for this ſubterraneous fire, nor for its elevating power.

Mr. de Caroſi having obſerved in calcareous rocks in the Palatinate of Cracovia the evident appearances of gradual tranſition from the ſtate of pure lime-ſtone to that of ſiliceous veins and nodules, and having alſo diſcovered in thoſe mountains a number of diſſeminated pyrites either entire or in a half-decompoſed ſtate, has imagined that theſe laſt, with acids contained in abounding waters, are the chemical agents which have operated a real tranſmutation of calcareous into ſiliceous matter. This he thinks confirmed by frequently finding in the nodules of ſilex cavities containing ſometimes concentric layers of calcedony, and ſometimes of a yet calcareous ſpath, and in one inſtance the remains of the diſſolving water; in others, pyrites partly decompoſed are alſo found. Both he and Mr. Macquer aſſert, that from their accurate experience they find calcedony growing daily, not only in the ſolid body of gypſum, &c. while in the mine, but alſo in the ſolid ſtone preſerved in their cabinets. Should this be aſcertained, it places the real tranſmutation beyond all poſſible doubt. Mr. de Caroſi alſo thinks he has perceived the transformation of ſand-ſtone having a calcareous cement into ſiliceous nodules. Mr. Patrin has obſerved

ſerved near the river Argun in Siberia, rocks interiorly of pure grey hornſtein, converted gradually into lime-ſtone as their ſummits approach the atmoſphere. Mr. Monnet, from the cryſtallization of tranſparent quartz within very pure lime-ſtone rocks at Champigny near Paris, is perſuaded that it is not only the particles contained in ſolution in the water, but the water itſelf conſolidated, which forms great part of theſe hard bodies. In a limited view this muſt be true, as there can, I think, be little doubt but that water forms a conſtituent part of mineral as well as of vegetable and animal bodies. But it is much more probable that by decompoſition and re-combination the lime-ſtone itſelf is converted into quartz. To all theſe obſervations and opinions Dr. Hutton anſwers, that were it even certain (though he thinks it all illuſion) that ſuch metamorphoſes and concretions do take place on the ſurface when expoſed to all the chemical agents contained in the atmoſphere, yet that the general conformation and conſolidation of the ſtrata of the earth muſt have a different origin, not becauſe he has proved theſe ſeeming converſions to be impoſſible, but becauſe ſuch atmoſpheric influences could not have been exerted under the bottom of the ſea, where he has determined that all was formed, concreted, and conſolidated by fuſion. Here we again find this author, inſtead of proving his igniform origin, decidedly rejecting as neceſſarily fallacious or partial every appearance not coinciding with his pre-determined ſyſtem.

(*k*) Page 556.

Mr. Lemery was the firſt perſon who illuſtrated by actual experiment the origin of ſubterraneous fires. He mixed 25 pounds of powdered ſulphur with an equal weight of iron filings; and having kneaded the mixture together by a little water into the conſiſtence of a paſte, he put it into an iron pot, covered it with a cloth, and buried the whole a foot under ground. In eight or nine hours, the earth ſwelled, grew warm and cracked; hot ſulphureous vapours were perceived; a flame which dilated the cracks was obſerved; and a ſubterraneous fire producing a volcano in miniature was lighted up. The experiment has been frequently repeated.

It is to be obſerved, that too much or too little water will equally prevent inflammation. Pyrites, which are frequently found both on the ſurface and at all depths in the earth, are chiefly compoſed of ſulphur and iron. (Vide Watſon's Chemical Eſſays.) About 45 years ago, the experiment of imitating a volcano was tried at Paris on a larger ſcale—whether by the directions of the late Duke of Orleans, or of the Count de Lauragais, I do not recollect. The neceſſary ingredients were depoſited under a mount raiſed for the purpoſe in a garden. A perfect volcano was thence exhibited, to the no ſmall alarm of the neighbourhood.

Volcanos, according to Doctor Hutton, are not only the ſpiracula, but proofs of the exiſtence of his ſubterraneous fire. It is ſurely ſurpriſing that a chemiſt ſhould find extraneous fire neceſſary for the production of ſuch phenomena. He muſt daily ſee inflammation and fuſion produced without the aid of external fire. Without recurring to the leſs known operations of a laboratory, the ſimple and frequent accident of a hay-ſtack taking fire ſhews that ſubſtances in fermentation by moiſture kindle into flame without the approach of viſible fire. The electric ſhock, the ſtriking of ſteel againſt flint, produce fire by liberating the latent element where before quieſcent.

(*l*) Page 558.

Perpendicular ſtrata, ſuch as are much inclined, often leaning angularly againſt each other or againſt horizontal beds, and others bent into circular or ſemicircular figures, ſo frequently obſerved in the Alps with wonder by Mr. de Sauſſure, are to Doctor Hutton confirmations ſtrong of the whole earth having been elevated from the ocean by the power of his ſubterraneous fire. But theſe appearances, however ſtrange, are at leaſt as eaſily, and I think much more naturally, accounted for by the convulſions I have deſcribed as happening at the deluge, when vaſt portions of the ſurface of the earth with all their ſtrata were partly ſunk into gaping cavities, and partly high uplifted into air far above their antient level. The obſervations of Mr. Whitehurſt in mines, where the correſponding ſunken parts may be yet followed, certainly confirm this ſyſtem. By this convulſion,

convulſion, former nearly horizontal beds would neceſſarily become inclined, more or leſs according to the depth of the cavity, from the precipice where the earth was violently torn from its ancient level to the very bottom of the cavern into which part of it ſunk. Parts of the falling ruin would be fractured by the ſhock, and will thence naturally there exhibit broken and variouſly diſtorted ſtrata. The perpendicular or much inclined ſtrata of ſchiſtus under ſuper-induced horizontal beds of calcareous matter, which appear ſo difficult to be accounted for by Mr. de Luc, and accounted for by Doctor Hutton, by having been raiſed from the ſea by his expanſive force, ſunk again, and raiſed a ſecond time to their preſent ſituation in the long ſucceſſion of deſtroyed and renewed earths, ſeem eaſily explained by the probable exiſtence of many lakes and interior ſeas remaining for ſome ages after the deluge, now either much contracted or entirely diſappeared. Indeed I do not know any appearances in the actual ſtructure of this earth, which may not either be attributed to the firſt ſubſiding of terraqueous ſubſtances by central attraction at the creation itſelf, when dry land was made to appear, and the waters which till then covered the whole globe were by that very operation made to retire into the beds or cavities prepared to receive them; or more commonly by the various convulſions which agitated the earth at the deluge. From the effects of that awful cataſtrophe—when the whole ſurface of this globe was diſlocated, torn, and rent; when the baſons of antediluvian ſeas were elevated into the midſt of our continents, whilſt great part of the former lands was ſunk into the now ſhallow Pacific antarctic ſeas, thereby changing the centre of gravity nearer to the ſouthern pole—can we be ſurpriſed to find the ſtrata of the earth ſo much and ſo variouſly diſordered and diſplaced? Some accidents are eaſily conceived to be the reſult of the breaking down of the mounds which upheld former lakes or interior ſeas in the firſt centuries ſucceeding the deluge. Many, no doubt, were occaſioned by the frequency of volcanos and of earthquakes, during a long continuance of fermentation in all the elements, both in the atmoſphere and in the interior bowels of the earth. That God who had miraculouſly protected Noah and his children would probably quiet the convulſion in Armenia; what

happened during 400 years in the wide extended and yet uninhabited parts of the world is known to him alone.

(m) Page 560.

Our author ſuppoſes a quite contrary effect from the degradation of rocky ſhores. He ſays, when the ſea undermines their baſes the mountains tumble into it, and the waters hurry off the ruins into their deep abyſſes. That the general caſe is very different, every ſhore can tell. A maſs of rock detached falls at the foot of the cliff, and by its weight ſinks deep into the ſand. Sinking deeper and deeper, it ſoon becomes immoveable, arreſts and gathers round it leſſer ſtones and rubbiſh; in time forms a maſs of reſiſtance not to be diſplaced by the moſt furious waves, till at length, by ſucceeding degradations from the cliff above it, a new ſloping bank is raiſed above the uſual level of the ſea. This proceſs is viſible on every ſhore where the waters are not too deep to make this incroachment of the land upon the ſea as yet viſible; where the beach is ſhallow, a moderate ſtone, a piece of wood forms by degrees a ſand-bank, and may at length an iſland. The tide returns with much leſs violence than it flows, and every coming wave adds more to the ſhore than its return withdraws. If tempeſts did not occaſionally degrade this daily work, the elevation of the ſhores would, even from the operation of the ſea itſelf, be more ſpeedy and more viſible. The winds too are not inactive in adding to the lands. Part of the ſea ſands is driven towards them by their violence, and by degrees raiſes extenſive ranges of ſandy-hills along the ſhore. Partial inſtances of lands ſwallowed up or torn away by unuſual hurricanes and ſtorms break not the general rule. Nothing ſeems more certain than that the low lands and marſhes leading to the ocean are very generally raiſed and extended, and the ſea ſlowly contracted. In every part of the world, places known as ſea-ports ſome centuries ago are now a few miles diſtant from the ſea. The labours of man haſten in many parts this incroachment. If nature conſtantly acted in oppoſition to them, vain would be all his art and induſtry.

THOUGHTS

ON THE

STRUCTURE

OF THIS GLOBE.

LETTER IX.

CONCLUSIONS.

READY to give up every hypothetical or conjectural part of what I may have advanced in the foregoing Letters, ſo ſoon as more luminous or probable explications ſhall be offered, I muſt own, Sir, that there are certain points which appear to me inconteſtable, and others which carry with them all the appearances of probability which can reaſonably be exacted in ſuch matters by minds not pre-occupied by ſome favourite ſyſtem.

It appears to me certain, that ſince the firſt exiſtence of this globe there has happened at ſome period a general deluge, atteſted by ſtill ſub-

ſubſiſting monuments of nature, and confirmed by the conſentaneous traditions of all nations, in all ages, and in all parts of the world. This diſaſter muſt have been cauſed by ſome great convulſion capable of deranging the whole exterior coat of the earth; and its preſent ſtratification indicates ſuch derangement. Its conſequences muſt have greatly altered and affected the conſtitution both of the earth and of the few inhabitants who ſurvived the cataſtrophe. All ancient opinions and traditions concur in aſſerting it. Far from the poſſibility of removing the epoch of this great event to the diſtance of many thouſand years, or to ſtill more indefinite antiquity, as Mr. de Buffon and others, from the pretended teſtimonies of nature, and Mr. Bailly in his firſt work, from a forced interpretation of antique traditions, have maintained, I think I have evidently demonſtrated, even with the more mature conſent of this laſt author, that this great revolution cannot be thrown to a greater diſtance than 3500 years before Chriſt. I have ſhewn it probable that this utmoſt antiquity ſhould be conſiderably reduced. Not only all authentic hiſtory, but even all thoſe fables fabricated by the vanity of nations which reſtrict themſelves to the exiſtence of man, are limited far below that ſuppoſed period; and the traditions of the more ſimple nations, ſuch as the Tartars and Arabs, as well as Jews, determine the renovation of mankind to times conſiderably later. Beyond a period of even 1500 years before Chriſt, the boaſted hiſtories of the more poliſhed nations preſent us with nothing but fictions and fables, varioufly combined, and afforted to the vain pretenſions of particular nations contending for priority

of

of origin, but frequently founded on remnants of truths appertaining to the general hiſtory of mankind, aſſumed by each of theſe as the particular ſtory of its race and country. Sir Iſaac Newton has proved, that the firſt technical chronology of the Greeks had conſiderably ante-dated the primitive events of their hiſtory. From thence, ſubſequent chronologers transferred a like antiquity to correſponding events of other nations. The only probable or authentic documents of the ſtate of mankind previous to 1500 years before Chriſt muſt be ſought for in holy writ. Mutilated fragments of theſe form the ground-work, however variouſly altered, of whatever is rational relative to man in the annals or traditions of all parts of the world. There only can the real origin of nations be traced; and the very names of the moſt ancient of theſe, either unaltered or reſumed after having been changed, confirm the veracity of thoſe venerable records. Whenever any people claim an antiquity unwarranted by the Moſaical narration, they have recourſe to imaginary or allegorical perſonages, to gods or demi-gods. The race of pure mortals is every where reſtricted within very narrow limits. The thinneſs of population in the moſt ancient countries of which we have any account, as we aſcend upwards from 15 centuries before the Chriſtian era, contraſted with its rapidly progreſſive increaſe in thoſe ſame countries below that period, demonſtrates that the date of their firſt being inhabited cannot be very ancient. The tardy occupation and civilization of no leſs fertile and very contiguous countries, ſo late or later than twelve hundred years before Chriſt, ſhew that mankind

was not even then ſufficiently numerous to ſpread itſelf over half the earth, and that this renovated race cannot probably date ſo high as Mr. Bailly has fixed. It appears that this author's famous Indian era of 3101 years before Chriſt was probably framed on retrograde calculations, and not on real obſervations. Several other fictitious anterior eras were avowedly ſo determined. The ſuperſtitious ideas of judicial aſtrology, fixing all great ſublunary events to certain poſitions and conjunctions of the heavenly bodies, evidently prompted theſe laborious retrograde calculations. No ſtreſs can therefore be laid on theſe pretended aſtronomical obſervations to raiſe either the antiquity of the Indians or of the poſtdiluvian race beyond a period which may be much more reaſonably fixed by the Moſaical chronology. Conſiderable variations in this chronology reſult from the three different verſions of Geneſis; and I have ventured to offer ſome obſervations which may, perhaps, determine the era of the deluge with the greateſt probability to a middle term, which places it about 2698 years before Chriſt.

According to the Hebrew chronology of the antediluvian world, which is a medium between that of the Samaritan and that of the Septuagint, mankind had ſubſiſted above 1650 years before the deluge. The ſpace is ſufficiently long for diſcoveries and improvements in ſcience. That firſt race of men from longevity had peculiar advantages for the ſtudy of aſtronomy, and it was neceſſarily the inſtitutor of the ſucceeding race. Noah and his children ſaved from the

deluge at an advanced age or in full manhood, would probably retain ſome part of its ſciences. Theſe, on the ſeparation of mankind, were loſt or nearly obliterated amongſt ſeveral tribes during their long wanderings and repeated emigrations; and even amongſt the moſt ſedentary and fortunate nations, forced by the new ſtate of things to attend above all to their ſubſiſtence and ſecurity, remnants only, and general practical rules without principles of the more abſtruſe ſciences, were preſerved. The antediluvian race is then that learned nation which Mr. Bailly wiſhes to diſcover, and to it belong thoſe relics of former ſcience ſtill retained amongſt the eaſtern nations, the ſource and origin of which he elſewhere ſeeks in vain. The year of 360 days every where prevailing in the earlieſt times, and the Indian mode of calculation, ſeem concurrently to point out a real difference between the antediluvian and poſtdiluvian years.

The reſult then of our hiſtorical inveſtigations is, that there has been an univerſal deluge which almoſt deſtroyed the former race of men, and that its date cannot be removed beyond 3500 years before Chriſt, but that it is probably much leſs ancient; and finally, that the Moſaical account is the only one on which any reliance can be had relative to all facts preceding the 15th century before that era.

We have next, Sir, conſidered the validity of the ſo often repeated pretenſion, that the more unerring teſtimonies of nature atteſt a much greater antiquity not only of the world, but a much

more ancient date to any great revolution on the ſurface of the globe than can be warranted by the narration of Moſes, from thence triumphantly rejected as ſpurious. For this purpoſe, we have minutely examined the celebrated ſyſtem of Mr. de Buffon, and curſorily reviewed the opinions of ſeveral other modern philoſophers, holding forth the indiſputable evidences of nature as unanſwerable proofs, that the account given by that legiſlator of the creation was purely framed to ſuit the underſtandings of a groſs and ignorant people, but can in no wiſe be looked up to as a philoſophic guide.

In this review, I think I have ſhewn that the doctrines of theſe pretended infallible interpreters of nature are ſometimes in direct contradiction with her beſt-known fundamental laws, and that their theories are frequently ſupported on diſputable and often falſe views of her proceſſes, from whence groundleſs and unlogical concluſions are drawn. Frequently in contradiction with themſelves, they are almoſt ever in oppoſition to one another, though all equally pretending to infallibility. Whatever then may be thought of the Moſaical ſyſtem, it appears that no other has yet been produced which can claim from the philoſopher a decided preference.

I think I have ſufficiently ſhewn, from the very nature of ſtony matters, which Mr. de Buffon alledges in favour of his ſyſtem, that the moſt general formation of theſe ſubſtances could not have been by

fire, but by or under water. He himſelf is forced to recur to an unneceſſary ſecond formation by water. I have agreed with that author and many others, that viſible traces of the operation of fire are diſcernible on moſt parts of the earth, and on many where earthquakes and volcanos are now unuſual and unrecorded in hiſtory: but I have maintained, that theſe appearances are no proofs of the whole earth ever having been in a ſtate of fuſion. The frequent exploſions of ſubterraneous fires in all parts of the globe were the natural conſequences of the entire ſubverſion and diſlocation of its exterior coat, in the firſt moments of a great convulſion, which both natural and hiſtorical teſtimonies ſhew us that this planet has experienced ſince its firſt formation. The univerſality and frequency of theſe exploſions were probably continued for ſeveral ages after it, till the final ſettlement of the earth, and further prolonged by the preſence of many great bodies of water which, though now diſappeared, continued to ſojourn on ſeveral parts of its ſurface to a ſtill later period. I have proved by facts, that the date of eruptions cannot be computed by the number or variety of beds of lava exiſting in any one ſpot, nor can they be neceſſarily referred to an undefined antiquity becauſe unrecorded in countries where, for many centuries after the moſt recently ſuppoſed date of the deluge, the inhabitants, if any, were in a ſtate of barbariſm, and incapable of handing down to poſterity the events of their times. Even in more civilized regions, where ſuch accidents of nature are yet frequent, what notices we have of them in remote ages are ſcanty and caſual.

I have laid before you, Sir, the diſcordant opinions of ſeveral philoſophers on the important, but yet undetermined and perhaps for ever indeterminable, queſtion of the nature of light, heat and fire. The cauſes of the atmoſpheric cold in the higher regions of the air, and of the ſtrong influence of the ſolar rays on animal bodies whilſt the earth and air remain frigid—circumſtances not peculiar to great elevations, but alſo experienced in a ſlighter degree in the plains of hot countries during the prevalence of the cold winds—naturally found their place under this head. Without pretending to decide, with Meſſieurs Wallerius and de Luc, that the ſun is not a fiery body, or that its rays have no intrinſic heat, I have inclined to the opinion, that the chief effect of thoſe rays on all bodies are derived more from them as agents exciting and putting in motion by their attraction congenial particles exiſting in thoſe bodies, than from any communication of ſuperadded heat.

In the following Letters I have given an abſtract of the opinions of Mr. Wallerius, and have followed them by my own founded on the ſame principles, explaining the gradual progreſs of creation from the firſt chaotic maſs, delineated in Geneſis, by the ſucceſſive application of the fundamental laws of nature, ſeverally impreſſed and beginning to operate at the diſtinct commands of the Creator. In the courſe of our obſervations on the formation of this earth, I think we have made it appear, that the Moſaical account of the creation is not only not repugnant to the laws of nature, but is probably in every

point

point explicable by them, without giving any forced latitude to the conciſe expreſſions of that author, who aimed not to inſtruct philoſophers, but to deliver truths in the moſt ſimple manner. It has been ſhewn, that ſeveral expreſſions which have been looked upon as made uſe of in pure conformity to vulgar ideas are not only poſſibly but probably exact in their moſt literal ſenſe. If in the diſcuſſion of ſo many difficult points we have ſometimes been miſtaken, if in ſome details we have erred, we have at leaſt, in my apprehenſion, pointed out the road, by following of which more fortunate or more conſummate philoſophers may at length clear from obſcurity that venerable hiſtory of the firſt exiſtence of nature, and thence poſſibly be enabled to diſcover many of her yet ſeemingly impenetrable arcana. In conjunction with Meſſieurs Wallerius, de Luc, and Whitehurſt, I have pointed out a ſtate and aſpect of the antediluvian world very different to that which now exiſts.

A general deluge which muſt have greatly altered this former ſtate, whatever it was, is confirmed beyond all reaſonable probability of doubt, both by the conſentaneous traditions of all nations, and by the preſent diſlocated aſpect of the ſurface of the earth, and the viſible effects of water every where apparent. The cauſe of that deluge muſt have been both great and univerſal. The primary one, no doubt, was the all efficient will of the Supreme Being. To this, in puniſhment of the crimes of man, it is aſſigned by all ancient traditions. But as God generally employs ſecondary intermediate means, it is

both

both lawful and becoming philoſophy to enquire into the immediate cauſe capable of producing ſuch great effects. Whether the preſſure of a comet broke up, or the violent exploſions of ſubterraneous fires ſhook and rent the outward frame of the globe, is uncertain and conjectural; but with Meſſieurs Wallerius, de Luc, and Whitehurſt, I truſt I have made it probable, that the centre of gravity of this planet was changed by that convulſion which was capable of inundating the whole ſurface; and indeed no other means ſeem adequate to that effect. A change of centre of gravity from the centre of the globe itſelf nearer to one of its poles would neceſſarily diverge the axis, and this would naturally not only alter the conſtitution, but the courſe of this planet in the heavens. The preſent great inclination of its axis ſeems neither conſonant, as the beſt poſſible poſition, to the primitive deſigns of the beneficent Creator, nor analogous, as far as we know, to that of other planets; and hence reaſon alone may ſuggeſt that it was not original. If at any time, agreeable to the univerſally received tradition of mankind, the Divinity purpoſed in his wrath to render the former conſtitution of this earth leſs propitious, it ſeems not improbable to have been effected by ſuch a change. The moſt obvious means of altering the centre of gravity appears to be a partial compreſſion and more intimate conſolidation of ſome part of the earth. The aſpect of the ſouthern hemiſphere, ſo ſunken as to have become one general ſhallow ſea, ſtrongly favours the ſuppoſition that it was by the internal conſolidation of this part of the globe that the centre of gravity was removed

nearer

nearer to the ſouthern pole. This could not be effected without the almoſt total diſlocation of the exterior ſurface of the earth, which muſt conſequently produce a general deluge. Its preſent both exterior and to great depths interior ſtructure plainly indicates ſuch almoſt univerſal diſlocation to have happened. Such extended ruin muſt have been effected by the agency of a very great interior cauſe, and it is not difficult to aſſign one. Supported by the authority of the above-named philoſophers, I have offered a probable explication, by the breaking down of interior caverns more generally and more completely towards the ſouthern pole. The entire failure of the great vaults which covered theſe ſubterraneous cavities, and their immediate filling with compact and heavy matter towards this pole, account for the change of centre of gravity, and for immenſe tracts being there ſunken into ſhallow ſeas. The much leſs complete and more unequal rupture of many vaults in the northern hemiſphere, by the partial depreſſion of great portions of land and the proportional elevation of others, has occaſioned deep ſeas and great extents of high and variouſly broken continents in all that circumference. In this great convulſion, it mattered not whether thoſe former tracts were originally lands or ſeas: as circumſtances commanded, thoſe were ſunk into fathomleſs waters, and theſe were elevated into rugged mountains. The general poſition of ancient lands and ſeas was changed, but the moſt central parts of the preſent continents would ſuffer the leaſt alteration. The viſible rents, fractures, and fiſſures of high coaſts and of mountainous countries, and the frequently inclined

inclined poſition of the various ſtrata which compoſe them, ſloping from their higheſt ſummits and dipping into the earth to the greateſt depths in the ſame direction and in the ſame order, ſtrongly evince that ſuch a rupture of the exterior coat has at ſome period taken place, and that few parts of the ſurface now remain in their natural and primitive level. This is further proved by the interior grain and ſtructure of many ſtony matters which never could have been depoſited, concreted, or cryſtallized in their actual poſition. If the exterior or interior ſtructure of ſome mountains cannot be accorded with this origin, or aſcribed to this firſt convulſion, the impetuous retreat of the waters of the deluge, the irruption of former ſeas, or the frequency of volcanic exploſions during ſome centuries, amply account for their different aggregations. Theſe firſt great derangements, and the variety of climates introduced by the altered level of the ſurface, and by the new and ſudden inclination of the axis, give ſufficient reaſon for many important phenomena which ſtrike us in the preſent compoſition of the earth, and have given it a conſtitution very diſſimilar from that which previouſly obtained; a change of which the confuſed memory has been handed down to us by the primitive traditions of all nations.

Natural indications concurrently with ſeveral antient traditions make it highly probable that the ſubſiding waters of the deluge, uncovering a quantity of land more than ſufficient for the paucity of its then inhabitants, left after their firſt retreat numerous interior

ſeas

ſeas and lakes ſuſpended far above the level of the preſent ocean, though many of them are long ſince run off and become gulphs of the ſea or dry lands in the midſt of the continents. The breaking down of the mounds which for a time upheld them at various periods, perhaps during ſeveral centuries after the deluge, muſt have naturally cauſed new and important ravages on the ſurface of the earth. Theſe may well account for many ſecondary accumulations and excavations, and, conjointly with the former great convulſion, for all that variety of animal or vegetable depoſites found on the ſurface or contained within the bowels of the earth.

The at one period very remarkable and afterwards gradual decay of the human conſtitution, and the conſequent abridgement of the age of man, I have conjectured to have proceeded in the firſt inſtance from a ſubſequent depreſſion of the level of the ocean, which ſunk not to its preſent depth till the days of Phaleg; and in the following ages to the ſucceſſive diſappearance or diminution of thoſe great interior ſeas and lakes, which during their exiſtence greatly tempered the climates of the whole earth. From the moment theſe final changes, very naturally from the then ſtate of mankind unrecorded in hiſtory, took place, and not before, the preſent extremes and frequent viciſſitudes of heat and cold were felt, and had their full influence on the human frame; and this ſeems not to have been completed till after the age of Moſes, 1500 years before Chriſt. This idea is indeed hypothetical, but it will perhaps be allowed to

give a probable cauſe for the decreaſe of the age of man to the moment of its being reduced to the preſent ſtandard.

As the reunion of cauſes and effects attendant on or ſubſequent to the deluge is ſufficient to account for all the changes which have happened either to man or to the earth which he inhabits, without recurring to an antiquity unwarranted by ſcripture chronology, and which with reſpect to poſtdiluvian times ſtands limited by every concurring evidence which the nature of things admits; it is clearly as uſeleſs as contrary to ſound reaſon to have recourſe, with Mr. de Buffon, to an imaginary original formation requiring the ſucceſſive operation of ages, or to a ſlow deperdition of terreſtrial heat; or, with ſome other philoſophers, to a gradual change of lands and ſeas by the ſuppoſed conſtant invaſion and deſertion of the ocean. The experience of the laſt 2000 years belies the former aſſertion; and the ſecond, ſhould even the pretended motion of the ſea be certain, is mathematically impoſſible.

If after ſo many celebrated philoſophers I have dared to hazard my ideas, grounded on the text of the firſt and moſt venerable of hiſtorians, and ſupported by ſome authors of high authority; if I have in the courſe of my inveſtigations ſtated my opinion on other myſteries of nature; I give them not but as conjectures which appear to me to wear the beſt ſemblance of truth. Should they excite ſo much of the attention of men of greater abilities as to bring forth

more

more luminous explications, my feeble efforts would be amply rewarded by their ſucceſs. On ſuch difficult points the wiſeſt cannot hope to reunite all ſuffrages. If the features of nature may ſerve to point out her revolutions or to diſcover her age, the ſtate of mankind at different eras, and the traces they have left, are not to be neglected. It is from the reunion and confrontation of theſe teſtimonies that this cauſe muſt be judged. Notwithſtanding his deference to the deciſions of Mr. de Buffon, Mr. Bailly felt the truth of this, and ſtrove to reconcile antique traditions with his theory. To ſuch who are poſſeſſed of all the neceſſary talents and variety of knowledge required, I would propoſe a few queſtions to be decided by the ſimple light of reaſon.

Is it neceſſary that all thoſe laws of nature, whoſe reunion ſeems requiſite to preſerve the balance of nature complete, ſhould have all been ſimultaneouſly impreſſed and active in the moment of formation?

Is it poſſible to explain the ſucceſſive order of creation deſcribed in Geneſis by the ſucceſſive application of ſome of the fundamental laws of nature as ſeverally taking place and becoming active at the diſtinct commands of the Creator?

Do the actual proceſſes of nature and thoſe which chemiſtry develops imply the neceſſity of a long ſucceſſion of ages for the firſt depo-

depoſition, concretion, or cryſtallization of the ſeveral ſubſtances of which the earth is compoſed?

Do the monuments of nature concur with the teſtimonies of hiſtory, in eſtabliſhing the reality of a great convulſion and of a general deluge? Does the actual ſtructure of the earth neceſſitate more than one ſuch revolution?

Should even more than one have happened, is the laſt to be referred to an indefinite antiquity, or muſt its date be limited within a few centuries more or leſs of the time I have aſſigned?

Can or cannot the preſent diſordered ſtate of the earth, and the various phenomena which preſent themſelves both on its ſurface and in its bowels, be reaſonably attributed to this convulſion, or to its conſequent effects?

The ſketch which I have attempted may poſſibly convince ſome perſons, but it will not have the authority or the preciſion which others may exact. If a more able hand could fix the ideas of philoſophers by a clear deciſion of the above queſtions, not indeed beyond diſpute, for that is impoſſible, but beyond all reaſonable doubt, we ſhould have certainly advanced one important ſtep. If the reſult was unfavourable to the general ideas I have advanced, the field will remain open to every bold ſpeculation. But if the concluſion to be deduced

deduced from plain reaſon was ſuch as it appears to me, the wandering genius of future philoſophers will be reſtrained, and their heated imaginations will no longer deviate into infinite ſpace. The ſublime ſtudy of nature, not damped but confined within reaſonable limits, would be more uſefully directed to the amaſſing a ſeries of real facts, and to making from them ſuch deductions as may be warranted by fair logic. The romance of philoſophy would diſappear; but the hiſtory of its real acquiſitions would advance by ſlow but certain progreſſes.

If my feeble efforts have been able to make you, Sir, perceive that it is not impoſſible to conciliate the preſent formation and apparent changes which have happened to this globe with the ſhort duration generally allotted to it, I ſhall have fulfilled my aim. Where I have only been able to throw ſome ſcattered lights, others more deeply read in the hiſtory of nature and of man may be competent to carry the full blaze of conviction. The uncertainty of human reaſon, by ſome too fondly held up as an unerring guide, will ſtill however render every deciſion controvertible. That reaſon limited, but truly ſublime when not blinded by paſſion, has unfortunately as many ſhades as the countenances of men. It is not always with great genius or talents ſhe reſides; they have frequently exhibited the example of the moſt eccentric wanderings: but it is ever with the ſober few that ſhe takes refuge. To her meditations nature preſents the moſt unbounded and moſt magnificent ſpectacle. Let us dare to inveſti-

gate

gate her wonders: but let us ſtill be diffident of an heated imagination which may hurry us beyond the limits which are aſſigned to the powers of man, and let us not too far flatter ourſelves to penetrate by the ſole help of reaſon into the full ſecrets of her origin. Nothing is too daring, ſays Horace (*a*), for the aſpiring mind of man; but it is when it overleaps its preſcribed circle that its weakneſs becomes moſt manifeſt. No opinion ſo abſurd, no folly ſo extravagant, as not to have been at ſome time adopted by men of otherwiſe ſuperior parts. The Supreme Being has wiſely guarded the great principles of morality by an inſtinctive ſenſe (*b*) of right and wrong (*c*), which the moſt impious and moſt licentious doctrines have never been able totally to pervert in the great body of mankind: but he has abandoned the nature of this world to the diſputes of the learned —"Mundum autem tradidit diſputationi eorum;" and it is not in our days that theſe will terminate.

NOTES

NOTES AND ILLUSTRATIONS

TO

LETTER IX.

(*a*) Page 598.

Nil mortalibus arduum eſt,
Cœlum ipſum petimus ſtultitiâ.—Hor. l. i. od. 3.

WE may remark ſome precious relics of ancient traditions in this ſame ode. The ſons of Japhet, father of the northern and weſtern world, from whom the Greeks and European nations are derived, firſt ſteal fire from heaven:

Audax Japeti genus
Ignem fraude malâ gentibus intulit.

It was the wrath of heaven which abridged the life of man, and death heretofore tardy haſtened his ſteps.

Semotique prius tarda neceſſitas
Lethi, corripuit gradum.

(*b*) Page 598.

Many metaphyſicians agree in ſcouting an innate moral ſenſe as well as innate ideas. They cannot deny an inſtinct to the brute creation; why refuſe

refuſe it entirely to man? It is the real guide of the former, but, ſuſceptible both of amelioration and in ſome degree of deviation by education, why ſhould it not be allowed as an impulſe to the other? Irrational animals follow it unerringly if left to themſelves. The purſuit of hares and foxes is the natural inſtinct of hounds; but, though naturally afraid of man, they may be taught to follow and reliſh his blood in preference. To man inſtinct can only be a firſt impulſe, which his own reaſon or his bias to imitation may change or warp. By ſome it is contended, that there can be no innate moral ſenſe, becauſe whole nations have been found to adopt as meritorious, actions which others univerſally condemn. To ſuch I ſhall ſuggeſt the following remarks. It is generally deemed piety to cheriſh our aged parents, whilſt in ſome countries it is piety to put an end to their exiſtence. But this laſt proceeds from the ſame general inſtinct of gratitude, which ſome nations think beſt anſwered, by terminating at once a life which has already or will ſhortly become burdenſome to the poſſeſſor. We reaſon the ſame with reſpect to aged or diſeaſed horſes or dogs. No ſavage yet thought it right to put to death the benefactor who had juſt ſaved his life, at leaſt if not a declared enemy to his tribe. Should it happen in the latter caſe, it can only be becauſe his acquired or political reaſon has got the better of his natural impulſe. On this ground it was that Virginius ſacrificed his innocent daughter to family honour or to the public good.

In my opinion, what is called the conſcience of man is ever juſt and upright, when not debaſed by brutal ignorance, or warped by national or private intereſts and paſſions. In ſome deſolate and frozen climates, the ſavage, ſtupidly inſenſible to every thing that relates not to the means of ſubſiſtence or to the groſſeſt gratifications, has very few ideas beyond thoſe appetites which ſway the brute creation. In more advanced ſocieties, right or wrong, rigidly adhered to within themſelves, is circumſcribed within the narrow walk of the particular tribe or community. In the moſt poliſhed nations, prejudices and habits originating in the intereſts of the ruling part or in miſtaken ideas of religion not only obſcure the idea, but convert

crimes

crimes into heroic virtues. In Indoſtan, women, though poſſibly cheriſhing little or no real affection for their tyrant huſbands, were and are ſtill taught that it is diſhonourable not to burn themſelves alive in the prime of youth on the funeral pile of a deceaſed lord, though old, infirm, or churliſh in his lifetime. This probably originated not ſo much in ſuperſtition, as in the policy of men having many wives to guard their own ſafety from jealouſy and diſappointment, and to ſecure the fidelity of females looked upon as ſubſervient property. In other nations, it was in like manner cuſtomary to bury with their chiefs and heroes, arms, horſes, ſlaves, and ſometimes favourite courtiers. The notion inculcated was to ſerve them in another world; but the moſt probable original motive was to ſecure the fidelity of thoſe more immediately about them in the preſent.

In individuals conſcience is frequently clouded and ſometimes totally perverted by intereſt and paſſion. Subtle ſophiſts theſe, they are ever at hand to gloſs over and give a favourable colouring to whatever may at firſt alarm it. The tyrant or uſurper who ſacrifices thouſands to his ambition veils, even to himſelf, his crimes under ſome ſpecious pretexts: his talents will confer glory and proſperity on nations, and vanity ſuggeſts that he alone is worthy to command. The appetites or pleaſures he indulges in are well-earned relaxations from care and ſolicitude, and habit makes them neceſſary. In inferior ſtations, the means of advancing, however vicious, become juſtified by general practice. Gradually enfeebled conſcience ſcarcely ſtartles at crimes of deeper hue; till it at laſt becomes dormant, and wakens not but to give from time to time ſome tranſitory ſtings of remorſe, ſoon repelled by the more vigorous habits of vice.

The pride of genius, of ſcience, or of wit, is perhaps no leſs an enemy to conſcience than the more impetuous paſſions. Philoſophic pride has aimed to drag the godhead from his throne, has broken down thoſe barriers which conſcience yet upheld, and equalized vice and virtue. Elated by either really ſuperior, or not unfrequently by imaginary talents, the new Titans of the

age affix the ſtigma of imbecility on all who dare not equally with them; and every witling, borrowing a few of their phraſes, fancies himſelf a philoſopher; even females enter the liſts as champions of infidelity:—but of philoſophy as of poetry, we may ſay with Pope,

A little learning is a dangerous thing:
Drink deep, or taſte not the Pierian ſpring.

To the paſſions of this motley crowd, however individually contemptible, their ſage legiſlators addreſs themſelves in every ſhape and form, and in return receive new incenſe and celebrity. What enormities their principles diffuſed amongſt the multitude are capable of producing, the example of a neighbouring nation has ſufficiently evinced. May it at leaſt be a laſting warning to poſterity!

ERRATA.

Page 18 Line 10 — with, Judea, *read* with Judea,
—— 22 ——— 7 — p. 24, l. 10 & 13.—p. 56, l. 23. — 3102 *read* 3101
—— 24 ——— 10 — 3502 *read* 3501
—— 34 ——— laſt line, Heraclides, *read* Heraclidæ
—— 36 ——— 6 — cotemporaries, *read* contemporaries
—— 63 ——— 5 — ſucceſſors ; dele ;
—— 71 ——— 12 — Sethura, *read* Ketura
—— 89 ——— 9 — Ægialaus, *read* Ægialeus
—— 120 ——— 1 — Mecheean, *read* Mechoacan
—— 138 ——— 29 — p. 217, l. 6.—p 240, l. 14.—p. 251, l. 7 & 14.—p 339, l. 11. Gengis-khan, *read* Jenghiz-Khan
—— 149 ——— 6 — p. 150, l. 19.—p. 151, l. 29.—p. 152, l. 24.—p. 292, l. 14.— — p. 293, l. 12 & 24.—p. 357, l. 4.—p. 358, l. 10, 18, & 23.— — p. 374, l. 14.—p. 384, laſt line — depoſits, *read* depoſites
—— 153 ——— 20 — depoſit, *read* depoſite
—— 158 ——— 17 — Mr. Count, *read* Mr. Court
—— 165 ——— 16 — the ſame, *read* that ſame
—— 180 ——— 11 — Belgium. *read* Belgium, and line 12, Britain, *read* Britain.
—— 200 ——— 19 — cotemporaries, *read* contemporaries
—— 288 ——— 24 — theſe planets, *read* their plancts
—— 314 ——— 5 — 6, & 15.—p. 326, l. 1.—p. 329, l. 16.—p. 374, l. 7, vitrifiable, *read* vitrificable
—— 318 ——— 10 — menſtruums, *read* menſtrua.
—— 369 ——— 20 — though now, *add* unuſual
—— 397 ——— 23 — Fero *read* Ferro
—— 399 ——— 25 — Catherine *read* Catharine
—— 401 ——— 27 — Atalantis *read* Atlantis
—— 509 ——— 8 — who, *read* whole
13 — carcaſe, *read* carcaſs
—— 579 ——— 24 — Pacific antarctic, *read* Pacific and antarctic