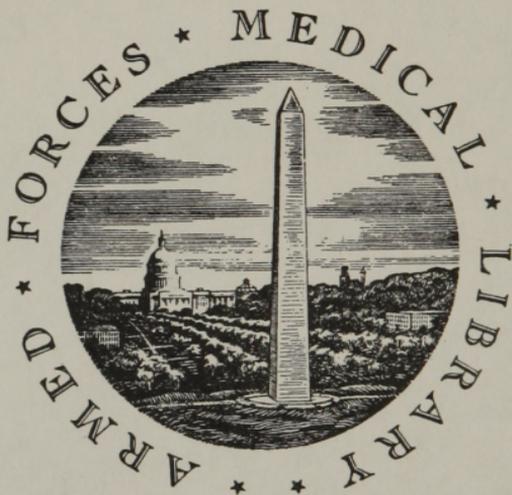


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Ann Jannet
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A Present from my
Friend Nancy Potts
March the 24th - 1809 - H

I have a bit of Piat in my soul,
And can myself create my little world.
Had I been born a four-legged child, methinks
I might have found the steps from boy to man
And crept into his nature.

"Death's Jest Book" - Beddow

TELLIAMED;
OR, THE
WORLD EXPLAIN'D:
CONTAINING
DISCOURSES
BETWEEN AN
Indian Philosopher
AND A
MISSIONARY,
ON THE
DIMINUTION OF THE SEA—
THE
FORMATION OF THE EARTH—
THE
ORIGIN OF MEN & ANIMALS;
AND OTHER
SINGULAR SUBJECTS,
RELATING TO
Natural History & Philosophy.

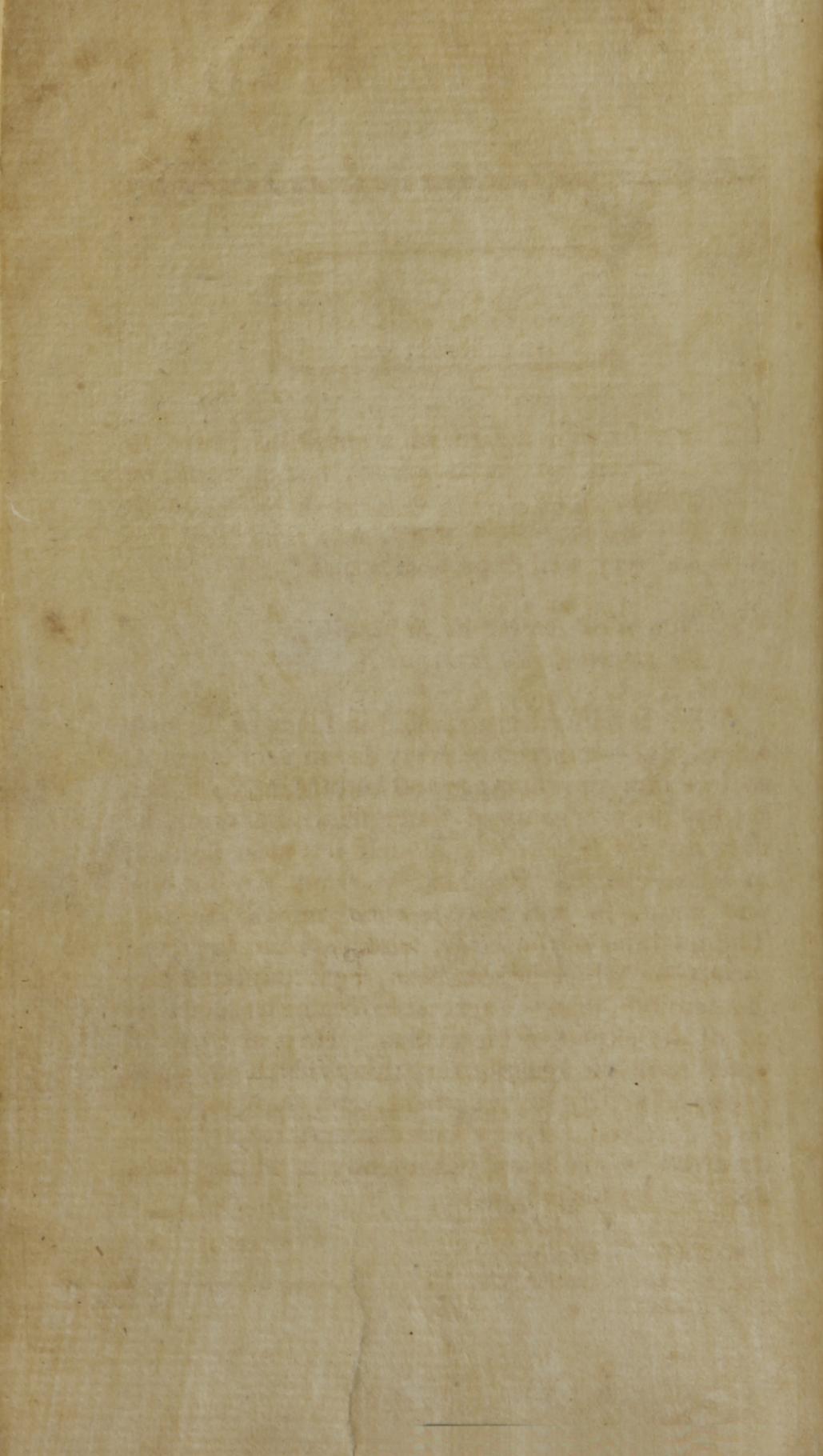
—A VERY CURIOUS WORK.—

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1797.








PREFACE.

IT is a strange design to attempt to prove to men that they are in an error; but it would be still stranger to be willing to force them to confess that they are so.—In a word, as a celebrated Poetess has very well expressed herself.*

*NUL n'est content de sa fortune,
Ni mecontent de son esprit.†*

MAN is naturally prepossessed in favor of his own knowledge—experience every day in vain attempts to shew him his ignorance and his blindness. When he has been a hundred times shewn his error, he does not for this believe himself less clear-sighted, or less infallible. Provided we grant him but this one point, he will perhaps condemn all the rest. The qualities of the heart, which are the bonds of society for which he was born, seem to interest him less sensibly, than the agreeable idea he has conceived of the extent of his genius. He is at first disposed to revolt against every thing which has a tendency to rectify his judgment, and shew him that he is deceived. Every one consents readily to be deceived by his heart, but nobody is willing to be deceived by his judgment.

* *Mad. des Houlieres.*

† No man is content with his fortune—nor discontent with his judgment.

THERE are, however, errors, which are not the less such for being generally believed. The antiquity or universality of an opinion, is by no means the standard of truth. I am of the opinion of an illustrious author*, who thinks, that in order to guard against error, the antiquity of an opinion is less a proof of its authenticity, than a just reason to call it in doubt, suspect it, and consequently not embrace it till after mature deliberation. To say that our ancestors have believed a thing, is a pitiful and pernicious argument, which cramps the mind, destroys reason, favours ignorance and error, and only proves, that in all ages men have been credulous; that since the number of ignorant and foolish men is greater than that of the wise and sagacious, truth is not always to be estimated by the multitude†; that the more ancient an opinion is, the nearer it approaches to the fabulous times; and that consequently there is no sentiment less worthy of reception, than that which has no more solid foundations than those of time, and the multitude of votaries. Experience furnishes us with so many proofs of this truth, that it would be an affront to the judgment of the reader, to pretend to give him instances of it.

* *The second principle that lays a foundation for error, is a blind veneration for antiquity. Our fathers, say we, have believed such a doctrine, why should we pretend to be wiser than they? If a folly is but ever so slightly established, this principle preserves it for ever. It forbids us to extricate ourselves from an error, because we have been in it for some time.*

FONTENELLE on the origin of fables.

† *The testimony of those who believe a thing already established, has no force to support that thing; but the testimony of those who do not believe it, has force to destroy it. Fontenelle's history of oracles.*

Grave etiam argumentum tibi videbatur, quod opinio de Diis immortalibus, et omnium esset, et quotidie cresceret.— Placet igitur tantas res opinione stultorum judicari, presertim qui illos insanos esse dicatis. Cic. de Nat. Deor. Lib. 5.

THE work now presented to the public, has been formed upon these principles. It is so singular, so much an original, and so very different from the common way of thinking, that the reader must acknowledge the whole to be new. The author is a bold philosopher—he reasons with uncommon liberty, and from plausible observations, and incontestable facts, builds a connected and coherent system. If his work is bad, he has the mortification of not succeeding, and if it is good, we reap the profit of his diligent researches.

As this work may fall into the hands of the learned, as well as the ignorant, we heartily wish that both may find their account in it. It is a great advantage for an author, when he knows how to mix delight with profit, without permitting erudition to lose any thing of its value, or suffering pleasant raillery to degenerate into pedantry and ostentation. But our *Indian* philosopher is so grave, that he never quits the serious and scientific strain. These *Indians* are an admirable set of men, and perhaps of all the animals God has made, none are less addicted to laughing. We must however apprise those readers, who seek for nothing but amusement in books, that this work is not absolutely destitute of entertaining narratives; that the second and sixth conversations, for instance, will furnish them with a considerable number of facts, which tho' related simply, and without ornament, will not fail to please them; and that the reading of the rest, will only cost them a moderate application. The reasonings of our *Indian* are generally so easy, and so far from being abstruse, that they require no more attention than that which our ladies daily bestow on a play or a romance. He never presents us with these metaphysical ideas, whose traces sometimes escape the reach of the

greatest penetration. He follows nature step by step, represents her most ordinary, and sometimes her most rare and singular productions. Is there any thing more pleasing than an observation of what nature daily performs before our eyes? What is more agreeable than to catch her as it were at work, and force her to display her most secret mysteries to us?

THE author could not have chosen a subject more capable of exciting the curiosity, not only of the learned, but of every man who is at the pains to think. Nothing is more important to us, than to be acquainted with the nature of the Globe we inhabit, which our ancestors inhabited before us, and which our posterity will inhabit so long as it shall subsist in the abyss of ages, the end of which is unknown to us; to examine whence it proceeded, how it was formed, what revolutions it has undergone, what its present state is, and to what vicissitudes it may be hereafter exposed.— If man is born to industry, it is more reasonable that he should be industrious about that which nearly concerns him, than about things which do not affect him.

THE author of the new dialogues of the dead*, ingeniously rallies those philosophers, who by an unpardonable abuse of their time and talents, tread upon man, because they do not know him, and often addict themselves to studies, which only tend to render them more vain and ridiculous than they were before. This reproach is equally due to most men of learning. But this perverse use of the human powers, is in no case more discernable, than in what relates to man himself. I know the

* *Dialogue between Paracelsus and Moliere.*

surprizing progress which within these two ages philosophy has made on this subject. Anatomy brought to a greater perfection, and the nature of the soul better described, than for five or six thousand years before, are sensible proofs of the genius, and just discernment of our moderns.— Among a vast number of frivolous studies, they do not neglect such as are most important.

THE nature and origin of our Globe have not been so well treated of by any other author; with respect to its origin, among the various opinions, which in all ages have divided mankind, all have agreed, that there was a period in which the world began to be inhabited; whether it was from eternity, as some of the ancient philosophers maintained, or whether it began to exist in time, as reason and religion induce us to believe this.— the human judgment has not as yet penetrated into. Religion in some, in others the prejudice of education, and in all, the obscurity of the subject, hinder them from carrying their researches farther. If some ancient philosophers, and even learned nations, have pretended to explain the manner in which this universe was formed, the ages in which they lived have seen that they only spread fables and romances under their most subtile systems, and most mysterious allegories.

WHAT relates to the nature of our globe, has not been better cleared up. This rude and unformed mass which supports and nourishes us, includes in its entrails numberless miracles, worthy of the longest and deepest study; such as minerals, metals, fossils, &c. and among these different species there is an infinite variety, the cause of which is but little known, since we have not made it our business to find it out. Prepossessed with

this general idea, that God by a single word, in an instant, produced the world out of nothing, we foolishly imagine, that this inhabited globe came from his hands in the state in which we see it, and upon this principle we have hastily concluded that it was needless to seek for any other reason than his omnipotence and will, for the prodigious variety observable in the composition of this globe. I leave mankind to judge of the truth of the consequence, by the absurdity of the principle; for without expatiating on this subject, let us only consider the different colours daily seen so whimsically mixed in the same piece of marble. To have recourse to the will of God, in order to explain this variety, is to have recourse to the occult qualities of the ancients, and tacitly confess our own ignorance; for to attribute this infinite variety to a supreme intelligence, without supposing an end for it, is at once to affirm and deny his existence.—What end worthy of God can we find in these instruments of human vanity, so long buried in the abyss which concealed them.

WHAT shall I say of that infinite number of extraneous bodies found in the hardest stones and marbles, or of those whole mountains of shells and sea bodies, which nature seems to have collected on purpose in places the most remote from those in which they were formed. To contest the truth of these facts, as some have done, to deny the heterogeneity of these bodies inserted in others of a quite different species, and not to grant the origin of these sea-bodies found in grounds the most remote from their element, is not only to belie the constant testimony of our senses, but also to renounce reason, and contradict good sense. Some learned men have for this reason

determined, not to investigate the cause of an effect which they could not call in question. Their different sentiments are explained or refuted in this work. It is true, some have had such absurd opinions of this matter, that they do not deserve refutation. Others with more penetrating eyes, and less prejudiced in favour of vulgar opinions, have carefully observed the composition of the different grounds of our globe. They have had considerable penetration, and seem to have had a glimmering view of truth; but because their eyes were as yet too weak to bear her splendor, she made her escape from them. Nature seemed to offer herself to them, without being hid in clouds. They wanted but to make one step into the most secret places of her sanctuary. But the small success of a great many researches has too often proved, that this last step is the longest, and the most difficult to be made. It was therefore reserved for TELLIAMED, first to penetrate into the dark recesses, where nature seems to wrap herself up in mysteries, to force her thence, and to reveal her secrets to us. It is he, who, concerning the origin and nature of this globe, gives us not simple conjectures, as many have done before him, but a certain knowledge founded on long, laborious, and exact researches, on incontestable facts, and upon lasting and sensible monuments of the great principles of the truths which he has discovered, and of the consequences which he has drawn from them.

It is astonishing, that in order to acquire this knowledge, he seems to have prevented the natural order, since instead of first attempting to investigate the origin of our globe, he has begun with instructing himself concerning its nature. This reversal of order has been in him the effect of

a happy genius, which has led him step by step to the most sublime discoveries. It is in decomposing this globe by an exact anatomy of all its parts, that he has first learned of what substances it was composed, and what arrangements these substances observed among each other. This knowledge joined to that arising from comparison, always necessary in the man who attempts to penetrate the veils in which nature loves to hide herself, has served as a guide to our philosopher, to arrive at the most important knowledge. By the matter and arrangement of these compositions, he has discovered the true origin of this globe, how and by whom it was formed. Hence, by natural consequences, he has fixed in some measure, not the first instant of its existence, which he did not believe possible for human reason to do, but the period at which it commenced to be habitable, that in which it began to be peopled, and that in which it may cease to be so. He has also laid before us all the revolutions, to which not only this globe, but all the others in the universe, may be subject in the immensity of ages.

WE can only judge by reading the work itself, how many meditations and researches were requisite to produce a system so *new* and *singular*, so connected and coherent. Perhaps it will not be improper to give a short analysis of it here. I must however promise, that I have no design to take any party for or against him; and that consequently, if there is any thing advantageous in this extract, to the system of the *Indian* philosopher, it ought to be looked upon as coming from an author who is highly charmed with his ideas.

THAT all the grounds of which our globe is composed, even the highest mountains, have risen out

of the waters; that they are the work of the sea, and have all been formed in her bosom, must at first certainly be thought a paradox, but, if we follow the deductions and researches of TELLIAMED, this paradox will appear to be a truth.

IF we narrowly examine, says this philosopher, the substance of our grounds, we observe nothing uniform in them, nothing but what indicates in their composition, the effect of a blind and successive cause; sand, mud, flints, confounded together, and united by a cement which makes but one mass of these different bodies; beds of those substances applied over each other, and preserving always the same arrangement, when they have not been disturbed by a foreign though known cause. If the sea forms in her bosom similar collections, composed of the same substances united by the salt which is proper to these waters, and which serves as a cement to them, arranged also in beds and layers, and disposed in the same direction, how is it possible for us not to be struck with such an agreement? But if this resemblance extends to the position of these collections; if it is the same in the bosom of the sea as upon land; if there as well as here, they are situated in the same manner; if on the grounds on dry land we observe, as well as in those covered by the waters, evident traces of the work of the sea, and of the assaults she has made upon them; who will be so obstinate as to refuse his assent to the truth arising so clearly from this discovery.

THIS so sensible proof of the origin of our grounds, continued he, becomes a demonstration, by the extraneous bodies inserted in their substances. We can distinguish two different species of these, which both concur to establish this truth.—

The first are terrestrial bodies, such as trees, leaves, plants, wood, iron, reptiles, and even human bones, found in the heart of the hardest stones and marbles. The second are sea-bodies, such as shells of all sorts, known and unknown, coralls, beds of oysters, bones of sea fish, and even fish themselves either intire or mutilated. These sea-bodies spread on the surface of the earth, are not in a small, but in an almost infinite number. They are not to be found in one single quarry perhaps placed on the coast, but are to be met with in all countries of the world, in places the most distant from the sea, on the surface of the mountains, and even at the bottom of their entrails. There are whole mountains of them, and these sea-bodies are really such, notwithstanding the sorry reasons of some literati, who at the expence of good sense have dared to maintain the contrary.

Now from these two species of extraneous bodies inserted in the substance of our globe, there results, according to TELLIAMED, a demonstration of his principle, that our grounds are the works of the sea. In a word, says he, it is evident, that these bodies whether terrestrial or marine, could not have penetrated into the masses in which they are at present found, except at a time when these substances of these masses were soft and liquid; neither is it less evident, that these sea-bodies could have only been carried by the sea into places at present so far distant from her. It is also certain, that these extraneous bodies either of the terrestrial or sea-kind, are found on the tops of our highest mountains. To attribute this prodigy to the deluge, is, according to our philosopher, an indefensible opinion. We must therefore, says he, draw this certain and necessary conclusion, that there has been a time when the sea covered the

highest mountains of our globe; that she covered them for a considerable number of years or ages, in order to knead and form them in her bosom; and that she has afterwards diminished by all the bulk of the waters supposed to be contained between their highest summits, and her present surface. This proof, continues he, which at first seems shocking, is confirmed daily, by the actual prolongation of our lands, which are visibly enlarged, and which shew us shores and harbours filled up and effaced, while others appear to supply their places. With how many examples does history furnish us of cities which the sea has left, and of countries which she has deserted?

THE apparent grounds then of our globe, are incontestably, adds he, the work of the sea; and since she has been diminished by all their height, it is evident that the cause of this diminution subsisting always, she still continues to diminish in like manner. From this principle arises a discovery, from which TELLIAMED knows how to draw a numerous train of consequences. In a word, says he, if it is true that the sea diminishes, it is no less evident, that there is no impossibility of finding the just measure of her real diminution. Now in comparing this present diminution with the elevation of our highest mountains, cannot we also discover the period of time, which the sea has employed in subsisting from all this elevation to her present surface, and consequently knew the number of ages elapsed since our globe became habitable? By comparing this sort of diminution at present, with the actual depth of the sea, cannot we also have the just measure of her future diminution, and consequently foresee the number of ages necessary for her total exhaustion, and perhaps for the burning of the whole globe?

THE *Indian* philosopher is not content with having found out the origin of the earth which we inhabit; the knowledge he acquired in studying this subject, has conducted him to other discoveries equally curious, and still more interesting. The very foundation of his system has furnished him with a proof, that in proportion as this globe exists, and as the animation of all that has life in it continues, there are formed, even in its bosom, the causes of the annihilation of that vital spirit which must one day cease in it, and lay a foundation for its burning. It is nearly thus, that during life the human body accumulates and collects what will one day be the principle of its destruction. Now from this, by a natural consequence, the *Indian* philosopher has concluded, that the same thing happened in all the other globes. In a word, he has observed that there is a perpetual motion in this universe, even with respect to its substance, and that there is a continual change in all the globes of which it is composed; that very considerable changes are observable in the moon, as well as in the globe of the earth, and in the body of the sun, as well as in the most distant of our planets; that after having shined for several ages, certain stars have disappeared totally, while others have appeared which we never saw before. From these observations, and some other phenomena which pass in the Heavens, he concludes, that at the end of a certain time the opaque globes become luminous, while those last become dark, and entirely lose their light; that both are not regular in this state of change; that by the exhaustion and extinction of the spirit of life, with which they are impregnated, these globes which are become opaque, are enflamed and set on fire a-new; that the new luminous globes, when the matter which served as aliment to them is totally consumed, fall

into their primitive obscurity, and that this continual circle of revolutions is formed and renewed perpetually in the vast immensity of manner.

SUCH are the principles which TELLIAMED has laid down and explained in the five first discourses of this work. He might have stopped here, and ought to have done so. His system by no means obliged him to explain, how in the passage from light to obscurity, men and animals might be renewed in the several globes of the universe. He had acted wisely, in referring these things to the supreme intelligence, who governs all. But the itch of reasoning, so common among philosophers, has not permitted him to confine himself within just bounds; and in order to push his system as far as it would go, he has carried things too far.— This is the subject of the sixth and last conversation, which is as singular, and as much an original as the others. In it TELLIAMED follows the same method, supporting himself much more upon the strength of facts, than the subtilty of reasoning.— It will no doubt appear very singular, to find men and animals coming out of the sea; but the *Indian* philosopher has only proposed this as an hypothesis. We must however grant, that he proves beyond contradiction, that the passage of any animal which lives in the water, to respiration in the air, is not so impossible, as is commonly believed; that respiration become necessary to animals come out of the sea, is not a sufficient reason to reject this opinion; that it seems founded on a great number of facts which cannot be easily denied, and which can hardly be explained on the ordinary hypothesis. Be this as it will, we have reason to believe, that many of the learned will find the whole system of the *Indian* philosopher sufficiently curious and singular to deserve their attention.

THE case is not the same with another class of persons, to whom this idea of novelty and singularity will perhaps appear a just reason for condemning the work; I mean those persons remarkable for their excessive scruples and delicacies in point of religion. I grant indeed, we cannot too much respect this delicacy, when it is enlightened and guided by reason; but it is equally certain, that this excessive zeal sometimes only proceeds from ignorance and meanness of spirit, since it often degenerates into false prejudices, and a barbarous and ridiculous blindness*; that without giving a shock to religion, we may boldly attack ill-grounded scruples, which are only the effects of an inexcusable superstition; and that if we are obliged to support the pure and salutary ideas of the former, we are equally bound to oppose the propagation of the stupid opinions set on foot by the latter; for it is hardly credible, how subtil error is to insinuate itself into the minds of men, how powerful it is to establish itself there, after it has taken possession, and to maintain itself, how dextrous to grasp at every thing which can favour the empire it has usurped†. Can we therefore be surprized, that it should cover itself with a cloak of religion, than which nothing is more venerable.

BE this as it will, these persons are the more troublesome, because “ though we can give them

* *Superstitio fusa per gentes oppressit omnium fere animos, atque hominum imbecillitatem occupavit. Nec vero, superstitione tollenda, religio tollitur. Quamobrem, ut religio propaganda etiam est, quæ est conjuncta cum cognitione naturæ, sic superstitionis stirpes omnes elidendæ sunt; instat enim & urget, & quocumque te verteris persequitur.*

Cic. de Divin. Lib. 2.

† *Errors once established among men, generally spread deep and wide roots, and cling about every thing which support them.*

Fontenelle's Origin of Fables.

“ very good reasons, yet they have a privilege not
 “ to yield to the best reasons if they do not like
 “ them*.” Now it is hardly to be doubted, but
 that upon the first appearance they will imagine
 there is something dangerous to religion in the sys-
 tem of the *Indian* philosopher, and that upon this
 account they will treat it as impious, atheistical and
 abominable. We might answer them in general,
 that we ought not to condemn slightly, and that if
 we were to found our judgment upon appearances,
 or upon consequences often very remote, there
 would be few christian schools, and even few
 ancient fathers of the church, who should be
 screened from censure. But the graver the accu-
 sation is, the more it deserves a formal answer.—
 Let us therefore fairly, and without prejudice,
 examine, whether instead of being opposite to reli-
 gion, the system of *Telliamed* is not on the contrary
 highly conformable to the most just and salutary
 ideas, which religion gives us of the deity.

LET us therefore separate from this system every
 thing which is foreign to it. Of this kind are the
 eternity of matter, *ab ante*, and the origin of
 man, such as our *Indian* has represented it. It is
 evident, that he only proposes both as hypothesis,
 and we cannot be offended at his taking this liberty,
 since it is authorised by the constant practice of all
 the schools. The eternity of matter, though sup-
 ported by some of the ancient philosophers, is an
 opinion so absurd, that in an age so knowing as
 ours, it is surprising that men who want to be tho't
 bright geniuses, should be the abettors of it.—
 With respect to the origin of man, what our phi-
 losopher has said of it in this treatise, is no more
 than a conjecture formed by a warm imagination,
 and can never make any impression on the mind

* *Preface to the plurality of worlds.*

of the reader. As to the deluge, it is needless here to enter into the celebrated controversy, whether it has been really universal, and whether the words of *Genesis* ought to be understood of an inundation truly general, and which covered the whole earth. *Telliamed* in some passages seems to deny this, but protests that it is indifferent to him which ever side of the question the reader espouses. And in a word, we find that the sentiments he has produced against the universality of the deluge, only terminate in some doubts; that if on these different subjects he proposes certain notions and reasonings, which seem to oppose revealed religion, he only does it to shew, that there is no object about which the human reason may not form either very great difficulties, or very probable systems, and that there are doctrines certainly true, which it combats with almost unanswerable objections.— Besides, it is to be remembered, that even in schools, we make a great difference between contesting a received doctrine, and contesting some reasons alledged to prove that it ought to be so.— Natural equity therefore demands that we should pardon our *Indian* philosopher on these three points, since in handling them, he has not pretended to establish a particular sentiment, and has never passed the bounds observed by the most sanguine defenders of orthodoxy, who have always claimed a right of examining the reasons used to defend the truths of religion, or to refute the opposite sentiments.

LET us now proceed to those opinions, which our philosopher has either established or supposed in this treatise, though they are not peculiar to himself. Of this kind are the plurality of globes, inhabited by creatures of our species, which is the basis of the fifth conversation; and the species of future eternity ascribed to these globes in the same

passage. But I am not of opinion that what *Tellamed* has said on this subject, can be any just reason to suspect his religion. Not to mention *Cyrano*, known for his imaginary voyages into the sun and moon, the author of the ingenious *conversations of the plurality of worlds*, has not been blamed for his ingenious raillery: And though we find a great deal of ostentation, and little solidity, in the works which *Huygens* composed on the same subject, yet he was far from being treated as an impious man, and an atheist, on that account. It has in our own days been shewn*, that this sentiment is by no means new, that it was known in the first ages of christianity; that though this opinion has been attributed to some heretics†, and though an author in the fourth century ranks it amongst the number of heresies†, yet it has been sustained, at least as a possibility||, in a work composed expressly against *Pagans*, by one of the most ancient and venerable fathers of the church,

WE may say the same of the future eternity of our globe, or rather of this universe. It is evident, that the scripture, which teaches us that this world must one day have an end, no where informs us that it is to be annihilated; that even in

* *Memoirs of literature, Tom. 9. Dissertation entitled, sentiments of the ancient philosophers on the plurality of worlds.*

† *Iræneus attributes it to the Valentiniens. Advers. Hæres. Lib. 2.*

‡ *Philastres bishop of Bresce. Hæres. 65. Tom. 2. Bibl. P. P.*

|| *Nec enim quia unus est Creator, idcirco unus est mundus; poterat enim Deus, et alios mundos facere.*

Athan. contra Gentes,

several passages it formally indicates the contrary; * that the primitive christians had been of this last opinion, and universally believed, that the general conflagration would only purify this world, without annihilating its matter; that the most celebrated fathers of the church, such as *Origen* and *Augustin*, † thought the same. Shall we therefore condemn in a philosopher, what we ought to respect in the defenders of the faith?

OF all the system then of *TELLIAMED*, there are only two points on which perhaps any accusation may be formed against him, I mean the origin of our earth, such as he establishes it, and the perpetuity of motion, which he admits in the other globes; for when we tell you that this globe which we inhabit is the work of the sea, if you reason but a little, you at once judge, that in order to admit this proposition, you must renounce the history of the creation, such as we read it in *Genesis*; and if you take one step farther, you think yourself obliged to acknowledge the pre-existence of matter.— This holds true of that eternal circulation of changes, by means of which our philosopher pre-

* For behold I create new heavens, and a new earth, and the former shall not be remembered nor come into mind—*Isa.* lxx. 17. And I saw a new heaven and a new earth, and the first heaven and the first earth were passed away; and there was no more sea—*Rev.* xxi. 1. Nevertheless, we according to his promise look for new heavens, and a new earth, wherein dwelleth righteousness—*2 Pet.* iii. 13.

† *Si mutabuntur cæli, utique non perit quod mutatur; Et si habitus mundi transit non omni modo, exterminatio, vel perditio substantiæ materialis ostenditur: Sed immutatio quadam sit qualitatis, atque habitus transformatio—Origen de Princ. Lib. 1. cap. 6. In litteris quidem legitur, preterit figura hujus mundi; legitur mundus transit; legitur cælum & terra transibunt; sed puto quod præterit, transit, transibunt, aliquanto mitius dicta sunt quam peribunt—August. de civitat. Dei, lib. 2. cap. 24.*

tends to shew, that the state of the universe may perpetuate itself. The reader may at first imagine, that this principle has a tendency to oppose the actual concurrence of a supreme and intelligent cause, and consequently to destroy providence*. Let us therefore enquire what we ought to think of these consequences; by reducing things to their just value, perhaps we shall find that the disadvantageous idea, which people may entertain of this work, is at bottom no more than a bugbear, and a phantom, only capable of terrifying prepossessed imaginations.

LET us begin with the origin of our globe. It is at first visible, that the opinion of pre-existence of matter, as it is explained or supposed in this treatise, gives no shock to the omnipotence of the creator, and the gratitude due to him from the creature, for the being he has conferred on it: For whether the creation of matter has, or has not, for many ages preceded the actual arrangement of this universe which TELLIAMED supposes in his system, God will for this be neither the less powerful and glorious, nor less the author and creator of all things.

It is true, this sentiment is not generally received; because it is opposite to the common belief, that the universe was produced from nothing in the same state in which we see it; and because it seems to combat what the scriptures teach us concerning the origin of the world. But we know that *Vatablius*, *Grotius*, and other learned men, have maintained, that in order to give the true sense of the first verse of *Genesis*, it ought to be translated,

* This is what *Clemens Alexandrinus* found fault with in the Vortices of *Anaxagoras*.

when God created the heavens and the earth, matter was without form, which clearly establishes the pre-existence of matter. If this opinion is not true, it may at least be looked upon as probable, and we must grant, that a simple probability is sufficient to lay a foundation for a philosophical system. It would be easy to shew, that if the system of TELLIAMED concerning the origin of the earth, is not entirely conformable to the Mosaic history of the creation, yet it is not absolutely contrary to it.

WHAT means that mass in the beginning without shape and form, that darkness spread upon the face of the deep; the spirit of God moving upon the face of the waters, and that separation of the waters from the waters, mentioned in *Genesis*? What other ideas do these expressions naturally convey to the mind, than those which our philosopher gives us, when he represents this globe to be buried at first under the waters of the sea, which animated by that spirit of life with which the creator had impregnated them, formed our grounds and our mountains in their bosom. These waters afterwards diminished in the manner explained by TELLIAMED, their surface subsided, and our highest mountains beginning to shew their tops above the waves, the earth as yet barren, soon gave the first marks of her fertility: Then she began to be clothed with herbs, and the verdant pasturage, necessary for the nourishment of the animals with which she was afterwards stocked. Man was the last work of the hand of God, and in all these respects, scripture and the philosophy of our *Indian*, present our minds with the same images.

IT may perhaps be said, that since in *Genesis*, the word *day* is used to denote the time in which God produced the works of creation, we ought by a

neccessary consequence to believe, that they were accomplished in the space of six days, or of six revolutions of the globe round its center. But it is evident from *Genesis* itself, that the sun was not created till the fourth day, and that consequently before that time, we could neither count days nor nights; whence we may conclude, that the word *day* is in that part used improperly, metaphorically, and to signify the succession with which the supreme intelligence executed the different works there mentioned. Besides, the longest or the shortest measure of time which this formation of the universe cost him, is by no means capable of taking from, or adding to his power; God would not have been greater, though he had produced the world in an instant, or to use the scripture expression by a *let it be*. Thus neither the six days in which, according to *Genesis*, he laboured at his production, nor a longer space of time, such as we imagine, according to the system of TELLIAMED, nor what the scripture says concerning his resting on the seventh day, as if he had been fatigued by his labour, in the least diminish his glory. There is no time in him; the past and the future are in him indivisible; and if *Moses* has said, that he employed six days to create the heavens, the earth, and all that they contain, it is perhaps a method of speaking which he used, to inform us that all these things were made successively.

WITH respect to providence, we want to know what we ought to understand by that term; and whether a work composed with so much wisdom and art, that without retouching it, its very destruction should prove the principle of its renovation, would not be an infallible mark of a wisdom much more perfect, powerful, and attentive to the good of those for whom this work was formed,

than if at every instant the artificer was obliged to put his hand to it? What comparison could we make between a clock-maker, who had skill enough to make a clock so curiously, that by the disorder which time should produce on her parts and movements, there should be new wheels and springs formed out of the pieces, which had been worn and broken; and another artist of the same profession, whose work should every day, every hour, and minute, require his attention to rectify its errors, and eternal variations?

PERMIT me to use this comparison, which in the present case, I confess has no foundation, except in the narrow limits of our understanding and ideas: This is precisely the case which remains to be determined between TELLIAMED and his opposers.

THESE represent the creator under the idea of a bungling and unskilful artificer, whose work is so slight and unjust, that its total ruin is every moment expected. The workman in vain puts his hand to it, and employs all his pains to rectify its faults. After a constant and assiduous application, after reiterated attempts which cost him no less labour than the original production, he is no farther advanced than he was the first day; and he will always have his toil to begin, till he destroys the sorry work of so much care and pains. I defy the most moderate abettors of the divine concurrence to say, that I have exaggerated this description of their opinion. Do they not maintain, that to every action of the creature, whatever it is, the intervention of the general cause is absolutely necessary, and that every instant of preservation is a new creation? As others have sufficiently shewn the terrible consequences arising from this system, I shall not here touch upon them.

THE *Indian* philosopher presents us with a quite different image of the Deity. He describes him under the idea of a skilful artist, infinitely master of his business, who in the production of his work, employs all the means proper to render it durable, useful, and beautiful. Time which consumes all things, and the nature of human affairs, always subject to vicissitudes, in vain attempt a change in his master-piece; they cannot produce its destruction. These very disorders which he foresaw must happen, will contribute to its preservation. It will perpetuate itself by the same means, which in other works prove the principles of their ruin; and from the bosom of its own wrecks, it will arise as perfect and beautiful, as it appeared on its first formation.

Now of these two representations, which gives us the most noble, sublime, and exalted idea of the Deity? What is more proper to excite our gratitude and love, than to see him so far concerned for our tranquility, as to prevent our dread, lest his works, abandoned by his powerful hand, should one day return to that chaos whence his goodness drew them for our sakes? What more glorious for God, than to have so formed the world, which we inhabit, that in preserving always, nearly the same number of opaque and luminous globes, the destruction of some should contribute to the renovation of others, without being obliged to produce new ones? What more worthy of the Creator, than to have established such an order in the nature of the universe, that it should carry in itself the principles both of its life and death; that animated with that spirit of life, with which he has impregnated it, it should be in its infancy the author of all those productions which were either useful or necessary to the subsistence of the creatures,

destined to inhabit it; that it afterwards should wax old, by the weakening of this same spirit; that it shall be set on fire by the extinction of this spirit—and by its return, like the *Phenix* rise out of its own ashes? If nature always uses the best economy in producing the greatest designs*, how can we think to honor the author of nature, by subjecting him to so painful and continual attentions, to a design of so small importance to him, as the preservation of this universe?

IT may, perhaps, be said, that this principle tends to establish the idle deity of *Epicurus*; and in order to render the opinion of *Telliamed* odious, people will not fail in imitation of *Cicero*, to draw a ridiculous picture of this divinity. Hence people will conclude, like him, that to imagine a God like this, is, in effect, to acknowledge none at all. We might answer, that to consult even the *Roman* orator in the comparison, the insensible idol of the *Epicureans*, was, perhaps, far more valuable than the restless active deity, to whom the *Stoics* gave so many occupations so highly below him.—But we have at present no business either with the *Stoics* or *Epicureans*. It is sufficient to have shewn, that the sentiment of *Telliamed*, is so far from striking at the wisdom, the goodness, and the omnipotence of God, that it is on the contrary infinitely favourable to these divine attributes, which both reason and scripture oblige us to acknowledge in the Supreme Being.

WE certainly cannot easily force our philosopher to grant, that God is continually employed in the preservation of the universe, and that he is so strongly attached to this work, that at every

* *Dialogues on the plurality of worlds*, 1 Evening.

moment it is requisite for him to use the utmost efforts of his power to sustain it. Besides, he will readily acknowledge, that the work of preservation, is truly the work of the hand of God; that nothing happens in the world without his permission, and in conformity to his eternal decrees; and that among all the second causes, there is not one which is not subordinate to his omnipotent will. The defenders of the actual divine concurrence will not be content with this concession.—But is not this, perhaps, as much a fault in their manner of thinking, as in that of our philosopher? Can they refuse to grant, that the operations of God do by no means resemble any thing that is suggested by our weak and shallow ideas? And upon this principle, is it not evident, that they attribute to the Deity a providence no more than purely human, and bounded by hours and moments, such as we may conceive in a wise man? Is not a providence, thus limited and imperfect, a providence, the end of which is nothing else than to make God the author of sin, and to sap the foundations of morality, † infinitely unworthy of a sovereignly perfect being? Can we more effectually honor this Supreme intelligence, than in disengaging him from the slavery to which these base and servile ideas seem to reduce him?

If, however, there should remain any scruples with respect to these points, every one is at liberty to look upon what *Telliamed* has wrote on them as the *diversion of his mind, founded on conjectures*, on some phænomena, or on consequences very remote from the solidity of the proofs, which he advances for the diminution of the sea. The pro-

† This is what the disciples of *Descartes* and *Malbranche* are upbraided with.

testations he frequently makes of his having no mind to take any part in these differences, but only to sustain his sentiment as a pure hypothesis, leave us no room to doubt of the rectitude of his intentions, and of the little disposition he had to appear a dogmatist. We ought therefore to read his two last conferences, with the same turn of mind, that we read the agreeable reveries of *Cyrano*, and the ingenious fictions contained in the discourses on the plurality of worlds. No body ever upbraided these authors on account of what they wrote, and *Telliamed* expects the same indulgence from his readers.

THIS is what I had to say in defence of our *Indian* philosopher, without pretending to be his disciple, or to justify him; and I protest that I only look upon his system, as well as the other systems of ancient and modern philosophers, to be an ingenious chimera. I shall add one reflection, which cannot fail to make an impression on the minds of wise men. When the philosophy of *Descartes* appeared, what outcries were made against his doctrine? The most hot and zealous asserted, that it had tendency to nothing less than the destruction of religion, the very foundations of which it sapped. However, this so dangerous system was afterwards adopted and maintained, at least in part, through all the most orthodox christian schools.—Why so? Because in the judgment of prepossessed and ignorant people, it is sufficient for a doctrine to have an air of novelty, to be judged pernicious. Time wears off this false impression, and it becomes less suspected in proportion as it grows older, or rather as it begins to be better known.—Let me add, that in our days we know better than ever, the extreme difference there is between the doctrines of faith and ideas purely human. In a

word, it is now generally granted, that religion and philosophy have rights very distinct, and a manner of reasoning peculiar to each of them; that the one is superior to nature, whose laws God may reverse at his pleasure; and that the other is the science of nature herself, whose laws God has permitted us to trace and investigate; that faith is above reason; and that on the contrary, *reason* is the *candle* which ought to light us to all natural knowledge.

UPON this principle let the reader look upon *Telliamed*, as a philosopher who has by no means attempted to compose a treatise of theology. Let him therefore be permitted to reason like a philosopher; and let us in his discourses only seek for systems purely philosophical. Let those who want to instruct themselves in their religion, consult the many excellent works, in all ages wrote in its defence. As for the *Indian* philosopher he here protests, that he only pretends to interest reason in his system, and that, if people do him justice, they can only attack him by the light of reason.

Cum de religione agitur, T. Coruncanium, P. Scipionem, P. Scævolum, pontifices maximos, non Zenonem, aut Cleanthem, aut Chrysippum sequor; habeoque C. Lælium augurem, eundem sapientem, quem potius audiam de religione dicentem in illa oratione, quam quemquam principem Stoicorum; mihi unum satis erat, ita nobis majores nostros tradidisse. Sed tu auctoritates omnes contemnis; ratione pugnas, patere igitur rationam meam, cum tua ratione contendere.

Cic. de Nat. Deor. l. 3.

THE STATE OF NEW YORK
IN SENATE
January 15, 1840

REPORT
OF THE
COMMISSIONERS OF THE LAND OFFICE
IN ANSWER TO A RESOLUTION PASSED BY THE SENATE
MAY 18, 1839

ALBANY:
PUBLISHED BY
J. B. BARNES, AT THE
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1840

P L A N
O F
Celliamed's System.

FIRST DAY.

PROOFS of the diminution of the sea.
Foundation and origin of this system.
Aquatic Lanthorn of a singular invention.
Principles of this system.
Proofs of this system by the disposition of our grounds.
— *By their composition.*
— *By the sea bodies found in them.*
— *By their external form and appearance.*
New proofs of this system.
Petrification of flints.
Variegated stones and marbles.
Rock and gravel stones.
Waved marbles.
Our large mountains.
Primitive state of our globe.
*Reason of the difference observable in the substance of
our mountains.*

SECOND DAY.

SEQUEL of the same doctrine proved by facts.
Extraneous bodies found in stones and marbles.

Ships, and parts of ships, petrified.
Flints, sea flints, and stones of a different colour.
Herbs and plants.
Sea-bodies dispersed in all parts of the globe.
Mountains of shells, corals, &c.
Small mushrooms.
Banks of oyster-shells.
Whether these facts can be attributed to the deluge.
Towns of Lybia buried under the sand.
Future consequences of the diminution of the sea.
How our grounds began to appear.
The actual enlargement of our dry land.
Examples of this enlargement.

THIRD DAY.

NEW proofs of the diminution of the sea.
Estimation of this diminution.
*The waters of the sea are not diminished by a change
of place.*
They have not retired into the centre of the globe.
The cause of their diminution is not an effervescence.
Defect of our histories.
*Invention to ascertain the progress of the diminution of
the sea.*
Ancient examples of mensurations of this kind.
Estimation of this diminution.
Difficulty of fixing it.

FOURTH DAY.

*EXAMINATION of the different systems concerning
the origin and nature of the sea-bodies found in our
mountains.*
*System concerning the origin of our mountains, and its
refutation.*
Answer to some difficulties drawn from this system.
Dissertation of Scilla on the same subject.

Sea-bodies found in the earth, are not the effects of chance.

Answer to some objections made upon this subject.

New proofs from Scilla.

Sentiment of Langius, and its refutation.

Sentiment of Omar.

Last proofs of the diminution of the sea.

Recapitulation of the proofs of this system.

Use that may be made of it.

FIFTH DAY.

CAUSES of the diminution of the sea ; consequences of this system, with respect to the past, present, and future state of the universe.

Whether matter and motion are eternal.

System of the general motion of the globes.

Alterations and vicissitudes to which they are subject.

Reason of the inequality of the days, and of the vicissitudes of the seasons.

Changes which have happened in the state of the heavens.

The nature of the sun.

The appearance of comets.

The entrance of our earth into the vortex of the sun.

The great age of the primitive men.

Renovation of the globes.

Origin of Vulcanos.

Uncertainty of the future fate of our earth.

The state of the fixed stars.

Refutation of Huygens's system concerning the plurality of worlds.

Various thoughts on the same subject.

SIXTH DAY.

OF the origin of men and animals, and of the propa-

- gations of the various species by means of their respective seeds.
- Terrestrial plants that grow in the sea.
- The origin of animals.
- Their resemblance to certain fishes.
- Easiness of the passage from water to the air.
- Birds.
- Terrestrial animals.
- Phocases, or sea-calves.
- Sea-dogs, or wolves.
- The origin of man.
- Sea-man.
- Savage, or wild men.
- Men with tails.
- Men without beards.
- Men with one leg, and one hand.
- Blacks.
- Giants.
- Dwarfs.
- The passage of men from the water into the air.
- Answer to some objections on this subject.
- Tradition of the Chinesse.
- An animal may pass from the respiration of the water to that of the air, and from the latter to the former.
- Answer to some difficulties.
- The propagation of the various species by their respective seeds.
- How these seeds become fruitful.
- Conformity of this system with the book of Genesis.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

First Day.

PROOFS OF THE DIMINUTION OF THE SEA.

SIR,

SINCE you desire that I should *ENTERTAIN* you with the whimsical opinion of an *INDIAN TRAVELLER*, whom I saw at *Grand Cairo* a number of years ago—I shall grant your request, and perform my task as exactly as I possibly can. I have still so lively an idea of the remarkable things I learned of him, that I hope I shall not omit the least particular. This stranger reposed a great confidence in me, and thought he lay under singular obligations for some small services I did him in *Egypt*. He readily disclosed his mind to me, when some days before his departure for the *Indies*, I asked him concerning his country, his name, his family, his religion, and the motives which induced him to travel;—he accordingly spoke to me nearly in the following manner:—

TELLIAMED'S NARRATION.

SIR, I have always declined speaking to you of my religion, because it can be of no use to you, and because all men being naturally prepossessed in favor of that in which they are born, it offends them to contradict the articles of it. For this reason, and by the advice of my deceased father, I have all my life avoided entering into this matter, that I might not give rise to disputes in which every man thinks it a point of honor and conscience to support his own opinion, and which never terminate but in mutual animosities. For this reason, Sir, I hope you will pardon me for not satisfying your curiosity in this particular. I would not have even spoke my sentiments to you, on the composition of the globe, the study of which is the cause of my travels, if I had not discerned in you, a soul capable of triumphing over the prejudices of birth and education, and above being provoked at the things I intend to communicate to you; perhaps they will at first appear to you opposite to what is contained in your sacred books, yet I hope in the end to convince you that they are not really so. Philosophers (permit me to class myself among that number, however unworthy of the name) rarely find these happy dispositions; they have not even met with them in the ages and in the countries of liberty, where it has been often dangerous for some of them who have dared to speak against the opinions of the vulgar. Besides, continued our *Indian*, you have travelled a great deal, you have travelled through many maritime countries, you seem to think that the secrets of nature are not unworthy of your curiosity. You have learned to doubt, and every man who can do so, has a great advantage over him who believes implicitly, and without taking the trouble to examine. You there-

fore possess, Sir, the principal dispositions necessary for relishing the observations I am about to make. This gives me reason to hope that you will yield to the evidence of the proofs I shall bring, for the support of my system.

As for my family, my name, and my country, what I can tell you is, that I am the son of a father who was far advanced in years when I was brought into the world ; as for my country, it is far distant from yours. My name, which you are curious to know, only from a principle of friendship to me and my son, is *Telliamed*. My father, who was blessed with the goods of fortune, was by my grandfather educated in the study of the sciences, especially of natural history, which he himself had greatly cultivated. My father took care to nourish in me the same inclination which he had received as hereditary from my grandfather, and to instruct me concerning the composition of this habitable globe, which was his own principal study. Such was his paternal affection, that notwithstanding his age, he travelled along with me and assisted my thoughts and meditations. Death, which cut him off too soon, did not permit him to perfect me in these sublime branches of knowledge : However, the passion with which he had inspired me for them, and the desire of communicating them to my son, render me now, though advanced in years, a traveller through the world with him.

AN observation which my grandfather made, and which he communicated to my father, was the cause of a course of study, which lasted all their lives, and which has been the principal occupation of mine. The house of my ancestors, which I still possess, is built on the sea-side, at the point of

a very narrow but long peninsula. It is covered by a small island, the whole of which is a hard rock perfectly horizontal with the sea. My grandfather, as he assured my father, had in his youth observed, that in the greatest calm, the sea always remained above the rock, and covered it with water: Twenty-two years, however, before his death, the surface of this rock appeared dry and began to rise.

THIS event surprised my grandfather, and made him entertain some doubts, concerning the generally established opinion, that the sea is not diminished. He even thought that if there was any reality in this apparent diminution, it could only be the continuation of a preceding diminution, of which the grounds or soils higher than the sea, would, no doubt bear or include in them the sensible marks. This idea engaged him to examine these grounds with more attention than he had done before. He accordingly found that there was no difference between the places far from the sea, and these which were either near to it or still washed by it; that they had the same aspect, and that the former as well as the latter had sea-shells adhering to, and inserted in their surfaces. He found twenty kinds of petrifications which had no resemblance to each other; some were deep, and others superficial; some were of an uniform, and others of different substances. He observed quarries of free-stone, hard and soft, of various colours and different grains. He found other quarries of flint or of inlaid stones, white, black, greyish, and often of a whimsical assemblage of colours. Some of the quarries were marble, white, black—of the colour of agate, shaded and not shaded.

THE origin of this so great variety of soils, joined to the *Strata* or beds so different in substance,

thickness and colour, of which most of these quarries were composed, strangely perplexed his reason. On the one hand, if this globe had been created in an instant, in the same state in which we see it, by the power of a will as efficacious as absolute, he thought that its solid substance would have been composed of one single matter; and especially that it would not have been arranged in beds laid over each other with justness, even in their inequality of substance and colour. This denotes a successive composition, which is also justified by the insertion, of so many extraneous bodies, even such as have had life, into those beds. But if it had been necessary to have recourse to another origin of our soils, though both within and without these petrifications he remarked almost infallible traces of the action of the sea, how could he comprehend that it could have formed them, since it was now so far below them? How could he persuade himself that it had drawn from its bosom, the different materials which he saw employed in the composition of these soils.

THESE reflections induced him to go to the seaside, to see whether in meditating on what happened there daily, it was possible for him to remove his doubts, and discover the true origin of the terrestrial globe. He thought that as the literati, who were the ornaments of his time, were mostly employed in vain and frivolous studies, he might well employ his days in the research of a subject so interesting as the origin of those soils or earths which carry us, of which our cities are built, and which supply our wants. With this view, he slowly wandered along the sea-shore, sometimes on foot, and at others in a light chaise, often very near, and sometimes at a great distance, that he might have a greater extent of ground under his eyes, and be

able to observe the disposition of a whole coast.— He stopped for several hours on one shore, and in a particular place observed (if I may so call it) the labour of the waves, which broke at his feet: the sand and the flints which the billows brought along, as they were either calm or tempestuous. Sometimes he sat down on the summit of a steep rock, which the sea washed; and from thence, as well as the waves permitted him, he observed whatever was most remarkable.

His principal study at this time, was to discover the disposition of subaquatic soils, the motion and the labour of the waves of the sea. For this purpose he hired several skilful divers, whom he used when the depth of the water no longer permitted his eye to distinguish objects and the qualities of soils. These divers had caps of cere-cloth and masks; to the tops of these caps, which below were lined with a large quantity of cotton, and so closely tied about the neck that no water could enter, were tied long thongs of leather, by means of which they could dive into very deep places, and remain under the water for several hours— Each of them had a compass in his hand and a small sharp-pointed stick, with a streamer at one end— By thrusting this stick into the bottom they perceived the force and direction of the current; they could also walk easily under water, when the bottom was not too soft. This my grandfather put in execution in the greatest calm, far from the shore, and in places where it was possible to reach the bottom with the thongs. He repeated his experiments in the same place several times, and when opposite winds blew. By this means he knew whether there were any variations in the currents and in the different observations he had made on the same places.

As he desired to know the state of the seas where the divers could not go either by the thongs or the assistance of their breath, he invented a machine, which succeeded with him to the greatest perfection. It gave him an opportunity of continuing his discoveries even in the deepest places where no sound could reach. This invention is so singular, that it deserves a description.

OF a very light but strong and thick wood, he ordered casks to be made, narrow at the bottom, one of whose extremities terminated like the apex or top of a sugar-loaf. These lanthorns, seven or eight feet in height, and about the middle three or four wide, had eight apertures. The four least made at equal distances, and disposed severally as high as the eyes of a man when he stood upright in the lanthorn, were exactly closed by sashes and crystal glasses. The four others, a foot and a half broad and three feet long, cut below the others, were closed up by tough and thin leather pasted and nailed to the outside of the wood, so that the water could enter into none of the apertures.— The first mentioned holes were designed to facilitate the diver's power of considering all the bottom which surrounded him, when he dived with this lanthorn. The others, by the air always mixed with the water, and transpiring through the leather which closed them, served to refresh the person contained in the lanthorn, and render respiration easy. These skins being gently stretched, had also another use, which was to yield to the double motion of this respiration; and to follow that of another leather, nailed in form of a purse, to the inner side of the bottom of the lanthorn, when the diver wanted to push it outwards,

To understand this the better, imagine to yourself that in the thickness of the wood of which the bottom was made, and which was two inches thick, there was an aperture made a foot and a half in diameter, covered externally by a plate of iron, nailed to the wood, and internally to this leather in form of a purse: betwixt the iron and the leather, was introduced into the aperture a foot and a half square, a piece of wood exactly fitted to it, and of the same thickness with the bottom. This piece of wood was suspended in the cavity which it fitted, at the distance of an inch from the plate of iron, by means of a spring tied to it at one of the ends, and at the other, nailed to the wood of the bottom. The toughness of the leather, with which it was covered internally, and the largeness of the square, permitted this elevation. By this means the piece of wood had a spring; for in proportion as it was pressed, it was depressed into its aperture as far as the plate to which it corresponded; and it rose an inch and more as soon as the pressure ceased, which produced the same effect in the pieces of leather nailed to the sides of the lanthorn.

IN the middle of this piece of wood, was made a long notch an inch broad corresponding to a similar one in the plate of iron nailed upon the outside of the aperture; the notch in the plate was designed to admit a piece of iron, furnished with beards on its sides, like those with which padlocks are shut. The notch made in the wood, a little narrower by some lines, served to catch these beards, and disengage them from the edges of the plate.

To this bearded iron was tied a rope of some fathoms length, and which had its other end fixed to a ball of stone. When the lanthorn was to be

used, after putting the diver into it, this ball of stone, destined to assist its descent, was fixed to its lower end, by introducing the bearded iron into the aperture made in the plate. By this disposition, when the diver wanted to return from the bottom of the sea, he had nothing to do, but with his foot to press the piece of wood contained in the purse of leather. Upon this the beards of the iron fixed in the plate, being re-united to their common trunk, gave the lanthorn, disengaged, from its weight, and become much lighter than the column of water it occupied, a full liberty of remounting to the surface.

To keep this lanthorn upright in its ascent, as the weight of the ball of stone did its descent; there were tied to the lower end of the lanthorn two other ropes, furnished with leads of five or six pounds weight. These ropes were longer by a fathom, than that to which the ball of stone was fixed. The superior end of the lanthorn was furnished with a large piece of cork, terminating in a point, and fixed to the lanthorn by a bar of iron running through it. At the top of this bar was a ring, through which a rope passed, in order to suspend the lanthorn by the yard or mast of a ship, when it was to be put into the sea. In this condition, after having introduced the diver, it was let down into the water as far as the cork. Here it was kept for some time, to give the diver an opportunity of preparing himself, and of knowing whether the lanthorn leaked; and as soon as he made a signal that every thing was in order, the lanthorn was let down, either by cutting the rope, or letting it slip through the ring.

UPON this, says our philosopher, who had his eyes fixed on mine, I see you have an ardent de-

fire to know whether, on these occasions, our divers have ever been exposed to danger from sea-monsters, or whether they have not seen some of them of an extraordinary form. Fishes, continued he, are rare in seas that are deep, and far from land which furnishes them with nourishment. The divers have indeed frequently met with animals, creeping or walking in the bottom of the sea, of a form approaching to that of animals, which creep or walk in the earth. If any fishes were in their way, they got off speedily, being no doubt, astonished to see in the abyss which they inhabited, so great a prodigy, and to hear the noise of some bells tied to the lanthorn, which were continually moved by the air in its descent and ascent.

My grandfather instantly marked down what the divers had discovered, as well as the quality and colour of the slime, which the leads brought from the bottom. He was not even afraid sometimes to descend in person into the sea, in order to inform himself by his own eyes, with respect to some remaining doubts, or extraordinary things, with which the divers could not acquaint him. By these researches and experiments, which he made in the bottom of the sea, he formed charts, especially when the discoveries were made near the coasts; and upon these charts, the force and direction of the currents were exactly marked. The divers knew these currents, by means of a red or green ribbon, a yard or two long, which was tied to the top of the lanthorn, and which the currents moved more or less, according as they were stronger or weaker.

AFTER this labour, my grandfather compared the state of the bottom of the sea, with that of the land which corresponded to it, in order to know

the relation there was between them, either in their conformation, or between the currents, and the winds most common on the neighbouring coasts, of which he took great care to inform himself.— He also observed, whether in the bottom of the sea there were cavities corresponding to the gulphs of the neighbouring grounds, or on the contrary, elevations, in consequence of capes, which almost always happened. He continued long on the isles and rocks of the coasts, which he visited; and thence he considered at leisure, what happened during the tempest and the calm, not only on the shore where he was, but also on that of the adjacent continent. His design was the better to judge by the labour of the sea, whether she had really formed these different soils, which only seemed to have been raised as barriers for her. In this study, he employed near two years, during which, to the east and west of his own house, he visited an hundred and fifty miles of the coast, and made experiments on the bottom of the neighbouring seas; and from these laborious researches he made the following observations.

THAT the sea contained currents almost in all its extent; that some of these were general, that is, considerable, going from one part of the globe to another: For example, from the north to the south, from the east to the west, or in contrary directions; that some were alternate, and returned on themselves after a certain space of time, like the flux and reflux of the sea, especially in the neighbourhood of coasts, and in the great gulphs; that others were continual, and without any other variation than their greater or lesser rapidity during their course—that some were proper to certain coasts, and that they were aided or opposed sometimes by winds, and sometimes by a superior sea, favourable or opposite.

THAT when one current meets another directly opposite to it, which often happens, there is the same combat between them, as there is between the waters of a river, and those of the sea, when they oppose each other; that the same effect was also produced by them; that is, at the point of their junction there was a kind of bar or ridge composed of the substances which were in the currents; and heaps of sand or mud accumulated, higher or harder in proportion to the largeness and force of the currents, and the deepness of the seas.

THAT there were also currents which crossed each other; that the strongest in this case, cut the weakest, whose course upon this terminates, stopping at its sides the substances carried along in the other, which often forms a ridge of mountains, and sometimes a double one, when some powerful and rapid current separates the two opposite ones, and leaving them on its right and left, continues its road between their deposited substances, as in a deep valley.

THAT the waters of the sea, however clear they may appear, always contain some substances, which they take up in some places and lose in others; that they collect these substances according to the rapidity of their currents, the disposition of the bottom through which they pass, or by accidents happening during their course.

THAT in passing through narrow places the currents undermine and carry off their substances with them, as we observe, that a river pent up between its banks, or which in its rapidity meets with a bottom which is shallow and soft, wears them away, and carries them along with it; that after having exhausted the matter of certain beds or soils, which

they or other currents had formed, which they successively carry off, they at last elsewhere form arrangements of these substances.

THAT when great tempests happened in the places whence these currents proceeded, or through which they passed, what they detached from certain parts of the bottom, the shells, and the fishes, which they either killed or bruised, the trees, the plants, the leaves of trees which the rivers and torrents had carried into the sea, where these currents were, were all carried along by them, and deposited partly in their course; when being less confined by the disposition of the places through which they passed, they flowed but slowly in the places where they terminated. That in these last places, there were always heaps of sand or mud, lying in the bottom of the sea, which as yet covered them, or other similar congestions which it no longer covered, such as rocks, islands, banks, or continents, appearing at present on our globe.

THAT when these currents reach particular coasts, they there find materials of another kind which they also employ in their different fabrications, according to the diversity of substances, and the disposition of the places where they arrange them.

THAT near the disembogements of rivers, brooks, and torrents, into the sea, there are formed in the sea, bars or beds, composed some of sand, gravel, and flints; others of slime or mud, different in colour and quantity, according to the quality of the substances which the adjacent rivers brought along with them; that these small mountains were more firm when only composed of slime or mud; that these last included a great many

herbs, which stopping on their surfaces, were afterwards covered by new slime added to the first; that by the softness of their substance they were subject to be moved, and their beds exposed to be disordered or confounded, since after violent tempests, or the overflowing of adjacent rivers, the divers, and my grandfather himself, often found the former figures of these beds changed, made flat, or lengthened.

THAT on the shallow coasts, the sea threw every thing with which it met, as far on shore as it possibly could; that on coasts covered by islands or rocks, which the sea could break, in gulphs where there were rocks, whose wrecks fell into a sandy bottom, where rivers and rapid torrents terminated, carrying with them stones, flints, gravel, and sand, the sea having received these, conveyed them to the shore, tossed them, rubbed them a long time together, and by this means made them round; that the sea at last placed them in such a manner, that it's billows had no longer force to carry back with them the flints, to which the little water which remained, could only add some gravel and then some sand; that this augmentation was not great, since after a very inconsiderable addition, the sand remained dry, at first in calms, and then in every state of the sea.

THAT on the contrary, when coasts were exposed to a vast sea, this sea only brought on shore some shells, with sand and mud, according to the substance of the bottom over which it rolls.

THAT at the foot of steep shores, there were new mountains formed, composed sometimes of large and sometimes of small stones, according to the nature of the stones in these higher places,

which the injury of time broke, and which fell into the sea; that among these great and small stones there were often some of a different quality and colour, which had been brought by accident from other parts; and that these stones were united together by the mud or sand, into which they had fallen, or that the waters of the sea had since inserted themselves between them; that there were only extraneous bodies and stones found in these congestions, when the bottom of the sea was sandy; that on the contrary, we see scarcely any of them when the bottom is muddy, because they are retained in their course, by the softness of the slime in which they sink.

THAT at the foot of steep rocks where the sea is deep, the bottom is always muddy, since the waters being repelled by the rocks and returning on themselves cannot convey any thing weighty thither; that this mud is tinged by the waters which fall from the mountains during the rains, and which retain the colour of the earth they have carried along, sometimes yellow, sometimes red, or of different colours, according to the impression they receive from the nature of trees, from their leaves or fruit, from plants or herbs, and from all other bodies which these soils produce, and which either perish in their bosoms, or are mixed with them.

THAT with respect to shores of stone or rocks which are not steep but rugged, and to which the sea flows on a nearly similar bottom, it dashes on them almost always mildly, on account of the rocks which oppose its course, and break the force of its billows; that it then brings with it sand, small flints, various and numerous shells, an incredible deal of impurities and light bodies, which it

collects in passing over a rugged bottom ; that with these substances it augments the rocks on the shore ; that these are also augmented by the wrecks of the fish and shell-fish, which are found in those parts ; and which adhering to the stones formed in these parts, live on the impurities which the sea brings along with her.

My grandfather had found in shallow places, and those where there were indurated rocks of sand covered with mud, certain shell-fish unknown or very rare on the coasts. Those whose fish were still alive, could hardly be torn from the rock ; and those whose fish were dead, were so sunk in the mud, with which many of them were filled, that by these dispositions it was easy to know why they were never, or at least very rarely seen upon our shores.

AFTER these different researches and experiments, nothing remained but to make the application of them to the present state of our soils, and to compare with their compositions, what passed in the sea or upon its shore. With this view my grandfather for some time visited the mountains near his own house and the coast, in order to discover more nearly the external appearance, and the disposition which he had before but viewed at a distance from the shore or from his boat used in his researches. He examined a long ridge of these mountains, stopping sometimes on their summits, sometimes on their declivities, and sometimes in the deepest vallies, that he might consider them in all directions and manners, often one after another, and sometimes altogether. In a word, after reiterated researches, he was persuaded their external appearance and their aspect did not differ in any thing from those of the elevations and vallies which

the sea covered, and that they were arranged on the earth by the same means as those which he saw in the sea.

THE direction of the beds which composed both, and perfectly corresponded to each other, and even the conformity of the substances of which these beds were formed, were to him a new demonstration of his opinion. He had observed similar beds formed in the sea of depositions of sand or mud, which were arranged on each other in a manner almost always horizontal; sometimes however the direction of these beds varied, when by the disposition of the bottom, the currents carrying these substances were forced to sink or rise against them, forming then their beds according to the winding of the ground, but always of an equal thickness. This he remarked most generally, especially on the surfaces of high mountains. He found other mountains which were not formed by beds or strata, and in these he discovered the collection of different substances, which he had seen formed in the sea, near the disemboguements of rivers and torrents, or at the foot of steep shores.

THE prodigious number of sea-shells of all kinds, cemented to the surface of both these concretions, from the sea-shore to the highest of our mountains, as is observable on the coast and in the parts adjacent to it, was not a less convincing proof to him of their fabrication in the sea, where these fish are produced, live and die. Considerable beds of oysters which he found on some hills, others which appeared inserted into the substance of the mountains; entire mountains of shells situated on the tops or sides of other hills and vallies, which were covered with them to the height of several feet; an incredible number of sea-shells coming out of

the substance of mountains which time had undermined, and many other sea-bodies which every where appeared to him, represented a just image of what he had seen in the sea itself.

HE saw nothing in the whole external appearance of the mountains which did not convince him of the same truth. The marks of the attacks of the sea in tempests, were deeply imprinted in a hundred steep places of these mountains; amphitheatres were formed by the action of the sea: Steps under steps were produced on their sides, according to the diminution of the sea, which was there evidently marked. Corals which it had left adhering there, after it had given birth to them, and nourished them in these places, where they were petrified. The holes of sea-worms, which only live in the water, and which were found imprinted on many rocks, were to him convincing proofs of the real origin of our mountains, and of their ancient state.

THE high and the low, between which they are divided, were to him the last proof which did not permit him to doubt, but these mountains were the same work which the sea performs every day in making roads through the slime and sand, which she raises at the junction of two currents, which are either opposite, or cut each other. Thus we see the waters of rivers, after having formed bars at their disemboguments, composed of the substances they brought along with them, break through these bars, by beating them down in certain parts when they require a more free and open passage. There is, however, this difference between the collections of matter in the sea, and these formed near the disembogument of rivers, that these last are not so indurated as not to be

subdued by the waters which first formed them.— The former, on the contrary, which are generated in the sea, being petrified at the end of a certain time, subdue it. It is by this means, that it at present seems subjected to all these banks which have resisted it. However they still retain the form of the passages, which the currents had made when their matter was soft, and which the flux and reflux of the sea, had long entertained, whilst as yet washing them, it sometimes raised itself between the apertures which the waves had made, and afterwards left them. This is observable on the coasts in a vast number of places, which differ in nothing with respect to their conformation, from those which are already far distant from it.

AFTER these general notions of the surface of our soils, and of some parts of their internal composition; which are observable in places which are either steep or undermined by torrents, my grandfather resolved to make an exact dissection of them, beginning at their surfaces, and passing to their deepest entrails. He began this new labour on the places most adjacent to his own house. I may say, on this occasion, that as nature had placed a rock under his windows, of so particular a form that it seemed to have been made to teach men the insensible diminution which the sea suffered every day, so the parts adjacent offered him so many other proofs of it, that it was natural to think, that all this could not be the effect of chance. It was, no doubt, the work of some happy genius, (if a philosopher may be allowed to speak so) who had made it his business to convince us in this short method, of the manner in which this whole habitable globe was formed; as if, by this means he had intended to supply the remembrance of facts, or the writings which time had destroyed, and which could have instructed us concerning them.

In these different parts my grandfather found all kinds of petrifications in the surfaces of the mountains ; and these petrifications were in places very distant from each other. One of the first which presented was a composition of stones, flints, wood, and other substances ; this is called a flint-bed, which is often of a considerable extent, but always shallow. He observed that this kind of petrification was rarely found except in such places as were either even, or had but a very small declivity. Afterwards comparing these compositions, with the work he had seen performed by the sea, on her coasts, and where she could freely roll stones and flints, he knew that these beds of flints were situated precisely in these grounds, whose disposition did not naturally differ from those in which the sea daily forms similar collections. At last examining exactly the composition of these flint-beds, he found that it included absolutely the same substances which the sea brought to the shore ; and that nothing might be wanting to a compleat proof, that the one came from the other, he found various shells and fish-bones in the collection of substances which formed these flint-beds. He even found that the sand by which the whole mass was united, was of the same nature and quality with that of the adjacent sea ; so that it was not possible to doubt but this kind of petrification was a preceding effect of the actual work of the same sea upon its shores.

He was also confirmed in the same sentiment, by a bed of hard sand and smooth stone which was not very thick, and with which these beds of flint are generally covered. He knew that this superior bed was the last work of the sea, beating on these collections, and only conveying sand mixed with shells to them. These collections being in a state

of perfect rest by the retreat of the water, had at last contracted that extreme hardness, and adhesion, which they had not, when agitated by the billows: My grandfather found this kind of petrification in places very far from the sea, and even on the tops of very high hills, which was a certain demonstration that the sea had reached thither, and that after having long remained there, and laboured for the collection of these substances, her waters had subsided all the height of these mountains, to their present surface.

FLINT-BEDS are very frequent about the city of *Marseilles*. A bed of this kind, five or six foot thick, covers the whole plain of *St. Michael*, and over it is another bed of smooth stone, very thin, and formed by the sand which the sea had left in that plain. The new walls of *Marseilles* are built of this flint, in which I have often observed pieces of earth incrustated. We also find veins of it in almost all the roads which lead to the pleasant farms which adorn its stony soil. Thus nature seems to have taken pleasure, to place in the middle of that city, which owes its riches and reputation to the sea, this sensible and infallible proof, that the rock on which it is built, was formed in the sea.

THESE beds of concretioned stone, lodged between two beds of smooth stone, have not been formed by flints and stones which the torrents of the neighbouring mountains may have brought thither, because the little hill on which *Marseilles* stands, is on all sides separated from these torrents by valleys. The sea alone, which still reaches to that mount, whose summit was disposed to receive them, has raised them by its billows on the north-west, on a ground somewhat lower. The sea alone could bring them thither, as you will easily judge on

observation, by considering the places, if you do not remember them sufficiently to comprehend what I now have the honour of telling you. One of the arches of the aqueducts which conveys water to *Marfeilles*, is built on a similar bed of flint opposite to *Aix-gate*. On the side of *St. Victor*, there are some of those beds very remarkable, by the pains which have been taken to make streets in that stony ground. Torrents and rivers may indeed form similar collections, and such are formed on the declivities of mountains, and at their feet by the stones and flints which tumble from their summits. But these collections have no consistence, because the earth by which they are joined, is not petrified like the sand which is salted by the sea.— If there is sand mixed with the collections, formed by currents and rivers which may compose a hard concretion, yet it is certain that neither fish bones, nor any sea-shells are found in them.

A second kind of concretion in the surface of the mountains, or which, at least, is neither considerably deep nor extensive, attracted the attention of my grandfather, because it is frequent. It is a collection of pieces of stone or marble, large in some quarries, small in others, generally of uniform colours and qualities, though some of them are of a different kind. These pieces are united by a mortar, sometimes white, sometimes gray, sometimes brown, sometimes black, yellow, redish, or of a different hue mixed of all these colours. This mortar is as hard and solid as the stones which it unites; and in this assemblage, we rarely find petrified wood, incrustated stones and flints, which are generally found in flint-beds.— These quarries were generally placed at the foot of some mountain, but were not arranged in beds like the others. On the contrary, their substance

was perfectly equal, and without any difference or division. In meditating on this particularly, my grandfather judged by the position of these quarries, that they might be the same work at which, according to his observations, the sea daily laboured, at the foot of steep mountains, whose wrecks falling into her, along with what the rains carry off, and what chance brings, are received into her bottom, buried at first in the mud, and afterwards covered by other substances which time throws upon them.

IN order to know whether these quarries really owed their origin to this labour, my grandfather compared the stones of their composition, with these of the superior places, and the cement which united them, with the mud of the adjacent seas. With respect to the stones, he found they were really of the same colour with these of the mountains raised above these quarries: But he observed this difference between them, that such as were included in these compositions had a finer grain, and were more weighty than those contained in the superior places. As for the mud, he observed, that it was also of the same quality with that of the bottom of the adjacent sea, but of a different colour.

THESE differences perplexed him at first, but it was not long before he knew the reason of them. He wisely judged that the great hardness of the pieces of stone included in these concretions, could only be owing to the long continuance of these stones detached from the superior quarries in the sea, in a weighty mud in which they were buried. He did not doubt but the change of the colour of the mud proceeded from the hue which the rising

grounds carried to the sea by the rains, had communicated to it. In a word, when the earth of the places superior to these quarries was white, brown or blackish, the mud which seemed to unite these stones retained perfectly the same colour; and it was red, yellow or greenish, when the more elevated earths were of these colours. For this reason the marble of *Saravessa* is so beautiful, because, on the adjacent mountains there is an earth of so lively a red, that the canals through which the rain-waters flow from these mountains to the sea, seem to be tinged with blood. This is easily observable by those who pass in boats from *Geneva* to *Portovenere*; nor is it to be doubted, but in the places where the rain-waters discharge themselves into the sea, there are quarries of marble preparing for our posterity, like that of *Saravessa*, or at least of a quality approaching to it. The marble of *Sicily* variegated with a beautiful yellow, which makes it so much esteemed, has the same origin. This may be proved by the earth of the same colour and beauty still found on the mountains superior to the quarry of that marble. This, in a word, is the reason of all the other colours with which the quarries of this kind are variegated in all the different countries of the world.

It is however to be observed, that the colour of the mud which serves to form these quarries, is often more beautiful and lively than that of the superior earths. The reason of this is evident; these earths having at first been pure, as all virgin earths are, and being so at the time of the composition of these quarries, to the mud of which they have served to give a tincture, they have been afterwards altered, either by the mixture of the things they nourished in their bosom, and which have been there petrified and confounded, or by extraneous

earths which the winds have conveyed thither.— However, they always retain marks enough of their first state, to convince us, that they have formerly served to tinge the cements of the quarries which are formed below them.

THE reason why these quarries include neither petrified woods nor baked earths, was also obvious to my grandfather; for being formed under the water of the sea, of substances which have been thrown into it, there cannot be wood found in them, which rarely goes to the bottom; neither can baked earths be found in them, except on very extraordinary occasions: The broken pieces of bricks and tiles, which are the wrecks of our houses, are not conveyed into the sea from the tops of steep mountains, at the feet of which these quarries are formed, since very little is built on their summits, but on places of a gentle declivity. Neither do we discover in these quarries, at least, not commonly, stones and flints made round, because stones do not become round in the sea, till they have been long rubbed against each other upon a shallow bottom, either of stone or firm sand. The sea, as I have already observed, cannot perform this work in deep water, nor convey flints to the tops of steep mountains, which break the force of her billows and currents, and force her to return upon herself. Besides, in these places, the bottom consisting generally only of mud, every thing weighty or bulky is stopt at a distance by the softness of the slime.— In a word, my father comprehended that these mountains could not be composed of beds, such as are found in the mountains lodged in a free and open sea, since the former are only the wrecks of these latter mountains, which falling at their feet are received into a mud proper to reunite them, and form them into a solid, whole, or mass. The

small extent of these quarries, and their oblong form, always terminating in a point, were still, to my grandfather, evident demonstrations of their origin.

HE also observed, that the quarries of this kind, when placed at the feet of mountains of a substance which was soft and easily broken by the impressions of the air, such as the quarries of black, gray, or agate-coloured marble, were composed of very small pieces; whereas, when they were situated at the foot of mountains, composed of hard stones that are with difficulty mouldered, such as all the mountains made of mud or fine sand, the pieces which composed these inferior quarries, were of a much larger bulk. In order to convince himself that the one came from the other, he observed, that the higher and steeper the superior mountains were, the more considerable were the quarries formed at their feet, which could only proceed from the greater quantity of their wrecks, which had had leisure to fall, and be accumulated in a long space of time necessary to exhaust a deep sea. In a word, to omit nothing proper to instruct him in the origin of these concretions, and to establish their truth, he pounded the stones of them, in the composition of which he found, as in the flint-beds, though less frequently, the bones of sea-fish, and shells. After this he thought he had no reason to doubt, but that these small quarries were the work of the waters of the sea, as well as the flint-beds. From this he concluded, that the sea had beat a long time on the parts where the quarries were situated, since it had been able to form similar collections, and consequently had been diminished by all the elevation observed from its surface to these quarries. The mountains in our neighbourhood are intermixed with pertifications

of this kind, all of marble. There are also a great many of them in *Europe*, both of marble and stone. There are petrifications of this kind in some places in *Provence*, and even these considerably high, since they are found in the neighbourhood of *St. Baume*. There are also others in *France*. There are many of them in *Spain*, especially in the *Peri-nean* mountains; in *Flanders*; in *Lorrain*; in the states of *Geneva*; in *Switzerland*; and in *Sicily*.—There are some of them very beautiful in *Asia*, but always at the foot of mountains, and of the same colour with their substance. When this kind of petrification is marble, it is very agreeable to the eye, by the variety observable in it on account of the cement tinged in a hundred different manners, and served to unite the pieces of which it is composed. This marble is the matter of a great many pillars, with which churches are adorned, especially in *Italy*. Tables are also made of it, and decorations for chimnies in houses and palaces.

Two other kinds of petrifications near the surface of the mountains, and which may be reduced to one, since they are of the same kind, were also the objects of my grandfather's reflections; I mean the rock-stone and the pumice, which hardly differ in the position of their small quarries, and but very little in the substances of which they are composed. The pumice is only less solid than the rock-stone; it is also more porous, and less equal in its composition.

IN order to know the reason of this difference, it is to be observed, that the bottom of the sea furnishes a great deal more impurities in some places than in others. It is fuller of these impurities on the coast, where rivers and torrents discharge themselves, than at a greater distance from the

shore. In a word, there are much fewer impurities in bottoms which are sand or mud, than on the shores, which are often embarrassed with rocks, where these impurities are collected, and to which they adhere. Thus, when in a tempest the billows of the sea have torn from these rocks and shallow places, the viscosities, moss, snails, shells, and a thousand other impurities, which are proper to them, as may be distinguished by the eye, in bottoms of this kind, they are carried to the shore with the sand and small flints—There, with the cement of the froth and the salt of the water, the sea fixes all these substances to the surfaces of the shores, which she still washes with the extremity of her waves, and makes of the whole a composition as unequal in hardness, as the natures of the substances employed in its formation are different. The holes contained in this pumice are the cavities formed by a little moss, the viscosity of snails, or other bulky substances, without a due consistence, which have entered the original composition. These substances have been consumed by time, which reduced them to a little dust or earth, which is to be found in these cavities. On the contrary, when the sea by its billows throws on shore more equal substances, and fewer viscosities and mosses, she composes a less rough, and a better formed stone, which is called rock-stone. The mouldering of certain mountains, also, contributes to the composition of this stone, because the sand and small gravel which are detached from them, and which are carried to the sea by a gentle declivity, are re-united by the waves at the foot of these mountains, with the other substances which they convey thither.

My grandfather, who had studied the various works performed in the bottom of the sea, especial-

ly on the coasts, easily discovered this truth: He found in these two kinds of stone, the same composition which the sea daily produces, almost every moment, in fixing to stony bottoms or small rocks, which it still washes with the extremity of its waves, the substances which its waters contained, or which were carried to them from the adjacent mountains. The position of these quarries of pumice and rock-stone, had the same aspect as those places where the sea had formed similar ones upon the coasts.— Thus the superficial quarries in the large mountains, which he had found very near their highest summits, were to him new proofs, both of the long continuance of the sea in such elevated places, and of the prodigious diminution of her water if we form an estimate of this affair from her present boundaries, and the elevation of these places.

THESE two kinds of quarries are however much less frequent, and thick near the tops of high mountains, than about the middle; and still less so about their middle, than at their feet, and in places at present near the sea. The reason of this is obvious; the rock and pumice stones are composed of the wrecks of certain mountains, of shells and impurities which she brings along with her. Now nothing of all this existed at the time of the discovery of the first soils. The sea could not break them, nor convey their wrecks to their feet, till after they had appeared: Its waters at first contained but very few shells, since they are only found near the shores, which were but of a small extent at first.— The sea-water was not then full of all the impurities which the rain-water, and a certain slime it brings along with it, produce and nourish in the bosom of the sea; since the first grounds were of a small extent, had not as yet been mouldered by the injuries of the air, and only furnished the sea

with some veins of water, or at least with small rivulets. As yet their waters must have been very pure, since they only washed rocks without earth, without herbs, and without shrubs. All these circumstances are changed by the longer duration of grounds, by the loss which the rocks have sustained of a part of their substance, by the multiplication of herbs and leaves, by the abundance of turbid waters which the sea has since received, and by the adherence of shells, and all the impurities which she has contracted.—These works were also augmented in proportion as our grounds were uncovered, the substances which the sea employs in her labours being increased according to the diminution of her waters. Hence it happens, that all kinds of stone or marble in the surfaces of mountains, of the wrecks of which they have been formed, are much less frequent and deep in high, than in low-lying places, because in their last, the sea has found more materials to work upon.

IN general, my grandfather, in this petrification in the surface of our soils, found numberless shells, some known, others absolutely unknown, or such as are very rare on the adjacent coasts.—He found in particular a great many corneamons, which are very frequent in the stones of *France*, though none of them are found on the coasts of *France*. He also observed that the unknown shells were more deeply sunk in these compositions, whereas, those which are frequent on our coasts were situated nearer their surfaces. In searching for the reason of this difference, he judged that it proceeded from this, that the shells unknown on our shores, which he had found in certain bottoms, had been petrified in the bottoms, with the mud, before it could be uncovered by the water; that

afterwards this petrification approaching to the surface of the sea, or being already at it, another kind of shells, such as we see on our coasts, and such as love the air more than the former, had composed a crust on this first stone, as it was common for the sea to clothe the rocks it still washed, with them, before it left these rocks; and that consequently these last shells must be found in the external parts of the mass, before we arrive at the internal parts, where the first mentioned shells are included.

My grandfather afterwards discovered other petrifications deeper and larger than the former, but which were not of a very great extent. These were certain small mountains separated from the large ones, and generally placed at their foot, or at a small distance, most frequently at the entry of large vallies, or in places not far from them.— These small mountains, I call them so in comparison of height and extent of the other mountains, are the same, and in the same position with the quarries of slate, or of certain tender marbles, such as the black, the agate-coloured, those mixed of red and green, and of yellow and white, and some other species. In examining the variegation of these marbles, my grandfather discovered that there were two kinds of them; the first is the effect of certain waves which are principally found in the agate-coloured, the redish, the green, and such as approach to these colours. A great deal of this kind is employed in the houses of *Paris*. The accidental variegation consists in certain streaks, generally white or yellow, which are found in these marbles, and in several quarries of stone

He judged that these waves observable in certain marbles, proceeded from certain strong impulses,

which their substance, as yet almost liquid and without consistence, could not resist; that the greenish colour with which some of these stones are tinged, could proceed from nothing else but herbs inserted in their composition, into which they could not enter, except when the matter was soft; and that the waves observable in their substance was an undoubted proof of this truth: These waves, in a word, supposed the same state of these substances, without which the mixtures of the different slimes of which these marbles were composed, could not have been made. The easiness with which these marbles were reduced to scales or flakes, convinced him that they were only composed of mud and slime indurated. In a word, considering their position, he concluded that such collections were natural in these places, and must have been formed there by the slime of the rivers and torrents, which flowed from the vallies into the sea, at the time when she was superior to these quarries. Thus, in his observations on the daily labour of the sea, he knew, that similar collections were at present made in her, near the disemboguments of rivers or torrents which fall into her. This appeared sufficiently evident to him from the various bones of sea and river fish which he found in several of these quarries, since with their waters and their slime, these rivers must have carried to the sea some of the fish they contained, either dead or alive.

As for the streaks with which almost all these marbles are variegated, at least on their surfaces, he knew that they were an effect posterior to the appearance of these small hills above the waters of the sea, that being formed of a muddy matter which is easily warped, and that being acted upon by the air, the sun and frost, they had been divided into clefts, into which receiving the rain and sea-

waters which sometimes covered them, they had contracted these variegations, according to the earths and slimes contained in these waters, this matter, which may be looked upon as a kind of glew or cement, having served to reunite the different pieces or flakes into which their surfaces were already divided.

IN order to support this sentiment he observed, that these streaks were of the same colour with the various slimes of the sea, by which the quarries were washed, or with the earth on their summits; and that where the earth was whitish, the streaks of the marble were equally so. Such is the variegation of several quarries of black marble, found in *Switzerland* and some other parts. Such also is the variegation of several stones dug up in *Tuscany*, with which the streets of *Leghorn* are paved; and of a hundred others kind of stones, whose substances, though solid, is yet easily warped and fissured. He found on the contrary, that in the places where the earth on the summit of these quarries was yellowish, as in the isle before *Portovenere*, whence black marble, marked with yellow streaks approaching to a gold colour, is dug, the stones were variegated with the same colour. This was a new proof that the variety of streaks common to so many marbles, has no other origin than that now mentioned. We also sometimes see in the same piece of marble, streaks of a white, and others of a yellow colour. Whence proceeds this difference? if not from this, that some of them are the work of a vein of water, tinged yellow with an earth of that colour which it imbibed; and others, that of a water which had run through a white earth,

THAT these streaks really proceed from the warping and fissures of these stones and marbles af-

ter the sea has left them, my grandfather found another sensible proof, which is, that if the foot of these quarries is still washed by the waves, we do not at their bottom find the variegations to be observed at their summits; that they are of an equal colour, or at least waved and varied without any mixture of these streaks; and even in the places where these quarries are far from the sea, their internal part which is sheltered from the wind, the cold and the sun presents none of these variegations. This I myself have observed in several quarries of *Europe*, especially that situated before *Portovenere*, whose variegations are diminished in proportion as we go farther from the surface, and at last totally disappear. In a word, he found in the matter of these streaks, flies and various other land insects, which could not enter into it, if these streaks had not been posterior to the fabrication of the substance of these stones, and to their appearing above the waters of the sea. Frequently also, several of these streaks were marked with green, which proceeded from the leaves or herbs, which being conveyed into these clefts or fissures by the rain-water, had tinged the mud which they touched.

THE nature of these quarries, and their position, were, to my grandfather, prepared by the observations he had made on the works of the sea, near the disemboguments of rivers and torrents, new proofs of the diminution of her waters. At the foot of these quarries, whose surface is easily warped and reduced to flakes, there are generally others, especially on the steepest coasts. These have been formed of the wrecks of the substance of the others, reunited by the sand or mud of the sea into which they had fallen when it was still at the foot of them; and this assemblage also subject

to wrap, and by that means susceptible of variegations, composes a kind of speckled or *mosaick* work, very agreeable to the eye, and of which we find some ornaments in the houses of *Paris*.—The pieces of which these quarries are formed, are generally very small. In this they differ from those I have mentioned, the substance of which is not so easily broken; but the quality of the marble, sand and mud, which compose these small quarries, the sea-shells inserted in them, and their position, are, as well as in the others, certain proofs of the state of the water of the sea, at the time of their formation, and consequently of the diminution which has since happened to that water.

AFTER the examination of these various petrifications on the surface of the large mountains, of which we might say the former are the daughters, my grandfather resolved to use all his application in examining the composition and origin of these also. With this view he ordered deep pits to be dug in several parts, even in the most lofty summits of these mountains, as far as their lowest entrails.—He visited the quarries whence stones were dug in the places where the mountains were highest, or he went to these places where the mountains were either split, undermined by time, cut, penetrated, or razed to a level, in order to make roads, raise fortifications, or afford passages for rivers. He carefully interrogated those who had the charge of these works, the diggers of the stones, those who cut them, and those employed in digging the pits. He with no less attention examined the mountains or little hills of hard sand, which are never so high as mountains of stone, neither have they been formed till long after them out of their wrecks, besides they are in such a situation, that the agitation of

the waves which washed the parts where they are, the quality of the sands which composed them, and the mixture of the fresh water, have not permitted them to be petrified. My grandfather spent several years in this occupation, and after long meditations on the internal and external parts of all mountains, he, with my deceased father, who imitated him in this study, and whom he conducted every where with him, made a collection of observations, the substance of which is as follows :

THAT all mountains or soils are originally but sand or stone ; that stone is composed of indurated sand or mud, or of a mixture of both, or formed of clay and these other depositions of the water of the sea, which are found in its bottom by means of the plummer, or by diving.

THAT the diversity of colour in stones proceeds from the diversity of the grain, and of the substances which have entered into their respective petrifications.

THAT all primitive mountains of stone, and even of hard sand not petrified, are composed of beds arranged over each other, almost always horizontally, thicker or thinner, and often of an unequal colour and hardness, which can only proceed from the successive arrangement of the different matters of which these collections are formed.

THAT these arrangements are found from the tops of the highest mountains, to their profoundest abysses, and even till we arrive at water. That when we go beyond the water, we only search with little certainty, and can distinguish nothing

with respect to the arrangement of the substances found there.

THAT it is not possible to imagine, that the arrangement of these matters different in quality, substance, colour, and hardness, which we find in the beds of all large mountains, could be produced otherwise than in the sea, and by the different matters which its waters contain during the time necessary to the fabrication of these prodigious collections; nor that the other petrifications adhering to them, and formed of their wrecks, were formed by another cause, than the assistance of the sea, acting successively upon them.

THAT for a proof in this truth, the sea on her bottom still continues the same labour, as may be proved by diving into her; that along her shores, we find the same arrangement of beds of different matters, as yet not indurated, at least in several places; and that we also find upon the coasts, collections of the same matters which are employed in the petrifications, adhering to the surface of all large mountains.

THAT besides these obvious proofs that all large mountains have been formed in this manner, they also contain a great many others which admit of no reply. In a word, that even in places most distant from the sea, they are to this day covered in a thousand parts of their surfaces, with a prodigious number of shells; and that on the summits of the highest mountains, we find several rocks entirely composed of shells; that the internal parts of mountains also include an infinite number of the same shells, and of all kinds of sea fish, the largest not excepted; that whole banks of oysters are found inserted in their bosoms, and a surprising

quantity of extraneous bodies all arranged in the same manner; that from this we ought to conclude, that these bodies could only enter into these enormous masses and be included in them, because at the time of the fabrication of these mountains, they have been thrown to these parts, and buried at the height where we find them, as are the materials of a wall which we see built.

THAT the difference of quality and colour, of one bed of the same stone, from another, proceeds from this, that the currents proper to the waters of the sea, as the winds are to the air which we breathe, after having passed through certain places with rapidity, and carried off the matter with which they are impregnated, find matter of another kind which they also convey successively to the places where they terminate; that they there form, by the deposition of all these matters, beds as different in substance, as the slimes are which they contain.

THAT there are sea-shells, and a much larger quantity of other extraneous matter in the substance of certain quarries, and that in considering the disposition of the places where they are situated, it is evident that we ought not to seek for any other reason for these facts, than that these quarries have been formed in the bottom of a gulph, or in parts where currents must naturally convey such things, rather than to other places.

THAT these extraneous bodies, especially shells, and the bones of sea-fish, are very rare at the bottom of quarries, less rare at their middle, and more frequent towards their surface, which proceeds from this, that the waters of the sea must naturally contain few fish, and almost no shells, when they covered the tops of our mountains;

that in a word, there was nothing in the bottom of the sea proper for the nourishment of either, so that they have not been multiplied nor perhaps formed, except when the first summits of our mountains were ready to appear, because in order to be brought to life, they required the assistance of the adjacent air.

IN order, Sir, continued our philosopher, to give you a general idea of the primitive state of our globe, and to conduct you insensibly to a knowledge of the composition of our soils, imagine to yourself, as I have begun to prove to you, that the sea has been a great many cubits higher than the highest of all our mountains.* The precise elevation of its waters above their summits, is unknown to us, and the measure of it cannot be ascertained. But we cannot doubt, after the proofs I am to advance, but there has been a time when the waters covered these mountains, and that they did not begin to be diminished till after they had formed the last beds of them.

WHATEVER might have been the elevation of the waters above our mountains, they did not then contain shells and fish. It is at least certain, that they contained very few of these, because there were then no grounds near the surface of the water, which alone are able to supply them with proper nourishment; and that long after the first diminution of the waters, the fish and shells were very few. A proof of what I advance, is, that at present there are very few fish in such seas as are either far from the shore, or very deep. For this

* It is under this image that *Ovid* represents the earth in the chaos, that is, before the ground began to appear.—This is also the idea *Moses* gives of it in *Gen. i. 2.* *And darkness was upon the face of the deep.*

reason, instead of finding indifferently, in all the quarries of our globe, fish-bones, shells, or other extraneous bodies, we find in some nothing but a simple and uniform substance; such is that observable in primitive mountains—I mean these high and large mountains which surpass all those around them, and which we must carefully distinguish from these last which were formed posterior to them, and of their wrecks. Now it is principally in these last, that we find extraneous bodies, bones of fish and shells, which are very rare in the others, or which are only discovered on their surfaces.

By what I have said, Sir, you may easily comprehend the reason of this difference. In a word, while the waters of the sea covered the summits of the highest mountains; that is, while they were employed in forming them, there could nothing but sand or mud enter their composition, since the sea contained nothing else which she could use for that purpose; as she then nourished but very few shell-fish, we must but rarely meet with shells in these first collections. The currents employed in this work, containing only sand or slime, which they detached from certain bottoms, or which they had contracted in the manner I shall afterwards mention; had as yet no other materials to work upon. But when the summits of these primitive mountains were ready to appear above the waters, the herbs began to grow upon the eminences next to the air. At the same time the fish and the shells were multiplied, and began to enter into the new compositions, which the sea continued to form at the sides of the great mountains, on their declivities, or at the intervals which her currents had made between them.

It was in these mountains posterior to the others, that plants, leaves of trees, fish-bones, and sea-

shells, began to be found. If in these last, we also find some other extraneous bodies, such as flints and others different from their own substance, the reason for this is very natural: The summits of the first mountains having appeared, were attacked by the impetuosity of the winds and of the waves natural to the surface of the sea. Their substance being as yet tender, was by them broken and mouldered in several parts. Heat and cold aided the billows, which were also assisted by the rivers and torrents which the rains formed. Every thing which was by this means detached from the substance of the first grounds, began to enter into the new labours of the sea: Of these new collections, the next to the summits of the first mountains were attacked and broken in their turn, in proportion as they appeared above the surface of the waves; and their wrecks were in the same manner employed in the composition of similar works, which the sea formed below them.

THE ruins of these three, afterwards served the same end, and lower mountains were formed of them; these generated others, and these works will continue as long as there are seas, and the superior mountains shall, with their wrecks, supply materials to the waves and currents, to compose new collections at their feet, as long as the rains, the rivers, and the torrents shall convey substances thither, and as long as the impetuosity of the winds shall carry thither the sand and dust, which it has blown from the land. This is the reason, why in the substance of several marbles, we find so many stones and flints of a nature absolutely different. In a word, an infinite number of these heterogeneous bodies has perhaps already served to the fabrication of five or six other different quarries, from which they have been successively de-

rached. It is also for this reason, that some of these pieces are streaked with white and yellow, though these streaks are not common to other contiguous pieces, which certainly proceeds from this, that before entering into these last compositions, these pieces making a part of the surface of a mountain anterior to this, had there been cloven and re-united in the manner above explained.—Herbs, the leaves of trees, fruits, insects, animals, and several other things which the earth produces, and which are inserted in the white or yellow of these streaks, are evident proofs of their origin.

It is then principally since the uncovering of the tops of the highest mountains, and in the manner I have explained to you, that extraneous bodies, fish-bones, and shells, have entered into the works of the sea; and then the wrecks of these mountains multiplying, contributed to the multiplication of new works, which lengthened the rising grounds. By the extent of her shores, the sea nourishes in her waters a greater number of fish and shell-fish; and these are more and more multiplied in her, in proportion as her diminution becomes more considerable. We have not only found in the substance of these works, posterior to the primitive mountains, shells, and fish-bones; but also, whole fish of all kinds in their deepest entrails. These are to be found in quarries of marble, slate, and stone, though more frequently in some than in others.—There are no kinds of animals either on the earth, or in the sea, which are not found in them. As for sea-shells, there are in these quarries a vast number of them, the species of which are entirely unknown to us.

At this part of our conversation, I began to relish the observations of our philosopher; but

we were interrupted by the coming of an *Indian* christian; he came to beg me to go immediately, and be a witness to the death of another *Indian* who was a christian as well as himself.

THOUGH I had no connection with these *Indians*, yet my religion did not permit me to neglect so favourable an opportunity of doing good. I begged TELLIAMED to defer the rest of his conversation till next day, and ran to the merchant whom I found at the point of death. I shall not give you an account of every thing I saw in that place.— What surpris'd me most, was a basin near the dying person, full of a thick and greenish liquor, with which they sprinkled him now and then: I at first took it for some composition proper to strengthen and comfort him, but having asked what it was, I was to my great surpris'e, told that it was holy-water, in which cow's dung had been steeped. You know, Sir, the stupid respect which the idolatrous *Indians* retain for that animal,† but I could not have thought to find so gross and ridiculous a piece of superstition among christians; I discovered my dislike of it to two or three friends of the merchant, who had attended him during his illness; but they stopt my mouth by telling me, that the missionaries had never found fault with it; that they used no other holy water in their churches;

† One of the greatest marks of this superstitious respect, is, that the *Indians* can think of no greater happiness than that of holding a cow's tail in their hand, when they are dying. As these people believe the transmigration of souls, they imagine that by this means the soul will pass directly into the body of that animal; and they think they cannot wish for a more agreeable abode. The use which they make of the excrements of this animal, in their ablutions and purifications, is sufficiently known. Though they have committed the most atrocious crimes, they believe themselves sanctified as soon as they are rubbed with it from the head to the feet,

that since they had preserved the *Lingan**, they saw no reason why they should banish the use of cow's dung. This fact which may, perhaps, appear incredible to you, is confirmed by a *French* missionary, who having resided several years in the *Indies*, was obliged to tolerate it on account of the complaisance necessary to gain that people to christianity : But I leave you to judge of what kind this pretended christianity must be,

* The obscene figure of an idol which these people adore, and which they hang about their necks.

END OF FIRST DISCOURSE.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

Second Day.

THE TRUTH OF THE LAST DISCOURSE—AND
ITS CONSEQUENCES PROVED BY FACTS.

TELLIAMED did not fail to keep his assignation the next day, and accosting me with an air of confidence; I know not, Sir, said he, what you think of our yesterday's conversation, or whether I have had the happiness to convince you of the truth concerning which I wanted to instruct you. The variety of different matters of which this globe is composed, the cement which unites them, their almost uniform arrangement of beds horizontally placed over each other; in a word, their position, aspect, and the surprizing conformity I have shown you in all this with the labour of the sea, in her bottom, or upon her shores; all these circumstances in conjunction, infallibly and sensibly prove the origin of our soils. But if you should still doubt of it, permit me by evident and well-attested

facts to confirm what I have said, and by that means demonstrate the truth of my system.

AN *Arabian* author whom you lent me, relates, that in digging a well behind the castle of *Cairo*, which in the *Arabian* language is called *Carafe*, after having pierced a rock more than two hundred feet deep, when the labourers came to the water they found a whole beam of timber: But as the testimony of an author of that nation may be suspected by you, I shall give you another concerning a discovery of the same kind, which will not permit you to doubt of the former fact.

IN the year 1714 of your *Æra*, the great duke of *Tuscany* having employed men to dig a ditch from the old infirmary of *Leghorn*, to the new, called *St. James*, through a rock, which at the depth of twenty feet terminated on mud, in which was found a tree of ten or twelve feet in length, hollow within, and which I and others take to have been a pump to some ship; it was sunk two or three feet deep in a clayey soil, in which were also various sea-shells, of kinds unknown in the neighbouring sea; some pine-apples entire, the horns, the bones, and the teeth of animals. I was at *Leghorn*, and present at the time this discovery was made, and with my own eyes saw two large baskets filled with these substances, which with the beam of wood were presented to the grand duke.

I have also seen in a steep rock of the *Apennine* mountains, which a torrent had undermined, the prow of a ship which stood out six cubits. It was petrified, and its hardness had resisted the force of the torrent, while the stone of a rock was undermined by it. This place is not far from *Mont-joue*. I wanted a long rope to descend from the summit of the mountain to the part where this ship ap-

peared, in order to examine it more accurately. It would be curious to draw the whole of it from the rock, in order to know the form of the ships used at the time when it was wrecked. Though it is very common to find the wrecks of ships in quarries, yet it is very difficult to know the form of them, because, at present, making a part of the stone itself, they are broken by the workmen, before it can be known what the whole was, which these parts formed.

THESE facts will, no doubt, appear surprising, but they are confirmed by authors of veracity who do not invent prodigies. *Fulgoſe* an Italian author, relates that in 1460 there was found in the canton of *Berne*, in a place where miners were working, and a hundred fathoms deep, a whole ship, almost like those used at present; and in this ship, in which the marks of the sails, cordage and anchors were still observable, were the bodies or bones of forty persons. This ship which then made a great noise in *Switzerland*, and even in the whole christian world, was seen by an incredible number of witnesses, from many of whom the author assures us he had the account of it. *Bertazzolo* also relates, that in laying the foundation of the sluice of *Governolo* in the territories of *Mantua*, he, in digging the earth found several pieces of ships, and a large quantity of sea-rushes and herbs.

IN *Dalmatia*, a few years ago, when the labourers were working on the fortifications of the castle above the citadel of *Castelnuovo* upon the gulph of *Cattaro*, ten feet under the foundation of the ancient walls they found an iron anchor so consumed by time and rust, that it bended like lead. *Bernard*, the *French* engineer, who had the charge of these

fortifications, assured me, that he saw the anchor. Another was also found about twenty-five or thirty years before, in digging the foundation of a house in *Padua*.

It is very common for those who travel through the sandy deserts of *Lybia* and *Africa*, to find in digging wells, small pieces of petrified ships, which were no doubt wrecked when the sea covered these parts. They also find there a great many pieces of petrified wood, which are probably the wrecks of some other similar ships. About a day and a half, or at most two days journey to the westward of *Cairo*, there is in the middle of a desert of sand, a pretty long valley bounded and interspersed with rocks, and at present partly filled with sand. This place is by the *Arabs* called *Bahar-Balaama*, that is, without water, because the plain is dried up.— In it are found a great many barks and ships which had been formerly wrecked, and are now petrified: we there find masts and yards, many of which are entire. When this place was a bed for the sea, it was, no doubt, very dangerous for navigation, as the remains of these ships piled upon each other, sufficiently prove.

WHAT is astonishing is, that in stones we find the bones of men and other animals. In the royal library of *Paris*, I have seen a bone taken from the skeleton of a man entirely petrified, and found in the plaster quarry of *Montmartre*. I was also assured in that capital, that some time before, there was another found in the quarries of *Arcueil*, and near it a sword much consumed by rust. Not long ago there was one dug up at *St. Angel*, near *Moret*, in *Gatenois*, from ground belonging to Mr. *Cau-martin*: It was found in a mountain of marble, and was fourteen feet long, which proves that there

have been giants. About thirty years ago there was a fourth found at Cape *Coronne* near *Mortigues*, in the quarries of free-stone used for building the houses of that town: This body, lying on its back, had its legs turned up, and was certainly one of these frequent victims which the gulph of *Lyons* received. A few years ago there was another found in a large piece of stone, employed in building a church in that city; and when I was there, they shewed me a piece of stone, in which was the thigh of a man petrified. What surprized me was, that in this thigh I found the bone and the flesh equally petrified, which I had never seen before.—Some years ago, in a stone taken from the plaister quarry of *Pisse-fontaine* near *Poissi*, there was found an egg as big as those of an *Indian* turkey, full of a yellowish liquor; and hard by it, a large sea-shell. *Philip* the fifth of *Spain* having ordered some embellishments to be made in the *Escorial*, the workmen in sawing a stone found a serpent which had remained without alteration. They extracted it, and found the hole in the stone to be spirial, according to the position of its body. The whole court of *Spain* was witness to this prodigy.

ALL the stones in the world, except those formed before the uncovering the summits of high mountains, are more or less filled with such bodies.—These bodies of a different nature, and often of a different colour from those in which they are inserted, are, as well as those I shall afterwards mention, a certain and incontestable proof that they have entered into the composition of the stones, at the time when the fabrication of these quarries was only at the height at which such bodies are found; that they were consequently of a soft and almost liquid substance, whether the cement of them be sand or mud; that this fabrication could not be

carried on without the assistance of the sea, and out of her bosom; and that to raise the mass of these mountains to their highest summits, and to rear these lofty edifices, it was necessary that the waves should cover them totally.

THERE are a great many small pieces of flint, or of large gravel in your free-stone of *Paris*, especially in parts where the quarries terminate in beds of sand, on which we see they have been formed of another more fine and proper for petrification. These stones are more beautiful or ugly to a certain thickness. Whence, Sir, does this proceed, if not from this, that when the ugly bed was formed, the flints or gravel have been carried to it by the waters of the sea; and that after some time, the gravel and flint failing, the water has brought a finer sand thither? It is thus, as I observed to you before, that nature operates in the formation of flint-beds*.

IN a word, how without this could it happen, that in the white stone employed in building the cathedral of *Rouen*, and in a hundred other places of *Normandy*, we should find large pieces of black stone, and elsewhere pieces of white stone in black or large flints of a very different quality from the stones which include them, pieces of marble inclosed in common stone, and common stone inclosed in marble, marble, and a hundred other extraneous bodies, even in the hardest flints? How can we account for this prodigy, if we do not admit,

* In the quarries of free-stone near *St. Leu Taverni*, I have seen stones split, in which were shells and small sea flints, of which the sea is generally full, and I have observed, that the surface of these beds of free-stone is covered with sand entirely, like that on the sea-shore. *Jessieu Dissert. on herbs, sea-shells, and other bodies found in certain stones in St. Chaumont in Lyons.*

that while the sea was employed, for example, in forming this white stone, the currents or a tempest, have carried into the mud or sand of that colour, which was then collecting into a heap, some pieces detached from a black rock, and inserted them in that sand or mud, in the middle of which we now find these variegations?

I have been assured, when at *Paris*, that in sawing that large piece of stone whose equal parts form the top of the frontispiece of the great entry of the *Louvre* on the side of *St. Germain*, the workmen about the middle of it found a bar of iron like the barrel of a gun, which the saw could not cut on either side; so that they were obliged to use wedges in order to separate the two pieces of stone. This fact is so much the more singular as it is notorious, and proves that there is a kind of iron which rust does not consume.

ARE not such things daily found preparing in the same manner on the sea-shore, for the use of future ages? When the sea in her reflux leaves plains of sand or mud, do we not find pieces of stone or flint, of a different colour from this sand or mud, already half immersed in them? and do we not a few days after, find them totally covered by new sand or mud? We find the same kind of work in searching the neighbouring mountains. This is particularly observable in the mountains which run along the coast of the river *Seine*, from *Havre de Grace* to *Paris*. This is discoverable in the stone with which the fortifications of the *Havre*, and the moles of that port are built. In the isle of *Scio*, I have, in a place rising much higher than the sea, observed pieces of green stones inserted in such as were white; and in searching the shores of that island, I observed that towards the north, green stones were formed by means of an herb,

which is nourished in the sea, and by its juice tinges the sand collected there, with greenish colour. It is natural to think, that this herb has always grown about that island; that it is in this manner our green marbles have received their colour, and that at the time when these pieces of green stone were inserted into the white, more than an hundred fathoms from the present surface of the sea, the waves still washed the part where I observed this singularity; that they then laboured at the fabrication of this quarry of white stone, to which in some tempest they conveyed these pieces of green stone detached and separated from some other rocks of the same nature.

BUT in a great number of quarries we very commonly find herbs and plants, which are often unknown, or only grow in far distant countries, inserted in stones, and there forming a kind of natural herbage. What a learned author* relates on this subject, when speaking of certain stones, which he had found about *Lyons*, is too remarkable not to command your attention.

THESE stones, says he, are scaly near the beds of coal, among which they are found; and according as they are near to or far from these, they are more clear or less transparent, blackest when nearest to them, and less so, when distant from them, when they are only of a greyish or cineritious colour.

AMONG the scales of these stones are found the impressions of various kinds of herbs, which are easily distinguished, but do not penetrate into the substance of the stone—some stones in *Florence*

* *Jessieu* Dissert. on the herbs, sea-shells, and the other bodies found in certain stones at *Chaumont* in the province of *Lyons*.

are impregnated with the colour of herbs between their scales or flakes.

THE number of these small leaves, continues the same author, the facility of separating them, and the great variety of plants, which I have seen thus impressed, made me look upon these stones as so many volumes of botany, which in the same quarry included the most ancient library in the world; which was so much the more curious, because these plants exist no more, or if they do, it is in so distant countries, that we have not come to a knowledge of them. We are however certain, that they are plants of the capillary kind, such as spleen-wort, polypody, maiden-hair, harts-tongue, osmonds, and species of ferns, which approach to those discovered by father *Plumer*, and Sir *Hans Sloone*, in the isles of *America*, and those which have been sent to the *English* from the *East* and *West-Indies*, and communicated to *Plunkenet*, in order to be inserted in his collection of rare plants. One of the principal proofs that they are of this species, is, that as they have their fruit adhering to the backs of their leaves, the deep impressions of their seeds are still easily distinguished upon these stones. The multitude of the differences of these plants, is so great about *St. Chaumont*, that every quarry seems to be a source of incredible variety.

BESIDES these impressions of the leaves of capillary plants, I have also remarked others which seemed to have been made by palm-trees, and others of a foreign growth. I have also observed particular stalks and seeds, and upon opening some of these stones, I have seen a black dust come from some vacuities in them, which was nothing else but the remains of the plant putrified, and includ-

ed between two beds, perhaps for more than three thousand years.

A singular remark, continues he, is, that we do not find in the country any of the plants whose impressions are marked upon these stones; and that among the leaves of an infinite number of different plants, though some may be broken, yet none are folded; since they are all straight as if they had been artificially pasted on. This supposes that these plants unknown in *Europe*, could only come from the countries, where they grow, which are the *Indies* and *America*; and that they could only be thus impressed and arranged in different directions, because they only floated in the water, which covered the bed on which they insensibly fell, as they were kept extended by the water; and that the water of the sea was absolutely necessary to bring them from so great a distance.

THUS one of your greatest botanists of natural historians, has expressed himself in favour of my system. These proofs of the diminution of the sea, and of the fabrication of our soils or ores in her bosom, are certainly very strong; but I add, that you have a demonstration of these things in the shells and other sea-bodies, with which the plains and mountains of our globe are interspersed.

You have no doubt seen, continued our philosopher, some stones of *Syria*, full of small petrified fish; (at the same time he pulled two or three of these stones out of his pocket) observe, continued he, the form and the diversity of these small fish; they are absolutely the same with those caught at present on the coast of *Syria*; and the quarries from which I took these stones, are two days

journey distant from that sea, and considerably higher than its surface. These stones are found in two different quarries, separated from each other about four or five leagues, as we may reasonably suppose from their diversity of colours. Now these small fish could only be thrown into and buried in the petrified sand, in which they are found, by the waters of the sea, and at a time when they still covered these places.

OBSERVE, I pray you, that all the fish are found between the beds of the stone, which are situated horizontally with the sea, as well as all other extraneous bodies found in the composition of the stones and marbles of our mountains. This observation is of great importance, since it is a proof, that these bodies have fallen, or have been thrown and conveyed to the parts where they are found, at the time when these places were beds of the sea; and that all the stone and marble which cover them at present, have been afterwards collected *Stratum super Stratum*, between which we find every where in the universe shells and sea-fish, some whole and others broken: Of this kind I could recount to you a thousand singularities, which have been discovered in the quarries and mountains of my country; but that I may quote nothing of this kind, the truth of which is out of your reach, or of which you are not perhaps already convinced, I shall content myself with mentioning the following facts.

IN travelling through the mountains which run along the *Moselle*, I entered a valley to the right, between *Metz* and *Thionville*. Curiosity had drawn me thither to view an iron mine, in which the labourers were at work; higher up near a vil-

lage called *Moyeuve*, situated between two very high mountains, in the middle of which is a rivulet which works the forge. I entered the mine of the quarry which is very near the forge; the vein or bed of this quarry, which is almost six feet thick, not only extends itself horizontally under one of these mountains, to the height of two or three fathoms above the rivulet, but also runs to a similar height and thickness under the opposite mountain, and all those contiguous to them, whether separated from them by deep valleys or not. I again found the same mine, and at the same height, under the mountains of *German Lorraine* beyond the *Moselle*, and under other mountains of *Bassigny*, and the adjacent countries; that is to say, at the distance of more than thirty leagues. It is not to be doubted, but the so equal bed of this vast mine is a deposition which the waters of the sea formed in these parts before all the mountains, with which it is covered, began to be formed.— This is evinced not only by the vast extent of this mine, whose bounds are not as yet known, or the quality and thickness of its bed, which are the same in all places where it is discovered, but also by the infinite number of sea-adders, and shells of corneamons, found petrified in that ferruginous mud or soil.

How could these animals be petrified under these large and thick mountains, in the muddy sand which composes this mine, if they had not lived and multiplied there? But how could they live there, except at a time when this mud, as yet liquid, was not buried under the weight of the mountains which cover it? so that it left to these animals the liberty of respiring the air, which is always mixed with the water, and the means of multiplying in that mine, then pervious to, and

habitable by them. This first matter was succeeded by all the rest, of which the different beds of this mountain are composed, from this mine to their very summits. It is also to be observed that in these beds we find a vast number of other shells, especially about *Thionville*. The stone there used for making the best lime, and composed of a mud different from that of the iron-mine, is also full of sea-shells, which certainly render the lime much stronger than it would otherwise be.

I have also seen the rib of a whale in the steep rock, on which the fortrefs of *Porto Hercole* is built. This rib was shewn to *Philip V.* of *Spain*, when his gallies went into that port, to convoy him from *Naples* to the dutchy of *Milan*.

BUT though the mountains and quarries of *Europe*, like ours, include numerous testimonies of the manner in which they have been formed, yet I find no where such a quantity of them as in the mountains and repositories or public buildings of *Switzerland*. The repository of *Mr. Scheuchzer* at *Zurich* is adorned with a prodigious number of stones, in which petrified fish of various kinds are to be seen; in one of these stones there is a petrified feather. I from that country brought several, which I broke off from some mountains, and which include various kinds of fish. I have a very singular stone which I found in my passage to *Malta*, when I visited a quarry at the bottom of the port; it includes the fin of a large fish, which a stroke of the wedge so happily divided through the middle, that it is seen entire in both parts of the stone in which it was buried. The quarry in which I found these two pieces was more than thirty fathoms above the present surface of the sea, and thirty fathoms of it were already consumed, as might be

casily known from the rest of the top of that mountain. Thus this fin was buried in the center of that mass sixty fathoms higher than the sea.

BESIDES these sensible testimonies of the fabrication of our mountains in the sea, you have also in their surfaces evident proofs, that the highest of them have been long buried under the waves, as a great many others are at present. Mount *Pelare* in *Switzerland*, situated in *Lucerne*, supports another very high mountain, called in the language of the country, the *Field of the Ram*, on which we see very large rocks, whose whole substance is composed of petrified sea-shells. In considering them we cannot doubt but the sea has formed them, as it still forms others of the same kind in a thousand parts of these coasts, by adding, during whole ages, shell after shell, and uniting them to each other with sand and salt, which serves as a cement to them. There are rocks of this kind in all the large mountains on continents, in the *Pyrenean* mountains, and those of *China* and *Peru*. We find the same disposition in all countries where there are high mountains, though it is more remarkable in some parts than others.

WE almost every where find upon the declivities of the mountains, sea-shells which adhere to them, especially in parts which the wrecks of the rocks and earth have covered and secured from the injuries of time. We also find there a kind of fish*, still adhering to the stones†; and pipes formed by

* Madrepores,

† I had the honor some years ago to present to the academy true Madrepores, still united to their rock, which I had separated from the earth at *Chaumont*, near *Gisors*: As also some petrified plants, which only grow in the bottom of the sea, and which are the most certain marks we can have that this part of

certain sea-worms which include themselves in them. This infallibly proves, that these places have formerly been beds of the sea, in which these worms are only produced. We also find corals petrified, and still adhering to the rocks, which alone can produce them in the sea. Some of these we find buried in the substance of mountains, and making a part of their petrification, which is an infallible proof of the preceding state of the places where these bodies are found.

THE mushrooms with branches used by the inhabitants of the *Guadaloupe* for making lime, or a kind of sea-tree which is only produced in its bosom, or on very shallow coasts. They grow very quickly, and spring up from their former trunks, when cut by those who search for them. This petrified tree, like all the other sea-trees, has its trunk sometimes a foot in diameter, and is no sooner raised above the soil in which it grows, than it is inflated on all sides, like a fungus or mushroom, just as the oak does when it is planted in a bad soil. From this fungus arise several branches in the form of flat fingers; and these fingers send off others of the same figure. The fibres of the trunk are perpendicular, and those of the fingers horizontal. As in digging the earth of *Guadaloupe* and the continent adjoining, we find a great many of these trees still standing, some whole, and others broken; so it is certain, that the sea in which they have been produced, once covered the places in which they are found; and that conse-

the continent was formerly a part of the sea.—Mr. *Bil-leret*, professor of Botany at *Becancon*, sent me some pieces of rocks taken from the quarries of *French Compté*, on which were found some of these pipes formed by certain sea-worms which lodge in them, and such as in our seas we find on the rocks which produce the coral.

quently its waters are diminished in proportion to the height of these places above their present surface.

BUT of this kind I have seen nothing more singular or worthy of attention, or instructive, than the banks of oyster-shells with which several mountains of *Tuscany* are covered, especially those of *Pisa*, because they are in the neighbourhood of the town of that name. Some of these banks are two or three miles in extent, and covered with earth or sand three or four feet deep, which the winds have conveyed thither since these hills rose above the sea, and the shells which have been detached from these banks by the rain, or by any other means conveyed into the neighbouring fields, cover all the adjacent grounds, just as ours are covered with pebbles and flints. Father *Feuille* who went to *America* to make his observations, assures me, that he has seen such works of the sea, in the mountains of *Peru*. A celebrated *Englishman* told me, that he met with some of them in the mountains of *Virginia*. They are also found in the country of the *Acaoukas* in *Mississippi*, a hundred and fifty leagues from the sea-shore. There are some of them found in *France* about sixty leagues from *Bordeaux*, in the parish of *St. Croix du Mont*, between *Cadillac* and *St. Macaire*, about seven or eight hundred paces from *Garonne*. There, on the top of a pretty high mountain, which rises among others, from which it is separated by valleys, we find between two beds of stone, the uppermost of which is five or six feet thick, a bed of oysters twenty or twenty-four feet thick, and extended about a hundred fathoms which were visible, the rest being hid in the rock. In this the inhabitants have hewed out a chapel fifteen feet high, in which they celebrate the mass. Most of

these oysters are close, and contain a small quantity of argillacious earth, which is certainly the substance of the oyster dissolved. These oyster-shells are united in the bank by a sand, which being mixed and petrified with them, at present forms but one common body. The literati of *Bourdeaux*, who are so assiduous in preparing a history of the earth*, can certainly give you an account of the manner in which this bank was formed, if the prejudices of education do not hinder them from discovering the reason of this phænomenon. For my own part, I think it is certain from the view of these banks of oysters, especially those in the hills of *Pisa*, which are so numerous, so large, and only covered with a little sand, that they were all beds of oysters when the sea covered them totally, like to those which it includes at present in the numberless places, and from which we take the oysters we eat.

A great many other countries of our globe furnish evident and uncontroverted testimonies, that the sea has been higher than it is in its present state, and that it has long covered our rising grounds. We were then sitting on the mountain of *Mokatan*, at the foot of which *Grand Cairo* is built. This is the place where *Herodotus* says, in his time, there were rings of iron to be seen in the stones, to which the ships which arrived at *Memphis* were tied. Three miles hence, continued our

* At *Bourdeaux* the literati are preparing to publish a history of the earth, and of all the changes which have happened to it, as well general as particular, whether by earthquakes, inundations, or other causes, with an exact description of the different progresses of the sea and land, of the formation and disappearance of islands, rivers, mountains, vallies, lakes, gulphs, straits, capes, and all their changes; with the physical cause of all those effects. *Journ. des Scavans. Mars 1719.*

philosopher, and in this long tract of mountains, which terminating at that city, extends to the Frontiers of *Abyssinia*, there is a long valley, which by a gentle declivity conducts the traveller in three days time to the *Red Sea*. This valley, which is a mile, and in some parts two broad, has its bottom covered to the height of several cubits, with shells of all kinds, from its entrance to the sea shore, where they are daily multiplied more and more. What can we conclude from this, if not that these shells have been collected by the waves, and heaped up in this valley; and that the sea has left them there successively, in retiring within the boundaries in which we now see it. How, without supposing a very long continuance in, and a real superiority of the water to these places, in which we find these sea-bodies, can we account for the collections which are made of them in all parts of the world?

ABOUT half a league from *Francfort*, on the other side of the *Main*, there is a mountain called *Saxenhausen*, whence stones are dug, the whole of the substance is composed of small petrified shells. These are united by a fine sand, which forms a very hard stone, of which the strong walls of that beautiful city are built. Most of these shells include their respective fish, which are also petrified. At *Vaguine*, a small town in *Provence*, we find another mountain full of sea shells and large oysters, some of which are still alive. The fields adjacent to *Havre-de-Grace* are full of oyster-shells; which are also to be met with in a great many parts of *France*. There is a bank of sea-shells at *Iffy*, near *Paris*; *Tuscany* contains a prodigious number of them, besides those I have mentioned to you; in a word, there are numbers of them to be found in all parts of the world.

How then can we doubt but this globe which we inhabit is the work of the sea, and has been formed in its bosom, in the manner that similar compositions are still produced under her waters, as we see with our own eyes on shallow coasts, and as the divers assure us? These in the bottom of the sea observe mountains, vallies, plains, steep places, and even ridges of mountains, such as in some parts, of our continents, extend to three, four, or five hundred leagues in length. That ridge, so well known in *Europe*, which begins at the peninsula of *Jutland*, and reaches more than three hundred leagues, under the waters of the sea, which are ready to let it appear above their surface, is an authentic testimony of what I advance. It convinces us, that as the formation of these ridges of subaquatic mountains, is the effect of two opposite currents which have raised a heap of sand or mud between them, so the long mountains on our globe, have been formed in the same manner, while the sea covered them. The sea-shells and fish which these mountains include, and the position of these sea-bodies always laid flat, leave us no manner of room to doubt of it. It is thus, that the mountains which bound the plain of *Antioch* from east to west, as far as *Tartary*, have been formed between two currents flowing from the south and north, while these mountains have been separated by a third, which cutting these from the east to the west, has digged and preserved the valley observable between them. This is easily distinguished from the top of the castle of *Antioch*, whence we discover the place through which this current flowed from the *Mediterranean*, and the road it kept in its way to *Tartary*.

THESE ridges of mountains are often formed in another manner by double currents; for the one,

for example, running from the east to the west, and the other from the west to the east, form between them a ridge in their proper direction, according to the disposition of the bottom of the sea. It is in this manner, that the current which runs from the straits of *Gibraltar*, towards the east along the coasts of *Barbary*; and that which runs from the east through the mouth of the *Dardanells*, and terminates in the straits, going along the coasts of *Morea*, *Italy*, *France* and *Spain*, have formed the islands of *Yvoica*, *Majorca*, *Minorca*, *Corfica*, *Sardinia*, and *Sicily*, almost in a right line, as we see them in the maps and charts.

You no doubt conceive, continued our philosopher, that in roads, so long as from our *Mediterranean* to *Tartary*, and from the straits of *Gibraltar* to the farthest part of the *Mediterranean*, the waters of these currents received impressions, which sometimes make them deviate from a right line; that a part of their waters is also detached, runs through the mud and sand, which it separates, and by which its beds are enclosed; and that these small currents detached from the large ones, insinuating themselves into these collections of sand and mud, form particular roads for themselves in them. These are the vallies and inequalities which you observe in your mountains, and which you find equally in those which the sea still includes in her bosom. The separations of our mountains, and the vallies by which they are cut, shews the various roads which the currents of the sea kept, when covering them totally she laboured at their fabrication, and point out to us the manner in which they have been formed. The flux and reflux of the sea, going into the straits between certain mountains, or into mouths of rivers, and returning immediately, teaches you the manner in which val-

lies have become deep, and by] what means the waters of the sea have formed the course of rivers and brooks. This is one of the noblest studies, to which we can apply, and I hope your literati, especially those belonging to academies in sea-coast towns, after having well considered the disposition of the mountains, will give us the history of the formation of our globe by the currents of the sea; with a just description of its exterior parts, and an exact plan of the earth uncovered.

FOR in order to destroy this truth, and elude so many facts, which infallibly established it; it is to no purpose, Sir, with some of your authors, to oppose to me the history of the universal deluge, which you pretend has covered the whole face of the earth. In order to confute this opinion, it is evident that one of the most learned doctors of your church,* grants that so considerable an event was absolutely unknown to the *Greek* and *Roman* historians. *Josephus* † assures us that *Berosus* the *Chaldean*, *Nicholas*, *Damasceus*, and *Jerome* the *Egyptian*, had spoke of it nearly in the same manner as *Moses* did. But must the fact pass for manifest? Is it astonishing that *Berosus* and the others who lived in the east under the empire of the *Macedonians*, at a time and in a country where the *Jews* were so well known, should insert into their histories, what the *Jewish* books contained on that subject? I add, that even the circumstances re-

* Quamquam Ogygius ipse quando fuerit, cujus temporibus etiam diluvium magnum factum est (non illud maximum quo nulli homines evaserunt nisi qui in arca esse potuerunt quod gentium nec Græca, nec latina, novit historia) sed tamen majus quam postea, tempore Deucalionis fuit inter scriptores historiæ non convenit.

Augustin. de civ. dei, lib. 18 cap. 8.

† *Antiq. Jud.* lib. 1. cap. 3.

lated by those historians, convince us how little we may depend upon their veracity, if it is true that they have wrote what other authors represent as their opinions: In a word, the passage which *Josephus* quotes from *Berosus*, mentions the remains of the ark, which, says that author, are to be seen at present, on a mountain in *Armenia*, and of which pieces are carried off by way of reliques or sacred memorials: I grant, some ignorant *Armenians* are still of this ridiculous opinion, with respect to the remains of the ark. But, it is sufficiently certain, that our most judicious travellers readily grant, that this is no more than a childish fable; that *Mount Ararat* on which the ark was said to land, is perpetually covered with snow, and so inaccessible, that it has never been possible to go half way to its top. It is therefore evident really that we could never know whether the ark rested on that mountain, or whether there are any remains of it there, unless we suppose that some favourite of heaven has learned the mighty secret by a particular revelation from God, which is not as yet proved.— Besides, the inhabitants of the country have a tradition with respect to *Mount Ararat*, which is by no means compatible with what the *Jews* relate concerning the deluge: They say, that *Noah* saved himself in the ark, together with twenty-nine persons; and that the town of *Tamarin*, situated at the foot of this mountain, has taken its name, which in the *Arabic* signifies fourscore, from the number of persons which came out of the ark, and settled in that part.

BESIDES, it is as astonishing that the *Greeks*, who so greedily swallowed every thing that was marvellous, and the *Romans* who were so dextrous in distinguishing truth from fable, and who have transmitted to us the memory of the deluges of

Osiris, *Ogyges*, and *Deucalion*, have not spoke a single word of the universal deluge, which is said to have swallowed up all mankind. Is it conceivable, that an event so remarkable and so terrible, should be abolished from the memory of men, who had been preserved from it, and from the memories of all their posterity, to which a degree, that neither the *Indians* nor the *Chinese*, whose histories are so ancient, and even before the *Epocha* you assign to this deluge, nor any other nations of the world, have preserved the least remembrance of it; so that an event which equally interests all mankind, is not to be found in the traditions of any country or nation, except in that little corner of the earth inhabited by the *Jews*, a people whom history and experience prove to have been, and still to be during their humiliation, the vainest and most credulous mortals in the universe.

SHALL I add to this general silence of the nations, with respect to so important and so sensible a fact, that it is not possible to conceive whence in forty days this prodigious quantity of water could come, capable of raising the sea from where it is at present, to the height of forty cubits above the highest mountains of the world; that neither can we comprehend where this immense quantity of water retired in so short a time, since I defy any man to prove that a collection of water capable of covering our highest mountains, could find room in the center of the earth, since the contrary is easy to be demonstrated; that in a word, it is equally inconceivable, that in a few months those waters could be dissipated, since in order to make them sink three or four feet, some thousands of years are at present requisite, as I shall afterwards shew. Is it not from this natural to conclude, that in order to support this opinion of the universality of the

deluge, we must have recourse to a miracle, and say, that God after having drawn this prodigious quantity of water from nothing, he afterwards annihilated it, which is absurd? For why should the Almighty take so much unnecessary pains, why furnish out so sumptuous an apparatus, in order to destroy a race of sinful mortals? Could he not have annihilated them by a single act of his power, or a word of his mouth? Besides, continued our philosopher, this fact is contradicted by your own sacred books: Do not these tell us, that the deluge was the effect of a simple rain, which lasted only forty days, and which could not consequently be equal to those which fall for five months in *Abyssinia*, and in some other countries of the world? Do they not add, that these waters only retired by little and little*, which only denotes the successive effects of natural causes, and not a sudden prodigy wrought by the omnipotence of God.

You are provoked, continued TELLIAMED, and no doubt take it ill, that I should so powerfully attack a tradition, authorized by your scriptures.—However, if you will but bestow a little attention, you will grant that my sentiment, with respect to this so famous truth, is by no means opposite to what is taught you by those books which you look upon as sacred; that these words *the whole earth*, which they use in order to denote the space of land covered by the deluge, may be equally understood either of the whole globe, or only one part of it;

* “ All the fountains of the great deep were broken up, and the windows of the heavens were opened. And the rain was upon the earth forty days and forty nights. And the waters returned from off the earth continually, and after the end of the hundred and fifty days, the waters were abated.”

Gen. vii. 11, 12. and chap. viii. 3.

for example, of that country in *Asia* inhabited by *Noah* and his family ; that in reality they have been understood in this sense by many of your literati, who have not thought themselves obliged to acknowledge this universality, which is by some maintained in opposition to all the powerful arguments against it ; that your scriptures themselves favour this last opinion ; because, from every thing they contain, it is evident that *Moses* had only an intention to write the history of the *Jews*, and by no means that of other nations. So that we may say with him, that the deluge of which he truly speaks, really covered *the whole earth*, that is, the whole country inhabited by *Noah* and his neighbours ; that we cannot besides understand that writer otherwise, without giving the most absurd explication to his words ; that when he says, for example, † *all flesh died that moved on the earth*, it is impossible to understand these words of the fish, who came not out of their element during the deluge ; that it is equally absurd and ridiculous to think, that all other created beings perished in this general inundation, and only perpetuated themselves by the care which *Noah* took to preserve them in the ark ; since in order to support this fable, it is necessary to admit that he took along with him not only Elephants, Rhinoceros, Camels, and other large or monstrous animals, which must take up a great deal of room in such a small place ; not only fleas and bugs, and other very incommo- dious vermin ; but also hand-worms, and a thousand other animals, which though smaller than the hand-worm, yet exist in nature. In a word, that as the deluge of *Deucalion* passed among the ancient *Greeks*, as yet ignorant, for universal, though it only happened in *Greece* ; and as according to your

† “ All flesh died that moved upon the earth. *Gen.* vii. 21.

own books, after the burning of *Sodom*, the sons of *Lot* imagined that their father was the only man alive, it would be by no means astonishing, if *Noah*, saved with his family from a deluge which had inundated all his country, should believe that this deluge had really covered the whole face of the universe.

BUT even admitting your system, with respect to this subject, I affirm, that it cannot account for every thing, which in our globe evinces the insensible fabrication of our soils, and of the different materials which the sea has employed in their formation. What you have said of this deluge, has engaged me more narrowly to examine the mountains of *Armenia*, on one of which you pretend *Noah's* ark stopped. Now I have observed, that these mountains, as well as any others in the world, contained in their entrails the bones of sea-fish, shells, and other matters extraneous to their substance, all laid flat and horizontal, as they are elsewhere, which is an infallible proof that they have not been inserted there in the time of the deluge.

IN a word, if the insertion of such extraneous bodies in these enormous masses, must be attributed to this great event, is it not certain, that they would be placed there with confusion and in all directions, the short duration of that deluge, not having permitted them to fall naturally flat and horizontal to the globe? Besides, in order to comprehend that these extraneous bodies have penetrated into these mountains, we must suppose either that these entire masses were formed during the short duration of the deluge, which is impossible, and even contradicted by your scriptures, which suppose that they existed before; or we must say, that these mountains must have become so soft

that such bodies could enter into them. Now, I ask you, if it is not absurd to think so? Whom will you persuade that the waters, however abundant you suppose them, were able in six or seven months to penetrate, soften, and liquify, a rock of marble or stone, four or five hundred feet thick? For these extraneous bodies are found in the bowels of the mountains, as well as in other parts of them. To produce such an effect, would not a new miracle be necessary? Besides, at the end of the seventh month of the deluge, did not the ark remain on the mountains of *Armenia*? Did not the dove bring back an olive branch to *Noah*, as yet shut up in the ark? These mountains were not then soft and fluid masses, since they were capable of supporting so clumsy a machine as the ark, and bore olive trees, which we know are long in growing.

BUT let us return to the proofs of the diminution of the sea.

EGYPT, in which we now are, has furnished me with a very singular, and in my opinion, a very convincing kind of proofs. About two or three days journey from the *Nile*, on the side of *Lybia*, and in the deserts which terminate *Egypt* towards the east, we find several ruins of considerable towns. The sands under which they are buried, have preserved the foundations, and even a part of the edifices, towers, and fortresses with which they were accompanied; and as in these places it never rains, or at least very little and rarely, it is probable that these remains will subsist there for several thousand years. These destroyed towns are situated nearly in a line, from the north to the south; or if you will, from the *Mediterranean* towards *Nubia*. They

are, as I have said, two or three days journey distant from the habitable parts of *Egypt*, and reach as far into the deserts. Their distance from each other is two, and sometimes three days journey.

If you consult the *Arabian* authors who have wrote the history of *Egypt*, or listen to the traditions of that country, with respect to these ruins, you will find that they are the remains of several towns built either by the magi, or by princes who wanted to signalize their power by making choice of so extraordinary situations for colonies: or perhaps these towns were built as so many shelters from enemies, since they are in places almost inaccessible by large armies. It would be easy to shew the impossibility and folly of building towns in places two or three days journey distant from an inhabited land. Such towns could not have been built, nor could the inhabitants have lived, without an incredible expence, since it would have been necessary to have carried even water to them, and since by the smallest interruption of the *Egyptian* caravans, the settlers must have died of Hunger and thirst. Besides, the inhabitants of these towns, which from the extent of their ruins must have been very populous, could not have had any commerce for their support, unless we suppose that the sea once bordered upon them.

INDEPENDENTLY of these considerations, let us examine the situation of these towns, beginning with that in which the temple of *Jupiter Ammon* was built in the time of *Alexander*, and the *Romans*: By doing so we shall evidently find, that they have successively been the sea ports of *Egypt*. The city and ports of *Alexandria*, have succeeded the city and port celebrated on account of the temple of *Jupiter Ammon*. This city succeeded the next to

it in going towards *Nubia*; and the rest successively followed each other. As a proof of this, we observe before all these ruins, towards the north and the *Mediterranean*, the places which have served them as harbours. These harbours are not so totally destroyed but that we may easily distinguish the form and extent of them. I do not doubt but if we were to dig into the sand, with which these harbours are in a great measure filled, we should find the remains of a good many ships: But I had neither men, victuals, nor water enough for undertaking a task which might have been longer than I was aware of.

THE position of these ruins is always higher than the harbours, which are almost all surrounded with rocks, except in some places where the entries of the harbours have certainly been. Before some of these ruins we see grounds raised as high as themselves, with some remains of buildings. These were probably islands contiguous to the port. These cities could serve for no other end than that of sea-ports, neither was it possible that their inhabitants could subsist without the aid and assistance of the sea. They could only be employed in commerce, and could not receive the necessaries of life, but by means of ships which brought them from the mouth of the *Nile*, then much higher than the place where they are situated.

IN proportion as that city, which was next to *Nubia*, was left by the sea, there was another built nearer the shore in the place most proper for the reception of ships. We meet with the second of these ruined cities, in descending through the desert of *Nubia* to the sea. This is succeeded by a third, which was succeeded by that in which the temple of *Jupiter Ammon* was built. This last was suc-

ceeded by the city and port of Alexandria, which receives the ships coming to *Egypt* on the west of the *Nile*, as *Damiette* receives those which arrive on the east: But in a little time this port, already half filled, will oblige the merchants to forsake it, and look out for a new harbour, in consequence of the successive diminution of the sea. Rising grounds on a coast already shallow, will at last appear entirely dry; and I am persuaded that in two or three thousand years, *Alexandria* will be farther from the sea-shore than the ruins of the temple of *Jupiter Ammon*, in which we only find a few ancient burying-places. The fine churches of Alexandria converted into mosques are, as you very well know, the only edifices within the new walls which for six or seven hundred years have enclosed that city. The houses are built on the sand, which for two or three hundred years has filled up a large part of the harbour.

THE greater and the smaller *Syrtes*, so renowned in *Roman* history, and both situated on the sea-shore about sixteen or seventeen hundred years ago, are now at a great distance from it. This, indeed, happens on account of the shallowness of all the *African* coast, as well as of the diminution of the sea. If you go into the deserts contiguous to this coast, or into *Egypt*, you will find the remains of numberless cities and harbours. The appearances of ports and the vestiges of the buildings which surrounded them, are to be found in a hundred places. Ships* petrified entirely or in part, and found thirty or forty days journey from the sea, as well as in places nearer it, numberless shells mixed with the sand of the deserts, or adhering to

* Vessels and boats of every kind, were formerly called ships.

the rocks and mountains, vallies at the feet of the mountains also covered with shells, and the whole beds of shells in other parts, are infallible proofs, that the sea once covered these countries.

IN a word, if the sea had not been superior to them, if she had not once overflowed the scorching desarts of *Lybia*, could we find these traces of her abode so distant from herself, especially such a number of sea-shells, with which these desarts abound, or which adhere to the rocks in that country? Have we ever to this day perceived even land-shells produced in places which at present have so little humidity for their nourishment and support?

VISIT, Sir, continued our philosopher, the little hill situated to the south-east of the largest of the pyramids, superior to their basis by some fathoms, and only two or three hundred distant from them, and you will find upon its summit, numberless shells and other marks of the sea. The desert at the entry of which this hill and the pyramids are situated, is that which conducts to *Lybia*, and its dryness, notwithstanding its contiguity to the *Nile*, is as great as that found in its farthest extremities.

THE names of a great number of places, which the sea has covered there, as well as in all the other parts of *Africa*, are evident proofs of my doctrine, among the people now most contiguous to these desarts. Thus they say the seas of *Barca*, *Borneo*, *Cyrene*, and *Jupiter Ammon*, in order to give proper names to the beds or channels in which these seas once ran, geographers themselves retain these very names in their charts and maps, since they are sensible that they have preserved them ever since they have been left by the waves of the sea. In

the history of the first and second ages of *Mahometism*, we are informed, that a canal was dug from the port of *Cairo* to the *Red Sea*, through which, by the assistance of the *Nile*, provisions were conveyed to *Mecca* and *Arabia*; of this canal we have at present no remains. We only find at the extremity of the *Red Sea*, the end of a canal dug in a rock, the rest of which is covered with sand. Whether this is the canal mentioned in history or not, yet still it is certain that when it was dug, the sea was by some feet superior to its bottom, which is at present a great many feet superior to the surface of the same sea; which is an evident proof of the diminution of the latter. Besides, vessels which arrived at *Suez* fifty years ago, are now obliged to land fifteen or sixteen miles from that port. We are even ignorant where the city and port of *Colzum* stood, which the first histories of *Mahometism* have mentioned, and which then gave their names to the extremity of the *Red Sea*.

It is a pity that *Nero* did not finish the canal he began to dig between *Epirus* and *Morea*. This would have been a sensible and remarkable proof of the diminution of the sea, which he intended should pass through that channel. There are, however, in your histories, as well as ours, continued our ingenious *Indian*, a great many instances of similar works carried to their full perfection, though we have but little attended to the causes of their abolition, or the cessation of their uses.—Some time there will be a passage from *France* into *England*, and from *Spain* into *Africa*, on dry ground, when perhaps those who thus pass, will be as ignorant of the diminution of the sea, as we are at present, in travelling over countries which heretofore were separated by seas less deep. How many islands

have been thus united? And by this means how often have our continents been enlarged? The union of one spot of ground to another, is the real consequence of the diminution of the sea: But as this work is long and insensible, we are but little acquainted with it, or with the cause which produces it, because we are ignorant of the state of places already effaced from the memory of man.—How much will people be astonished, when by the exhaustion of the seas which run from Spain to America, they find *Mexican* piasters and ingots of gold and silver in the grounds which these seas have left. Some of these substances will be found in the stones dug from the mountains in order to build houses. In these stones there will be emeralds, pearls, diamonds, and such precious stones as are commonly brought from the east, and have been lost with the ships which were dashed to pieces in their passage between our coasts and the American shores. We shall there even find entire ships, and if brass and iron were not subject to rust and be consumed, we might there find brass and iron cannon, the use of which our posterity may not perhaps then know: But they shall observe their forms as it were sunk into the stones, and what will appear still more surprising, they will discover the impressions of the coats of arms of our brass cannon.

How, sir, said I, on this occasion, is it possible that in plains far distant from all continents, plains which at present are covered by the sea, and in which there are neither rivers nor dry land, there should one day be inhabitants? How is it possible that in such places there should be cities built, or that the bosoms of the mountains should be opened in order to furnish the materials proper for building towns? Granting it was possible (as you

intend to persuade me) that the immense quantity of water, with which these parts are covered, was totally exhausted, how could these brackish grounds of a sandy or muddy substance, become fertile, habitable, and actually inhabited, without the assistance of fresh water.

YES, sir, replied our traveller, all this is very possible: it will happen as I predict it to you, and these plains which are now under water, will one day be as fertile, at least in some parts, as the best cultivated countries in *Europe*. You must observe, sir, that brooks, rivers, rivulets, and even the peculiar substance of our soils, are things accidental to our globe, and posterior to the appearance of our first ground; and that the former derive their origin from the latter. Imagine to yourself then, that there were no rivers and brooks, when our highest mountains began to raise their tops above the waters; these tops were enlarged, in proportion as the waters of the sea subsided, and augmenting gradually at last, formed small islands. The waters which separated them, continuing to subside more and more, these mountains were united and formed a tract of land of greater extent. This which once happened in one part of the globe, afterwards happened in several others. From these new grounds, at first very small, by the insensible and continual diminution of the sea, have since arisen these vast continents, which we inhabit, that infinity of islands, with which they are surrounded, and of which the sea is full; these islands and these continents will form but one continued tract of land, when the waters of the sea are totally exhausted.

WHETHER there have been winds blowing on the sea, or not, before our first lands began to ap-

pear, is a thing of no great importance to know; but there were certainly currents in the sea, since it is by their means that our mountains were raised and our vallies produced, the matter of which has certainly served to their composition.

As soon as there were grounds, there were certainly winds and rains which fell upon the first rocks; then there were veins of water formed, which carried back these rains to the sea, whence they had been exhaled. These veins became larger and longer, in proportion as the grounds became more extensive. The veins of water formed brooks, several rivulets formed large rivers; the rays of the sun, the heat, the cold and the winds, and the rains acting on the summits of the rocks, mouldered their surfaces away. A part of their dust and wrecks, by the winds and rains, carried from the superior to the inferior places, was there collected. Another part was by the rivulets conveyed into the bosom of the sea, and another stopt at the mouths of the rivulets. Here the herbs, roots, and trees, which the sea formerly nourished in her brackish waters, finding a softer mud, received a new substance which made them lose their bitterness and acrimony: Thus the plants which were before sea-plants became terrestrial ones.

OUR naturalists, I know, pretend, that a transformation of our sea productions into those of the terrestrial species, is as impossible as the change of certain substances into others, because their essences are immutable. I shall afterwards have an opportunity of examining this point; besides, if it is true, as we cannot doubt, that various kinds of trees grow in the sea; that in the *Red Sea*, there grew several species of very perfect mushrooms,

which being soft at first are afterwards petrified ; that all seas produce an infinite number of herbs, even such as are good to eat ; why should we not believe that the seeds of these have produced the herbs and roots which we see on the land, and which we daily use for nourishment. When by the reflux of the sea, the water is very low on the coast of *Ireland*, the inhabitants pull from the rocks, a crisped herb which is very good to eat, and resembles succory ; they salt it and put it up in barrels for use. The divers of *Chili* go three or four fathoms deep in search of this herb, which they call goimon, and which they love greatly. Our crisped succory has probably sprung from this sea-plant. It is thus, I am persuaded, that the earth was first stocked with herbs and plants, which were before contained in the sea. It is in this manner that the grounds left by the sea, being watered by the rain and rivulets, daily produce new trees and plants.

IN proportion then, as these subaquatic plants, of which I first spoke, shall be uncovered and enrich us with new stores, the rivers of *Europe* will also be daily extended ; and through the uncovered lands, follow the sea, which separates them from America. The rivers of America will also advance to *Europe* through the lands which the sea shall have left, till all these rivers meet with each other, or terminate in the deepest place and there form a lake. Such is that of the *Caspian* sea, into which several rivers from all parts of Asia discharge themselves. The rains which afterwards fall upon the new grounds, will form rivulets, and these rivulets will produce rivers, which augmenting the fertility of these new lands, will furnish the necessaries of life to the inhabitants of these countries.

BUT before the ocean lays bare the vast tracts which it covers between *Europe* and *America*, numberless places ready to appear in a hundred parts of the sea will lay a foundation for the multiplication of the human species, by multiplying and enlarging the places whence it draws subsistence.— Such are the shallows between *Corfica* and *Majorca*, such is our *Archipelago* or the *White* sea, which is so shallow, and numberless places in the *Mediterranean*; such is the *Archipelago* of *St. Lazarus* in the *Indies*, the great bank of *Newfoundland*, the shallow sea which separates *England* from *Norway*, and those which wash the coasts of *Germany*, *Holland*, and *France*; such in the *Baltick* sea is that ridge of mountains called the *Borneur* or *Boundary*; and a thousand other parts which the sea is ready to uncover to our view: The basin of the *Mediterranean*, and those of the *Caspian* and *Baltic* seas, will be dried up long before the ocean affords a free passage by land to *America*.

ALL the rivers and rivulets which now terminate in the *Mediterranean*, will however continue to flow through the straits of *Gibraltar* to the ocean, on the plains which she shall have laid bare, till the *Mediterranean* sea has subsided in such a manner, that the bottom of the straits has become superior to the level or surface of her waters. The *Black* sea will cease to communicate with the *Mediterranean*, by the *Bosphorus* of *Thrace*, which is so shallow; so that the *Black* and *Mediterranean* seas, shall like the *Caspian*, be no more but lakes without any communication with each other, or with the ocean. These lakes themselves, at first supplied by the rivers discharged into them, will like the ocean afterwards have their surfaces diminished, because these rivers will become smaller, the rains being no longer supported by so many

clouds and vapours exhaled from the seas, which are now more extensive than they will be then.— In a word, is there not more dry weather at *Marseilles*, than there was forty or fifty years ago, before on the side of the *Rhone* they had drained a lake which afforded more copious rains, and by that means rendered the soil more fertile? It is for this reason that it almost never rains in this country, nor in those countries of *Africa*, which are far distant from the sea, nor at *Ispahan*, nor in the greatest part of *Persia*, which is without rivers and lakes capable of ballancing their distance from the sea. It is for a contrary reason that rains are frequent in countries, which are near the sea, or which abound with rivers and lakes from which the winds can borrow moisture and humidity.

I doubt not, Sir, continued TELLIAMED, but you have observed the manner, in which on the the brinks of the ocean, the beds of those rivers are formed, which run into it. The flux and reflux of the sea first dig passages for her waters; she on this occasion, runs with violence into the least elevated places, and afterwards leaving them with the same rapidity, she preserves roads which are succeeded by rivers and rivulets. This agitation of the waves being often repeated since the appearance of the first mountains, the roads which the sea has made, serve as so many canals for conveying all the waters which fall on the surface of the globe to the ocean. That I may give you a known example of this truth, it is thus that the valley in which the *Seine* now runs from its source to the ocean, has been formed by this flux and reflux, which still continues to dig it even at its mouth near *Havre de Grace*. The reason why the waters do not now produce the same effects in the rivers which flow to the *Mediterranean*, is because

they are hindered from it by the barriers, which *Spain* and *Africa* have opposed to their flux and reflux, and because the waters confined in a small basin, have not as formerly the agitation which they receive in vast seas, from the annual gyration of the globe round the sun, and from its daily motion round its own axis. Thus the water carried in the hand in a small cup, is not subject to the same motion as water carried in a very large vessel.

It is this same flux and reflux, seconded by the winds, which towards one coast elevates the surface of the sea, the weight of which pressing the inferior waters afterwards, obliges them to retire with rapidity towards the opposite shore, where it produces the same effect. It is the successive elevation of the waters, which this motion causes, sometimes towards one part of these coasts, and sometimes towards another, which occasions the alternate currents of all our seas, by which our mountains, and the vallies which continually divide them, have been formed; for passing with rapidity over their bottoms between collections of sand or mud, sometimes in one direction and sometimes in another, they undermine and separate them, composing these eminencies and depressions which we observe in them. This is the eternal work of the sea in all places where her flux and reflux joined to the currents arrives with freedom. These currents add mud to places where before there was but sand, and carry sand to places where before there was but mud. By this means they diminish in one part those masses which they have formed, in order to augment them in another.

THIS is what we observe in our mountains already raised out of the sea, and what our posterity will find in those which shall afterwards appear.— Such will those be between which the *Seine* shall

afterwards flow from the *Havre*, where her waters are now discharged into the sea, to the most distant parts where her waters shall afterwards flow.— These mountains shall in no respects be different from those which run along her shores from *Paris* to *Havre de Grace*; we shall there find beds of marle, petrified mud, and indurated sand with mixtures of sea-shells, fish-bones, and other extraneous substances, as we now find in the composition of mountains, between which these are carried to the sea, which has formed them all, and continues to form the rest of them by retiring from *England* and *Ireland*.

IT is in vain to object, that on the coasts of *Normandy*, the sea continually gains upon the land. Is it not evident that *Harfleur*, which formerly served as a port to the city of *Rowen*, and where we still see the towers which the sea has ruined by her billows, is already distant from the sea?— *Havre de Grace*, which succeeded it, and which has been lately built on the sand and mud which the sea had collected between *Harfleur* and herself, will not long keep its place: Art must labour afresh to form another harbour for the reception of the shipping, which from foreign countries shall bring necessaries and commodities to the inhabitants of *Rowen* and *Paris*.

SUCH is the fate of all maritime places; the present *Marseilles* is not situated where that of the *Romans* was placed; its port is neither that in those times, nor even that of old *Marseilles*. It is a work of art dug at the side of the former harbour, and a restitution made to the sea, of a place which she had abandoned and rendered useless by the retreat of the sea, as the old one was, while the islands of it, united to the continent on the

side of the old infirmaries, and deprived of the little water which surrounds them, will form a more beautiful one. We hardly now remember the position of old *Marseilles* and its harbour, and afterwards our posterity will as little remember the situation of the port of modern *Marseilles*.

FREJUS, a port formerly so famous for the Shelter it gave the *Roman* galleys; and where I have seen the basin in which they anchored, is another authentic proof of the diminution of the sea. This basin is not only at a considerable distance from the sea shore, since there is a lake of fresh water between them, but it is also evident, that though all the ground which separates them was removed, the sea could not return into this basin, to the height at which it is thought to have been in the time of the *Romans*. I even doubt, whether if by a canal, it was brought back to the walls of *Aiguemorts*, at the foot of which *St. Louis* embarked in the ship which carried him to the east, it would be so high as it was so few ages ago. Is not *Ravenna*, another *Roman* port, totally laid in heaps, and is not this city already at a considerable distance from the sea? the port of *Brundisium*, is become useless, more by the diminution of the sea, than the industry of the *Venetians*, who want to fill it up. Most of the coasts of *Italy* and the *Mediterranean* have changed their face within these seventeen or eighteen hundred years*. Read the itineraries of the *Romans*, and compare what they say of the ports of *Provence* with those now found there, and you will see, that if some of these which they mention still subsist, there are a great many effaced, while new ones have appeared. The first being at that time very

* THE reader is to observe—this work was translated, and first printed in the year 1740---and written a number of years prior to that date.

shallow, have ceased to be harbours for vessels, either on account of the sand which has overflowed them, or the diminution of the sea. For the same reason those which subsist are perhaps become better, while the new ones, unknown to the *Romans* have been formed in the same manner.

THE places near the city of *Hieres*, as much as any others on that coast, furnish sensible proofs of this truth. Between the place called the *Signal*, where it is said the son of a count of *Provence* was drowned, and the sea, there are, at present, three large quarters of a league; and the progress of the enlargement of this ground is remarkable from year to year, not only by the diminution of the sea, but by the sand and dirt, which a small rivulet coming from the mountains conveys thither continually. Besides, in this place the depth is so inconsiderable, that at five hundred fathoms from the shore, there are no more than two feet of water.

It is upon this bottom that towards the east they have erected a pier, at the foot of a small hill, on which an hermitage is built, running towards the isle of *Gien*, from the north to the south coast, and that another pier similar to this, and situated to the westward of it, is built from the foot of the small hill to the same island. These two piers form a lake almost square, and three quarters of a league in diameter. By this means the island of *Gien* is become a peninsula, and is joined to the continent. The lake, as I have said, is in general no more than two feet deep. Thus by fortifying and elevating the two piers more, it would have been easy to draw the water out of the lake with pumps, and render it a fruitful meadow. But they thought it better to leave an aperture in the eastern pier, in

order to admit the sea, which by this means communicating with the lake, makes it abound with fish, on account of the shelter which they there find in storms. Now it will be upon this bottom, that by means of the sand and dirt, every year conveyed thither in a great quantity by the torrent of *Capeaugy*, and with the assistance of the mud which the sea carries into the lake, joined with the diminution of her waters, there will, no doubt, soon appear a plain with which the continent of *Hieres* will be augmented. It is in this manner, as I have been assured by an old inhabitant of the place, that forty other lakes at least, have within these hundred years become beautiful meadows, and now serve as pasturage for flocks.

It is certainly in this manner, that all the rivers and rivulets which discharge themselves into the channel, by which *England* is separated from the main land, will some time after this, by the sand and dirt conveyed thither, form a solid earth, which will gradually be enlarged till both are united. Thus after these substances shall have several times filled up the successive harbours, *England*, by its being united with *Ireland*, will become a peninsula, and sailors must go round it, from the ports of the *Lower Germany*, to arrive at the coasts of *France*, and must do the same when they set out from these coasts for any of the ports of *Germany*.

IN a word, is it not in this manner, that the whole of *Holland* has but a few ages ago risen out of the sea? You will, perhaps, say, that the sea daily attacks its moles: But this objection is easily answered. The *Hollanders*, by the sea, confined, within narrow limits, have endeavoured to put her

at a greater distance, and have succeeded by means of moles erected upon her and against her. By these methods they have prevented the diminution of her waters. Thus, when the waves are favoured by the winds and tides, it is not surprising, that they should break through the moles, and recover a part of the ground which had been taken from them, especially, when at present, by importing the riches of the *Indies*, they have introduced a pernicious set of worms, which destroy the stakes used in the fortification of the barriers. The continual attacks of the sea, are not proofs of the augmentation of the water in that part. They only evince, that we have encroached upon, and by that means prevented her apparent diminution.— Thus, it is highly probable, that the waters of the ocean, will be long dreaded by the inhabitants of the neighbouring plains, till the downs are so enlarged on the coast of *Holland*, as to form a barrier before that, which art has erected against their impetuosity.

BUT it is equally certain, that these plains are daily enlarged towards the ocean. How much sand, earth, and other substances, are by the *Tamise* on one side of the *Rhine*, and by the *Meuse* and *Escaut* on the other, carried to the sea, since *Holland* became a republic? Do you believe, Sir, that the port of *Texel* will last for ever? Does not the number of vessels lost every year in attempting to arrive at it, through the mountains of sand which they are obliged to avoid, denounce its speedy end? *Amsterdam* itself will not be long the residence of the merchants employed in negotiating with the other cities of *Europe*, *Asia*, and *America*. If we compare the oldest maps of these provinces and coasts with the modern, we must certainly perceive that the coasts of *Flanders* and

Holland which are contiguous to them, daily undergo alterations and augmentations pernicious to the entrance and arrival of shipping. *Ostend*, which in the *Dutch* wars with the *Spaniards*, was so large and so commodious a harbour, is now good for nothing. You will perhaps object, that the *Dutch* have endeavoured to fill it up: But have the other ports of that coast suffered less? How much has it cost to keep that of *Dunkirk* in such a situation as to be of any use? *St. Omer*, now considerably distant from the sea, was hard by it a few years ago.

Who can reasonably doubt, but in time it will be the same with *Venice*? Very soon that city will be on the continent, which daily approaches it by the enlargement of the land. Several islands are already formed in the basin which surrounds that beautiful city; and notwithstanding the care to make it deep, the slime collected in it will daily render the sea farther and farther distant from it.— It is already a difficulty for large vessels to pass the mouths of *Malamock* and enter and come out of these arsenals, notwithstanding the repeated labours to keep them deep. The *Lower Lombardy* is a new acquisition made on the sea; and the plains of *Italy*, from *Boulogne* to the *Adriatic*, have been but for a few ages left by that sea. The borders of *Italy* on one side of that sea, and the *Roman* ground on the other, have considerably advanced to each other within these fifteen hundred years. The places near the *Baltic* on the side of *Germany* and *Gottenbourg*, are recent conquests made upon the sea. The heaths found in so many parts of *Europe*, such as *Germany* and *France*, are plains of sand without any fertility, because, since the sea left them, they have not had time to acquire that quality: But they will, in process of time become

fertile, as those plains are, which are farther distant from the sea. *Bausse* and *Champagne* were formerly in the same state. The plains of sand which the sea forms at the mouths of the *Rhine*, and the plain of *Cran*, which she has covered a few ages ago, will become as fertile as those of *Arles* and *Languedoc*, which were once in the same situation with the former.

IF you turn over the sands of our heaths, even in places at the greatest distance from the sea, how many shells and vestiges of the water in which they were formed, do you not find? If in these plains, you consider the extremities by which they touch the sea, do you not daily see them enlarged towards her, form themselves in the same manner, and assume a soil absolutely like that found in places far distant from her. There is only this difference, that those last have already acquired some fertility from the sweetness of the rain with which they have been washed for some ages; from the dust mixed with the sand, and from the putrefaction of some herbs, brooms, ferns, and other plants of a similar nature, which have grown and died there. The walls of *Copenhagen* and *Cadiz*, a few years ago washed by the sea, are now at a considerable distance from it, and this effect cannot be ascribed to an augmentation of the sand thrown to the feet of these walls. The *Lower Egypt* rose out of the sea, within these four thousand years. In the days of *Herodotus*, were there not, near *Memphis*, rocks with rings of iron fixed in them for securing the shipping? Notwithstanding this, *Memphis* is at present twenty-five leagues from the sea. The city of *Damiette*, which was situated at the mouth of the *Nile*, when *St. Lewis* besieged and took it, is already nine or ten *Italian* miles distant from it.—Have not you told me, that at your arrival in *Egypt*

the castle of *Rofette*, now more than a mile from the sea, was within a gun-shot of it? You know, we must grant that the fortress of *Damiette* was hard by the mouth of the *Nile* fifty years ago, in order to hinder the *Christian* corsairs from entering that river.

THESE enlargements of earth near rivers, which like the *Nile*, the *Loire*, the *Rhone*, and the *Garonne*, carry a great deal of sand to the sea, have indeed something very dubious, when considered as proofs of its diminution. Its waters, I know, may be put at a distance from these places by the matter conveyed thither by the rivers, without their surfaces being sunk. But it is not so with the marks which you see of her diminution at the high mountains and rocks on which she beats. Consider in *Provence*, the steep rocks which serve as a mole to the sea. Examine the coast of *Genes*, especially from *Sestri*, on the east, to *Porto-venere*, you will there find, without any possibility of doubt or mistake, the parts at which the sea has arrived, but which she does not now touch. You will there observe the same shells, which she fixes to the place where she beats; but whitened, as well as the rocks, by the air, in proportion as they rose above the surface of the water. You will there observe the same depressions which the billows form in the tenderest parts of the rocks against which they beat. The persons who are ever so much prejudiced against the diminution of the sea, must in these parts read their own condemnation.

THE number of ages, and the degree of diminution of the sea, are known upon these rocks.—We can, at least, distinguish the period of a thousand years, by the different impressions made from

the top to the foot of those mountains, and upon the shells which the sea has fixed to them. Have you ever considered that high rock which forms a cape in coming out from the harbour of *Crouta* to go to *Marseilles*, that *Eagle's-Bill*, which is the name it receives, so much elevated above the surface of the sea, that at no time the billows can rise to half its height? The whole crust of this rock is an equal composition of shells, which the sea has fixed to it at different times, from its top to the part where she now is. Though the various injuries which you at present observe on the coast of *Genes*, are not so fully marked upon that rock, nor the impression of the billows so sensible, because it is composed of beds more equally hard than the mountains of *Liguria*, they are nevertheless sufficiently observable.

WHAT I have told you of your own coasts, I can affirm to be true of all the others I have seen. There is no high mountain or rock, against which the sea now beats, in which we do not find evident proofs of her diminution. A thousand testimonies of this are found on the coasts of *England* and *Ireland*. But it is not only on the mountains contiguous to the sea that we find proofs of her diminution, since these are found also in places far distant from her, and even in the center of her continents. Very remarkable instances of this appear in the mountains between *Gap* and *Cisteron* in *Dauphine*, where we discover the different degrees of the diminution of the sea, by so many amphitheatres which she has formed from the top to the bottom of these mountains. There are also very singular proofs of this in the mountains near *Antioch*, and along the coasts of *Caramania* and *Syria*. We may say in general, that the proofs of the diminution of the sea, are common to all the

mountains in the world, but especially to the steepest, and those whose hardness has best resisted the shocks of time. Is there any more convincing proof of this, than the mountains of congealed mud between which we pass in going into and coming out of *Toulon*? Whence proceed these collections of mud, and these narrow vallies, which divide them in certain places? How were these formed except in the sea by her waters and currents? Are not these rocks called *the Brothers*, as yet in the sea, within sight of that town, the effect of the same cause, though produced more slowly than the former? Does not the appearance of all the islands of the world, especially those that are rough and composed of petrified mud, such as those on the coast of *Provence*, particularly before *Marseilles*, inform you that they were but recently formed by the sea? The similarity of the grounds of these islands where she arrives no more, with the soils of these which she still washes; the same shells adhering in places the most distant from her, as those in parts the most contiguous, inform us that they are equally her work; that some of them are already come out of her bosom not to enter into it again, while others come out of it, and return into it when her waters are swelled by a violent tempest.

THIS diminution of the waters of the sea, has given rise to the opinion, that the stones grow upon her shores; and that the rocks are augmented in her bosom. It is this diminution of the sea which has furnished us with islands unknown to former ages, and made us lose so many others which were formerly known, but which we now search for in vain. It is this diminution which makes the ancient geographers pass for ignorant or inaccurate in the descriptions they have left us. One of my princi-

pal studies, in my native country, has been to search for ancient hydrographic charts. I have, in the most ancient, found several considerably large cities marked, which now subsist no more, and I perceived the want of a great many others, which are now found upon our coast. However, as most of these charts were made upon the disputes which happened about frontiers, between contiguous nations and cities, and were deposited by both parties in the public archives, to serve as common titles to the respective parties, it is not possible to doubt of the fidelity and exactness with which they have been composed. Hence we must necessarily conclude, that the faults observed in the charts are the effects of time, and of the changes which the diminution of the sea has made on the grounds, by joining to the continent, islands which were separated from it, or by making new islands appear which were not seen when these charts were made.

BUT, Sir, replied I here, is it not possible that the waters of the sea may diminish on one coast, and be augmented on another; that they may appear to diminish, whereas they only change their place? That they may even subside in their surface without a diminution, by sinking into the earth, or falling into vast caverns? For it is difficult to believe, that these waters are either dissipated or transformed into another element.

You give me a pleasure, replied our philosopher, in affording me an opportunity of satisfying your doubts, and even of answering the strongest objections, which have hitherto been made to my system: But as this subject requires some extent, and as I must also refute the opinion of those who are persuaded that so many proofs of the diminution of the sea, and of the fabrication of all our

grounds in her bosom, are the effects of chance, the sports of nature, or purely natural productions, let me defer the pleasure of entertaining you on this subject, till another day.

END OF THIRD DISCOURSE.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

Third Day.

OTHER PROOFS OF THE DIMINUTION OF THE
SEA—AN ESTIMATE OF THIS DIMINUTION,
AND A REFUTATION OF THE CONTRARY
SYSTEM.

NEXT day our philosopher came to my apartments at his usual hour, accompanied with other *Indians*, who before their departure from him asked letters of recommendation from me, to some of our merchants established at *Pondicherry* and *Surat*. I promised to grant their request, and as soon as they retired, TELLIAMED resumed his conversation in the following strain,

IF the diminution of the sea, was only confined to her subsiding a few cubits, we might perhaps, think, that by means of some earthquake, which

might have opened a road for her, to lower channels than those in which she formerly was, or to some deep cavern in the entrails of the globe, this quantity of water, though immense, with respect to its extent, might have followed such a road.— It would not even be absurd to suppose, that an extraordinary impulse may have carried the waters to a certain shore, which it may have drawn from the opposite one: But yesterday Sir, I made you observe, that the waters of the sea, have not only covered our highest mountains, but I also by numerous and evident proofs shewed you, that she had reared them in her bosom from their foot to their top; and that she consequently must have surmounted them considerably.

WITH *Lucretius's* leave, it is not the earth which has engendered the mountains, as he pretends*; it is the sea which has formed them in her bosom, and afterwards brought them forth by her diminution. In a word, if it was not so; if the waves in every part of our globe had not been, at least, equal to the tops of our highest mountains, how could we in the composition of the most elevated places find the same substances, which at present she produces on her shores? Without supposing such a preceding elevation, how can we account for this surprizing phenomenon, that in the stones of *Europe*, and especially *France*, and other coun-

* In the fifth book, *Lucretius*, when explaining why the earth possesses the center of the universe, says, that at its origin, the rays of the sun happening to strike upon its surface when laid bare, forced it to condense towards its centre, that then the vallies became low, and the mountains reared their tops in consequence of the rocks, whose bulk and parts could not equally subside.

*Sedebant compi crescebant montibus altis
Ascensus; neque enim proterant subsidere saxa, &c.*

tries at present far superior to the sea, there should be shells, plants, and leaves of trees, which only grow in *China*, *Asia*, or *America*, or which are only conveyed to us from their seas: That in the composition of the stones of these other parts of the world, we find other shells, plants, and leaves, whose species are only produced in *Europe*, or in her seas: That in a word, in all these parts of the world we observe a great many other species of shells and leaves of trees absolutely unknown, and which probably grow in places as yet undiscovered? How could these foreign and unknown shells, plants, and leaves, pass from one part of the globe to another? How could they be inserted in the stones of the mountains in these places? How could they have been conveyed without the assistance of the sea, and of her alternate currents from one of these parts to another? Consequently the waves must have covered the places, in the stones of which these bodies are found. If in *Europe* the sea covered the mountain of *Chaumont* in the forest, and a part of the *Helvetian* hills, the *Alps* and *Pyrenean* mountains, in the substance of which we find plants which only grow in *Asia*, or *America*, if she covered certain mountains in *Armenia* and *China*, in the composition of which we find so many plants and leaves of trees peculiar to *Europe*, the whole globe certainly, then contained but some few islands, which were but little raised above the surface of the sea.

BESIDES, in order to convince you farther, that these fabrications have no other cause than the sea, consider, if you please, the other marks which you find in the position of these eminences, the sea-flints, so called, because the sea has formed them; in the holes of the sea-worms, and in the various sea-shells adhering to the adjacent rocks. Then

examine the arrangement of the plants or leaves in the stones in which they are found. You cannot doubt but they have been placed there horizontally to the globe, and so arranged that they appear to have been applied with the hand: You will indeed find some of them bruised or divided, no doubt by the impetuosity of the torrents which carried them from the mountains superior to the sea, or by the violence of her waves; but you will find none of them folded, which is an infallible proof that they were kept in that extension by the waters in which they floated when they were at last precipitated to the bottom. Hence we must conclude, that our grounds have been formed in this manner, and gradually in the bosom of the sea, of mud, sand, and other substances which the waves contain, at all times, and which they carry from one part to another, where they arrange them successively.

Now if the sea has reared our mountains from foot to top, as it is impossible to doubt after the observations I have made; if these compositions could not be formed unless the waters surmounted their highest summit; if the sea has since diminished to its present surface, as the one supposes the other; that prodigious quantity of water, which was certainly greater than that which remains to be exhausted cannot have passed from one part of the globe to another, since the sea is equally diminished in all parts of the world. It would therefore be unreasonable to think, that the waters are augmented in height in some few places which have not yet been discovered, while they are diminished in all other parts. Besides, the surface of the sea is not less convex than that of the earth. If that state which is peculiar to the waters round a spherical body which turns upon its axis, suffers some

slight alteration in a tempest, which raises the billows in one part, and depresses them in another by some cubits, this tempest no sooner ceases, than they return to their natural situation. Thus their elevation ought to be equal all over the globe, and their situation uniform.

THE waters of the sea could not be collected in the center of the globe, where there has never any vacuity been found below the surface of the waters, large enough to contain the quantity which is wanting from the summits of the mountains to their present level. This is easily demonstrable. If our mountains had only been formed and reared upon an empty crust, which by opening, might have received the waters, and occasioned their prodigious diminution; would not the waters which we find in the bosom of the earth after we have pierced this crust, be salt like those of the sea? However, the deeper wells are, the sweeter waters they contain. Besides, this vacuity when once filled, would prove no longer an occasion of the diminution of the sea, which is daily continued. It is therefore evident beyond dispute, that this diminution of the sea is real and actual, otherwise her surface, instead of subsiding, would be raised; for the rivers, torrents and rains, continually carrying a part of the grounds which they wash, to her, and the winds perpetually conveying dust into her, the bulk of all these substances must raise her waters proportionably; but on the contrary her surface is daily and visibly diminished. This is evident from the sensible marks of her diminution, which she has imprinted on the steep rocks on which she as yet beats.

I know, continued our philosopher, you firmly believe that the elements are not transmutable. I

shall not confine myself to the proofs you have of the contrary among yourselves, nor to the experiment made at *Paris* of the change of water included in a thick glass bottle hermetically sealed for thirty years, into earth. Neither shall I affirm that the water of the sea is changed into earth, since it is only by her diminution, that our mountains have appeared, and that the visible part of the globe was uncovered. There would be neither mountains nor vallies, nor sea nor water, if such a transformation had been made. I do not affirm that any part of matter is lost; and in this I agree with you and with *Lucretius**. The waters of the sea, as I shall afterwards shew, subsist, notwithstanding the diminution they have suffered, and which they still daily suffer.

I do not believe that this diminution proceeds from the weakening of the effervescence, which was greater before than it is now. It would not be impossible that this should happen in consequence of a diminution of the heat of the sun, or of the volcanos included in the bowels of the earth, which might have formerly inflated her waters to such a degree, as to make them cover our highest mountains. Thus water heated in a vessel, is augmented or diminished, in proportion to the degree of heat which agitates it; but I am persuaded that the diminution of the sea proceeds from the waters taken

* It is in the fifteenth book, where this poet attempts to prove the unchangeable state of matter, which is never more compact or extended, which is not susceptible of augmentation or diminution; so that the motion of the principles of things, is always maintained in its immutability.

*Nec stipata magis fluit unquam material
Copia, nec porro majoribus intervallis:
Nam neque adaugefcit quidquam neque deperit inde.*

from her. I shall explain the causes of this in another conversation, and hope that in this you will suffer me to confine myself to the proofs of this diminution.

THE histories we have left, are so recent, confused, and uncertain, in proportion to their distance of time from us, that it is surprizing we should be ignorant of what preceded us by some thousands of years. If the memory of it still subsisted, we should in this tradition, or in our books, have incontestable proofs of the diminution of the sea. There is no reason to doubt, that there have been maritime cities for an incredible time past, and that navigation has been in use for a great number of ages. The ship found in *Sweden* a hundred fathoms deep, in a place where labourers were working a mine, is a convincing proof of this.— If we justly know the position of the towns built on the sea, and that of the most ancient ports, we should have no occasion for other proofs to destroy the almost general prepossession against the diminution of the sea; for there certainly were before, in places four or five hundred or a thousand fathoms above her present surface, habitations and ports, frequented as ours are at present.

I do not pretend that cities and ports have been built on our highest mountains, being persuaded that this globe was neither habitable, nor inhabited till many ages after the appearance of our first grounds; that navigation itself, and the use of that art in order to pass from one island to another, were not known till long after the existence of men; and that after a beginning, which was made by a plank, the progress of navigation has been so slow, that from that time till the building of the

ship found in *Sweden*, we may reckon an incredible number of years, and perhaps the half of the age of the earth. Nevertheless what in your histories goes beyond three or four thousand years, is not only obscure, but even totally destitute of facts. I want no other proofs of this than your own bible, the history of the dynasties of *Egypt*, and that of the *Chinese* themselves, though it goes to ages far before those which you admit.

HAVE you sometimes thrown your eye on the *Bibliotheca* of your *Herbelot*? It is a compilation of all that can be read in that of the son of *Callezanne*, and in several other *Arabian* authors: Of how many monarchies, wars, destructions of cities and nations, and generally vicissitudes, do you not see the last traces, of which you do not find the smallest marks in the *European* authors. These vast provinces of *Asia* and *Arabia*, which have been the theatre of these events, only preserve histories of them, which are very imperfect, and so summary, that they leave more facts in obscurity than they relate. These provinces are reduced to so small a number of inhabitants, that they are almost deserts. These inhabitants are already ignorant of the names of towns, on the prodigious ruins of which their small cottages are built. Were there ever upon earth, two cities more large, populous, and famous, than *Ephesus* and *Alexandria*? However, there is not at present a single inhabitant in the place where *Ephesus* formerly stood; hardly do we know the part were its temple, so much celebrated and frequented, was built. Of the lofty and vast *Alexandria*, which extended from the *Bigueirs* to the tower of the *Arabians*, forty *Italian* miles, there now remains no more than some pillars standing or thrown down, and some cisterns found in the middle of the mountains composed of their

own ruins. The present *Alexandria*, which only contains some refugees from *Barbary* and *Morea*, is not so much as situated within the bounds possessed by ancient *Alexandria*, since it is built upon the sand which has filled up the ancient harbour of that city.

It is not therefore surprising, that we have lost the memory of the position of the ancient maritime towns; and that we at present find some of them bearing their first names in places different from those which they formerly possessed. They have had the same with *Alexandria*; they have changed their places, retaining their first denomination, and following the sea, which is removed from their antient situation. If we are ignorant where a hundred famous cities were placed about two thousand years ago, in Asia and in Africa, is it surprising that we in vain search for the position of cities, which perhaps existed fifteen thousand years ago? Must they not have been subject to the desertion of their inhabitants, in proportion as by the retreat of the sea they became useless for the purposes of commerce?

Do you believe, Sir, that in a small number of years, the people will have more certainty of the position of the present maritime towns, than we now have of these in so remote ages? Do you think that they will then be better instructed with respect to the present state of our coasts, continents, islands and harbours; or that from the change happening in the surface of the sea, which must be succeeded by that of the land by which she is bounded, they can judge more surely of her diminution? No, Sir, the fate of nations, cities, kingdoms, and the state of the earth and sea, which have preceded our days, will be that of our cities, geographical maps, observations and histo-

ries. The famous library of the *Fatimian Califs*, of which so many thousand volumes were written in gold, was dispersed by the ignorant *Saledin*, who did not know the inestimable worth of it.— Another as famous, has been formerly burnt at Alexandria, under the reign of one of the *Ptolemies*. Those of the *Mosques* of *Cairo*, *Damascus*, and *Babylon*, partly enlarged with those of the *Fatimian Califs*; and in which, among many other Arabian books, were the most beautiful works of the *Greek* and *Roman* authors translated at the expence of Calif Aaron, by the learned men of his nation, whom he had sent to *Constantinople* for that purpose, have been also dispersed and lost. Those of the *Greek* emperors have not been more lucky. Yours will one day have the same destiny, notwithstanding the favourable appearance of their duration, and the passion to collect such numbers of them, with which the princes and grandees of *Europe* are at present animated. The descriptions they contain of all the coasts which navigation has made known, of the islands we have discovered, of the foundings and shelves observed in the sea, the particular state of the principal capes and harbours of the world: their depth and extent, the maps which have been drawn of them with so much exactness, and which painting or sculpture might have rendered capable in some thousands of years, to prove the diminution of the sea, and the increase of the islands and continents; all these things will not be transmitted to a very late posterity.

No, it is not for want of historians, that we are ignorant of the actions of the heroes, who lived before the *Trojan* wars; it is because the books composed before the *Iliad* and the *Odyssey* are lost, and with them the memory of the facts they contained; that of succeeding heroes shall not have a

better fate. The names of our Alexanders, our Cæfars and our Pompeys, fhall about two thousand years hence, be buried in oblivion, with the works which fpeak of them; the name of *Louis XIV.* who has made fo much noife in the world, thofe of a *Conde*, a *Turenne*, a *Vendome*, and a *Villars*, the principal inftruments of the victories he obtained, fhall alfo perifh with the hiftory of their mafter.— It will indeed be late, but they will at laft perifh; and the generation four or five thousand years after us, will no longer know thefe great men, juft as we are already ignorant of thofe who were the ornaments of their age about as long ago.

It is not even prefent fame and the force of the moft fplendid actions, which determine the duration of names, and the remembrance of pofterity; chance, and certain facts of great importance to mankind, have often a greater fhare in this than any other thing. The name of *Americus Vefpucius*, will probably live longer than that of *Charles V.* who employed him fo ufefully for *Spain*, and for all *Europe*. I am even perfuaded that the name of this emperor will be long preferved from oblivion, by that of this *Florentine*, but they will both perifh at laft. The *Egyptians*, who had in their hieroglyphical characters found an inalterable method of writing, by means of which they thought to tranfmit the obfervations they had made on the ftate of the Heavens and the earth to the lateft pofterity, have not, however, been able to preferve them from the fhocks of time, nor tranfmit the knowledge of them to us. The meaning of their hieroglyphics is already loft, and the temples, as well as pillars on which they were engraved, demolished and deftroyed.

To prevent, therefore, with refpect to the fubject of the diminution of the fea, the effects of oblivion and obfcurity infeperable from a great

length of time, my grandfather found nothing more proper than to use the means, which in a few years furnish certain proofs of this diminution. He could imagine nothing more proper for this design, than to establish infallibly, and by durable monuments, the actual height of the waters of the sea, and the epocha of this first observation.— He with grief saw, that the marks she had imprinted in a hundred different manners, and for a great many ages, of her preceding elevation, could no longer give mankind a knowledge of the proportion of this diminution. The little care that has been hitherto taken, to fix the time in which the sea has written each of these characters as intelligible as ineffaceable, in the natural books with which our mountains have presented us, has rendered them useless to us. He judged, that the actual height, and the time in which this height was acknowledged, being once established, these facts would not only infallibly convince posterity of the diminution of the sea which is not dubious, but also determine the precise progress of this diminution, which is a circumstance of great importance to judge of the past and future ages of the globe.

My grandfather had about 6 or 7000 crowns a year, and about 30,000 which he had laid up.— He did not hesitate to employ the money for the purposes of travelling, notwithstanding the love he bore to my father, who instead of being angry at his conduct, encouraged his expences of this kind. The lands which my grandfather possessed, were situated in places where wages and the nourishment of the labourers cost but little. The quarries of stone and marble belonged to him, and were near his house. All these circumstances facilitated the means of his executing his design in the following manner ;

HE out of his quarries chose the four sorts of the hardest stone and marble, of which he caused four octagon pillars to be erected. He then caused a solid wall twenty feet thick and twenty high, to be erected round the little island or rock situated before his house, which had laid a foundation for his observations, and after having fortified the side of the wall opposite to the sea, with large rock stones heaped on each other, the interstices of which were filled with large flints, in order the better to defend the wall from the impetuosity of the billows, he ordered four wells ten feet deep each to be dug in the inclosure, which was about six hundred paces in circumference.

HE afterwards made in their bottoms a small horizontal canal, which communicated with the sea, in order to admit water to the wells every time it was necessary. These wells were paved and lined with the hardest and best cemented stones.— He solidly erected the pillars in the middle of the wells, and after having for eighteen months introduced at different times the waters of the sea, at the greatest calms, it was easy to know the present state of her surface, which in that interval he found nearly at the same height. Then my grandfather ordered the pillars and the sides of the wells, to be divided into lines and inches, and took care that upon both, the year of this observation relatively the æras of all known nations should be cut in deep letters.

NOT content with these precautions, he ordered a double dome to be erected round the four walls. The first was built of bricks, and the outer one of cold stone, and both were ten feet thick. Care had also been taken, so to elevate the window which was the only entry to the first dome, that

the waves of the sea could not reach it in their greatest agitation. My grandfather also made the outsides of these domes be fortified with large stones, as he has before done to the wall round the edges of the island, in order the better to defend them against the shock of the waves. In a word, the domes were covered with plates of lead several inches in thickness. Besides the vaults composed of cold stone were built in such a manner, that they could have resisted the rain and the injuries of the air, for a great number of ages, though the lead should have been destroyed or consumed by length of time. When his measurings of the sea were repeated, which was twice a year, in the spring and autumn, he opened the canals, which passed between the bottoms of the wells and the sea, and which were covered with a large plate of lead. They were closed up after the operation, and the water taken out of the wells, that nothing might be left to make an impresson upon the marbles, which were carefully cleaned.

My grandfather carried his care and industry still farther. He ordered another well to be made in the continent, a small way from his own house, and about three hundred paces distant from the sea. But he made it much larger and deeper, and placed in it four columns of stone different from those used for the others. These columns were also divided into degrees, and had the actual height of the sea engraved upon them, with the date of this observation, in four languages employed in marking the first pillars: The characters used for this purpose, were formed of stones of different colours inserted in the others, in order to render this writing ineffaceable. From the sea to this well, they dug a deep and winding canal through the rock which separated them. This

canal serves to bring the water to the well, at the times of observation; except on this occasion, it is always closed up at that extremity which terminates in the sea.

THAT these wells might be preserved, and the observations carried on without interruption, my grandfather round this last well built a firm and agreeable house, and affixed to it revenues in land capable of supporting six learned men to watch over it: After this favour he imposed no other task upon them, than that of studying all their lives what passed upon the earth with respect to the change produced in it by the diminution of the sea, and thus to augment the proofs of this diminution, so great a number of which he had collected.— With this design two of them in company now and then travel into the various countries of the globe, to make a collection of the opinions or traditions which relate to this study. The collections which they make of these is to be wrote on parchment in four different languages like the inscriptions of the wells, and deposited every twenty-five years in six parts of the empire, so that my grandfather in that house deposited the charts of the coast contiguous to his habitation, which he had prepared with the greatest care and exactness.

I DO not pretend to know that my grandfather found the most just and certain method of determining the diminution of the sea, and its progress, nor that the walls he built could not be in a more favourable position than where he has placed them. He has been obliged to conform himself to the ground with which his house is surrounded, and to the situation of the lands which he could set apart for the sup-

port of these wells. I am even persuaded that islands are more proper than continents for these mensurations, especially such islands as are smallest, most distant from the main land, and against the shores of which the currents and the waves cannot stop, and raise themselves as they do against extensive coasts.

I know not a place more proper for this purpose, than that lake which I mentioned to you yesterday, situated on the coast of *Provence*, and which joins the isle of *Gein* to the continent of *Hieres*. We might even erect a graduated pillar in the middle of a basin, of hard stone, situated on a level with the real bottom of the lake, and divided internally by inches and lines. By making the first operation in a calm, we should have the precise measure of the real height of the waves; and bringing them afterwards back into this basin, it would be easy to know, both how much the bottom of the lake is raised by the slime brought to it by the sea, and how much the sea herself has been demolished, since the first observation.

THE island of *Malta* has also appeared more proper to me for such a mensuration, than any other in the *Mediterranean*. Besides the advantage of its situation, which is pretty far from *Africa* and *Sicily*, there is reason to believe, that the present government and that species of republic, will last as long as the borders of the lake in which it is included, and shall, as at present, be divided among *Christian* and *Mahometan* princes.— This island has round it two large rocks to the east and the south, and a third to the west, between it and the isle of *Gose*, which will be of themselves, slow, but immoveable testimonies of the diminution of the sea. It will be sufficient, to evince this,

to consult an exact chart of its coasts and parts, adjacent, in which the shelves and depths are marked with precision. The city of *Malta* itself, its fortifications, and its batteries on a level with the water, whose disposition justly establishes the present state of the sea, and its height, may without any other assistance, teach posterity the diminution of the sea, if the plans of them are exactly preserved; and if in changing a fortification or battery, care is taken to mark upon new plains the changes which they have made, and the reasons which have induced them to make them. However, the wells dug on the rocks and little islands, as high as *Malta*, or on *Malta* itself, will greatly advance the testimonies of this diminution, without which this operation would be pretty expensive.

WHAT hope might not a great master, who is generally a lover of his reputation and memory, conceive, of immortalizing his name, by succeeding in this enterprize? I spoke of that immortality with which we may flatter ourselves here below, and of a space, which though short, yet appears a kind of eternity, in the eyes of human weakness. If the names of *Europe* and *Africa* are still lasting, if that of *America* will last for a great number of ages, as we cannot doubt; why should not that name of him be immortal, who should teach inadvertent men prejudiced in favour of the contrary opinion, that this globe which they inhabit has been formed in the bosom of the sea, and afterwards shew, by the diminution of the waters, how long it is since the earth appeared above them, and how long it has been inhabited?

AFTER the example of my grandfather, several governors of sea-port towns, and a great number of private persons who have habitations on the

sea-shore, have established similar mensurations.— Some have placed in the sea, on rocks inferior to her surface, pillars, on the top of which they have accurately marked the actual height of her waters. Others have raised rocks superior to her surface, and equalled them with it, affixing at the same time plates of marble, which testify the year in which such works were produced. Some have on steep rocks, against which she still beats, marked the present height of her waters, and above it written this observation and its date, after having at divers times observed the elevation of her waves. Others have dug wells in rocks screened from the agitation of the sea, and in certain grounds almost like those which my grandfather made choice of. Experiments of a hundred different kinds have been made, and we have reason to hope, that some of these testimonies will subsist long enough, to triumph over the incredulity of men with respect to the diminution of the sea, and to teach us the precise degree of this diminution.

I HAVE seen examples of this kind in some monuments of antiquity, with which I hope you will not take it ill if I now entertain you. At cape *Carthage*, in the ruins of a fortress which might have been that of *Bothra*, built by the *Carthaginians*, I have seen three apertures in that part of the wall which was next to the sea, which is at present twelve or fifteen feet high, and some fathoms in length, though its thickness is greatly diminished. These apertures, about four feet broad, whose depth could not be measured, because their bottoms were filled up, but whose height is still five or six feet, had been made to introduce the sea into that fortress.

AN infallible proof that these apertures were destined for this purpose, is that their roofs as yet

covered with free-stones as well as their sides, though the wall is only built of small flints united by a cement as hard as iron, are raised higher towards the sea, than at the part where they terminate on the side of the fortress. Now if these apertures had not been made to introduce the waters of the sea, they would at least have been equal; but if these apertures had been made to facilitate the discharge of the waters from the fortress, they would have been built quite differently, that is, higher within the fortress, and lower without it. We must believe from the form of these roofs or arches, that at the time when this fortress was built, the sea was higher than the highest of these apertures; her surface, however, is now six feet inferior to them. She cannot even arrive at the foot of these apertures, from which she is only two or three fathoms distant, except in a violent tempest, produced by an easterly or a north-east wind. Hence I conclude, that the sea was at least five or six feet higher, than she is at present, when this fortress was built; which, as we have good reason to believe, was more than two thousand years ago. As far as I could judge, these apertures were destined for introducing the water of the sea into a basin contained in the middle of the fortress. Some gallies could formerly land here in an entry placed at the side of the fortress, and now filled up by its ruins; this basin perhaps also served for building ships, after which the water was let in through these apertures, in order to bring them out by others larger.

I found at *Alexandria*, at that point of the main land which leads to the rock on which the pharillon is built, several small canals cut in the rock, terminating in the sea, and communicating with the ruins of some buildings, observable on that point.

These canals were certainly destined either to introduce the waters of the sea into these edifices, or to convey water from them to the sea. There is, however, a great probability, that they were rather made to admit the water of the sea into baths, the forms of which are as yet distinguished there, than to serve as discharges for other waters conveyed to these baths. I form this judgment, because they rather decline from the sea to the land, than from the land to the sea, or at least, there was no inclination towards the latter. The lowest of these canals, which was yet pretty entire, and which might be two feet in height and fifteen or sixteen inches broad, was at the time I saw it, covered with the sea-water to the height of two or three fingers-breadth; but the wind which then agitated the waves raised them at least the whole height of the water, which that canal contained. The superior canals were absolutely dry.

I saw others of the same kind at *St. John d'Acre*, formerly called the *Ptolemaide*; they were dug in that smooth and pretty large rock, which is before this fortress, and which being formerly covered with free-stone, served as a plat-form and a mole to its harbour. These canals were numerous, and almost as high and broad as those of *Alexandria*; some of them were like the former, dry, and others of them filled with the sea-water to the height of two or three inches. They were not only horizontal, and without a declivity to the sea, but there were also one or two of them in which those extremities, which were next the sea, were not opened, but shut up by the stone of the rock itself. Hence it is obvious, that they were destined to receive the water of the sea, and to convey it into the city; and that the sea was consequently superior to these canals. In a word, without this she could not

have entered into those which were closed up, or her waters must have been admitted by a superior aperture. When I saw these canals, the wind also agitated the sea, and raised her waters at least half a foot.

I CONFESS, that from the observation of these places, it is not possible to pass a certain judgment of the actual degree of the diminution of the sea. In a word, we know not precisely either the time in which these canals have been dug at *Alexandria* and the *Ptolemaide*, these cities having successively passed under the government of various nations, or in what year the fortress of *Carthage* was built, in which the apertures I have mentioned are found. We are also ignorant what the actual height of the sea was, when the *Alexandrians* worked at that fortress, and at these canals; however, if we consider the diminution observed in the wells made by my grandfather seventy-five years ago, which is at present about two inches, we may estimate that made in a century, to be about three inches, and in a thousand years three feet. Now according to this estimation, the sea having diminished six feet in two thousand years, which we may account from the building the fortress of *Bothra*, whose ruins we see at *Cape Carthage*, she must have been superior to the apertures observed there. Thus also the sea, less than eight hundred years ago, was superior to the canals, which I found in the point of ground joined to the pharillon of *Alexandria*, and upon the plat-form situated before the city of *St. Jean d'Acree*.

HOWEVER, by other testimonies, the diminution of the sea seems to be quicker; for not to cite facts, but what you have an opportunity of examining, as I have already begun, there is between

Genes and the gulph of *Specia*, a rock called *Grimaldi*, from the name of a noble *Genoese*, who lost a vessel against that shelve, about ninety years ago. According to tradition, that rock did not then appear, though at present in a calm it is near two feet above the surface of the sea. I have also been shewn upon the coasts of *Languadoc*, between *Agde* and *Narbonne*, another rock pretty much raised above the sea, though I was told that it only first appeared about sixty or seventy years ago. In the motion which always agitates the waters of the sea, even in a calm, it is difficult to mark a fixed point for her surface, which a preceding wind might have raised; besides, that several rocks grow in the sea by means of the sand and shells which she attaches to them in certain places, while she undermines in others.

Now from the estimation I have made, of the diminution of the sea, that is about a foot in three centuries, and three feet four inches in a thousand years; you must conceive, Sir, how difficult it is for a man in the ordinary course of life, of fifty or sixty years (for we must be twenty before reason is duly formed) to distinguish this insensible diminution amidst the flux and reflux of the sea, and the perpetual agitation of her waves, caused by the winds and the currents, which sometimes raise them in one part while they diminish them in another. To these difficulties, add, that those who have gone before us died ignorant of this diminution, for want of having thoroughly studied the composition of the globe, and compared what passes daily on the shore of the sea, and in her bosom, with what we see from her coasts to the summits of our highest mountains. To these obstacles, add, that our reason is reduced by the position of certain cities of very ancient names, which

we know to have been situated on the sea-shore, in very distant ages, and which we find situated there still.

PEOPLE are not at the pains to observe, that these are the ancient names, but not the ancient situations of these cities; for the inhabitants of maritime places at first extend their habitations on the grounds which the sea uncovers, as being most near to her, and consequently most favourable for commerce, so that cities change their position by following the sea, without changing their denomination, and without their change of place being perceived.

It is not therefore surprising that the diminution of the sea, and the true origin of our globe, have been hitherto unknown to most of the human race, notwithstanding all the circumstances in nature, which point them out. However, now and then, and in all countries, there have been men, whose genius and application to natural things, have triumphed over the prejudices of birth and education. The opinion of the preceding superiority of the waters of the sea, to the lands at present visible, and of their long continuance above these lands, has been that of several ancient as well as modern philosophers. *Bernard Palissi*, a simple potter, who lived under *Henry III.* arrived at this piece of knowledge, by searching into the mountains in quest of minerals, for the improvement of his art, at that time very imperfect. He dared to maintain the truth of his system in public conferences held at *Paris*, where the most learned persons of his time did him the honor to hear him, not disdain- ing to pay the tribute which his poverty obliged him to exact of those who attended his les-

sons. He had posted up publicly, that he would return their money to those who should prove the fallhood of any of the opinions he taught; but nobody contradicted the sensible testimonies he had collected of his opinion, in several petrifications, which he had in his cabinet, and which he had taken out of the mountains and quarries of *France*; especially of *Adrennes*, and those on the banks of the *Meuse* and the *Moselle*. His works have been printed at *Paris*, and the facts which I have cited, are in them established.

TELLIAMED was going to continue, when an unforeseen accident, and such as was pretty new for the country in which we were, made us think of something else. It was such a rain, as for sixteen years had not fallen at *Cairo*, where it sometimes does not rain once in four years. Though this rain was none of the most violent, yet it wet us so as to oblige us to quit the field. We parted under a promise to meet next day in the same place; and while our *Indian* ran to the city as fast as he could, I who am not by nature favoured with the talent of running well, being wet to the skin, sought for the best shelter I could find against this little deluge.

END OF THIRD DISCOURSE.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

Fourth Day.

AN EXAMINATION OF THE DIFFERENT SYSTEMS, WITH RESPECT TO THE ORIGIN AND NATURE OF THE SEA-BODIES FOUND IN THE BOSOM OF OUR MOUNTAINS.

THE rains are never of long continuance in *Egypt*. In a few hours a serene sky succeeded the storm, which had parted us, and the next day was one of the finest that could be wished for.

TELLIAMED was faithful to his appointment, and resuming the conversation: I yesterday mentioned to you, said he, one of your modern philosophers, to whom the system I now explain to you, was not unknown, and who dared to maintain it in the capital of *France*. When I was at *Paris*, continued he, I saw an anonymous work compos-

ed by a modern philosopher, and entitled *New Conjectures on the Globe of the Earth*. The author affirms, that in examining the internal parts of the globe, it is not possible to doubt but it is a composition of several beds of slime arranged upon each other, by the waters of the rivers, and consisting of the substances which they contain, at least, to a seventeen hundredth part, and which these rivers carry off from the rising grounds, in order to deposit them on their banks or in the bottom of the sea, to which they run; that the globe of the earth was originally formed of a flat crust composed of these depositions; that this crust being very thin, since the author only allows it to be two thousand three hundred and fourscore fathoms thick, includes a very subtile air, is supported by the weight of a double atmosphere, which surrounds it, and pressed on all parts both externally and internally; that this equilibrium having ceased at the time of the deluge, this crust was broken and shattered; that its wrecks floated in the sea, as the clouds do in the air, or the shoals of ice in the water, were heaped on each other, and in certain parts so accumulated, as to form certain prominences or elevations; that our mountains proceeded from this; that by this subtraction from the crust of the earth, of the pieces by which the mountains were then formed, there remained vacancies in this crust, perhaps, says he, two or three hundred leagues in diameter; that it is by means of these apertures, that the seas of both surfaces of this crust, at present communicate with each other; that these seas enter by the poles into the cavity of the globe, and that turning round this cavity in a spiral line, they come out between the tropics; that the entries of these waters from the external to the internal surface of the earth, and their departure from the internal to the external

surface, are the causes of the flux and reflux of the sea, which are more sensible in one part than in another, according to the position and largeness of the passages, through which these seas enter or come out.

THE author however does not believe that there is any thing animated, within the globe, except the fish that swim in the seas. Besides, he is persuaded, that there are rains in the sea, and that there are in her several rivers, with which the internal surface of the globe is watered; and which, by their overflowing, spread slime upon the ground. He also admits of several volcanos in the cavity of the earth, which maintain a mild and gentle heat in it; and believes, that the rays of the sun, passing through the waters, transmit their favourable influence thither. Upon these principles I see no reason why the author stopped, and did not favour this internal world with the production of every thing found in this, even of animals and men.—In a word, admitting his opinion, it is highly probable, that there are.

THE proof he adduces for the thickness of the crust of the earth, is drawn from the degree of the elevation of the mercury in the barometer, in proportion as it is raised above the surface of the sea, or depressed below it. By this experiment, it is evident, that mercury thrown into the sea, in one of the parts where it pierces from one side of this crust to the other, would remain suspended to the height of eleven hundred fourscore and fifteen fathoms, which ascertains the middle or the center of these two surfaces, without including in this thickness the elevation of the mountains, some of which are fifteen hundred fathoms high. He also

gives the reason why the seas on the internal and external surfaces of the globe, cannot abandon the channels they possess, in whatever position the globe may be when turning daily round its axis. This happens, said he, on account of the extreme rapidity with which the earth is carried from the west to the east. Thus the water in a glass fixed to a cord moved circularly with rapidity, does not quit the bottom of the glass, though its mouth is turned from the centre of the earth, or towards the horizon.

THE different motions of the earth during its annual course round the sun, were particularly explained in this treatise, with a peculiar brevity and accuracy. I am persuaded, that if the author, whose erudition and discoveries deserve uncommon esteem, had been acquainted with what passes in the bosom of the sea, or if he had more attended to the extraneous and marine bodies, which our grounds contain, he would easily have acknowledged, that they were the productions of the sea; and that, in order to account for their origin, there was no necessity to have recourse to a system so unnatural as his.

No one can readily comprehend, how a globe full of air so large as our earth, was formed; conceive of what matter this vast bladder was composed; nor find out what blast extended it to its present bulk. We know that children form bubbles, by blowing through a pipe whose extremity is dipt in soapy water. But if the globe of the earth had at first been formed in this manner, of an unctuous matter, by means of an impetuous wind blowing within it, how could its weak sides have been supported against the rays of the sun,

which pushed it with such violence as to make it move millions of leagues in an hour's time?

BUT whatever the origin of this globe has been, how was it afterwards fortified by the bed of matter, which the author acknowledges to be added to its first crust, by the substances which the rivers carry along with them? The rivers could not exist, till there were grounds proper for collecting the rains and conveying them to the sea. It was not even possible that there should be rains, if there were not previously seas, lakes, or marshes, whence the waters of the rains should be exhaled. The rivers could not, on this occasion, flow without a declivity. Thus before the origin of rivers, it must have been necessary that there should be water upon the earth, to supply the rains. That there must have been elevations whence the waters should flow to the sea; and whence they should borrow the matter of which our globe is formed. Now what were these first grounds in the globe, before these beds were composed? This is what is not easily comprehended, since abstracting from the water, which deprives us of a knowledge of the inferior grounds, we discover none which is not formed by the substances carried off by the waters, or by beds of matter applied over each other.— Hence it is natural to conclude, that the substances carried off by the waters, must have had their beginning in the bosom of the waters themselves, and before the existence of the rivers.

SOME, however, suppose with the author, that the crust of the globe of the earth, was flat, or almost flat, till the universal deluge, when it was broken. How in this case could the wrecks of this crust be heaped on each other in the sea, into which they fell, and upon this crust form mountains fifteen hundred fathoms high? It is true,

that by means of a certain form which renders the exhalations light, they are capable of being sustained for some time in the air, and carried over each other according to their greater or smaller elevation. It is also certain, that ice being lighter than water, floats upon it, that by this means the pieces of ice happening to strike against each other, some of them are thrust towards the bottom; whence their lightness bringing them towards the surface, they often remain engaged under others which they raise, while they themselves are raised by others, so that the elevation of the superior shoals grows in proportion to the number of those collected below them. It is in this manner that the mountains of ice are formed. But can that which happens in the air and water, with respect to the clouds and ice which fluctuate in them, happen to the beds of stone which cannot float in the sea, be engaged over each other in similar motions, and form elevations? Our mountains could not therefore be raised in this manner, in the middle of the sea, above the crust of the earth, as our author supposes.

In a word, let us with him suppose, that mercury thrown into the sea cannot descend more than eleven hundred fourscore and fifteen fathoms, which happens to be the center of the earth's crust; yet upon this principle, the wrecks of the crust of our globe, which on its rupture must have fallen side-ways into the sea, could not have been sunk below that depth, nor push towards the opposite side, other parts of this crust proper to form mountains. Thus we cannot conceive that they could have been formed, either by the elevations produced by the waters, in which the pieces of which they were composed would have floated, nor by the immersion into the waters, of those pieces

which would have pushed and raised others in the opposite part. Neither can we conceive how the pieces of the crust of the earth, could have been plunged into the sea. In parts where there was no earth, the pieces of earth could not possibly fall into the sea; and where there was seas, was not this crust defective by all their depth?

WE cannot even comprehend, that the water of the internal and external seas, which according to our author does not exceed the sixth part of the solid crust of the globe, whose diameter is only two thousand three hundred and fourscore fathoms, should in the time of the deluge be able to rise upon the two surfaces of this crust, higher than fifteen hundred fathoms, in order to form mountains of that height. Far from rising above their first level, the waters of the sea, must have on all parts of this crust subsided, in order to fill the cavities which the wrecks employed in the composition of the mountains must have left. The author, in vain, supposes a violent agitation in the waters of the sea, which has thus raised them on one side of the crust, and then on another, and by this means produced mountains fifteen hundred fathoms high. I believe he is the only person who can think so, or find the least probability in the opinion.—No book, no tradition, has ever spoken of any thing similar to this. Besides, we see by your own writers, to whom the author appeals, that there were mountains before the deluge, that these mountains bore trees, and that the ark of *Noah* rested on one of these eminences.

IT also follows from the proof drawn from the mercury, included in a barometer, that though the waters of the two seas join, yet they cannot

pass from one part of the globe to another, nor advance beyond that semidiameter of the crust where the mercury would stop. Besides, if the globe of the earth was composed of a crust so thin as the author supposes it, and if it had opened in as many places as he imagines, should not we on the surface of the sea observe some of these apertures, which should pierce from a ground on its external to another on its internal part, without their being filled with water, and without the view of the whole thickness of the globe being intercepted.— If there were none of these apertures, whose cavity the water had not filled, yet at least some of them might be seen, on the edges of which we might discover the surface of this water. We must there observe ebullitions and gyrations of water, which the author assures us happen in these parts, and which he pretends are the causes of the flux and reflux of the sea.

IF it were also true, that a part of the superior seas were plunged at the poles in the internal part of the earth, and that after having run through this internal part in a spiral line, it should come out between the tropics, the dreadful and rapid currents thus maintained between one part of the globe and another, would again throw up what had been plunged internally towards the poles.— We should, at least in the meridional seas, know places which should continually vomit mountains of water, and occasion such rapid currents as would render it impossible to approach them. But there is no place hitherto in the known seas where we observe any such thing, and which is not accessible to ships. If, however, in this part, a portion of the superior sea was conveyed to the cavity of the globe, no ship durst approach it by several leagues, without being carried off and swallowed

up. Can the boats which sail upon your rivers of *Canada*, approach certain cascades by half a league, without being carried off in their falls?

IN a word, if the globe of the earth was hollow, and composed of a crust so thin as the author supposes it, we might conclude that all the other globes, whether, opaque or luminous, in the universe, were the same. Now if it was so, since those of the sun and stars are set on fire, their crust would have certainly been consumed, and these globes destroyed. There would also be a possibility of sounding every where, though we do not find the bottom at fifteen hundred fathoms deep.—Mount *Gemini* in *Switzerland*, though not the highest in the country, is near two thousand fathoms high. Our seas then, and our mountains are of a greater depth and height than our author attributes to them.

BUT to convince you still more, Sir, that our mountains, are not formed in the manner which this author supposes, permit me for a moment to make you consider their external parts, of which the apparent confusion has produced the error of this modern. It is true, there are grounds where the beds of matter, of which they are composed, are considerably distant from the horizontal direction of the globe; there are even some beds absolutely perpendicular: But with respect to these, observe, I pray you, that such collections of mud and sand, as the currents of the sea carry off from the deposition of matters with which her waters are more or less impregnated, remain long soft, before they are petrified. It is therefore natural and ordinary, that some of the elevations happening to be undermined by those currents which formed them, or by others, should be cloven, and that

the undermined parts should fall upon the neighbouring bottom. Thus the edges of rivers, undermined by the same matters which have formed the different beds of them, tumble into their channels. It is in this manner that certain elevations of sand or mud, which were horizontal in the sea, are become perpendicular.

BUT independently of these rare cases, the dispositions of the bottom of the sea, are alone sufficient to produce an almost perpendicular intermixture of these substances. The waters which run over it, continually apply to it the matters which they contain. Thus a brush dipt in water whitened with lime, and applied to a wall, leaves one layer of the lime, which a repetition augments, and renders thick enough to cover the blackness and deformity of the wall. It is from this, that in going from *Septeme* to *Aix*, we see beds of mud of considerable thickness, and almost horizontal, applied to each other for near a league. They have certainly been formed here by a current coming from the north-west and from the side of the sea, which has formed them successively after each other in several thousand years. To explain this fact, it is not necessary to have recourse to the wrecks of a bedded crust, nor the heaping of its pieces upon each other. This application sideways, would be repugnant to this, since according to the system of the author, the wrecks of the crust ought to have been heaped up on each other.

IT is also to be observed, that in a violent tempest, the waters of the sea pushed between the rocks, boil, as it were, and run a hundred different ways, sometimes rising against them, and afterwards falling from their summits, into their proper abysses. In like manner the waters pushed by

rapid currents, aided by a violent wind, in the middle of certain heaps of mud which the waves have formed, elevate themselves, subside, and run back upon themselves in an hundred ways, running according to the disposition of this collection, building and destroying in their agitation, sometimes in one direction, and sometimes in another: The effect of this we at present observe in these high mountains of petrified mud near *Olioure*, in going from *Toulouse* to *Marseilles*, and almost all along the coast of *Provence*. These mountains were long ago formed by the sea, when she covered them, and when the currents from the north-west, seconded by the wind, were thrust thither with violence from the main ocean; so that being pent up among these heights and depressions observable there, they exercised their fury by a hundred motions opposite to each other. It was thus that in their agitation they formed these whimsical arrangements, where you so plainly discover the work of the sea, if you give but the smallest attention, that you must necessarily grant, that these compositions can be ascribed to no other cause.

WE should therefore be in the wrong, to be surpris'd at this confusion, which is observable in the different beds of our mountains, and which to the author I have quoted, has been a reason to doubt, whether they were originally formed in the places where they are now situated. On the contrary, this confusion well considered with respect to the present and past state of the sea, is a proof of their fabrication in these places of the depositions, which the waters have conveyed thither, and applied over each other with this diversity at the times of their agitations. Can these beds, waved without any rupture observable in so many mountains, leave us the least doubt, but they are

the natural work of the washing of the sea? Could their matter already petrified, as it must have been, according to the author, on the crust of the earth at the time of the deluge, have been thus moulded and ready to yield to all directions.— We must therefore grant, that this could not happen, except when their matters were soft, and consequently in the same position where these mountains were at present.

THIS truth is also confirmed by what I have said of the prodigious number of extraneous or sea-bodies which all the grounds of the world include, and which could only be inserted at the time of their composition, and in the bosom of the sea; besides, the substances contained in rivers, could not be petrified but in the sea, and by a certain salt only proper to her waters. Besides, if on the surface of the globe, there are some petrifications formed of substances which the rivers spread on it, it is easy to distinguish them from those formed in the sea. The former have but little consistence, and contain no sea-bodies.

THE general state of the globe of the earth, which the author had not well considered, is also a certain proof of their origin; for the horizontal or nearly horizontal beds, of which most of them are composed from the top to bottom, extend almost always to those which are contiguous to them, which ought not to happen, according to the system of the author. The interruption which the vallies, and certain arms of the sea, put between these mountains, fortifies this testimony of their formation in the parts where they are. In a word, notwithstanding these interruptions, we may often find in contiguous mountains the same beds equally thick, and at equal heights? Can this

uniformity be explained on the system which this author endeavoured to defend? On the contrary, does it not demonstrate the falshood of it? Thus the state of the mountains is so far from giving him reason to think, that they were only composed of pieces collected and confusedly arranged over each other in the deluge, that the order observable in them, and which the sea herself, though she separates them in some places, has not been able to interrupt, ought to have convinced him, that they have been formed gradually, and in the same position, still observable in all their parts, except a very few changes. I shall not resume what I said to you concerning the opinion of an universal deluge. The author ought not to have had recourse to a fact of that nature, for an explication of the actual state of our mountains.

Scilla, an *Italian* painter of the royal academy of painting established at *Messina*, going one day from *Rigo* to *Musorina* in *Calabria*, found in a place, at which he could arrive from the plain in two hours, a whole mountain of petrified shells, though he could find none in the neighbourhood. At this sight he was so struck with surprise, that he resolved to read the ancient and modern authors, in order to know what they thought of these singularities. This study, and the knowledge he had acquired by his own meditations on the composition of our mountains, put him in a condition afterwards of composing a learned dissertation, in form of a letter, against the opinion of *Crollius* and a doctor in his time, who pretended that the shells, whether broken or entire, found in the substance of stones, especially the teeth of fish, so copious in those of *Malta*, and which are called serpents eyes or tongues, according to their round or pointed figures, were only the effects of a sport of na-

ture, and fortuitous configurations. In this dissertation of *Scilla*, Sir, which is entitled, *Vain Speculation cured of Prejudices*, and which was printed at *Naples* with permission, in 1670, you will find all that the ancient and modern naturalists have wrote on this subject. You will there find the opinion of the former, who were persuaded that *Egypt*, *Africa*, and some other countries at present far from the sea, were formerly her channels; you will there also read, that a very great number of modern philosophers are of the same sentiment.

Scilla makes it his particular business to prove, that the shells, bones, and teeth of fish, found in all the petrifications of the globe, are true sea-bodies; that they are the spoils, the remains or parts of these bodies which were generated in the sea, and formerly lived in it. He proceeds to the demonstration of this truth in the following manner:

IN the proofs of any truth, says he, the most certain and least dubious, is that arising from eyesight; for there is a great difference between imagining that the apparent figure of a crescent, which the panther bears upon his left shoulder, is a representation imprinted on it by the new moon; and that the streaks with which the musical shell is figured, are true musical notes; or judging that shells inserted in a mass of stone, which I know by my eyes are absolutely similar to those of the sea, are really shells, which come from it, and which by some accident, are inserted and petrified in the substance of these stones. I have seen, continues he, in the cabinets of several princes and noblemen, stones, in which they pretended to shew men, animals, and landscapes. But I have never found one of these perfect. I readily believe, that

the stone in which the ancients imagined they found the portrait of *Galba*, that which *Carneades* asserted to contain the image of *Paniscus*, that which was said to give a just representation of mount *Parnassus*, and which *Pyrrhus* wore on his finger, bore some resemblance to the figures which people imagined they observed in them. But I shall never believe that, without the assistance of art, they could perfectly represent either mount *Parnassus*, or the heads of *Galba* and *Paniscus*.

THIS is not the case, continues he, with shells, and other sea-bodies, which I find in the substance of several petrifications. I see these precisely such as those of the sea are. I find them so similar in substance, figure, and every part, that I cannot doubt but they are the same. Of these I see not one, but ten thousand kinds; and I see ten millions of each kind without the least difference. Now, continues he, there would be no more reason to imagine, that these shells, of so many forms, so different, so numerous, whole, and broken, and of so singular and natural an agreement between their broken parts, are the effects of chance, and the sports of nature; than to believe the mountains composed of broken pots observable at the gates of *Rome*, a fortuitous production of nature in that place, without any of these pieces of broken pots, having ever been a part of a real earthen pot.

IT is far from being true, continues *Scilla*, that the great number of shells and teeth of fish, found in the substance of most mountains, is as *Crollius* and his adherents would have it, a reason to doubt of their being true sea-bodies, or true parts of these bodies. On the contrary, their multitude

and diversity fully attest their origin, since they are sufficient to prove that these bodies are not the effects of chance; neither is the scarceness of some sea-bodies in seas adjacent to mountains, where some of such bodies are petrified, a reason to doubt of their being true sea-bodies. In a word, at the seasons when the south-east winds blow violently into the *Mideterranean*, its currents carry towards the coasts of *Catania*, so great a quantity of shells, whose species are unknown in the neighbouring seas and coasts, that whole buildings might be erected with them.

Martin Lister, an *Englishman*, in the preface to his treatise on sea-shells and those of fresh-water, printed at *London* 1678, after *Scilla's* dissertation, of which he probably knew nothing, also appears to doubt whether the shells, &c. found in great quantities in the stones of *England*, *Scotland*, and *Ireland*, were true sea-bodies. His doubt is founded on this, that those mountains contain various species unknown on the contiguous coasts, and that the shells included in the stones, are of the same colour with the stones themselves. When speaking of the unknown species, he says, that the fish of them must have totally perished in nature; that they must have lived in seas so deep, or have so plunged themselves into the mud, that they are never seen in the sea.

You have been convinced, Sir, by the observations of my grandfather, on the present state of the sea, that there are shells so buried in the mud, that the species of them are unknown in the neighbouring coast. We find in the stones of *Europe*, twenty-four kinds of shells called *Corneamons*, of which we have hardly hitherto found two or three species not petrified. But this small number is suf-

sufficient to prove the reality of all the other species, which have not been discovered; the unknown species may have also failed and perished by the drying up of the waters in which they subsisted.— There are few seas which have not particular shells as well as fish, and these seas happening to dry up, all the fish they nourish must fail with them. These species may have also been no longer carried from the coasts where they subsist at present, to the shores whither they were formerly conveyed, if between these two places there is a barrier formed by the diminution of the sea. If for example, the shells conveyed to the coasts of *Catania* come from the *Archipelago*, as we have reason to think, it is certain that the island of *Candia*, prolonging itself by the diminution of the *Mediterranean* as far as *Caramania* on the east, and to the *Morea* on the west, these shells could be no longer conveyed to the shores of *Catania*, without the species having perished. The case may be the same with those found in the mountains of *England*, and of which we find none in the seas with which that island is surrounded. These shells may in former times have been carried thither by the currents of the sea, from the various parts of the globe, which correspond to those coasts, and by the diminution of the sea, cease to be conveyed thither afterwards. The mountains of *France* contain a thousand evident testimonies of this interception of passage from one part of the globe to another; since they include plants and shells of a thousand kinds, proper to other parts of the globe, and which neither grow nor are produced in your country, as I have observed to you.

WITH respect to the colour of the shells resembling that of the stones, *Lister* was in the wrong from this circumstance to doubt of their being true

sea-bodies : As these shells are composed of transparent pellicules applied to each other, it is natural, especially after the death of the fish, that they should imbibe the mud, slime, or sand in which they are buried, and assume the colour of these. But they are also distinguished by their surface, from the substance of the stones in which they are found ; by a vitriolic matter, and by a smoothness which renders them easily separable from the stone. If you suffer them to soak long in water, they lose their petrification, and in some measure the colour they had contracted, which evidently proves that these shells, bones, and teeth of fish, are true sea-bodies.

SCILLA gives us an account of several groupes of very remarkable petrifications. In some we see several of these shells mixed with each other, and the teeth of fish interwoven. Those of the upper jaw-bone are there distinguished from those of the inferior ; and those of the right are different from those of the left. *Woodward*, an *English* author, has since composed a treatise to prove, that most of those found in the stone of the island of *Malta*, are the teeth of a fish called the *Sea-Dog*. A singular groupe engraved in the dissertation of *Scilla*, is that exhibiting a petrified jaw-bone, with three of the teeth still fixed in it. From this the author concludes, that those separated from their jaw-bones could have no other origin. Some of these teeth are also found in these groupes with their roots, as well as without them. We there also see some of these teeth with their enamel, and others in which no part is wanting.

IF these productions proceeded from the stone itself, says *Scilla*, the substance and the colouring of these teeth would be equal ; but the enamel is

harder than the internal part, and of a different colour. If they were formed in the stone, this formation would be either by a gradual increase, or all at once. But in beginning to grow from a small to a larger bulk, the tooth would meet with an obstacle to its growth from the hardness of the stone. On the contrary, if we admit that they were there formed originally in all their bulk, we run counter to the rules of nature, who produces her works successively.

IN these groupes we also find some of the teeth considerably worn. Now, why should they be so, if they had never been used? These figures also exhibit various shells shattered, which could not have happened if they had been formed in the stone. Others are broken into several pieces, which are distinguished by the agreement of one piece with another. We there see sea hedge-hogs, with their prickles petrified as well as themselves, and these, when re-united, would form the perfect hedge-hog, just as the pieces of a broken china faucer, when put together and cemented, compleat the faucer.

BESIDES, the pieces of the shells bear sensible marks of their rupture; for we evidently see that they have been broken. On the contrary, if these wrecks were the work of nature, the edges of them would be smooth as the rest of the shell, and rounded like those of a vessel, prepared by a tradesman. Such are the extremities of a truncated body formed in the natural matrix. Let nature produce an animal without a foot or arm, and the extremities at which this foot or arm are wanting, are not in the same state as if these parts had been cut off with a knife, or separated by another accident, since they will be covered with skin, and smooth as the rest of the body.

WE also find in these groupes, representations of matrixes of shells, some of which are in their infancy, while others are more advanced. We there see corals and skins of serpents in great number.— One of the most singular is that which represents the breast of a sea-crab, holding in its claws a shell-fish already half broken. Is it possible, says the author, that this should be the effects of pure chance, who so perfectly imitated what daily passes in the sea, between the crabs and the shell-fish which are their prey? In a word, among these groupes there is a shell, in which the animal itself is petrified; an evident proof that it once lived there.

SCILLA afterwards justly observes, that the point in dispute is not to know, whether these numberless bodies found in petrifications are true sea-bodies, which have existed in the sea, or parts of these bodies; that the matter is to determine by what means, or event, they are either inserted in the stones, or attached to their surfaces. Some, continues he, pretend, that this insertion was made at the time of the deluge; others affirm, that these shells or fish being produced in some salt-water river or lake, have by some inundation, or even by subterraneous canals, been placed where we now find them. Towards the end of this dissertation the author confesses, that he had been formerly of this last sentiment: But says, that after he had considered the grounds where these sea-bodies are found in greatest plenty, after having reflected on the extent, the height, and thickness of the mountains which include them, the largeness of the fish inserted in them, and the dispositions of these mountains themselves, he had changed his opinion; that, in a word, it was impossible to conceive, that any lakes or rivers should be capable of furnishing

these prodigious collections of petrifications in the places where they are now found. He confesses that he was ignorant how this transmigration could be brought about; and only adds, that he could not doubt, by the composition of several mountains, especially those little hills with which the city of *Messina* is surrounded, and which are all composed of beds and layers, but these repeated beds have been formed at different times, and are the work of as many inundations, in which the waters of the sea have reached above all the mountains.

THE ways of petrification, continues he, are different in nature; a certain volatile salt, a salt-water, an humidity alone long preserved in the substance, are sufficient for petrification; but it is requisite that the quality of the matrix should be proper for this petrification. It is from this, that shells inserted in the substance of mountains, either petrify with them, or do not petrify at all, or receive a greater or smaller hardness in their petrification, according as the matter in which they are included is capable of receiving the one or the other. They are not petrified in the substance of the little hills with which *Messina* is surrounded, because the substance of these hills is of a sand which is not disposed to petrification.

LANGIUS, professor of philosophy and medicine in the city of *Luzern*, where he was born, has composed a treatise to refute the opinion, not only of *Scilla*, and his adversaries *Crollius* and others, but also that which attributes to the deluge, the shells found either inserted in our mountains, or affixed to their surfaces. With this view he has faithfully collected, in the first part of this work printed at *Venice* in 1708, all the reasons which each party advanced. Then in the second he lays

down those on which he pretends to found his opinion, which is certainly very singular. He had from *Scilla's* reasonings perceived the absurdity of ascribing these petrifications to a sport of nature ; he at the same time saw the impossibility that the waters of the deluge, which lasted so short a time, should be able to insert into the internal parts of the mountains, at that time solid, and even raised to their greatest height, shells as heavy as lead, and often of fifteen or twenty pounds weight.— He conceived at the same time, that he could not deny but these extraneous bodies included in our mountains, were either true sea-bodies, or parts of them. What he therefore imagined to explain, and illustrate this doctrine, which is the most difficult in the whole compass of natural history, is what follows :

HE pretends, that all the shells found in our mountains, whether whole or broken, have proceeded from the seed of the same sea-bodies, entire or separated ; that by subterraneous caverns having been carried by the waters of the sea to the foot of the most distant mountains, it has been elevated through their stones, often to their very summits, and rendered fruitful in the places where these bodies are, especially at the tops of mountains, by the fecundity proper to the snow, with which they are generally covered ; that these sea-bodies are more or less perfect, more entire or divided, according as the seed of which they have been produced, has remained in it totally or been divided, and according as the disposition of the stones is proper or improper to fertilize this seed ; that thus, for example, the seed of an oyster, or other sea-shell fish, preserved entire, and meeting in the place where it is rendered fruitful, an aliment proper for its growth, there produces two

shells ; that on the contrary, in other parts we only find one shell, because the seed of which it was produced, was only proper for the generation of that half. *Langius* extends this division of the seed to every part of the animal, such as the head alone, a jaw-bone with or without teeth, a single tooth, the bone of a fish's back, to one of its sides or fins ; but also to parts of parts. Thus, a shell broken into twenty pieces, for example, the prickles of a sea hedge-hog, which are so plentifully found in all stones, have, according to him, proceeded from so many portions of the seed proper for each of these parts.

Does not this sentiment, Sir, appear admirable to you? It has for a principal foundation, says he, a kind of flesh found at certain seasons of the year, without bones or animal. This is what we call fossil flesh, which is certainly nothing else but a collection of the seed of insects, or of insects themselves, beginning to unfold and display themselves ; which can have no relation to the production of the sea-bodies, or of their parts in the substance of stones. Besides, was it ever known, that there was a division of the seed proper for the generation of a body, to form only a foot, an arm, or a leg, even in a matrix proper for that generation, and still less a part of these parts, a finger, a bone or any other thing? Is not this sentiment so absurd, that the contrary seems to be already demonstrated? We have seen bodies born without arms, legs, or even heads ; but did ever any person hear of arms or legs born without a body. Shells, whatever they be, are the skins, the house, or the defence of the animal. It forms it for itself, in proportion to its growth, and enlarges it daily by a glutinous matter which trans-

pires from its body. The skin of an animal grows with it, the bark with the tree, and the shell with the kernel. But we have never seen even in natural matrixes, the skin of an animal produced without the animal itself, the bark without the tree, and the kernel or skin of the fruit independently of the substance, of which they are the defence and covering. This would however, seem a thousand times more natural, than the generation, without the fish, of the surface of certain sea-bodies, or of some of the parts of this surface in the substance of stones, which is absolutely foreign to them.

HOWEVER, after a great many inductions drawn from certain facts, which have no relation to his opinion, *Langius* concludes his treatise in these terms. It is evident from all these facts, that the production of sea-shells in our mountains, is so far from being impossible, that it is highly probable; I hope, on the contrary, you will conclude with me, that this is not only impossible, but also improbable to the last degree: There have as yet never been, nor never will be found, as the ignorant imagine, subterraneous canals which lead to the bottoms of the mountains the most distant from her. If there were any such, we should discover the courses of them, which we have not as yet done. But though these chimerical canals should exist, is it probable, that the seed of fish and sea animals should be filtrated through the substance of the mountains, often to their summits, or become fruitful after they have arrived thither?

THE division of seeds, and the generation by parts, which the author supposes, is a monster in nature, and in the system of generation. Besides, in the substance of the stones, there are not only

the limbs and parts of sea bodies, but also all sorts of land animals, either whole or in part, as is proved by a learned *German*, in a particular treatise concerning the singular things found in the stones of his own country. Now, certainly the passage of the seed proper for the generation of land animals, could not happen from the earth which they inhabit, through the substance of the mountains, and much less become fruitful there. The point in dispute is not only concerning the bodies of sea and land animals, and their parts, which the mountains include, as I have observed to you, but also concerning all bodies extraneous to their substance, such as ships, anchors, masts, stones of a different colour or quality, pieces of agate, or any other substance, or pieces of gold and silver coin. These bodies evidently could not have been produced in these stones by any seed, and are, no less than the bodies of sea and land animals, irrefragable proofs that our mountains were formed in the bosom of the sea.

THE east also produces several authors, who have treated of the marks which the sea has left of her abode on different parts of the globe. But among all those, he who has carried this branch of knowledge farthest, is *Omar el Aalem*, that is, *The learned Omar*, who taught philosophy at *Samarcande*, about nine hundred years ago. He maintained, that there were in every part of the globe, and in its bosom, incontestable proofs, that it had risen out of the sea, by an insensible diminution of her waters, which still continued to be carried on. He founded his opinion on this, that its crust was, according to him, kneaded with a cement composed of several shells of fish, and that this paste, mixed with these different substances, penetrated so deep into its mass, that in proportion to the pre-

sent labour of the sea, she must have employed several hundreds of years in the composition of this crust, for the preservation of which she every day labours on her coasts. He conducted his disciples thither, from thence carried them to the mountains, and shewed them, from a comparison of the similarity of both places, that they were the same work, with this difference, that the one was more ancient than the other.

HE supported his sentiment by geographical maps, which he had the happiness to recover, prepared more than two thousand years before with the greatest exactness, by the care of the kings of *Persia* and the *Indies*. He shewed, by the former state of the coasts of these kingdoms, that most of them had already changed either meridian or longitude, by lengthening themselves more or less towards the sea, even to the extent of two degrees, according to the flat or more elevated disposition of the ground. This was so true, that on the coasts where the sea on these antient charts was marked as shallow, and where there were islands, these were already joined to the continent; while others, before not seen, appeared at a considerable distance in the sea. On the contrary, there was no lengthening of the ground on these coasts, at the foot of which it was observable in these maps, that the sea had been deeper, the diminution of her waters in these places, or the elevation of her bottom, not having been considerable enough to become sensible.

OMAR to these maps, joined geographical treatises of the same time, in which were marked the names of the principal sea towns, promontories and islands, their extent and figure, the depth of the sea on their different coasts where they could

be founded, and their distance from the line and first meridian. These treatises served to confirm the accuracy of the ancient maps which I have mentioned. At the same time *Omar*, by this means, proved the change which had happened in the figure of these coasts, as well by the diminution of the sea, (which that author, from various observations, calculated to be about three inches in a century) as by the sand, slime, or other substances, which she every day threw towards her shore, and which in places flat and proper to receive these substances, made the diminution appear more considerable and quick than it really was.

BUT, continued TELLIAMED, besides the many proofs I have already given you of the diminution of the sea, the brackish or salt-water found in the sandy plains of *Africa* or *Egypt*, and in a great many other countries, when we dig wells in them, is a new proof of this truth. Are they not the effect of the salt which the sea has mixed with these sands when she threw them into these places?—Why are the waters of these wells, and all others dug in places where it rarely or never rains, more salt than other wells? Are not the salt-wells found in several countries far from the sea, the mines and quarries of salt discovered in certain places, whose hardness, or the ground which covers them, have not permitted the rain to penetrate and melt, and the salt lakes of hot countries where the rains are very rare, evident proofs that the waters of the sea have formed, and for a long time covered the crust of the globe? Why is salt so scarce in *Ethiopia*, and all the countries under the two tropics, if not from this, that it there rains four months in the year, and that the continual fall of these fresh waters has washed away and dissolved the salt of the grounds which they penetrate? But with

whatever rain countries are washed, and of whatever nature their substance is, whether rocks, sand, earth, or stone, the salt which the sea has mixed with their compositions, is always preserved more or less. In a word, if we calcine stones or sand; if we pass metals, earth, wood, plants, animates or inanimate bodies, whatever the earth includes or produces, and in short, fresh water, through an alembic, we find salt in each of them, and discover the vestiges of the sea, to which all things owe their origin.

IN a word, Sir, independently of so many proofs, the surfaces of certain mountains are the strongest and most sensible testimonies of the hand employed in forming them. These testimonies, especially in elevated places, so perfectly represent the effect which a torrent or rapid river produces on the ground inundated by it, that it is impossible not to discover in those mountains the same configuration which the waters of the sea have imprinted on the substances which she conveys thither.— We must necessarily observe these equal arrangements, the justness of which no art is capable of imitating, nor of following the windings which the sea has successively formed on the inequality of grounds.

THIS is observable in going from *Marseilles* to *Aix*, about three quarters of a league from *Septeme*, where, on the summit of a mountain, situated on the left, the mud conveyed from the north-west coast, or from *Martigues*, has in stopping formed the just arrangement of beds which terminate that eminence. At *Tripoli* in *Syria* we see a similar arrangement, on the left, in looking towards mount *Libanus*, from a ship anchored in that road. These distinguished beds are arranged with so much just-

ness, upon the various windings of the ground, that they are no thicker in one place than another, which is an evident proof that they have been produced by the dispositions of different substances which the sea has made in these places. It is visible that these substances have been brought from *Tripoli*, by currents running from the south, or from *Damascus*. From the same coasts those substances have been carried, which from the beds observable in the mountains of *Cape Bon*, and in all the rest, which on the *African* coast border upon the *Mediterranean* sea. On the contrary, the beds of the opposite mountains, such as those of *Genes*, the *Appenine*, those of *Morea* and *Caramania*, have been formed of a matter carried from the currents flowing from the north-east. The long rock on the right, near *Melun*, coming from *Fountainbleau* to *Paris*, has also been composed of beds, some tender and others hard, of the various substances which the waters of the sea, coming from the coasts of *Bise* carry along with them. A cross current which runs in the direction of the river *Seine*, and which has dug its channel, does not permit them to carry the substances they bring along with them farther.

It is in this manner, that the mountains which border on the *Mediterranean*, and numberless others composed like them of the matter of certain currents, have been terminated by others which bore upon them and opposed their prolongation. You cannot walk on the bulwarks of *Paris*, near the port of *St. Antony*, without observing the same work in the mountains adjacent to *Montfacon*, nor consider the buttress of that place, without discovering this arrangement of beds, and different substances, the places whence they have been brought, and the direction of the currents which have ter-

minated them. The flux and reflux of the sea, by which these currents were assisted, passed then on the ground where *Paris* is situated, entering there with rapidity from the direction of the *Seine*, and extending over the plains of *St. Germain*, and *St. Denis*, left on the right the mountain of *Mont-facon*, and on the left that of *St. Genevieve*, which is washed away, while at the mouth of the gulph it formed the small mountain of *Montmartre*.— Thus not only the aspect of all steep mountains acquaints us with the manner of their composition by beds, but also the termination of these mountains teaches us the place whence the matter which composes them has come. The least inspection then into the fabrication of our mountains, affords us evident testimonies of their origin.

THE conformation of the dry part of the globe, and of that part which the sea still conceals from us, together with the external and internal parts of our mountains, are irrefragable proofs of the truth of my system. The position and aspect of these mountains, the substances of which they are composed, the stones of all kinds, the marbles whether uniform or variegated in colour, which are only congelations, the beds of flint included between two others of sand, the resemblances of these substances to those which the sea daily employs in her bottom and on her shores, the beds which they compose, and their arrangement; the terrestrial and extraneous bodies, wood, iron, plants, bones of men and other animals, stones of a different substance inserted in our mountains; the numberless shells known and unknown, and adhering to their surfaces, and contained in their internal parts; the whole beds of them which we find in some parts of the earth, so many other sea-bodies found in their bosom, so many shells, plants and

leaves proper to certain regions, discovered in the grounds of other countries situated in distant parts of the globe, the always horizontal manner in which such bodies are arranged in the grounds, the old islands united to the continent, and the new ones which have appeared, the harbours filled up, while others are produced, the towns forsaken by the sea, the new grounds with which our continents are visibly augmented, the salt lakes and wells, the brackish waters, the quarries of pure salt in places far distant from the sea, a thousand effects proper to her found in countries far distant from her, the aspect of the ground near her, so like to that with which she presents us, that it is almost impossible to distinguish them; in a word, every thing in nature informs us, that our grounds are the work of the sea, and that they have only appeared by the diminution of her waters.

THIS, Sir, continued TELLIAMED, is no less certain, than the proportion and degree of this diminution. There has been a time when the first mountains of the globe have begun to be covered with trees and grass, another when animals appeared upon them, and another when they began to be inhabited by men. If these periods cannot justly be determined, we may, at least, guess pretty nearly at them, by laying it down as a foundation, that since the appearance of the first grounds, the diminution of the sea has always preserved a degree of equality proportioned to the extent of their surface; so that being lessened from age to age, and becoming daily more impregnated with a large number of extraneous bodies, her diminution is accelerated proportionally every day.

THESE principles being granted, our business is to find out the degree of the actual diminution of

the sea, and of the augmentation of the earth, which may be established by the mensuration of the sea, for two or three hundred years at most.— After this it will be easy to know the number of ages since the first of our mountains appeared above the sea, by taking the elevation of the highest mountain, above the actual surface of the sea at this time. This elevation being known, we can by the present progress of the diminution of the sea, during an age, determine that of preceding ages; consequently we can ascertain the time she has employed in this diminution, since the appearance of the highest mountains, considering at the same time, that their summits have lost some of their primitive height; and certainly this loss must be very considerable, since for so many ages these summits have been exposed to the attacks of winds, rains, snows, heat and cold, which must have mouldered them away and made them lower.

WE may also from a knowledge of the progress of the diminution of the sea, from one age to another, nearly judge of the time since this globe was inhabited by men. It will be sufficient for this, to examine the highest parts of the mountains, in the petrification of which we find earthen ware, which is the work of man. Then by measuring the elevation of these places above the present surface of the sea, we can know the time when these waters were employed in this petrification, which will be a proof that mankind then existed upon the earth. For example, if we found pieces of brick or earthen ware in quarries twelve hundred feet above the sea, supposing the common degree of her diminution to be three inches in a century, we shall find that the earth has been inhabited by men, near five thousand years, and perhaps more. I say more, continued our philosopher, because it

is certain, that men did not from their origin invent the art of making earthen ware for their commodity, and because we cannot be sure that the highest part, where this earthen ware is, is the most elevated of any others, which may contain it. But we must at least know the time since this petrification was formed; and it will be evident that mankind existed then.

WE shall go farther, Sir, and consider the useful object of this study, adding to this knowledge, that of the present extent and depth of the sea, which is not impossible to be found; the surface of the globe being at present nearly all known, we may judge of the progress of the future diminution of the sea, relatively to the waters which remain in it, and the depth which their surface conceals from us. Now from this progress it will be easy to conclude, how many ages will be necessary to the draining the present seas, and nearly to determine when the earth will cease to be habitable, man and other animals perishing with the things which moisture and the heat of the sun produced, and which served as nourishment for them.

WE shall arrive at this knowledge of what is past, and what is to come, by supposing that the state of the heavens, with respect to the globe of the earth, has been always the same since the summits of our mountains began to rise above the sea, and that this state will not be changed till the entire dissolution of things. But what, Sir, will surprize you, is, that notwithstanding the generally received opinion, that the state of the world, such as it now appears, has always been the same, and will be so till its total annihilation, this system is not so certain, but that the opposite sentiment is support-

ed by well-founded facts and traditions. This is what I shall entertain you with next time I see you? and in order to prepare you the more easily to comprehend what I shall say on this subject, I beg you would once more read the evenings of the plurality of worlds, which I see among your books. The ingenious author has there so sensibly established the state of the other opaque globes of our system, which are in nothing different from that which we inhabit, that you will not be obliged to hear from my mouth with less pleasure than you will have in reading that agreeable work, things so singular, that they are above our views and imaginations.

END OF FOURTH DISCOURSE.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

Fifth Day.

CAUSES OF THE DIMINUTION OF THE SEA,
AND CONSEQUENCES OF THIS SYSTEM,
WITH RESPECT TO THE PAST, PRE-
SENT, AND FUTURE STATE OF
THE UNIVERSE.

I DID not see TELLIAMED for two days, because he was preparing for his departure. I was so enamoured with his system, that I waited with impatience till he should communicate to me the singular things he had promised to explain. My reading the plurality of worlds had strongly excited my desire of hearing our philosopher reason on that subject. I before knew the turn of his thought, and expected something very surprising from him. I was not disappointed; for in two days he returned to me, and made some excuses for his absence. But I interrupted him, because

I was unwilling to lose in compliments, a portion of time which I thought might be employed to better purpose. I testified my joy in seeing him again, and begged of him to proceed: He granted my request, and spoke in the following strain.

THE diminution of the sea from the summits of our highest mountains, to her present surface, supposes, Sir, as you very well know, a preceding state of this globe, in which it was totally covered with water. It is our present business to enquire into the reason of these different states, or how it came about, that the sea, should surmount all the matter of which our grounds are composed, and what is become of her waters.

GADROIS, one of your authors, in 1675, printed a treatise, in which, according to the new opinion of one of our greatest philosophers, he pretended to account for the formation of all the opaque and luminous bodies which compose this universe. He supposed them, according to your principles, a creation in time, of matter and motion, by means of which, and the different figures of this created matter, there was, said he, a separation made, of which the arrangement we see, the planets, the stars, the sun, the light, and these regular motions which we behold, are the effects,

IT would be easy for me to prove, that this system of the beginning of matter and motion in time, is repugnant to reason, and cannot be supported by your own philosophers. I could from the authorities of *Grotius* and *Vatablius*, two of your most celebrated interpreters of scripture, shew that these words, *In the beginning God created the Heavens and the Earth*, is a very improper version of the *Hebrew*; that the words used in that language

signify only *made or formed the Heavens and the Earth*, and that the just translation of the *Hebrew* phrase is, *When God made the Heaven and the Earth, Matter was without Form*; that, in a word, the *Septuagint* has rendered the *Hebrew* word *Barach* by a *Greek* one, which signifies no more than *made or formed*; that according to the remark of the learned *Burnet* in his theory of the earth, the word *create* is a new term, invented a few ages ago, to express a new idea, and has no word corresponding to it either in the *Hebrew, Greek, or Latin*; and that thus your bible supposes the pre-existence of matter, which God put in motion from all eternity, and of which he formed the heavens and the earth.

BUT if I consulted reason, which is the only guide of a philosopher, I should tell you, that I cannot comprehend how matter and motion had a beginning, and must consequently believe them to be eternal; that I have known able philosophers among you, who pretended to adduce invincible proofs that matter could not be annihilated; and that if this is granted, we may thence conclude, that it has existed in every period of time, and is not less eternal, *a parte ante*, than *a parte post*, the one being a natural consequence of the other.

IN a word, to use the thought of one of your authors*, can they who know nature, and have a reasonable idea of God, comprehend that matter, and things created, should be only six thousand years old; that God had deferred the production of his works during the preceeding part of eternity, and that he only lately exerted his creative power? Did he so, because he could not, or be-

* *Persian letters*, let. 109.

cause he would not exert it? If he could not do it at one time, he could not do it at another; so that it must have been because he did not chuse it. But as there is no succession in God, if we admit that he once willed a thing, he must have willed it from eternity.

You will perhaps object to me, continued TELLIAMED, these trivial difficulties so often refuted, and always advanced with so little success: If the world was eternal, why, during this eternity, should not the mountains become flat? Why should not arts and sciences have been sooner invented? Would printing, the mariner's compass, and gun-powder, so beautiful and useful inventions, have remained unknown to mankind for an infinite number of ages; These objections, however specious to superficial and prepossessed minds, which only touch on the surface of things, vanish like smoke, before the clear and resplendent light of reason. I shall not mention the changes which, supposing the eternity of the world, must have happened to the globe of the earth. It has suffered very remarkable ones, even within these four thousand years, according to the accounts of all historians. Very considerable changes have happened to the rest of the universe, and I shall by and by shew, that the globe we inhabit, as well as all the others in the vast extent of matter, is really subject to such vicissitudes; that supposing it to be eternal, it must at present appear to us in no other state than that in which we now see it.

To the objection drawn from arts and sciences, independently of my system, which removes the greatest force of the difficulty, we answer, that the human mind invents but by little and little, and so slowly, that in order to produce the smallest novel-

ty, it requires several ages * ; that we have lost an infinite number of curious secrets, of which history has only preserved the remembrance to us ; and that the discoveries of whatever kind made two centuries ago, will certainly one day be buried in oblivion ; the ancients have perhaps had a greater number which have not come to our knowledge ; that the invention of arts and sciences, is not so recent as is pretended, as may be shewn by tracing back to the most distant ages ; that the *Romans*, who, modestly speaking, were not inferior to us in useful and agreeable arts, owed almost all their knowledge to the *Greeks* ; that the *Greeks* borrowed from the *Egyptians* all that skill which has rendered them so famous ; that numberless ages ago, these last had acquired perfection in all the arts and sciences ; since according to your own historians, they were remarkable for their improvement, when the *Jewish* nation was but in its infancy ; that the *Chaldeans* did not yield to them in this respect ; and that the *Chinese* dispute their title with both.

WE may add, that of these modern inventions so much extolled, such as telescopes, the mariner's compass, gun-powder, and printing, the two last, especially, are not new, but to some people ; that they are, on the contrary, very old in *China*, which renders it very probable that they have also been known to other nations ; and that if they are lost there, it is, perhaps, because they have been

* With what prodigious slowness do men arrive at any thing reasonable, how simple soever in itself ? To preserve the memory of facts, such as they have happened, is, one would think no hard task ; however, several ages must pass before we are capable of doing it ; and even then the facts we remember will appear to be but visions or dreams.

there neglected and despised, as the *Turks* have for a long time neglected and despised printing; that what we read of the voyages and maritime commerce of the *Phenicians*, *Carthagenians*, and some other nations, leaves it dubious, whether they had not the means of supplying the mariner's compass by some other secret unknown to us; that after all, these new discoveries have much more splendour than solidity, and that perhaps, they are not at present new, but because they are useles*; that in a word we do not now live longer, nor are more sound and robust, on account of our improvement in anatomy; that by the discovery of some stars, astronomy is not more perfect; that for want of knowing what we call new inventions, the *Romans* and *Greeks*, the *Egyptians* and *Chaldeans*, were neither less great and powerful, less rich, knowing and learned; that since, for so many ages, men have lived in the ignorance of these discoveries, it is not impossible but they may still be older, and that the world having been without them for six or seven thousand years, may be as well without them for sixty or seventy thousand.

BUT, continued TELLIAMED, not to enter upon a question, which you look upon to be necessarily connected with your religion, though in my own opinion, the former is quite indifferent to the latter, let us be here content not to fix a beginning to that which perhaps never had one. Let us not measure the past duration of the world, by

* There is a certain degree of useful branches of knowledge, which mankind acquired very early, to which they have not added very much, and which they will not exceed a great deal: As for other things which are not so necessary, they are discovered gradually, and in a long series of years. *Dial. des Moris d' Euskrat & Heru.*

that of our own years. Let us carefully consider what presents itself to our view in this universe, this immensity of the firmament, where we see so many other stars like our own sparkling, and which without doubt, only appear so little on account of their distance. Let us imagine to ourselves what is rendered highly probable since the invention of telescopes, that if we were placed at the highest point of this distance from our earth, which we can reach with them, we should perhaps discover as many worlds above us, which would be no less distant from our view. Let us enquire after the manner in which this universal system perpetuates itself nearly in the order in which we have found it. A knowledge of this will teach us how it has been formed, better than all our conjectures.

OUR eyes, reason, experience, and the discoveries made in the heavens, since the invention of telescopes, have taught us that the sun, by his heat and the motion peculiar to him, makes our earth, and the other planets within the sphere of his fire, or within his vortex, as your philosophers express it, turn round him. We also know, that carrying them round him in this vortex of matter which surrounds them, and in a shorter or longer time, according to their greater proximity to, or distance from his disk, he also makes them turn round themselves, some more quickly, and others more slowly, according to their peculiar dispositions. We must however except the satellites of *Jupiter*, and those of *Saturn*, which indeed turn round the sun, but are in their circuit carried along by their proper planets, from the motion of which round that star, they borrow and receive their own.— Thus the moon borrows and receives hers from our earth, without turning round her own axis; so that she never presents us but with one half of her

surface, which is always the same. This no doubt holds equally true with respect to the satellites of *Jupiter* and *Saturn*.

To these general observations, let us add, that the sun, or at least the force of his heat, is from time to time subject to alterations. The *Roman* history, for example, informs us, that after the death of *Julius Cæsar*, the heat was for two years so weak, that the things necessary for the support of life, could hardly arrive at maturity. Besides, we at certain intervals observe in his disk, spots, which approach and recede from each other, and are afterwards dissipated. With telescopes we also perceive in him, a prodigious number of volcanos or mouths, which discharge flames, and whose borders being obscure render them more sensible.

WE also know that his rays do not produce the same effect, when they fall upon the waters, as when they strike upon the solid parts of the globe, and that even their vibrations are not always equal. Hence it happens that our days are a little longer than they were formerly, and that in the reign of *Julius Cæsar* they were also longer than they had been some time before. We must certainly believe so, since it was then necessary to retrench a certain number of them, to bring the equinoxes to the true point whence they had receded, and compose a new calendar, which took its name from that dictator. But under the pontificate of pope *Gregory IX.* who made a similar reformation, was it not necessary to retrench eleven days of the year, to bring the seasons back to the natural point whence they had varied? In a word, after the small number of years elapsed, since this second reformation, is there not at present a necessity for retrenching two other days, which can only

proceed from an alteration of the force in the heat of the sun, or from a change in the surface of our globe by the diminution of the sea?

IN a word, I pray you with me to make one essential observation, since it leads us to a knowledge of the reasons of this variation in nature, whether with respect to the seasons produced by the annual course of the earth round the sun, or with respect to the length of the days, and the greater number of circles it seems to describe in the northern than in the southern part, a phenomenon which philosophers have had so much difficulty to explain? It is certain that the figure of the earth is not round, as was formerly imagined, but oblong. This has been discovered by exactly measuring the degrees of the meridian from one extremity of *France* to the other, that is, from the northern to the southern part. One pole is about thirty-two or thirty-four of our leagues longer than the other; so that its form is that of an egg. It is even a little longer from the equator, towards the arctic pole, than from the same equator towards the opposite pole, at least it is heavier, since from the point where, in its annual circuit round the sun, it cuts the equinoctial, entering into the northern part, till its return to the same line, it turns six or seven times round its axis, oftener than in the southern part. This greater length in one of the poles, is the true reason why the globe of the earth cannot vary its state in turning round its own axis, and round the sun. Thus to explain this stability, it is no longer necessary, as formerly, to have recourse to these subtle matters and currents of air, supposed to pass from one pole to the other. The figure of the earth alone, and its greater weight towards the arctic, than the opposite pole, is the only reason why it cannot change

its axis, and incline more to the north in raising itself as much towards the south pole.

THE globe then of the earth is like a spindle placed over a basin of water at rest, and drawn by a person at one of the edges by a thread wrapt about it. It would turn in such a manner as is natural to suppose, and in the direction according to which it is rounded; and it would be maintained in this state by the lengthened form of its two extremities; but if one of its ends was larger and heavier than the opposite one, it is plain that in rolling, the weightier part would be plunged in the basin, while the other would be proportionably raised above the level of the water.

Now it is thus that the earth struck by the rays of the sun, which on it produce the same effect with the thread on the spindle, turns round its own axis in twenty-four hours; that by the greater weight of the arctic pole, it is more depressed towards that pole, in the calm air, in which it moves, while the opposite pole is elevated in proportion; and that by the lengthened form of these two poles, it is kept in this disposition with respect to the sun and other stars, without being able to change its axis, either in its diurnal motion, or in its annual course, which it performs in three hundred and sixty-five days and about a quarter. It is for this reason that in this situation, it runs not through the equinoctial line, but the zodiac which cuts the former, and by that means, twice lays a foundation for the inequalities of nights and days, and the diversity of seasons. It is also for this reason that the earth remains longer, and turns six or seven times oftener round her axis in the northern than in the southern part of the zodiac.

SUCH are the two motions which one impulse communicates to the earth. Struck with the rays of the sun she turns round herself in one of our days; and inclined twenty-three degrees towards the arctic pole, she in a year runs through all the points of the ecliptic, at two seasons of the year, spring and autumn, cuts the equinoctial line, and in that annual course feels the four seasons in her different parts.

OBSERVE also, Sir, that when the whole globe was covered with water, which I proved must have been the case, the equinoctial line was that, or nearly that, through which the earth described her circle round the sun; then during the whole year, the days would have been equal to the nights, to the inhabitants, if there had been any, and they were nearly such to the first men. Then also, all the days of her yearly circuit round the sun, were nearly equal, but as the waters of the sea, included much larger mountains in the northern than in the southern parts, whose seas were consequently much deeper in proportion as the waters were diminished, the equality which had before subsisted between the two parts of the globe was lessened; then by the diminution of its waters, the south pole lost that weight which is preserved in the north, because these seas contained mountains ready to appear, whose weight still subsists. Thus in the poles of the earth is produced that variation relatively to the position of the sun, and the state of the firmament, of twenty-three degrees, which keeps the arctic pole always as much lower as the opposite is elevated. If men were numerous, strong, and active enough to transport a sufficient quantity of stones and earth from the northern parts, it is not to be doubted, but they might re-establish the equilibrium lost, reform the situation

of the globe, and change the disposition of nature.

WE have also lately discovered, that there is in the globe of the moon, an inclination of the axis, that is an ecliptic, which though it inclines twenty-three degrees on our earth, is only three in the moon. This inclination certainly proceeds from the same cause which has produced the same effect in this earth, I mean the diminution of her waters. It is pretended that the ecliptic formerly inclined more upon the earth, and that since a certain time it has approached one degree, to the equator: The reason of this is easily comprehended, if from that time we suppose there is more earth collected in the southern seas, than there was formerly, the greater or smaller inclination depending, as I have said, on the greater or less weight found in the two poles.

WE also observe a variation in the length of the annual circuit of the earth round the sun, and even in that of her diurnal motion. This is what makes the natural day shorter at the equinoxes, and longer at the solstices; so that the months of *December* and *June*, are longer about 20 minutes than those of *March* and *September*. But this variation proceeds always from the diminution of the waters of the sea, and from this, that in some parts of the globe she has uncovered grounds, while in others she still covers many of its parts.— In a word, as there is more land than sea, under the equinoctial line, the globe being more strongly struck by the rays of the sun, when it presents its terrestrial, than when it shews its aquatic parts, where the force of these rays is blunted and lost, it then turns more quickly than at the solstices, where there are more seas; and it turns with more

velocity at the summer, than at the winter solstice, because the terrestrial parts of the south-pole are even now interspersed with more seas. Thus the change of the conformation in the globe of the earth by the diminution of the sea, is the cause of the variation of the time, which she protracts, according to the calculations of our antient astronomers, to perform her annual course round the sun. This variation has laid a necessity for the reformations and retrenchments hitherto made in our calendars, and will prove the cause of the subsequent reformations, which may also depend on the variation which will happen in the force of the sun's heat, which must necessarily be daily weakened more and more.

PERMIT me, Sir, continued our philosopher, to add to those observations, some on the state of the heavens. The histories, both of the most remote and modern times, inform us, that some stars have disappeared, while others have shewn themselves; that little ones have become large, while such as were large have become little. The constellation called *Pleiades*, for instance, was first composed of seven stars, though we can now count but six*.— We have lost one in the lesser *Bear*, and another in *Andromeda*; but since 1664, we have discovered two new ones in *Eridanus*; and there are at present four towards the pole, of which the ancient philosophers have not spoken. There are other stars which sometimes appear, and afterwards cease to shew themselves. In 1572, there was a new one discovered in the constellation of *Cassiopeia*, with a more resplendent light than the others; it after-

* Pleiades ante genu septem radiare feruntur:
Se tantum apparent, sub opaca, septima nube est.

Ovid. Metam.

wards diminished, and totally disappeared at the end of two years. In 1601, there appeared one in the breast of the *Swan*, but twenty-five years after it was not to be seen; three years after it shewed itself in the same place, but daily diminished so considerably, that two years after it was no more to be found; but at the end of other five years, and in 1636, it again appeared, though much less than at its former appearances. That in the neck of the whale, and another in the girdle of *Andromeda*, have in like manner appeared and disappeared several times.

BESIDES these phenomena, the histories of almost all nations mention a great number of comets, which have appeared at intervals, some large and some less, some in one, and others in the opposite part of the heaven, sometimes for a long time, and at others only during a few days. Some have been seen, which occupied three signs of the zodiac, and remained in view for three whole months. A man in the course of a moderately long life, must certainly have an opportunity of observing some of these bodies.

AMONG the number of observations made concerning the heaven, we may place the sensible changes, which telescopes shew us to happen every day in the numberless globes which revolve there. We have remarked several in the *Moon* and in *Jupiter*, and there is hardly a month in which *Mars* is not subject to these variations.

THEN returning to facts, which we have a better opportunity of knowing, we find in ancient histories, that there have been times when men lived a thousand years, and did not propagate their species till they were an hundred and fifty years old. Ac-

according to your own histories, the men of the first centuries lived to these great ages. Those of the *Egyptians* mention a prince, who, they say, reigned a thousand years over them. Now in meditating on all these pieces of knowledge, and combining them with each other, I cannot doubt, but that, without any alteration of that whole, of which the universe is composed, there is, nevertheless, a real transformation of the state and disposition in which we have found it, into another, which will be no less subject to change.

WHAT has formerly passed, and daily passes in the sun, informs me, that he is a globe totally set on fire, of the nature of ours, which, as yet, is so but very little, and in some parts only; that these torrents of fire consume him; that there has been a time when these inflamed seas, have been covered by the rubbish of the substances, which serve as aliment to them; and that we ought to judge thus of the thing, by the spots from time to time observed in the sun, and which afterwards disappear; that the fire continually acts on the matter of which that globe is composed; and that a time will happen, when having consumed the whole of it, it will be entirely extinguished, after becoming insensibly weaker in proportion to the diminution of its aliment. The extinction of the seventh star seen in the *Pleiades*, and that of many others equally well known, and which have disappeared, render this opinion the more certain, since we cannot say that these bodies have been annihilated. The appearance of certain others, which had not before shewn themselves, also confirms me in this opinion; for you cannot certainly imagine, that they owed their origin to a new creation, since this would be a prodigy of which nature furnishes us with no example. We cannot

therefore doubt, but these are opaque bodies sufficiently set on fire to become visible, though they were before imperceptible on account of their state.

THE appearance of comets is a new proof of these vicissitudes. I know what most of your philosophers have thought on this subject, and how little uniformity there is in their sentiments. For my own part, I do not doubt but these comets are opaque globes, which the sun, by whom they were governed, has, by the extinction or weakness of his fire, whose activity retained them in his vortex, set at liberty, if I may so speak, to seek their fortunes elsewhere. Perhaps also, as we have reason to believe, these are the wrecks of the same sun, which passing near enough to us to be perceived, remain longer or shorter visible, and appear to have tails, beards, or hairs, according as they approach us more or less and reflect to us the rays of the sun, which strike upon them. I do not doubt, for example, but that comet whose tail possessed three signs of the zodiac, was the wreck of some broken sun, whose different pieces followed each other, and formed that long chain. I am also of opinion, that these bodies remain erratic, till passing near enough to another sun, to enter into his vortex, they are there stopped by the activity of his fire, which forces them to turn round him.

Now in this event, if they enter into this vortex in a part where there is another smaller opaque globe already placed, they carry it round themselves, whereas formerly it was carried round its own sun. On the contrary, that which enters into the particular vortex of a larger globe than itself, is carried round that large body, and whirling

round it, is along with it carried round the sun which animates that vortex. For example, if the earth, which is larger than the moon, entered after her into the vortex of the sun, as I have reason to believe, she entered it at the distance of the parallel circle which the moon described round the sun. There she was stopped, and obliged to turn round herself and round the sun at that distance. The moon in the mean time performing her course, and passing into the matter, which turned with the earth, was stopped in that particular vortex, and obliged to turn round the earth, whereas before she only turned round the sun. If, on the contrary, the earth had been placed in this vortex before the moon, this last having entered there, at the part which the earth occupied, and falling into the vortex proper to it, was carried round it, and along with it round the sun. In like manner, if a comet larger than *Mars* should at present enter into our vortex, at the parallel circle which *Mars* describes round the sun, there is no doubt, but that being stopt there by the force of the rays of the sun, and obliged to turn round its own axis, when *Mars*, should come into the matter of the particular vortex of that comet, he would be forced to turn round that new planet, and jointly with him round the sun. It is thus certainly, that the four satelletes of *Jupiter* have been engaged in his vortex, and obliged to turn round him in a shorter or longer time, in proportion to their greater or smaller distance from that planet. We must think the same of *Saturn*. His ring is also, perhaps, formed by the wrecks of a broken sun, which have been engaged in his particular vortex.

LET us return to my opinion of the probability, that our globe entered into the vortex of the sun, after the moon was placed there, in the parallel of the circle which the moon there described. I found

this opinion on an ancient tradition of the *Arcadians*, which *Ovid* has preserved†. You know that this people called themselves the most ancient in the earth; but what is surprizing, they added, that their ancestors had inhabited it before the sun and moon appeared to them; and that these were made for them. You will, no doubt, say, that this pretension of the *Arcadians*, ought to be looked upon as an effect of their vanity, or perhaps a simple poetical expression which implies no more than that this people was very antient. But besides that *Ovid* relates this tradition as certain; and that *Pausanias* also speaks of it, it is evident that it was commonly believed, since both the *Greek* and *Roman* authors used a name for that people, which imported that they were on the earth before the appearance of the moon.

BESIDES the great care which the *Egyptians*, who were great astronomers, and accurate observers of the heavens, have taken in their temples which they consecrated to the sun, to dedicate altars to each of the planets, and there to place them in the order which they observe round the sun, with their names, their courses, and the times they take to perform these courses; these precautions, I say, should incline me voluntarily to believe, that they were intended to establish so great an event, and to perpetuate the memory of it. But from these circumstances we can only draw conjectures, having already lost the knowledge of the hieroglyphical characters, which we still see engraved round these altars, and on the walls of these temples.— This event, and the new arrangement of the hea-

† It is in the second book of the fables, where relating the origin of the Lupercalia, and why the priests of *Pan* ran naked in that ceremony, he says,

*Ante Jovem genitum, terram habitasse feruntur
Arcades, & luna, gens prior illa fuit.*

vens to us, which happened on that occasion, were, no doubt, marked there with accuracy.

HOWEVER this be, if to the tradition of the *Arcadians*, and the precautions of the *Egyptians*, we join what histories inform us of those great ages which men lived to seven or eight thousand years ago; these lives of near ten centuries of which your *Genesis* makes mention, that reign of a thousand years of a king of *Egypt*, whose memory is still subsisting, we will find in the union of these circumstances, a very strong proof of an arrangement of our globe round a sun different from that which now enlightens us.

IN a word, the life of man has never been either longer or shorter, as people foolishly imagine. The duration of it is founded on the nature of things. If we could admit any difference, it would be in favour of the wise and moderate men of the present generation. Have not they more means and opportunities of preserving and prolonging their lives, than our ancestors had when they inhabited caves, lay upon the leaves of trees, or upon the hard ground, and only lived upon the herbs and fruits which the earth produced spontaneously, and without culture. On the other hand, these numberless years for which we have endeavoured to find a measure which should approach to probability, were not certainly lunar years, since, upon that supposition the difficulty could not be removed. Neither were they years of one single moon, as some of your authors have imagined; much less were they years of three months, as others of them have asserted. The one of these terms is too short, and the other too long. We are not, generally, capable of propagating our species when we are a hundred and

twenty, or a hundred and forty months old; and the propagation would be too late, if it was not to happen to the end of four hundred and fifty months. There would also be nothing extraordinary in a life of a thousand moons. Besides a period about three thousand months would not agree with the laws of nature, which change or vary but very little. Hence I draw this consequence, that the years then were measured, as they are at present, by the duration of the earth's course round the sun: But I think that this duration was a mean between the time of one moon and our three months; so that in that time the earth performed her annual course. The sun which then regulated her, was certainly less than the present sun, or more probably, the activity of his fire was so weak, that our earth could perform her circuit round him in sixty days, or somewhat less.

THIS fire dying was also the cause of these continual rains which occasioned that deluge whose waters covered, I do not say, perhaps, the whole earth, but a great part of the land. This deluge was felt in *Greece* and in *Egypt*, as we are informed by the histories of these countries*. But the

* It is pretended that there have been several deluges, which have so overflowed some countries, that hardly could a few of their inhabitants be preserved. The most ancient are those of *Osyris* and *Ogyges*, and the most famous is that of *Deucalion*. All these deluges well considered, may perhaps be found to be but one. No one is ignorant of the fable of *Deucalion* and *Pyrrha*. *Justin* explains it in the second book of his history. In the time of *Amphyelion* king of *Athens*, a deluge, says he, destroyed the greatest part of the people of *Greece*, only they escaped who could retire to the mountains, and a few others who in boats conveyed themselves into *Theffaly*, where *Deucalion* then reigned. Thus it is said of him, that he restored the race of mankind. We may also say, that by these stones which were animated in the hands of *Deucalion* and *Pyrrha*, the

mountains of *Thessaly* and *Arcadia*, and that of *Mokatan* which borders on the *Nile*, proved shelters to the inhabitants of these lands. The *Arcadians* have preserved to us the memory of the change then made in the heavens with respect to the earth, and of the appearance of a new sun and a new moon. The *Egyptians* were, perhaps, willing to transmit the same fact to us. Your history also tells us, that after the deluge, the life of man was reduced to a hundred and twenty years. Hence we ought to conclude, that the earth having changed its motion and its sun, a hundred and twenty circulations round the present sun, were the measure of nine hundred and fifty, or thereabouts, of those which she described round the former sun. In a word, almost a thousand years, which some of your patriarchs lived, is a term infinitely above the life of man, if you count these years by the number of circles which the globe of the earth describes, at present, round the sun. On the other hand, to count these years by the moons, is, as I have said, too short a measure for a hundred and twenty of these revolutions, to which *Moses* assures us that the life of man was bounded after the deluge. We must therefore chuse one of these opinions, either the years were counted by moons before the deluge, and had a longer measure after that grand event, which *Moses* ought to have told us, which however he has not done: or we must grant, that as it was not by the duration of a moon, that the year was counted since the deluge, so it must have another measure before it. Now it is evident, that this measure can be no other, before as well as after the deluge, than the course of the earth round the sun, according to which men did

ancients intended to represent the barbarity of that first race of men sprung from another, and which owed its origin to this event.

not die till the age of nine hundred years, though at the same time they did not live longer than we do now. Hence we ought to conclude, that before the deluge, the circle of the earth round the sun was much smaller than that which it describes at present; and that consequently it changed its motion on that occasion. Now it is evident that this could not happen, but by that transmigration from one vortex to another, of which *Pausanias* and *Ovid* have preserved the memory.

IF the histories of the *Chinese* really contain, as we are assured, events which have happened for forty thousand years past, I do not doubt but we shall there find testimonies of this transmigration too memorable to have been omitted. But these forty thousand years will not be all of the same length, as you must imagine from what I have said, that a hundred and twenty of our years make near a thousand of those which preceded the change of motion in our globe. These annals of forty thousand years would not therefore make ten thousand of our present years, but they would be sufficient to confirm the truth of this grand event.

THIS is so much the more credible, because by the nature of our sun which is insensibly consumed; by the appearance of some new stars, and the extinction of several old ones; by the number of comets which have been seen by our ancestors, or which we ourselves have seen; by the present state of our earth, which convinces us, that this globe has been in a very different disposition, we cannot doubt that this whole system which we see, and this fine order which we admire, are subject to changes; and that what we know to have happened, or what we see still to happen, may continue to be repeated; that the suns are extinguished

after a certain duration, and that opaque bodies are inflamed, as we know that this has already happened; that the opaque globes included in the vortices of the suns which are extinguished, become erratic, in the extent of the vast empyrean heaven, till they are carried into another vortex, where they are stopped by the activity of the fire of that sun, as they were formerly in that of their own, and as all those have been which we call comets; that what has happened to them may perhaps before have happened to the planets of our vortex, as well as to the suns by which they were governed, and may afterwards happen both to our sun, and to the planets which he governs; that, in fine, in these revolutions, our planets entering into other vortices, are with respect to the principal star, in dispositions, different from that in which they are at present, with respect to our sun, whether they carry smaller globes along with them, whether they are themselves carried off in the particular vortex of a larger globe, or, in a word, whether they are placed at a greater or a smaller distance from a new sun.

Now in these differences, the waters with which they are now covered, will be augmented or diminished according to their greater or lesser proximity to the star. Thus we see the waters of the globe diminished, which have certainly covered it totally, as I have shewn, and which have perhaps been collected there, in a position with respect to a preceding sun different from that in which they now are. No part of matter is lost*, and these waters now wanting, which we know to have surmounted the highest of our mountains, have not been an-

* Neque enim adaugescit quidquam neque deperit inde,

nihilated; they subsist in whatever places they have been carried to. The diminution of the waters of our seas, proceeds from a true evaporation, which elevates them to other globes.

THE substances which the rays of the sun carry off from the globes next him, the dust, the particles of water, with which they are loaded in making these globes move, and in passing with rapidity to the most distant; what these rays contain of the proper substance of the sun, which they devour, whence they proceed and are darted; all these, I say, are carried through the fluid of the air to the extremity of the vortex, where the activity of these rays being at last dead and languid, has no more force than the rays of the sun reflected from the moon upon us in the night-time.

It is there, that in the middle of an air almost without motion, the rays are deprived of the substances with which they are loaded. It is also at this extremity of the vortex where the body of the extinguished sun, which shall have been pushed thither on account of its lightness, receives the depositions of these matters, and by their means recovers what it had lost of humidity and weight while it was inflamed. It is there, that enriching themselves with the spoils of others, these globes are again covered with water, and with it regain slime, which restores to them the weight and substance they had lost. It is in the bosom of these waters that the ashes remaining after the burning of these globes, sands, metals, and calcined stones are rolled and agitated by the currents of the new seas there collected. Of all these, upon the crust of the spongy part, there are new beds formed, some of fine, and others of coarse sand; some of clay, and others of slime and mud, of different

qualities and different colours. These beds will, one day, compose quarries of stone of different kinds, such as marble, slate, mines of all kinds of minerals, and with them the hills and mountains of these globes, when by the succession of time, and the vicissitudes which shall happen in the vortices, the waters in which all these things shall be formed and arranged, shall cease to increase, and begin to diminish; for it is by their diminution that the mountains of these new earths will appear, just as it happened in ours.

It may however happen in the dissolution of a vortex, that a globe already inhabited, may be placed at such a distance from the star of the vortex where it is stopt, that this globe, whose waters were before in part diminished by its position, may acquire new waters instead of losing what it had; that its waters may augment so as totally to cover it, and destroy its inhabitants; and that thus, without passing through the state of fire, it may be augmented by new slime. If we could dig to the centre of our globe, and there run through the various arrangements of matter of which it is composed, we should be able to judge whether it has been several times successively and totally covered with water after having been inhabited, without having been the prey of the flames. In this case we should find in the globe, the vestiges of several worlds arranged over each other, entire cities, durable monuments, and all that we now observe on the surface of our globe; for we must think, that if in the present state our globe should be totally covered with the waters of the sea, before it is inflamed, all that we now see would be buried under the slime, sand, and mud, of the sea, with which it should be covered; that these waters happening afterwards to diminish, there would arise

from them a new world situated upon this, which would be unknown to its inhabitants, as we are ignorant of that which has preceded ours, and which is too deeply buried in the entrails of the earth, for us to arrive at the vestiges of it.

IN order the better to make you comprehend the different manners in which these changes may happen to the globes, permit me, Sir, to put you in mind, that in our preceding entertainments I have distinguished two kinds of mountains, some of which I have called primordial, and which have been formed in the bosom of the waves, when they covered the whole surface of the earth, others which are only, as it were the daughters of the former, and which, since the appearance of the first grounds, have been formed of their wrecks. I have observed to you, that the sea not being capable of producing herbs, plants and fish, except where she was shallow, that the rays of the sun might render them fit for fecundity, these large and primordial mountains included no extraneous matter, that they were only composed of sand finer or coarser, without any mixture of all these heterogeneous bodies found in the other.

It was then, after the appearance of these first grounds, when they were clothed with herbs and plants, and when the sea was stocked with shellfish and others, that these posterior mountains were formed out of the wrecks of the former, and of the different substances which the currents of the sea contained. It is also in these posterior mountains that we find so many extraneous bodies, such as plants, herbs, trees, fish, and shells. It is in them we meet with metals, minerals, precious stones, all the ornaments of the globe, commodities of life, the support of luxury, the ob-

jects of ambition and avarice. Now it is by the composition of these last mountains, that in the duration of their existence, and the state of their fertility, the opaque globes contract what will one day make them cease to be opaque.

WHENCE, in a word, do you imagine that the volcanos draw their origin, if not from the oils and fats of all these different bodies inserted in the substance of these mountains? All these animals which live and die in the bosom of the sea, (and some of them are very large, such as whales, from which we obtain so great a quantity of oil) so many rotten trees, plants, and herbs, make a part of these mountains which the sea has raised. It is with these oleous and combustible substances, that the mountains of *Vesuvius* and *Ætna*, and some others, which like them vomit torrents of fire, have their entrails filled. Is the sea-coal found in *England* and so many other countries, any thing else but a collection made by the sea in the places where it is found, of herbs and the fat of fish? Is it not this which renders it combustible, as well as of a bad smell? It is to these volcanos, whether visible or not, that we owe all our minerals and metals, our gold, silver, copper, lead, brass, iron, sulphur, allum, vitriol, and quick-silver, which their fire has fixed to the chimnies or vents which their flames had made. It is in imitation of these that chymistry has been formed, and improved, and that labouring to discover the secret of transforming metals, and changing essences, we have found out that of impoverishing ourselves, in seeking to become rich; a just punishment for our folly!

BUT not to say more of this vain and dangerous science, to which, however, we owe the discovery

of a thousand curious and useful secrets, we must be persuaded that it is these vulcanos which insensibly produce the extinction of the spirit of life in globes, and at last their total conflagration; for though they are not equally combustible in all their parts, yet the parts which are really so, at last burn those which are less so, such as stone and marble. Such is the order established by the author of nature, to render his works eternal; the fat and oil of all the animals, fish and other bodies, which may serve to the inflammation of opaque bodies, are collected in certain places, where by the succession of time, these bodies are set on fire. Hence arise vulcanos, which at last communicate with each other, inflame the globe, deprive all its animals of the power of generation, and make a true sun of it. This new sun, by his heat, communicates to other opaque globes that power of generation which he has lost himself, till by his activity having consumed all that which in his substance is proper to entertain this prodigious heat, he is weakened, extinguished, and returns to his former opaque state.

It is also to be observed, that in proportion as the sun is extinguished, he must naturally, on account of the lightness he has contracted, in the fire which has penetrated and devoured him, be carried to the extremity either of his own or some other vortex. If it is to the extremity of his own, our sun for example, being extinguished, would be carried behind the planet most distant from the center which he possesses. This center would be then occupied by *Mercury*, as being the nearest planet, and consequently the most disposed to be sufficiently inflamed to succeed the sun. At the same time the other planets would be brought nearer this center of the vortex, and would come still

nearer to it, when the fire of *Mercury* being extinguished, and his wrecks carried behind the former sun, *Venus* would possess his place. This succession continuing thus till *Saturn*, the most distant planet of the vortex, was become the sun and mover of it, after the Earth, the Moon, *Mars*, and *Jupiter* had been so in their turns, it would happen that the most distant of the planets would gain instead of losing by this means; that is, it would acquire the waters and substances carried off from the others, till approaching towards the center of the vortex, it would cease to acquire any more and begin to lose. Thus we have reason to believe, that the waters of *Saturn* are still increasing, and perhaps those of *Jupiter* and his satellites; but if the succession of the earth to the center of the vortex should happen, the waters of *Jupiter* would certainly begin to diminish, if they do not already so. We must think the same of *Saturn*, behind whom would be the bodies of the sun, *Mercury* and *Venus*, which would there receive what *Mars*, *Jupiter*, and *Saturn*, began to lose.

BUT if at the extinction of the sun of one vortex, his planets are carried off with him, without any certain direction, towards other vortices, which is most probable, and seems to be evinced by comets, the waters of these planets will be augmented or diminished according to their arrangement round the sun, which shall stop them. It is in the like event that our earth may be totally covered again with waters, instead of continuing to lose them, according as it is placed at a greater or smaller distance from the sun. Chance is by no means the disposer of these arrangements. The heavier a planet is, the more it is in a condition to approach to the sun of the vortex; on the contra

ry, the lighter it is, the greater its bulk will be in proportion, like the bodies of extinguished suns; the further also the rays of the star, which possesses the center of the vortex, push it, only admitting it to the extremity, and that part where their activity has almost lost all its force.

THUS the future fate of our earth is uncertain: Before our sun is extinguished, she may be totally burnt, form a particular and separate vortex, take from the sun some of his planets, and perhaps acquire some from other neighbouring vortices. If on the contrary she is totally burnt, she may continue to lose her waters by the arrangement she may acquire in another vortex, if she is placed at too great a distance, her waters will be augmented, so that she will be covered by them totally or in part, according to the duration of her situation at that time. But whatever may be the fate of the earth and her inhabitants, there is reason to believe, that in the numberless multitude of globes contained in the universal system, some inflamed and others opaque, of which we perceive but the smallest part, there will always be some whose waters and matter will be augmenting, while a proportional diminution will be continued in others. There will always be some of them which will be totally inflamed, and serve as suns to those which are not inflamed; others will be extinguished, and pass into dispositions proper to the state in which they were before they were burnt.

AN *Arabian* author relates, that among the different opinions of the philosophers of his nation, concerning the antiquity of this world, its duration and end, there was one who asserted, that the earth had been formed fifty thousand years before it was inhabited, that it had been inhabited

fifty thousand years, and should continue to be so for fifty thousand more. But how can we otherwise than by the consequences I proposed, conjecture how long it remained a desert, how many years it has been peopled, and how long a time it may still be inhabited. It is in the works of nature, and in the faint notions which remain to us, of some singular events which have happened in the heavens and the earth, that we ought to seek the history of a very remote antiquity, and the knowledge of a futurity which will perhaps be still more extensive. We cannot otherwise hope to learn the state of two extremities so distant from us as these.— This is the study to which, in imitation of my father and grandfather, I have applied myself from my earliest youth. My sentiments, with respect to future things, are more flattering and alluring for men than any hitherto proposed to them, since without destroying the opinion with which they are prepossessed, that the world will be destroyed by fire, I leave them, the hope of a posterity, which will perhaps be more durable.

I HAVE done more ; for I have even informed them what will become of the globe which they inhabit, when after several vicissitudes, it shall have been consumed by fire, and I have proved, that like the phoenix it will spring out of its own ashes. In a word, though this does not at first appear so probable as the other changes which shall previously happen to the earth, yet this consequence is not less necessarily deduced from the diminution of the sea, and the composition of our mountains, for if these have been really formed in the sea, the earth has been totally covered with her waters. Now this could not have happened, but in a position and arrangement of the globe, different from that in which it is at present, and at so great distance from

the sun, that her waters must have augmented instead of being dissipated. It is therefore manifest that the globes change their state and disposition; that in a certain arrangement, they are covered with water, while in another position these waters are diminished, which lays a necessity for all the vicissitudes which I have attributed to the globes, even that in which having been consumed by fire, and served as a sun to other globes, they are conveyed into places where they recover their weight and moisture.

THESE transitions from one state to another, from luminous to opaque, and from the latter to the former, are, as I have irrefragably proved, by stars which I have said, disappeared, and others which have appeared afresh; for we cannot say, that the appearance of stars lately discovered, is the effect of a new creation, nor that those which have disappeared, have been annihilated. You need not therefore doubt, but the remains of these last bodies exist in nature; when experience has convinced you of the diminution of the sea, you must with me allow, that the waters carried off from her, exist elsewhere; that in changing their place they carry with them all the substances which they contained; and that the whole of this, on which the rays of the sun, act, is carried to the greatest distance from the star, and is deposited and received by the bodies which exist there. It was perhaps there that our earth formerly received the immense waters, with which the highest of our mountains were covered; and it is in a similar position, that in the ages to come, after having passed through the fire, her dry and arid remains may recover the waters and substances which they may have lost.— These are infallible vicissitudes, and must necessarily be admitted on the principles which I have esta-

blished ; they will follow each other without interruption. The opaque bodies will become luminous, and, as I have before observed, of luminous these will become opaque. Their matter and their waters will be augmented, when they are the greatest distance from the star of the vortex in which they are placed. They will augment, on the contrary in a disposition which will render them nearer to this star. They will at first become habitable, and then be inhabited till they cease to be so, and be totally burnt. Both the opaque and luminous globes contained in this vast universe, will undergo these alternatives a hundred and a hundred times. They will pass successively from one of these states to another, changing their position and vortex.— Though these vicissitudes are often concealed from our eyes, they are not the less certain nor perhaps the less frequent, in this immensity of globes, to which our highest imaginations cannot attain.

IN a word, Sir, cried I, you had reason to say, that you would explain to me things of so singular a nature that I should be surpris'd at them. I confess to you, that notwithstanding the small foundation I find in your system, I am charmed to hear you speak with as much assurance of what you think passes in the vast extent of the universe, as if from infinite ages, flying from vortex to vortex, you had been an eye-witness of what you relate concerning them. Go on, Sir, to unveil your mysteries to me : Tell me what you think with respect to the state of the fixed stars, which always preserve the same order, and seem to me to float by chance in the extent of this grand whole, or in this liquid of the air, as you call it. I hope you will also deign to give me your opinion of the origin of men and animals, which in your system, are

no doubt the productions of chance, a doctrine which neither my religion nor my reason permit me to believe. I am already persuaded that what you shall say to me, on these two subjects, will be neither less curious nor singular, than all you have hitherto told me.

I OWN to you, replied our philosopher, that I am as much persuaded of the truth of these vicissitudes, with which I have entertained you, as if for a long time running through the state of the heaven, and the globes it contains, I had with my own eyes seen these different revolutions. But I ought for my justification to add, that if I embrace so extraordinary an opinion, it is not till after more than thirty years meditations and researches, doubts and objections, which I have formed to myself, or which have been proposed to me by others; after the most exact study of the philosophers, and of the different sects upon that subject; and in a word, because I have found nothing more conformable to the events which have hitherto happened in the heavens and the earth, more agreeable to the invincible proofs we have of the diminution of the sea, to the conformation of our globe, to the histories and traditions which remain, and in a word, to reason; so that my assurance in what I have related to you, does by no means deserve to be treated as temerity.

As to the questions you propose to me, I think it is easy to conceive how the stars are stopped or fixed in an expanse, such as that which the heavens present to our views and our imaginations. This expanse is what I call the fluid of the air, or more properly the vacuity through which it flows, or the tranquil scene of the passage and motion of every thing that exists.

I HAVE told you that the inflamed globes have not been so always, but that from an opaque they have passed to a luminous state. I must add, that in this state, they have acquired a proper motion, which has made them turn round their own axis, and fixed them in those parts of the vacuity which they possess. It is nearly thus that a bowl or wheel of artificial fire, placed upon a large sheet of calm water, and kindled, would not change its place so long as its fire lasted, and made it turn round itself. It is in this manner, that the stars stopped at that part of the vacuity where they are set on fire, turn there, and will always do so till the extinction of the fire, which penetrates them, without receding from their position.

BUT in the arrangements of all these burning bodies, which at present exhibit to our view a certain state of the whole system, an universal change will happen at the end of a particular time; all the stars will be extinguished, perhaps, one after another, as several of them are already, of which we ourselves have been witnesses. New ones will successively arise by means of opaque globes which will take fire, and these will not always shew themselves in the same parts where the others have disappeared. Thus the state of the heaven, which now seems fixed to us, will be totally changed, and in a time which we cannot ascertain, it will not be the same that it is now. It will be so renewed, that our posterity shall not perhaps see one of the stars which we at present observe.

IF comets in passing near us seem to keep a certain road, conform to the course of our planets; this happens, because, approaching near our vortex, they participate of the motion which the sun communicates, to the globes with which he is sur-

rounded. They are also, no doubt, assisted by the influence of the rays of some other contiguous stars, which by the subtile matter flowing from them, form in the spaces by which they are separated from ours, a kind of currents, by which these comets perform their motions rather in one direction than another. After all, there may be other natural reasons for the arrangement of inflamed globes, of which we cannot fix the number. It is no affront to our weak and limited understanding, not to attain to a just knowledge of things so prodigiously distant from our eyes as these, and of which to judge soundly, the astronomical observations of an infinity of years would be necessary.

HUGENIUS, continued our *Indian*, has composed a treatise on the plurality of worlds, in which he pretends to prove, not only that there are men and animals in our planets and their satellites, but also, that these men have the same knowledge as we in astronomy and geometry, in all the arts we know, and in all the sciences we have acquired. The author has entered into a detail in which he is more successful in shewing his learning, than in convincing the reader that in the habitable globes, there are men of our species, and that among them we find all the sciences of which we are masters. It is not impossible that there may be globes where all these may be found even in greater perfection than in ours; but even supposing all these globes inhabited, it is very probable that there are many of them in which most of the arts and sciences acquired by the men of our globe, are absolutely unknown.

IN a word, whence have we learned that the moon was a globe such as our earth; that there were lands and seas, and mountains and vallies in her; that she had, like ours, regular days and

nights; that consequently she might be inhabited, her seas stocked with fish, her lands with animals, and perhaps a species of reasonable creatures either approaching to them, or differing from them? Whence, I say, could we derive this knowledge, if not from the discoveries we have made in that planet?

If then as the Earth has the moon for a satellite, as *Jupiter* has four, as *Saturn* has five, and perhaps a much greater number in the ring with which he is surrounded, all the opaque globes had in like manner satellites; or if these globes were at least near enough to each other, that people might from one distinguish what happens in another, the opinion of *Hugenius* would be much more supportable. But are the inhabitants of *Mercury*, if there are any who can live in so great a proximity to the burning sun, round which they turn, so near to us or *Venus*, as to know the conformation of our globes, or judge whether they are similar to the small globe which they inhabit? Are the inhabitants of *Mars* and *Venus*, to whom our earth, and its satellite, must appear no larger than their planets do to us, able to make this comparison of our globe with their own? It is however from the knowledge we have acquired of the conformation of the moon, that we draw this natural consequence, that all the planets, and all their satellites which we observe in the vortex of our sun, are probably composed in the same manner, and consequently habitable, and may be inhabited. Hence we must conclude, that if the supposed inhabitants of the other planets cannot have the same assistance, it is very probable that they cannot equal us in this part of our knowledge.

It is true, that if by this means we have some advantages over the pretended inhabitants of several globes which have not satellites like ours, yet we may in some suppose men, who if they really existed, must infinitely surpass us in knowledge. I shall on this occasion relate to you, added *Telliamed*, the discourse of an *English* nobleman, whom I met, when at *London*, walking one evening in *St. James's park*. You will find him no less prepossessed than *Hugenius* in favour of a plurality of worlds.

OUR conversation turned on the nature and species of creatures, which he pretended inhabited not only our planets and their satellites, but also that numberless multitude of small opaque globes which roll in the vortices of all the suns of which the milky way is composed. My friend pointing with his finger at *Jupiter* and *Saturn*; do you see, said he, these two stars, and especially *Saturn*, which is nine or ten thousand leagues in diameter? Could you believe that he turns round his own axis in ten of our hours? This motion is certainly prodigious, and must, no doubt, make the heads of his inhabitants giddy, since in the space of an hour his surface runs over more than three thousand leagues. But what is no less remarkable is, that the inhabitants of this planet are so near the first moon that turns round it, that this moon describes her circle in a day and twenty-one hours. Consequently the borders so near upon *Saturn*, that the inhabitants of both places may from the tops of their highest mountains almost shake hands with each other, or at least see and speak together. For a still stronger reason, the inhabitants of this first moon may converse with those of the second, which performs her course round the principal planet in two days and seventeen hours. Besides,

continued he, the inhabitants of the first moon might jump into *Saturn*, and those of the second jump into the first; at least these three people, if they have like us the use of telescopes, and speaking trumpets, may easily see one another, and carry on a conversation together. In a word, you cannot deny, continued he, but they can at least reciprocally perceive the large cities built in these three globes, and the vessels sailing on their seas; neither can you refuse that they hear from one to another, the noise of cannon, and especially that of thunder, formed at the extremities of the air which separates them.

ANOTHER *Englishman* still improved on this, and called the milky way the summary of suns and opaque globes. They were there, said he, so contiguous to, and so mixed with each other, that they were ready to touch one another in the circles which they described round the suns by which they were governed, so that their respective inhabitants must know one another, and pay frequent visits. He even took it highly ill, that I should believe nothing of his system, and only applaud so strange a proposition by a smile.

WHAT a third told me of the proximity of *Saturn* to his first moon; and of this to the second; of that of *Jupiter* to his first satellite, &c. appeared more rational and probable. If we have drawn, said he, so much knowledge from the proximity of the moon to our earth, especially since the invention of telescopes, what advantages over us have not the inhabitants of several globes so near each other, and within the reach of so great a number of luminous bodies? How much more easy is it for them to be better acquainted than we, with every thing which happens in the opaque globes, and

in the stars, whether, when there is a new one formed by the inflammation of one of these bodies, or whether others have their fires extinguished, which with their eyes they gradually observe to consume the matter which nourishes them, and which are insensibly weakened in proportion as this is consumed?

THESE degrees of knowledge, said our philosopher, cannot be denied to the inhabitants of these globes so contiguous to each other, if they are inhabited. As for us, continued he, we cannot hope to arrive at such knowledge, but by the extinction of our sun, and by the transmigration of our globe into another vortex. Then if what I have explained to you should reach posterity, nothing of what I have said, as likely to happen, could surprize our offspring, since they would be apprised of the future changes which time will produce in the state of the heavens; that is, in the stars and opaque globes destined for an eternal passage from obscurity to light, and from light to obscurity.

BUT though nothing durable can be promised amidst these continual vicissitudes, we ought however to hope, that whatever may happen on the earth, till the human species is totally destroyed, these pieces of knowledge will not be absolutely lost. If in this age there are learned men, who have found that the universe may include many worlds, that certain stars have disappeared, that new ones have shewn themselves, that these lost stars were so many extinguished suns, and that the new ones proceeded from the inflammation of opaque bodies; so long as the earth is not destitute of men, there will always be some, who, attaining to the knowledge of these things, will teach their fellow-mortals what I have this day explained to you.

THE men who shall live in the remote ages, may from the discoveries of ours, and from future events, judge more surely than we, of the diminution of the sea. Thus upon the estimation of this diminution, measuring the deepest seas they may judge of the time in which they must be totally exhausted, independently of the weakening of the sun's fire, which may be exhausted, and of the multiplication of our volcanos, which are already very numerous in *America*.

FROM what I have said, Sir, you must conclude that the earth may equally lose its inhabitants, either by the total dissipation of the waters of the sea, which are the sources of the rivers and rains necessary to fertility, or by the general kindling of its volcanos, and consequently the burning of the whole earth, or by so considerable a weakening of the fire of the sun, that at his extinction the sea must universally cover it. Now if the destruction of the human race is to happen by a total exhaustion of the waters of the sea, the men destined to be the witnesses of it, will retire into profound vallies, and dig wells, in order to maintain fertility, and provide for their subsistence, or they will pass towards the poles, where they will long find a freshness, which will be banished from the meridional countries, and a fruitfulness which will subsist in no other parts of the earth.

BUT if in proportion as the force of the sun is weakened, or his extinction approaches, the inhabitants of the earth have reason to dread a total submersion, they will not be alarmed. They will build large vessels, in which placing their flocks and necessary provisions, they will wait for their delivery from this melancholy situation by the total extinction of the sun, and by the passage of the

earth into another vortex where her waters may be diminished. In a word, if happily for them, the sun is extinguished before our globe is set on fire, and totally deprived of its waters, our observations will assure them against the total extinction of mankind, and even make them hope, that in a new arrangement of the earth in another vortex, she may find a favourable situation, which restoring her a part of her waters without drowning her, will preserve this generation to very distant ages.

TELLIAMED, in a hurry, and without interruption, pronounced this prophecy, with an ardor and enthusiasm which almost made me take him for an inspired man. But, added he, I must leave you, the night which draws on, obliges me to stop; tomorrow I shall endeavour to answer the question which you have proposed to me concerning the origin of man.

END OF FIFTH DISCOURSE.

TELLIAMED;

OR, THE

WORLD EXPLAIN'D.

Sixth Day.

OF THE ORIGIN OF MAN AND ANIMALS, AND
OF THE PROPAGATION OF THE SPECIES
BY SEEDS.

THE philosopher kept his assignation very early in the morning, and told me that he was that evening to set out for *Ormus*. I am come, said he, to take my leave of you; and though the time yet permits me to inform you, as I promised yesterday, what I think of the origin of men and animals, yet I hope you will freely excuse me for not keeping my word. Besides, it would be uselefs for me to expatiate with you on a subject which is independent of the system of the diminution of the sea, and concerning which you are forbid to believe any thing besides what your scripture teaches you.

You injure both me and yourself, replied I, in depriving me of that which is certainly the most curious in your system. I conceive that the truth of your opinion concerning the diminution of the sea, does not depend on the origin of man; but I am persuaded that your sentiments on this subject are not less singular than all I have hitherto heard from you, and you must confess I

should have reason to complain of you, if you left me ignorant of what I cannot learn from any person else. Let us make the best use of the small time which remains; you may speak your thoughts with freedom, without any fear of offending me. I already know what some philosophers advance against the creation of man by him who created all things. The reasons on which they found this opinion are so frivolous and absurd, that they only serve more and more to confirm a wise man in a steady belief, that men and animals are the work of God.

You do not do me justice, Sir, replied our philosopher.— It is by no means as you think, a natural consequence of my opinion on the formation of our Earth, and its coming out of the waters of the sea, that men and animals have been formed by blind chance, and at random. I know there are abundance of philosophers both with us and you, who believe all productions, even that of man, to be the effect of a concurrence of atoms, or of a generation proper and natural to matter. Have not the *Egyptians* pretended, that the first man was formed in this manner, out of the slime of the river *Nile*, warmed by the heat of the sun? How many other nations have maintained, that the Earth produced men in their own countries? Some have foolishly believed, that men and animals were let down from heaven by a chain of gold. This is nearly your sentiment, since you believe them formed upon earth by the hands of God. Others have maintained that they came out of the sea.

LUCRETIVUS as you know, has condemned both these opinions, and I agree with him, that men have not descended from heaven. But granting matter to be created, if we suppose also the creation of men and animals, by the hand of God, in that sense in which he is the author of their production and their species, I do not conceive that the salt proper to the waters of the sea, is a reason sufficient to hinder the animals with which the earth is stocked, from drawing their origin from these, the salt of which the earth still includes in her bosom.

IN a word, do not herbs, plants, roots, grains, and all of this kind, that the earth produces and nourishes, come from the sea? Is it not at least natural to think so, since we are certain that all our habitable lands came originally from the sea? Besides, in small islands far from the continent, which have but appeared a few ages ago at most, and where it is manifest that never any man had been, we find shrubs, herbs, roots, and sometimes animals. Now you must be forced to own, either that these productions owed their origin to the sea, or to a new creation, which is absurd.

INDEPENDENTLY of these proofs of my sentiment, experience furnishes us with invincible arguments for it. I know you have resided a long time at *Marseilles*; now you can bear me witness, that the fishermen daily find in their nets, and among their fish, plants of a hundred kinds, with their fruits still upon them; and though these fruits are not so large, and so well nourished as those of our earth, yet the species of these plants is in no other respect dubious. They there find clusters of white and black grapes, peach-trees, pear-trees, prune-trees, apple-trees, and all sorts of flowers. When in that city, I saw in the cabinet of a curious gentleman, a prodigious number of these sea productions of different qualities, especially of rose-trees, which had their roses very red when they came out of the sea. I was there presented with a cluster of black sea-grapes. It was at the time of the vintage, and there were two grapes perfectly ripe.

As for the origin of terrestrial animals, I observe that there are none of them, whether walking, flying, or creeping, the similar species of which are not contained in the sea; and the passage of which from one of these elements to another, is not only possible and probable, but even supported by a prodigious number of examples. I speak not only of amphibious animals, serpents, crocodiles, otters, various kinds of sea-calves, and a prodigious number of others, which live equally in the sea and the air, or partly in the water, and partly on the land, but I also speak of those which can only live in the air. You have no doubt read the authors of your own country, who have wrote of the various species of fresh and salt-water fish known at present, the representations of which they have given us in their books. The discovery of *America*, and its seas, has furnished us with a great number of new fish, which are proper to them, as there are others found in the seas of *Europe*, *Africa*, and *Asia*, which are not to be met with elsewhere. We may even say, that among the fish of the same species which are equally caught every where, there is always some difference according to the difference of the seas; whether we have placed under the same class, species which only approach to each other, or whether these fish are really of the same species, only with some difference in their form. Thus the species of sea-fish, which have entered into rivers and stocked them, have undergone some change in their figure, as well as their taste. Thus the sea-carp, perch, and pike, differ from such of their species as are taken in fresh waters.

THE resemblance in figure, and even inclination, observable between certain fish and some land-animals, is highly wor-

thy of our attention ; and it is surprizing that no one has labour'd to find out the reasons of this conformity. Without attempting to treat so vast a subject with that care and accuracy it deserves, permit me, Sir, to make a few observations relative to it. We know from the relation of the most famous divers of antiquity, of whose histories we have preserv'd the memory ; from the testimony of those whom my grandfather employ'd for eighteen months in examining what pass'es in the bottom of the sea, and in its bosom, and from our own knowledge, that the animals produced by the sea are of two kinds ; the one being volatile, rises itself from the bottom to the surface of the waters, in which it swims, walks, and pursues its prey ; the other creeps in the bottom, is not separated, except very rarely, from it, and has no disposition to swim. Who can doubt, that from the volatile fish sprung our birds, which raise themselves in the air ; and that from those which creep in the sea, arose our terrestrial animals which have neither a disposition to fly, nor the art of raising themselves above the earth ?

In order to convince ourselves, that both have pass'd from a marine to a terrestrial state, it is sufficient to examine their figure, their dispositions, their reciprocal inclinations, and to compare them with each other. To begin with the volatile kind, attend, I beseech you, not only to the form of all our birds, but also to the diversity of their plumage and inclinations, and you will not find one, but you will meet with fish in the sea of the same way, have the fins placed in the same manner, which swim in the water as the birds of their figure fly in the air, which make their course straight or round, and their chase, if they are birds of prey, just as the fish of their form do in the sea.

You must observe, Sir, that the passage from water into air is much more natural than is generally believed. The air with which the earth is surrounded, at least to a considerable height, is mixed with a great many particles of water. Water is an air impregnated with a great many parts more coarse, humid, and weighty, than that superior fluid, to which we have given the name of air, though they are in reality the same thing.— Thus in a tun full of any liquor, though the inferior part is mixed with coarser particles, and consequently is less clear and thicker, than the superior; yet it is evident, that a part of the liquor still subsists in the precipitated lye ; and that a part of this lye, in like manner remains mixed with the superior liquor, but in a greater quantity, immediately above the lye, than in the uppermost part of the liquor. Thus immediately above the waters, the air is impregnated with more aqueous parts, than at a greater elevation. Thus in a tempest, with which the sea, the lakes, and rivers, are agitated, the air is fuller of the particles of

water than after rains, which restore to the sea, &c. the aqueous particles which the winds had raised and mixed with the air. It is thus, in a word, that in certain climates, and at certain seasons, the air with which the earth and the sea is surrounded, is so impregnated with aqueous parts, that it ought to be considered as an equal mixture of air and water. It is therefore easy to conceive, that animals accustomed to the water may preserve life in respiring an air of this quality. 'The inferior air, says one of your authors, is nothing but an extended water. It is moist because it comes from the water; and it is hot, because it is not so cold as it may be when it returns into water.' He adds a little lower,——'there are in the sea, fish of almost all the figures of land-animals, and even of birds. She includes plants, flowers, and some fruits; the nettle, the rose, the pink, the melon, and the grape, are to be found there.'

ADD, Sir, to these reflections, the favourable dispositions, which may concur in certain regions for the passage of aquatic animals from their abode in the water to that in the air. Consider even the necessity of this passage in some circumstances; for example, when the sea has left them in lakes, whose waters are so diminished that they have been forced to accustom themselves to live upon land. This may also be the effect of some of those accidents, which are not looked upon as very extraordinary; for it may happen, as it often does, that winged or flying fish, either chasing, or being chased, in the sea, stimulated by the desire of prey, or the fear of death, or pushed near the shore by the billows, have fallen among reeds or herbage, whence it was not possible for them to resume their flight to the sea, by which means they have contracted a greater facility of flying—Then their fins being no longer bathed in the sea-water, were split and became warped by their dryness. While they found among the reeds and herbage among which they fell, any aliments to support them, the vessels of their fins being separated were lengthened and clothed with beards, or to speak more justly, the membrances which before kept them adherent to each other, were metamorphosed. The beard formed of these warped membrances was lengthened. The skin of these animals was insensibly covered with a down of the same colour with the skin, and this down gradually increased. The little wings they had under their belly, and which like their fins helped them to walk in the sea, became feet, and served them to walk on land. There were also other small changes in their figure. The beak and neck of some were lengthened, and those of others shortened. The conformity, however, of the first figure subsists in the whole, and it will be always easy to know it.

EXAMINE all the species of fowls, large and small, even those of the *Indies*, those which are tufted or not, those whose feathers are reversed, such as we see at *Damiette*, that is to say, whose plumage runs from the tail to the head, and you will find species quite similar, scaly or without scales. All species of parrots, whose plumages are so different, the rarest and the most singularly marked birds, are conformable to fish, painted like them with black, brown, gray, yellow, green, red, violet colour, and those of gold and azure; and all this precisely in the same parts, where the plumages of these birds are diversified in so curious a manner. All kinds of eagles, falcons, kites, birds of prey, and in a word, all that we know flying in the air, even the different species of flies, large and small, with long as well as with short wings, are conformable to similar species contained in the sea, and have not only the same form and colour, but also the same inclinations.

THE transformation of a silk-worm or a caterpillar into a butterfly, would be a thousand times more hard to be believed than that of fish into birds, if this metamorphosis was not daily made before our eyes. Are there not ants which become winged at a certain time? What would be more incredible to us than these natural prodigies, if experience did not render them familiar to us? How easy is it to conceive the change of a winged fish flying in the water, sometimes even in the air, into a bird flying always in the air, in the manner I have explained? The seeds of these fish conveyed into marshes, may have also laid a foundation for this transmigration of the species, from an abode in sea to that on land. If a hundred thousand have perished in contracting the habitude, yet if two have acquired it, they are sufficient to give birth to the species.

WITH respect to walking or creeping animals, their passage from the water to the land is still more easy conceived. There is no difficulty, for instance, in believing that serpents and reptiles may equally live in either of the elements. Experience does not permit us to doubt of it.

As for quadrupeds, we not only find in the sea, species of the same figure and inclinations, and in the waves living on the same aliments by which they are nourished on land, but we have also examples of these species living equally in the air and in the water. Have not the sea-apes precisely the same figure with those of the land? There are also several species of them.—Those of the southern are different from those of northern seas; and among these last our authors distinguish the *Danish* ape from the other species. Do we not find in the sea a fish with two teeth like those of the elephant,

and on its head a trunk with which it draws in the water, and with it the prey necessary for its subsistence? One of these was shewn at *London* very lately. Would it be absurd to believe that this sea-elephant has laid a foundation for the species of land-elephants?

THE lion, the horse, the ox, the hog, the wolf, the camel, the cat, the goat, the sheep, have also fish in the sea similar to them. In the preceding age, there were some sea-bears shewn at *Copenhagen*, which had been sent to the king of *Denmark*. After having chained them they were permitted to go into the sea, where they were seen to sport together for several hours. Examine the figures of the fish which are known to us, and you will find in them nearly the form of most of our land-animals.

THERE are twenty kinds of phocas's, or sea-calves, large and small. Your histories, and the journals of your literati, speak enough of the occasions, on which they have been taken, and even tamed. The city of *Phocæa*, as is said, drew its name from the great number of these animals always seen in the sea contiguous to it. At *Smyrna*, about twenty-five years ago, one of these came to repose itself every day, for five or six weeks successively, in a convenient place. She threw herself out of the sea upon some planks about two or three feet from the shore, where she passed some hours, sighing like a person in distress.— This animal ceasing to appear, came back three days after, with a young one clasped in one of its fore legs. After this, it continued to show itself for more than a month, eating and sucking bread and rice, which were thrown to it.

MUCH about the same time, another sea-calf appeared in the middle of the harbour of *Constantinople*. It threw itself out of the sea into a barge laden with wine, and laid hold of a sailor who was sitting on a hog'shead; this wine belonged to *M. de Ferrol* an ambassador to the port. The calf secured the man with one of his fore legs, and plunging with him into the sea, he came up about thirty paces thence, still holding the man as if he had gloried in his conquest, after which he disappeared.— This animal, some of your poets would say, was a nymph or a nereid, who falling in love with the sailor, carried him off in order to conduct him into one of her aquatic palaces. It is highly probable, that facts of this kind, happened in former ages, have given rise to the histories of your metamorphoses.

ABOUT a hundred years ago, one of the petty *Indian* kings tamed one of these phocas's or sea-oxen; he called it *Guinabo*, from the name of the lake to which it retired, after having eaten its food at the king's palace, to which it went every day,

when called, followed by a crowd of children. This continued nineteen or twenty years, till a *Spanish* soldier having thrown a dart at it, it no longer came out of the water, while it saw on the shore men with arms and beards. It was so familiar with the children, and at the same time so large and strong, that one day it carried fourteen of them on its back, from one side of the lake to another.

THAT taken at *Nice*, about sixty years ago, was very different from this: It was not much larger than a common calf, having very short legs, and a large head. It lived several days without doing any harm, and eating whatever was given it. It died when they were transporting it to *Turin*, to shew it to the duke of *Savoy*.

THE phocas's are very common in the *Scotch* seas: They come to repose themselves on the sand by the sea-side, and there sleep so sound, that they do not wake till people are very near them; then they throw themselves into the sea, and afterwards rise out of the water to look at persons on the shore. There are a great many of them on the coasts of *Hispaniola*, they enter into the rivers and feed upon the grass and herbs on their banks. At *Rome* they were fed with hay, and millet, which they eat slowly, and as it were sucking it.

You can easily conceive, Sir, that what art can do in phocas's, nature can do the same of herself; and that on certain occasions these animals, having for several days lived well out of the water, it is not impossible, but they may be accustomed to live always so, even by the impossibility of returning to it.—It is thus certainly that all terrestrial animals have passed from the waters to the respiration of the air, and having contracted the faculty of howling, howling, and making themselves understood, which they had not, or which they had but very imperfectly in the sea.

DURING the embassy of the marquis *de Ferrol*, whom I have mentioned, there was a small sea-dog about a foot high, taken near *Constantinople*, on the brink of the river. His mother, who was higher than a calf, large and thick, had brought him to land. She came with fury to the mariners, who had seized her puppy; but some balls shot at her obliged her to return to the sea. This puppy, which was carried to the ambassador's palace and lived there six weeks, could scarce bark when it was taken, but its voice was stronger and louder daily. This species was, in that respect different from that of certain dogs of *Canada*, which continue always dumb; which invincibly proves that they descend from sea-dogs; that of which I speak, was ugly and

fierce; he had small eyes, short ears, and a long and sharp snout; his hair was short, hard, and of a brownish colour; his tail terminated like that of certain fish, and of beavers, in the form of an helm or rudder, in order to direct his course in the sea.

Do they not in the lower *Germany*, feed in ponds of fresh-water, sea-bears, which may be also called sea-dogs, and which are very common in the seas of cold countries? Have not these the colour and the hair of *Danish* dogs? When I went to *Dantzick*, I saw one of them in a pond. At the smallest noise he heard on the brink of the pond, he lifted up his head, to see what was the occasion of it. Is it to be doubted that our dogs have come from these sea-dogs, since they resemble them so perfectly in figure, colour, and other circumstances?

As for man, who ought to be the principal object of our attention, you have, no doubt, read, continued our philosopher, what your ancient histories relate concerning the tritons or sea-men; but I shall not mention what the ancients have wrote on this subject, I shall pass over in silence, what *Pliny*, who is perhaps unjustly branded as a liar, has said concerning a tritons who was seen in the sea playing on the flute. His music, to be sure, could not be very delicate and harmonious. I shall not speak of that generally received tradition that there are human forms perfect from the middle upwards, and terminating in a fish below. This has with you passed into a proverb, in order to denote a work whose end does not correspond to its beginning. I shall also omit the history of the syrens, who by the sweetness of their songs, as it is said, only allured men, in order to devour them. In a word, I shall reject every thing which may be supposed to be the effect of fancy and imagination, in the works of the ancient poets, and only adhere to well-attested facts, which have happened in or near our own time, and which every one has an opportunity of enquiring into.

I HAVE in your histories read, that in the year 592 of your *Æra*, on the 18th of *March*, an officer of one of the towns of the *Delta*, or the lower *Egypt*, walking one evening with some of his friends on the banks of the *Nile*, perceived pretty near the shore, a sea-man, followed by his female, the male raising himself oftner above the water, as far as his secret parts, and the female only to the navel. The man had a fierce air, and a terrible aspect, his hair was red, and somewhat bristly, and his skin of a brownish colour. He was like to us in all the parts which were seen. On the contrary, the air of the woman's countenance was sweet and mild, her hair was black, and floating on her shoulders, her body white, and her breasts prominent. These

two monsters remained near two hours in the sight of this officer, his friends, and those of the neighbourhood, who had come to see so extraordinary a fact. An attestation of it was drawn up, signed by the officer and many other witnesses, and sent to the emperor *Maurice* who then reigned.

DURING the stay which *Salem* made at *Derbent*, when he was sent by *Vatec*, calif of the race of *Abassides*, to the *Caspian* sea, in order to review the fortress, which the ancients said was built to hinder the northern nations from making incursions into *Asia*, there happened a fact of a still more singular and surprising nature. It was related by *Casvinia*, a celebrated *Arabian* author, who in his book intiled *Agaub. el Malkloukat*, that is, *the marvellous things found in the Creatures*, places it in the year of the hegyra 288, which corresponds to the year 894, of your *Æra*. He says, that the prince of that country, going one day to fish on the *Caspian* sea, took *Salem* with him: In the course of the diversion, they took a large fish, which was immediately opened, and in whose belly was a sea-girl still alive; she had on a pair of drawers without a seam, made of a skin like that of a man, and which came down to her knees. This girl sometimes held her hands on her face, and at others tore out her hair. She fetched deep sighs, and lived but a few moments after she was taken from the belly of this monster. *Casvini* adds, that the *Tarik Magreb*, an *Arabian* history of *Persia*, confirms this narration by other facts which he quotes, concerning the firens and the tritons found in the sea.

THE history of the *Netherlands* also relates, that in the year 1430, after a great inundation, which was considerably diminished, some women of the town of *Edam*, situated on the sea of *Zealand* at the extremity of the little river *Tye* going from their town in a boat to *Prumeraude*, where their cows were feeding, found in their way a sea-girl half buried in the mud; that they took her up, washed her, cleaned her, and took her to *Edam*, where they cloathed her: The history adds, that they taught this girl to spin, and to make the sign of the cross, but that they could never teach her to pronounce one word, though they had taken her to *Haerlem*, where some literati attempted to make her speak. She was entirely like to our women, except in a very few particulars. She retained a great love for the sea, and even for the waters of rivers and canals, so that they were obliged to watch her lest she should throw herself into them, as she had several times attempted. But after having some years contracted a habitude of respiring nothing but air, perhaps she could not have afterwards lived in the element in which she was born.

THE following fact is taken from an account drawn up by *Peter Luce*, captain commander of the quarters of the *Diamant* in *Martinico*, on the thirty-first of May, 1671, and given to *Peter de Beville*, notary of the quarters of his company, in the presence of *P. Jusfan* a jesuit, and three other witnesses who have signed the account, which is also corroborated by the separate and conjunct depositions of two *Frenchmen*, and four negroes. This account testifies, that on the twenty-third of May these *Frenchmen* and negroes, having gone in a boat to the islands of the *Diamant*, in order to fish, and returning about sun-set, they saw near the shore of an island where they were, a sea-monster of a human form from the middle upwards, and terminating below like a fish. His tail was large and split, like that of a *Carangue*, a fish very common in that sea. His head was of the bulk and form of that of an ordinary man, with straight black hair intermixed with gray, hanging over his shoulders.— His countenance was large and full, his nose big and flat, his eyes of the usual form, and his ears large; his beard, which like the hair of his head was mixed with gray hairs, was seven or eight inches long, his stomach was covered with hair of the same colour; his arms and hands were like ours, and when he appeared above water, he seemed to wipe his face with them several times, and on his coming up snorted as dogs do when they come up after being plunged in water; his body, which was raised above the water as far as his middle, was slender like that of a young man of fifteen or sixteen years of age; his skin was moderately white, and the length of the whole body seemed to be about five feet; his air was fierce, and he looked at them all one after another with great attention, without appearing to be astonished. When they first saw him he was not above seven paces from the rock on which they were. He plunged sometime after, and came up only about four paces from them. Diving again, he came up about three feet from them, and was so near that one of the company presented his line to him, in order to see if he could catch him; then he made off towards the *Savanna* contiguous to the island where they were, and plunging a third time disappeared.

THE description of this sea-man, agrees with that which I have before related, except in this, that the man and woman seen in the *Nile*, were at so great a distance that the spectators could not distinguish the inferior figure of their bodies, which was under the water. That taken at *Sestri* in the state of *Genes*, appeared also in the sea to be terminated like a fish, and to have his tail divided like that taken at *Martinico*. He was, however, a man from his middle downwards as well as upwards. It is easy to perceive the reason of the error which our eyes fall into,

when we view a man in an upright position in the sea. It is sufficient for this to reflect, that in order to keep ourselves upright and elevated above the waters, we must keep our thighs and legs close, and move our feet up and down, which to the sight produces in the inferior part of a man, the figure of a fish, and of a tail divided by the separation of the extremity of one of the feet from the other. On the contrary, a man who swims flat on the water swims naturally like a frog, separating his thighs and uniting them, in order to act the more strongly on the water, with the soles of his feet.

THIS sea man taken at *Sestri* in 1682, was seen by all the inhabitants of that small city. He in every respect resembled that taken at *Martinico*, except that instead of hair and a beard, he had a kind of moss on his head, about an inch long, and a little very short down on his chin. In the day-time he was placed on a chair, where he sat very calmly for some time; which evidently proves, that his body was flexible, and that he had joints, which fish have not. He lived thus for some days, weeping and uttering lamentable cries, but would take nothing either to eat or drink. I got this account twenty-five years ago at *Sestri*, where I found a lady of my acquaintance, of great wit and curiosity, and who, as well as I, informed herself of these particulars.

SUCH also was the form of another sea-man who was killed in the night-time by a musket-shot, in the ditch at the foot of the walls of *Boulogne*, where the reflux of the sea had left him, and from whence he attempted to get out. The centinel taking him for an ordinary man who refused to speak, shot him. Mr. *Mason* has given a description of him in the book he has composed concerning the fish and shell-fish of that coast, printed at *Paris*. This difference of hair and beard among sea-men, proves that both of those of the human race, who have long hair, such as the whites, and those who have on their head and chin a kind of wool, as the blacks, equally derive their origin from the sea.

I SHALL add a fact well known at *Martinico*, and posterior by more than thirty years to that in 1671, which I have related. Mr. *Larcher*, an inhabitant of the place, returning one day to Fort Royal, from a house he had at the three isles, being in his canoe, armed with eight negroes, and having his head turned from the negroes, these cried out all at once, a white man in the sea. Upon this Mr. *Larcher* turning his head towards them, only perceived the bubbling of the water in the part where the monster had disappeared. The eight negroes separately attested, that they had seen a man, such as the whites, raised

above the water, and attentively looking at them. They added, that he plunged into the sea, the moment they cried out, a white man.

THESE examples then are not so rare as people are apt to imagine; and if such sea-men are found in the most frequented seas, is it not probable that they must be found in greater abundance, in those contiguous to desert coasts?

WE read in the history of Portugal, and in the account of the East-Indies, that some people having on the Indian coast one day caught a considerable number of tritons, or sea-men and women, they could bring none of them to Don Emanuel, who then reigned, except one woman and her daughter, all the rest having died, either soon after they were taken out of the water, or in their passage from the Indies to Lisbon. This woman and her daughter were so extremely melancholy, that nothing could comfort them, and they eat so very little, they sensibly decayed. The king touched with their condition, and perhaps prompted by curiosity, ordered, that after having chained them that they might not escape, they should be put into some shallow part of the sea. They rushed into it eagerly, and having plunged themselves, they sported together, and in the water, where they were distinctly seen, performed a thousand tricks which testified their satisfaction and their joy. They remained three hours under water, without coming above its surface to respire. From that day, when the king and all his court had the pleasure to be witnesses of so new a spectacle, they continued every day to lead them to the same place, and permit them to enjoy the same pleasure, by means of which they lived some years; but they could never learn to articulate a single word.

THE fact I am now to relate to you is of another kind, and much more singular. Towards the end of the last age, an English vessel belonging to the city of Hull, situated one hundred and fifty miles from London, on the north coast of England, when fishing for whale in the seas of Greenland, a hundred and fifty leagues from land, was surrounded about noon by sixty or eighty small boats, in each of which there was a man. The sailors had no sooner discovered them, than they put out their ship's boats, in order to come up with some of them: But the men in the small boats, which they conducted with two small oars, perceiving this, and seeing that the ship's boats gained ground of them, plunged all at once into the sea, with their boats, and none of them appeared the whole day after except one.— This returned to the surface of the water, a minute after, because, by plunging, one of the oars was broken. After four hours chase, and a hundred new plunges, in proportion as the ship's

boats approached, the little boat was at last taken, together with the man that was in her. He was brought on board the ship, where he lived twenty days, without ever taking any nourishment, or uttering any cry or sound which could make people suspect that he had the use of speech; but he sighed continually, and the tears flowed from his eyes. He was shaped like us, with a beard and hair pretty long, but from the middle downward, his body was all covered with scales.

As for the boat, it was eight or nine feet long, and was very narrow, especially at the two extremities. The ribs of it, and even the seat on which he sat, were fish-bones. It was covered within and without, with the skins of the sea-dog stitched to each other. This boat had in the middle an opening large enough to let the rower in, and the aperture was surrounded by a kind of sack or purse of the same skin, with which the man introduced to the middle into the boat girt himself so perfectly with bands also made of the same skin, that the water could not enter into the boat. Before the man were two pieces of the same skin fixed to the covering, where they formed two kinds of pouches. In the one were found lines and hooks also made of fish-bones, and in the other some fish, which appeared to have been but lately taken. At the rower's sides were two small oars, also fixed to the boat by straps of the sea-dog's skin. All these curiosities, together with the man himself dried, are still to be seen in the town-hall of *Hull*; and the account itself attested by the captain and all the crew, is to be found in the archives of that place.

THE consequences of a fact so singular, and so authenticated, are such strong proofs of the possibility of the human race coming out of the sea, that it even seems impossible, after what has been said, to doubt of it. In a word, except in point of reason, of which we are not here speaking, the men belonging to these little boats, were men, such as we are, dumb indeed, but capable of living in the sea as well as in the air, since during the whole day, there only appeared one on the surface of the water. They certainly drank the water of the sea, since there was no fresh water in the boat which was taken, and since they were an hundred and fifty leagues from land, on which they must have certainly built their boats, and found the wood for making their oars. They must therefore have known how to return into these places, whether they had this knowledge from the disposition of the stars and sun, or from the bottom of the sea, under which they could walk and rest by means of their oars. It was also necessary, that they should visit their small boats in the places where they had built them, and where, perhaps, they had their wives and children. All these are circumstances worthy of singular attention, and of the most profound reflection.

FATHER *Henriquez*, a *Jesuit*, relates, in one of his letters printed at *Venice* in 1548, and 1552, that being in the *East-Indies*, near the *Indian* point, he was one day invited to see fifteen tritons, seven male and nine female, which they had taken at one haul of the net. I was assured, that in the *Texel*, about thirty years ago, there was a sea-man taken, who lived three days, and was seen by all the people of *Amsterdam*.—They who sail in the *Greenland* seas affirm, that on the coast of that country they often meet with those figures male and female, but of a larger size than those in the other seas. A thousand similar examples found in your books, especially in your voyages, evince that these monsters, are frequently seen by ship's crews, during the course of their navigation, even so near, that it is often easy to view them and their shapes perfectly.

THE following is a proof of what I have advanced, so recent, so circumstantiated, and so authentic, that we must renounce our reason, and bid adieu to all evidence, if we do not yield to it. In 1720, on Thursday the 8th of August, the wind variable, being east south-east, in twenty-eight or thirty fathoms of water, seven ships in view on the banks of *Newfoundland*, about ten o'clock in the morning, there appeared near a French vessel called the *Mary de Grace*, commanded by *Oliver Morin*, a sea-man, who first shewed himself under the roundlet of the owner, whose name was *William L'Aumone*. The owner forthwith took a gaff in order to draw him on board. But the captain hindered him, for fear the monster should drag him along. For this reason he only gave him a blow on the back with it, without piercing him.

WHEN the monster felt the blow he turned his face to the owner like a man in wrath, who wanted to make reprisals. He swam round the ship, and when he was behind her laid hold of the rudder with both hands, which obliged the crew to fix its handle to both sides of the ship, lest he should endanger her.—Then he repassed by the starboard, swimming always as if he had been an ordinary man, and when he was before the vessel, he stopped to look at the figure on the bow, which was that of a beautiful woman. After having long considered it he laid hold of the lowest rope of the bowsprit, and raised himself out of the water with a seeming intention to seize the figure. They tied a cask to a rope, and allowing it to hang at the side of the ship, he took it and handled it without breaking it.

HE afterwards swam to the windward of the ship, about a cable's length, and passing behind her, again laid hold of the rudder. The captain having ordered a harpoon to be prepared, tried to harpoon him, but mist his blow. The handle only struck

his back, upon which he for a long time turned his face to the captain, as he had to the owner, and with the same gestures.— After this he passed before the ship, and again stopped to consider the figure, upon which the owner ordered the harpoon to be brought to him: But being afraid lest this sea-man had been the ghost of a sailor called Commune, who the year before had made away with himself on board the ship, the 8th of the same month, which was August, his trembling hand ill directed the blow, so that for a third time the monster was only struck with the baton, to which the harpoon was fixed. Then he presented his countenance with a menacing air, as he had done the two former times. This, however, did not hinder him to come nearer, and to lay hold of a line with which one John Marie was fishing. After this he again swam to the windward of the ship, to the distance of a gunshot.

HE afterwards returned, came very near, and raised himself out of the water as far as his navel, so that all the company distinctly observed, that he had a breast as full as that of a woman. Then he turned himself on his back, and with his hands laid hold of his private parts, which were as large as those of a horse. After this he swam round the ship, and again laid hold of the rudder. Swimming from thence slowly, he raised himself out of the water, and turning his back towards the ship, he voided his excrements against her side. After this he moved off till we could see him no longer.

THIS entertainment lasted from ten o'clock in the morning till noon, the monster having all that time been near the vessel, and often not above two or three feet distant, so that the crew, composed of thirty-two men, had both the pleasure and convenience of remarking the following particulars; that his skin was brown and tanned, but without scales; that all the motions of his body, from head to foot, were like those of a real man; that his eyes were well proportioned; that his mouth was of a moderate size, considering the length of his body, which by the crew was computed to be about eight feet; that his nose was large and very flat, his tongue thick, his teeth large and white, his hair black and straight, his chin furnished with a downy beard, and moustaches of the same kind under his nose, his ears like those of an ordinary man, his feet and hands the same, except that his fingers were joined with a pellicule, such as that found in the feet of geese and ducks. In a word, his body was as well shaped as that of an ordinary man.

THIS detail is taken from an account drawn up by John Martin pilot of the vessel, signed by the captain and all those of the crew who could write, and sent from Brest by Mr. Hau-

tefort, to the count de Maurepas, on the 8th of September, 1725.

IN 1731, about two leagues from Nice, there was a large fish found, in the belly of which, there was a hand like that of a man, separated from the arm, as if it had been cut by a hatchet. This hand was so found, that by the small impression the digestion of the animal had made upon it, it was easy to see, that it was but very lately swallowed. It was seen by a prodigious number of people, and among the rest by Mr. L'Honore procurator of the court of Turin, from whom I had this relation, as well as from a fisherman who was present at the opening of this fish. The fingers of the hand, entirely like those of a man, were united by a pellicule like that in the feet of geese and ducks; a certain proof that it could be no other than the hand of a sea-man, which the fish had just bit off, without being able to swallow the whole man, or a more considerable part of his body.

PERHAPS, Sir, you will say, that these facts tend to prove, that there are different species of men; for my own share, I think it impossible to doubt of it, after all these testimonies. Is it not sufficiently known, that in the island of Madagascar there is a kind of wild or savage-men still dumb, and so swift runners, that it is almost impossible to come up to them, or take them?

A SHORT time ago, two vessels coming from your coasts, in order to purchase blacks at Senegal, one of them was separated from her convoy by a tempest, and for want of fresh water put in to a land little frequented. The king of the country made a present to the captain of an animal all covered with hair, which he put on board, believing it to be an ape of an extraordinary figure. The vessel set sail, and was afterwards exposed to so many tempests, that the sailors, who are generally superstitious, imagined that such bad weather proceeded from the strange animal they had on board. They begged that it might be thrown into the sea; and the captain, who would have gladly preserved it, was obliged to satisfy them. Some time after arriving at a port not far from the former, he understood with astonishment and regret, that what was taken for an ape, was a man of a particular species, who inhabited the mountains of the country where he had been embarked.

NOTHING is more common than those savage-men; in 1702, the Dutch East-India company sent out two vessels from Batavia, for the coasts of New Guinea, and the southern countries, in order to trade and make discoveries. During that expedition, which was of no use, the Dutch seized two male animals, which

they brought to Batavia, and which, in the language of the country where they were taken, they called Orang-outangs, that is, men who live in the woods. They had the whole of the human form, and like us walked upon two legs. Their legs and arms were very small, and thick-covered with hair, some of which they also had on the whole of their body, their faces not excepted. Their feet were flat, where they are joined to the leg, so that they resembled a piece of plank with a baton driven into it. These Orang-outangs had the nails of their fingers and toes very long, and somewhat crooked. They could only articulate sounds very indistinctly, but were very melancholy, gentle, and peaceable. The one died at Batavia, and the other in the road to Holland, whither he was sent as a curiosity worthy the admiration of all Europe. In a word; if we could not say, that these living creatures were men, yet they resembled them so much, that it would have been rashness to pronounce that they were only brutes.

To return to the different species of men. Can those who have tails, be the sons of them who have none? As apes with tails do not certainly descend from those which have none, is it not only natural to think, that men born with tails are of a different species from those who have never had any? They are also characterised by very different qualities. I know that a great many people are persuaded, either that there are no men with tails, or that if there are, it is an error of nature, or an effect of the mother's imagination: But they who think in this manner, are certainly deceived in supposing, that such men and women either do not exist at all, or are very rare. It is true the shame and turpitude attached to this deformity, the fierce character, and the little sense of all those subject to it, and their natural hairyness, oblige them to conceal their misfortune from the persons among whom they live. They take the same care of their children, and these instructed by their parents use the same precautions with respect to their posterity. Besides, it is evident, that this race of men with tails, is much more numerous than we imagine, and that the expression so common among you (*homines caudati*) men with tails, in order to denote people of little sense, is by no means metaphorical, but founded on truth. There are a great many of these men in *Ethiopia*, *Egypt*, the *Indies*, *England*, and especially *Scotland*, according to all your relations. Some of them are also found in *France*, where I have seen several of them. But I shall only relate some recent instances of this kind, of the truth of which you may have an opportunity of being convinced.

Mr. CRUVILLIER, who with no less courage than success made an expedition against the *Turks*, and who died in *Carmenia*

in a ship which one of the officers, in order to be revenged of his captain, blew up, was equally remarkable for the tail with which he was born, as for his valiant actions. He was only a clerk of a merchant-ship, when one day that ship mooring in the port of *Alexandria*, a bashaw, who was going to *Cairo*, having heard of the exploits of this young man, proposed to him to wrestle with a black, whom he had in his service, and promised him thirty sequins if he came off victorious. The black had killed fifteen or sixteen men in this exercise. Though Mr. *Cruvillier* was informed of this, yet he accepted the proposal of the bashaw, and came to the place appointed without any preparation. The black, on the contrary, came naked, and his body rubbed with oil, after the custom of the ancient wrestlers, having only a small bit of cloth to cover his nakedness. They, at first, viewed each other for some time, without engaging. At last, after some feints, the black suddenly rushed upon Mr. *Cruvillier*, with a resolution to seize him: But Mr. *Cruvillier*, who had stretched out his arms to prevent him, beat the black so in the sides, that they resisted his fists no more than if they had been butter. By this means he deprived him of respiration and strength, and taking his neck between his hands, totally suffocated him; then lifting him off the ground, he threw him upon his head with such force, that the whole head was plunged in the sand. The bashaw, witness (together with all the people and strangers at *Alexandria*) of so extraordinary a strength, though touched with the loss of his black, ordered Mr. *Cruvillier* the thirty sequins which he had promised him. *Cruvillier* when on a cruise, and about to engage, left to his crew the choice, either of weighing the anchors while he hoisted the sails, or of hoisting the sails while he weighed the anchors. He had a brother of equal strength, who residing at *Tripoli* in *Barbary*, was by the *Turks* obliged to turn *Mahometan*.— It is said, that he also had a tail.

WHEN I went to *Tripoli* some time ago, I saw a black called *Mahammed*, of an extraordinary strength. By the help of two oars he alone rowed a large sloop, with greater swiftness than twenty ordinary men could have done. With one hand he could throw down two or three men at once, and could carry burdens of an astonishing weight. He was covered with hair, contrary to what is usual among the blacks, and had a tail half a foot long, which he shewed me. I enquired into his country, which he told me was that of *Borneo*. He assured me that his father had a tail like his, as well as most of the men and women of his country, who go naked, and among whom this tail has nothing dishonorable, as in *Europe*. The merchants of *Tripoli*, who dealt in black slaves, also assured me, that those of that country were

more fierce, strong, and hard to be subdued, than those of any other part; that they had almost all tails, women as well as men; that many of them passed through their hands; that they sold them well on the coasts of *Caramania*, where they were employed in cutting wood.

It is by no means shameful for a naturalist to dive into facts, which may instruct him in the secrets of nature, and conduct him to the knowledge of certain truths. Being at *Pisa* in 1710, I was informed that there was a courtesan, who boasted of having known a stranger who had been there three years before, and who was one of the species of men with tails. This inspired me with a curiosity to see her, and examine her with respect to the fact. She was at that time no more than eighteen years of age, and was very beautiful. She told me, that in returning from *Liburnia* to *Pisa*, in a passage-boat, in 1702, she met with three *French* officers, one of whom fell in love with her.— Her gallant was large, well-made, and about thirty-five years of age; he was of a very fair complexion, his beard was black and thick, and his eye-brows were long and shaggy. He lay all night with her, and came very near that labour for which *Hercules* is no less famous in fable than for his other exploits. He was so shaggy that bears themselves are hardly more so. The hair with which he was covered, was very near half a foot long. As the courtesan had never met with a man of this kind, curiosity led her to handle him all over, and putting her hand to his buttocks she felt a tail as large as ones finger, and half a foot long, and shaggy as the rest of the body, upon which she asked him what it was. He replied with a harsh and angry tone, that it was a piece of flesh he had had from his infancy, in consequence of his mother's longing for a tail of mutton when she was big with him. From that moment the courtesan observed, that he no more testified the same affection for her; the smell of his sweat was so strong and particular, and smelt, as she said, so much of the savage, that she could not get quit of it for a month afterwards.

A PERSON of your country assured me, that the deceased Mr. *Barfabas*, and his sister a nun, both remarkable for particular features expressive of strength, had each of them a tail.— When passing through *Orleans*, I saw a man who had one, and who was also very strong and shaggy. I have been since informed, that wanting to have this tail cut off, he died under the operation, as we are informed in the mercury for the month of September 1718. At *Aix* in the street called the *Courtiffade*, there is a poor woman called *Louisa Martin*, who when thirty-five years of age was seized with a contagious disease, which ranged in that city; the people who had the charge of her in her illness,

discovered that she had a tail, and shewed it to several persons, so that the story became public. This woman has a strong beard with black hair and eye-brows, is possessed of an extraordinary strength, and carries on her shoulders two large sacks of corn with as much ease as most other people carry a faggot. One day she gave a man so severe a blow, that he fell flat on the ground, and remained half an hour in a fainting fit. There is now at Aix, one Mr. Berard a procurator, called Hog's-Tail, because he was seen to have a tail when bathing himself, neither does he deny it. He is not of a strong complexion like the woman I have now mentioned, but his face is full of freckles.

To these facts, which all the curious may enquire into, I might add a great many others in distant countries; but I hope these are sufficient to persuade you, that the men with tails found now and then, are not born with these tails by an effect of chance, or the force of the mother's imagination. They are probably men of a species as different from ours, as the species of apes with tails is different from that without them. The ferocity of these men, their extraordinary strength, their hairyness, and the communication of these tails from parents to children, seem to be certain proofs of a different species. If this extraordinary ferocity and hairyness are not always equal in all the persons of this kind, it proceeds from this, that their species mixed with ours, no doubt loses some of its properties; and that some are preserved in a person produced from this mixture, while the others are weakened or concealed for a time. Thus a son begot by a father who has tail, and born of a mother who has none, may be without a tail, and this son may by a wife without a tail beget a son like his grandfather; he may be shaggy without having a tail, or he may have a tail without being shaggy.

ONE of your authors pretends, that in the southern part of the island of Formosa, there are whole races with tails; such as those of Africa, mentioned to me by the merchants of Tripoli. Another assures us, that he has found whole nations with tails, in the Molucca and Philippine islands. This is certain, because as I have told you, notwithstanding the mixture of their race with ours, it is always perpetuated, sometimes remaining such as it was in its origin, and sometimes partaking of both; and after having become spurious, it may again resume the whole force of its essence, if a person produced by this mixture, finds another in the same case. This is one of the causes of the diversity observable in the constitution of these men.

INDIANS of America, and especially those of Canada, except the Esquimes, have neither beards nor hair on any part of

their body. If we transport the *Brafilians* into *Portugal*, and the *Natives* of *Canada* into *France* or *England*, they and their posterity will always remain without beards and hair. On the contrary, the *Portuguese* children when they have lived for two hundred years in *Brafil*, and the *Erench* children established in *Canada* equally long, have as much hair on their heads, and as long beards as their ancestors. Do the men who are born without beards and hair, in cold and hot climates, proceed from the bearded race of men in the same countries? Do the black and white moors of *Africa*, and the northern countries, so different from ordinary men by their features, and by the wool with which their heads are covered instead of hair, descend from men who have an air, a stature, and hair so different from theirs? At *Cairo* are sold blacks of a certain canton of *Africa*, whose *Penis* in erection is crooked from the middle to the extremity.— Do these men proceed from the other blacks, in whom no such singularity is observable? There is another race of blacks, the outermost parts of whose eyes are redish, whereas ours are white, and this species are of so bad natural dispositions, that no body will purchase them. There are some blacks whose legs and arms are no bigger than spindles.

I HAVE already mentioned the *Esquines*, who of all the nations of *Canada*, are the only people who have hair and beards. About two or three years ago, these people made an incursion towards the *Fort of Pontchartraine*, on which occasion two of their men and two of their girls were taken prisoners. These last, one of whom was about sixteen, and the other fourteen years of age, were conducted to the fort, and lodged in the house of the commander's mother, from whom I have this account. The youngest of these girls died, and the other having a fine genius, soon learned the *French* language, and remained two years in the fort. One day viewing the sailors who arrive in that road for the sake of fishing, this young savage asked her mistress, why in that nation, there were not men with one leg, as among the *Esquines*. The lady answered her, that there were men in *France* as well as elsewhere, who had lost one of their legs, but that these men were no longer fit for the purposes of navigation. These, replied the young savage, are not the men I mean; there are also such among us; but I speak of a race of people, the men and women of which have but one leg and one hand, shaped in a very extraordinary manner. These men are very numerous, never smile, and can only walk by a kind of jumping or leaping. They are employed in raising our boats when they sink, and in taking up what falls into the sea, on these occasions. They speak, reason, and act like the other *Esquines*. In vain did her mistress endeavour to make her vary from this declaration, by pretending that the thing was impossi-

ble. This girl, who never contradicted herself, at twenty different examinations, asserted that there was great numbers of such men and women, and that there was even a whole nation of them.

I COULD relate twenty other particulars, which seem to prove that there are different species of men: But I shall ask you in general, whether you believe, that the black men are descended from the white; and why in the former rather than the latter, there should be, immediately below the epidermis, a fine membrane, which is thought to be the cause of their blackness? In a word, this coat blunts and absorbs the rays of light; whereas, on the contrary, a leaf of quicksilver applied to the back of a glass, reverberates and reflects them. Mahomet was so struck with the difference of the species of black and white men, that he did not hesitate to assert that God had made the one of black and the other of white earth. He could not imagine, that men so different, not only in colour, but also in shape and inclination, could have the same origin. He observes in another place, that though there have been prophets of all other nations, yet there have never been any among the blacks, which denotes that they have so little sense, that the gift of fore-knowledge, the effect of a natural wisdom, which has, in some, been honored by the name of prophecy, has never been the portion of any of the blacks.

THERE are, in my opinion, still more remarkable differences among the several races of men which we know; for besides these I have mentioned to you, do you imagine that the giants proceed from the same origin with us? About fifty years ago, six leagues from Salonica, in a tomb built of large stones at the foot of a small hill near a town called Katikioui, the body of a man forty-five cubits long was found. Upon the report of this news, Mr. Dusquet, then French consul in that city, sent people, and Janisaries, furnished him by Cara-Ailam-Ismael-Pacha, commander of Salonica, to take up the bones of that giant. Such of them as were found, were sent in two large boxes to Paris, where the greatest part of them still remain in the king's library. The head was carried to Salonica, and hung up on the top of a public gate, in order to perpetuate the memory of this prodigy. But the injuries of time having rotted it, its great weight made it fall some years ago, when it was unfortunately broken. The Cranium was so large, that before it was hung up, it contained seven quinlots of the corn of that country, which weighed seventeen hundred French pounds. One of the fore teeth, and another of the jaw-teeth having been weighed, the former was found to weigh a hundred and forty, and the other four hundred and twenty drams; that is, the one was about a

pound and an half, and the other about four pounds in weight. One of the men sent by the consul, to raise the bones of this giant, was still alive, when I passed through Salonica, and obligingly recounted these particularities to me.

THERE have been also giants in France. Not longer than five hundred years ago there was in Dauphine, one eighteen feet high, whose tomb, bones, and figure are drawn on the walls of the church in which he was buried. During this last age a man between eight and ten feet high, was shewn publicly at Paris; and in America a whole nation of giants are lately discovered, of whom I have got the following account.

FOUR savages of the village of Sejou in Canada, having gone, according to the Canadian custom, to take a prisoner, in stead of one of their own who had been assassinated, took their road towards the west, and crossed several countries, the people of which were sometimes their enemies. They avoided them, and went farther, in order to execute this resolution, which among them is looked upon as a piece of generosity and bravery. They travelled in this manner for ten months, till they came to a country where the men were ten or twelve feet high. Pleased to find these giants, they proposed to bind one of them and carry him off with them. With this design they concealed themselves in the thickets adjacent to one of their habitations, where they remained three days. During that time they saw several pass and repass, but durst not attack them, because they were in companies. At the end of that time they saw one alone, at whom they all shot their arrows at once. The giant being wounded fell on the ground, and as his wounds were too considerable to admit of carrying him off, they cut off his head, and carried it to their own country, after being about eighteen months absent. This head, with the hair which they had torn off from it, was seen by Mr. Pachot, a French officer, then in these quarters, with a detachment of the colony of Canada. According to his relation, this head was at least as large as three ordinary heads.

THERE has lately been shewn at London the hand of a sea-giant killed near Virginia, by a cannon-ball, and having with him another smaller giant, who was, no doubt, one of his children. This hand was four feet from the wrist to the extremity of the fingers. It was so perfectly like our hands, with lines, nails and fingers, so similar, that it was not possible to doubt of its being a human hand. Several surgeons thought it artificial; but, upon probing it they were undeceived. I have this fact from my lord Baltimore's brother, who assures me that he has seen and touched this hand, as well as the sea-elephant shewn at the same time in London. The giants are not therefore a race

of imaginary mortals, since there have been, and still are such men. I have seen a book intituled, *the Universal History of the East-Indies*, wrote by Witfliet in Latin, translated into French, and in 1707 printed at Doway. The author there relates, that in 1722, Magellan being near the straits called by his name, ordered several soldiers and sailors to descend to the port, since called the port of St. Julian. These having entered pretty far into the country, found a house separated into two apartments. In the one were three men ten feet high, and in the other their wives and children. By some stratagem they got one of these men on ship-board, but the other two made their escape. This giant had a throat so wide, that he could put an arrow a foot and an half long down it. He was so strong, that no fewer than eight men could tie him. He eat a basket full of biscuits, and drank a gallon of wine. This land was called the land of giants or patagons, and still retains the same name. The people of Magellan found, that the coasts on both sides of the streights were inhabited by a gigantic race of men.

Now, do these giants of past or present times, descend, in your opinion, from the same fathers with our race of five or six feet high, or that of two feet and an half? That of the giants and ours are, perhaps, intermixed; and the giants of the last ages are the remains of the spurious seed of the first. Thus the species is still renewed on particular occasions, and presents us with diminutives, of the original race, which no longer subsist without a mixture in Asia and Europe, because our species being more subtil, dexterous, and without doubt more numerous than theirs, have almost destroyed them. Does the race of dwarfs about three feet high, such as those of Lapland, and the Esquines in Canada, descend from a race about five or six feet high? or can this smallness of stature be ascribed to the country of which they are natives? But as the dwarfs of Lapland, and among the Esquines, are surrounded by people of an ordinary height, who live in the same climates, is it not probable that they have a different origin? In 1698, there died at London a little man brought from Dangola, on the coast of Africa. The literati of London had taught him to pronounce some words; he walked sometimes on his feet, but more frequently on his feet and hands like a beast. His head and back were precisely like those of another man, but the other parts of his body, were not so fully similar to those of man. Some years ago there were two dwarfs no more than three feet high, shewn in boxes at Paris. Their heads were very large, and their voices very rough. They had no teeth, and their bodies were square.

Mr. DAVID VANDERBOETE, a philosopher of the last age, whose meditations on the principles of natural things, wrote in

latin, were published at Hamburgh in 1678, pretends, that the generation of dwarfs and giants only proceeds from a difference of the humours; that these being more or less dense, change the determination, or the rectilinear motion of the acid and volatile sulphur of the seed, which contains the representations of the species, by diffusing them for giants, and contracting them for pigmies. This system might be defensible, if we were only treating of rare and singular cases; but as there are whole nations of giants and pigmies, this sentiment cannot be maintained. — Besides, I must confess to you, that I do not thoroughly understand what the author means by humours more or less dense, and changing the determination, or rectilinear motion of the sulphur.

As for my own share, if I was not afraid of depreciating men too much, I should compare the different species of them to these of the brute creation. How many species are there of apes, oxen, and goats, in the parts of the world known to us? How many species of dogs are there? How great is the difference between a small Boulogne dog, and a mastiff of England or St. Malo; between a grey-hound and a spaniel; between a rough dog, and one without hair? You include however all these differences under the genus or kind of the same animals, because they mix with each other. Do you, however, believe, that all the species of apes and dogs, which we see, descend from the same origin? But if we give these a different origin, why should we not admit the same in men, since the thing is no less probable?

As all the species of sea-men are not known, it is impossible to determine those from which the various human races particularised by figure, dispositions and qualities proper to each, may have descended. It is at least certain, that some of them who have been taken, respired in the common air, as well as in the sea. However, though the respiration in the air is as natural to them as that in the sea, we ought not to doubt, but the former being sudden and forced, especially when such a transition happens in warm climates, the diversity of the air and water which they quit, is very prejudicial to the species. It is not therefore surprising, that sea-men taken in temperate or warm climates, have either lived so short a time, or by their melancholy air testified the change of their health. Men born and bred in plains and certain marshy grounds, either soon die, or are subjected to disorders, when they are obliged to breathe the pure air of the mountains; and these born on the mountains, are, as it were, suffocated, by respiring the gross air of low and marshy places. It is for the same reason, that birds only rise to a particular height above the earth.

BESIDES, it is not to be doubted, but nature chuses proper times and places for the transmigration of the sea-races to the respiration of the air. Now, it is certainly towards the poles, and in cold countries, that the dispositions to these passages are most favorable, because in these climates the air being always moist, and full of thick fogs the greatest part of the year, is not very different in cold and moisture from the water of the sea— Thus, it is probably in these countries that the sea-race have passed and still passes most frequently from one element to another. These sea-races may however become terrestrial in all parts of the globe, by the advantage of certain dispositions, as in deep vallies, where the elevation and proximity of the mountains maintain a perpetual coldness and moisture, and where thick and gloomy forests, or large caverns, sheltered these races at their departure from the water from the warm air, which might at that time have been incommodious to their breast and lungs.

BUT it is more probable, that the transmigrations of the sea-species, always have, and always will be more frequent towards the poles, and in cold climates. It is for this reason that the immense multitudes of men with which the southern parts of Asia and Europe are peopled, have come from these northern countries. It is also for this reason, that waters in these cold regions, are more fertile in monstrous fish, and sea-calves, than those of warm climates; and that these lands are better stocked with birds and animals of unknown species, than temperate countries. The moist and cold air, as I have said, of these northern places, is more favourable for the passage of sea-animals from that element to another.

It may, perhaps, be objected, that if men had drawn their origin from the sea, the tradition of this origin would have been preserved among them; whereas there is no account now subsisting, except that the earth produced them. But this tradition itself favours my opinion. A single reflection will, I am persuaded, convince you that it is so. In what condition do you believe the human races were at their departure from the sea? Why, being fierce, dumb, and without a power of reasoning, they have long wandered upon the earth, and inhabited caverns before they had acquired the power of articulating sounds, appropriating them to certain ideas, and communicating their thoughts and knowledge to their children. There was, no doubt, a long time wherein the memory of the places whence the first of them came, was lost, when they began to speak, and still longer, when they found the art of conveying their sentiments to posterity in writing. There are, to this day, nations so barbarous, that they hardly have the use of speech. Almost all the natives of America

and Africa, except those who live on the borders of the Red Sea, and the Mediterranean, are still ignorant of the art of writing.

WHAT could savage and barbarous men imagine, as those of the first ages were after thier departure from the sea? and what more reasonable thought could they entertain of their origin, than that they had been produced by the earth which they inhabited? there was among them no Tradition that they were sprung from fathers, who had come from the sea, because these fathers had certainly never been in a condition to communicate this knowledge of their origin to their children. Many of these people inhabited islands, the narrow bounds of which they took for the whole world. Others, though in a country the extent of which they knew not, had never seen other men than those of their own family or troop, and, like the others, believing themselves to be the only inhabitants of the earth. In this state could they imagine any thing more probable, than that the first among them was born of the earth?

I have however found in *Witsliet's* History, already mentioned, a testimony concerning the origin of these men who came from the sea, no less singular, than natural and probable. In page 89, the author in speaking of the *Chilinese*, has the following words: 'A great many fabulous things are related of this nation; for they say that their ancestors, who were the first men, proceeded from a certain lake.' The word *proceeded* is so expressive; that the meaning of the tradition cannot by words be rendered less dubious. Let the author treat it as fabulous, as much as he pleases, I am yet of opinion, that it deserves to be transmitted to posterity.

But if the passage from the respiration of the water to that of the air is natural, if it is proved by a great many facts, and well founded consequences, the return of the respiration of the air to that of the water, though much less extraordinary, is yet supported by a considerable number of examples. I have read in one of the relations of your country, that one Baker, having about forty years ago the command of a Dutch vessel called the *Swallow*, and being on the coasts of Holland, a sea-man jumped from the sea amidst the crew of sailors, to whom the captain was speaking. Their astonishment was still increased when they heard him speak Dutch, and in that language ask for a pipe of tobacco, which was readily granted him. He was covered with scales, and had hands like the fins of a fish. They asked him, who he was? Upon which he replied, he was a Dutchman, and having embarked when eighteen years of age, in a vessel which was lost with all her crew, he had since lived in the sea, without knowing how such a miraculous thing happened. But perceiving

that the captain made a sign to the sailors to lay hold of him, he threw away the pipe, and by a spring jumped into the sea.— The captain and company forthwith drew up an account of the fact, which they lodged in the admiralty of Amsterdam, as soon as the ship landed, and confirmed by their depositions.

THIS fact, however singular, will only appear incredible to those who are ignorant of the anatomy of the human body, especially that of the breast and lungs, and who have not reflected on what passes when we are included in the womb of our mothers. We then live without respiration. This respiration, which only serves to refresh the blood, and convey it through the arteries to all the parts of the body, for the preservation of life, is only supplied by two apertures, which correspond to the four large vessels, through which the blood, on its departure from the heart, passes from one vessel to another, without entering the lungs. Of these two apertures the one is called the Foramen ovale, because of its oval shape, and was discovered but a few years ago. The other is called the Arterial Duct, because of its arterial construction. It arises from the Vena Cava, passes into the right ventricle of the heart, above the right auricle, and terminates in the pulmonary vein. Its construction is such, that by particular valves, or suckers, it permits the blood to circulate from the Vena Cava, into those of the lungs, and hinders it from returning from these last to the first; so that in a fœtus, the blood neither passes through the lungs, nor enters into the left ventricle of the heart.

Now these two canals thus disposed, are dried up and obstructed, when the infant is born, and after the air entering into the lungs dilates them, and opens another and easier road to the blood, in which it circulates ever after. Thus in adults, there are generally no marks of these two apertures which supply respiration in the fœtus. However, it sometimes happens that these apertures are not absolutely closed up, as we find in the dissections of various bodies. This has been observed, especially in famous divers, and in the bodies of criminals which could not be hanged. This formerly, and before anatomy was brought to its present perfection, was attributed to the hardness of the larynx. It is by means of this conformation that sea-men and sea-calves live in the sea without respiration. It is not therefore to be doubted but this young Hollander, who lived in the sea, without being suffocated, had these two holes open when he was shipwrecked; and that he had resumed the habit of living without respiration, as he did in his mother's belly.

CONSULT, Sir, the most skilful surgeons, and those who make frequent dissections, and they will tell you that our bodies

are originally disposed to live without respiration, as well as with it; and our lungs are almost nothing when we are first born.— Hence it happens that sea-men of a considerable age, before they are taken, have no voice, because they want lungs, which are the instrument subservient to the respiration of the air, and because the air is the matter of the voice. Perhaps also they have not the dispositions in the larynx, produced in land-men, nor in the mouth, those which are proper for the just articulation and modulation of sounds. The divers celebrated by antiquity, and of whose history we have preserved the remembrance; these who in the Indies search for pearl, and remain under the water whole hours, and those who are justly famed at present, were subjects in whom these apertures are not entirely blocked up.— If ever we watch a sea-man and dissect him after his death, we shall find that these apertures are subsisting, and that he has no lungs at all, or at least very little, and these withered and decayed.

THERE is in all men an indelible mark, that they draw their origin from the sea. In a word, consider their skin with one of our lately invented microscopes, which magnify a grain of sand to the bulk of an ostrich's egg, and you will find it all covered with small scales like those of a carp. Besides, we have several men covered with scales visible to the naked eye, which still confirms this origin. If therefore the men who now inhabit the earth, are descended from other men, who live originally in the sea, is it not probable, as the former observations attest, that some of them, especially in their youth, might recover the habit of living in the sea, as their forefathers did?

Is it, after this, surprising, that many of the Greek philosophers should assert, that water was the first principle of all things? Thales, Anaxagoras, and many others, have been of this opinion. Anaximenes gave this prerogative to the air, which amounts to the same doctrine; since, according to Sorel, water is only a condensed air, and air a rarified water, since there is air in water, and water in air, and in both a terrestrial matter, which becomes visible in the sediment. All those who have said, that the earth and the air were the principles of all things, have looked upon water as the cause of the generation of every thing which has either a sensitive or a vegetative life. Has not Homer advanced, that the Ocean was the father of the Gods, and Thetis their mother? Truth has its distinguishing marks even in fable. These fictions at least indicate to us, that the memorable men of antiquity, who were by the barbarity of the ages made Gods, owed their origin to the sea, which includes air and earth, and even fire, when her waters are warmed by the rays of the sun. Thus she re-unites in herself every thing that

can concur to the generation of all species capable of life, animals, trees, and plants.

THIS opinion has not only been espoused by many ancient philosophers, but also lays a foundation for several conclusive proofs, that men owe their origin to the sea. How many disorders do your physicians cure only by the use of water? Has it not been known to be the most speedy and efficacious remedy, to extinguish in a patient's veins the scorching heat of a fever, which consumes him? Has it not been found, that of two runners, if the conquered, bathes himself and runs afresh, he will gain the prize, and beat his antagonist? The frequent ablutions daily ordered to the Mahometans are indeed religious ceremonies, but at the same time things contrived by the wisdom and knowledge of their legislators, as the best preservatives of health. What cures are at present produced in England, by plunging patients for two or three minutes in very cold water? What augmentation of strength and vigour do not these immersions produce in persons who are in a state of health?

THE naturalists of the eastern countries, where it is customary for men of easy circumstances, to have baths of their own, assure us, that if they copulate with their wives in these tepid waters, generation almost never fails. Bathing is in these countries an infallible remedy for sterility, provided the husband embraces the wife in the water. No body doubts, but warm baths excite to the pleasures of love, and favour generation.— This was the intention of the Romans in erecting baths wherever they could find water. The priapus found at Aix, in searching through the old buildings erected at the source of the hot waters of that city, sufficiently indicate the advantages arising from these baths. It is no doubt from these happy qualities observable in water, that our poets have feigned that Venus sprung from the froth of the sea. Do we not still use both natural and artificial baths, in order to cure sterility in both sexes.

IF we reflect on all this, have we not reason to believe, that as our species find assistance in the most important mysteries in nature, that is, in the desire of perpetuating themselves, in the cure of several diseases, and the restoration of strength, from this so favourable element, so it must be natural to us? If the constitution is altered or weakened by diseases, we have no more sure and speedy method of recalling nature to her functions, and banishing her weakness, than by re-uniting her to her principle.

BUT, Sir, said I, if the races of terrestrial animals proceeded from those of the sea, should we not still observe this passage, and see animals coming from the sea, very different from those

which came from it long ago? Yes, replied TELLIAMED, you would no doubt observe this difference, if you lived in the countries where this transmigration happens; that is, in the coldest countries, and those nearest the poles, where I have told you that this passage from one element to another must occur most frequently. The primitive races of men, after their first appearance on dry land, must have lived much in the sea, because you know that animals which come from the sea, are at first so savage, that every thing extraordinary which they either see or hear, frightens them, and makes them fly to the sea again.

BUT granting that this doctrine should not on the first view appear probable, yet the fierce and savage humour of so many of the inhabitants of the cold nations, and of the animals found in them, is a just image of the recent transmigration of these races from the water to the air. This alone is a proof of their late change of state and condition. You may observe recent traces of this both with respect to men and animals, in almost all the parts of the habitable world. These creatures taken by the Dutch on the coast of Terra del Feugo in 1708, who only differed from ordinary men by the want of speech; these of a human form met with in Madagascar, who walk as we do, and who are deprived of the use of voice, though both species comprehend what we say; these very men, who hardly appear to be men, are perhaps people who have lately come out of the sea, and who have no voice, just as some dogs of Canada are deprived of it. But both will certainly acquire the use of it in some generations to come.

IT is true, all the species have not the same dispositions.—There are now races of blacks in Africa, whose language we do not understand, either perhaps because they are lately come from the sea, or because that race is so barbarous as not to learn to articulate sounds justly. Perhaps this may proceed from some natural defect of the organs. May we not safely affirm, that there are certain races of men, as well as species of trees, which must be grafted in others in order to perfect them? Thus from a race, dumb, and without sense, mixed with another more perfect, there is a posterity very different from the original stock produced. A Chinese which author has asserted, that men were only a species of apes more perfect than those which did not speak. Though I am far from adopting this opinion, yet it is certain that from the copulation of men with them, there arises a race which has the use of speech. The same holds true in the conjunction of men with bears. Near Moscow, some years ago there was found in the cave of a bear, amidst some young bears, a child of nine or ten years of age, who had no use of speech, and who probably was begot by that animal and a woman; for

if it had been a child which the bear had carried off, it would probably have had some language, unless it had been snatched from its mother's breast. Besides, it is highly probable, that the bear would not have spared it so many years, if it had not been his own offspring.

IF your countries were less peopled with men, so long accustomed to the land, and civilized, if they had desert coasts, where the transmigration of races from the water to the air, might be made in the silence of never frequented forests, you would no doubt be acquainted with examples of this primitive barbarity. I may add that there have lately been, and still are examples of this kind, notwithstanding the unfavourable dispositions to such a passage, in countries where the coasts and mountains are so well inhabited. Of how many monsters found in your country, do histories make mention? Are these monsters dragons, or winged serpents, as they are represented in your books? Are they not perhaps animals just escaped from the sea, or carried to land by its waves, though we are not as yet sufficiently acquainted with their forms?

IT is not therefore surprising, that on account of the situation of our countries, we should not observe this first departure of aquatic animals from the sea. Let us be content to be witnesses of the rusticity and stupidity of those who are perhaps lately come from it, and whom we have an opportunity of seeing.—What barbarity still reigns among the human races found in Greenland, Spitberg, the country adjacent, to the straits of St. David, and Hudson's bay? I shall not spend time in pointing out to you the extreme difference between these barbarians, probably lately come from the sea, and certain races of men, who have come from it long ago. You well enough know the extent of this difference; perhaps a good many generations were necessary, and even a change of climate, to bring them to the point of perfection at which ours has already arrived. I am persuaded that certain races, such as the blacks of some of the cantons of Africa, will not arrive at such perfection in fifty ages, except by their mixture with other people of more favourable dispositions.

THE learned author of the *Origin of Fables*, has a piece of reasoning which agrees perfectly with this subject, "according, says he, to the traditions of Peru, Iuca-Manco-Guyna-Capac, son to the sun, found means by his eloquence to draw from the bottoms of the forests, the inhabitants of the country, who lived there after the manner of beasts, and to make them live under reasonable laws. Orpheus did the same good office to the Greeks, and he was also the son of the sun, which shews that the Greeks were also savages as well as the Americans, and that they were

brought from barbarity by the same means, since the Greeks with all their wit, when they were a new people, did not think more reasonably than the barbarians of America, who were, according to all appearance, a very new people when they were discovered by the Spaniards; and there is no reason to believe, but the Americans would have at last thought as reasonably as the Greeks, if they had had leisure for it." There is no people in the world, to whom this reasoning may not be applied.— This we may say, since after the deluge there was a time when the Assyrians, Egyptians, and Chaldeans, notwithstanding all their wit, thought as unreasonably as the Americans did, who were a new people when the Spaniards discovered them. There is reason to believe, that there was a time after the deluge, in which all nations of the earth have been a new race.

I CONCEIVE, Sir, said I to TELLIAMED, that every thing living on the earth may draw its origin from the sea; but in order to establish this opinion, you have a great difficulty to resolve, for when in this globe there were no species perhaps, because they had been totally destroyed by fire, as you suppose that may have happened, how was it peopled without the assistance of a new creation, or at least without a transportation of animals to it, from a new globe where they subsisted before? How could this transmigration have been made? What to you seems so difficult, replied the Indian, is by no means so. I am now to convince you, that without the help of this new creation, all the species which now live in the globe might have been there naturally produced, though they had been extinguished.

IN order to understand this œconomy of nature, imagine to yourself, Sir, that the whole extent of the air which our eyes see, the opaque globes they perceive, and those which they do not discover, and even the parts of the inflamed globes, which are not as yet penetrated by the fire; imagine, I say, that the whole of this space is full of the seeds of every thing which can live on the earth. Besides, these seeds are so delicate and fine, even for the productions of animals, which grow to the most enormous bulk, that it is impossible to perceive them with the assistance of the best microscopes. Some authors have asserted that the original seeds of living creatures, are little, indivisible, and consequently not capable of perishing in their essence.— Among other proofs of this they affirm, that when they burn the seeds of the poppy and the palm-tree ever so long, and in ever so intense a fire, yet if we sprinkle the ashes on the ground, and water them, they shoot up into poppies and palm-trees.

OBSERVE also, that the air we breathe, the aliments we eat, and the water we drink, are so full of these seeds, that they

make a part of it. It is equal to me whether this constitution and mixture, are established by the invariable laws of nature, or by those of the creator. My reasonings on all the pieces of knowledge I have hitherto acquired, discover nothing more probable.

Now these seeds spread in the extent of this vast universe, are however more numerous round the opaque globes in thick airs, and in waters, than in the immense spaces by which these globes are separated, because they are not fixed there by the same arrangements which keep them near the globes. It is almost in this manner, that the filings of iron are arranged, and adhere about a loadstone which attracts them. In this position, these seeds are always ready to yield to the operations of nature.— There is no instant in which some of them do not receive dispositions which render them more capable of arriving at life.

WHAT passes in the generation of animals by the species is the image of that which nature alone operates in these seeds in the bosom of the waters where they are spread. The generation of man and most other animals by their species, is according the most skillful anatomists, performed in the following manner ;

WHEN the male has arrived at a certain age, the seeds of his species re-unite in him, by the air which he respire, and the aliments with which he is nourished, according to a general law of nature, which wills that every thing should tend to be attached to its own species. Then these seeds are prepared for fertility in the vessels of the male, by the dispositions which puberty has put into them. If with a good microscope you examine the seed when warm, you will see it composed of small animals, like fish, which move up and down, but after the seed is grown cold they lose the motion, and, no doubt, the life which they had acquired in these vessels. Hence it is evident, that these seeds receive in the vessels of the male, a disposition to life, and to augmentation, which they had not when they were introduced thither.

THESE vessels therefore a kind of first uterus, where the seeds are prepared for a greater growth, which they are to receive in the uterus of the female. In a word, when come to this first state, they are poured into the second uterus, there assume a much more considerable bulk, and acquire strength, by means of which, they are pushed out either into the water or the air, according as the species either respire the one, or live in the other. Then they have liberty to seek for themselves a stronger nourishment, by which they arrive at the bulk proper to their

species, and become capable of contributing to the continuation of that successive generation.

THE operation of nature alone on these seeds in the bosom of the sea, is performed nearly in the same manner. The waters with which the globes are surrounded, become at certain times, and by certain dispositions, proper for fruitfulness. In them is the first uterus, in which the seeds receive that beginning of extent and motion which they acquire in the vessels of the male. Your Moses has, like a great philosopher, explained this preparation of the waters for the fecundity of the species which they contain, when he says, that in the beginning the spirit of God moved on the face of the waters; and in another part, that he covered them; that is, by the heat of the sun he disposed to fecundity, the seeds contained in them, by beginning to unfold these seeds.

THE effect which this spirit of life produced on the seeds contained in the waters, is justified, by what is observable in taking a drop of water on the point of a needle from any vessel in which some herbs have been steeped for two or three days. By the assistance of a microscope we find in this drop of water, a prodigious number of animals, even of different species; for the different herbs produce different species. Some of them have a human form, like that of an infant in swaddling clothes, their arms being no doubt, too slender to appear. Some of them go in a straight line and swiftly, while others walk in a round slowly. We may see them grow, since their parts are daily augmented.

Now, Sir, permit me to observe to you, that the animals alive in this drop of water, were the sons of the air, the seeds which produced them adhering to the herbs which had grown in the air. This particularity, joined to that observed in the seed of terrestrial animals proves, that all are made to live in the water, as well as in the air. The extension of this first sensation of life, which happens to these seeds, is the same effect, which the spirit of God, mentioned by Moses, produced in the seeds contained in the waters which first covered the globe of the earth. These are the same dispositions which they acquire in the vessels of the male, before they are poured into the second uterus, where these beginnings of life are augmented to a certain point.—These seeds, thus prepared for life, in the waters of the sea, as in their first uterus, afterwards, find in the diversity of the dispositions which the waters diminishing daily, continually produces in the bottom, that is, in the fat slime, or other more favourable substances, a second uterus which supplies that of the female. It is in this slime, by the assistance of a proper heat, that they acquire a bulk and force so considerable, as to get out of it, and go in quest of their nourishment in the waters.

I BELIEVE, Sir, continued our philosopher, I have sufficiently proved the probability of the system which makes ter-

restrial descend from sea-animals, and which establishes the formation of these last in the sea, by the seeds with which her waters are impregnated, whether these seeds are supposed eternal, or whether they exist by creation, which you admit. After this it is easy to conceive the manner of the generation of all things living, sensitive and vegetative, in a globe, whether it is re-peopled, or whether it has never been peopled before. Besides, whether these seeds have existed always, or have been created in time, each of these opinions is equally agreeable to my system. If I at first appeared to defend the former, it was only to convince you that it was not absolutely without a foundation.

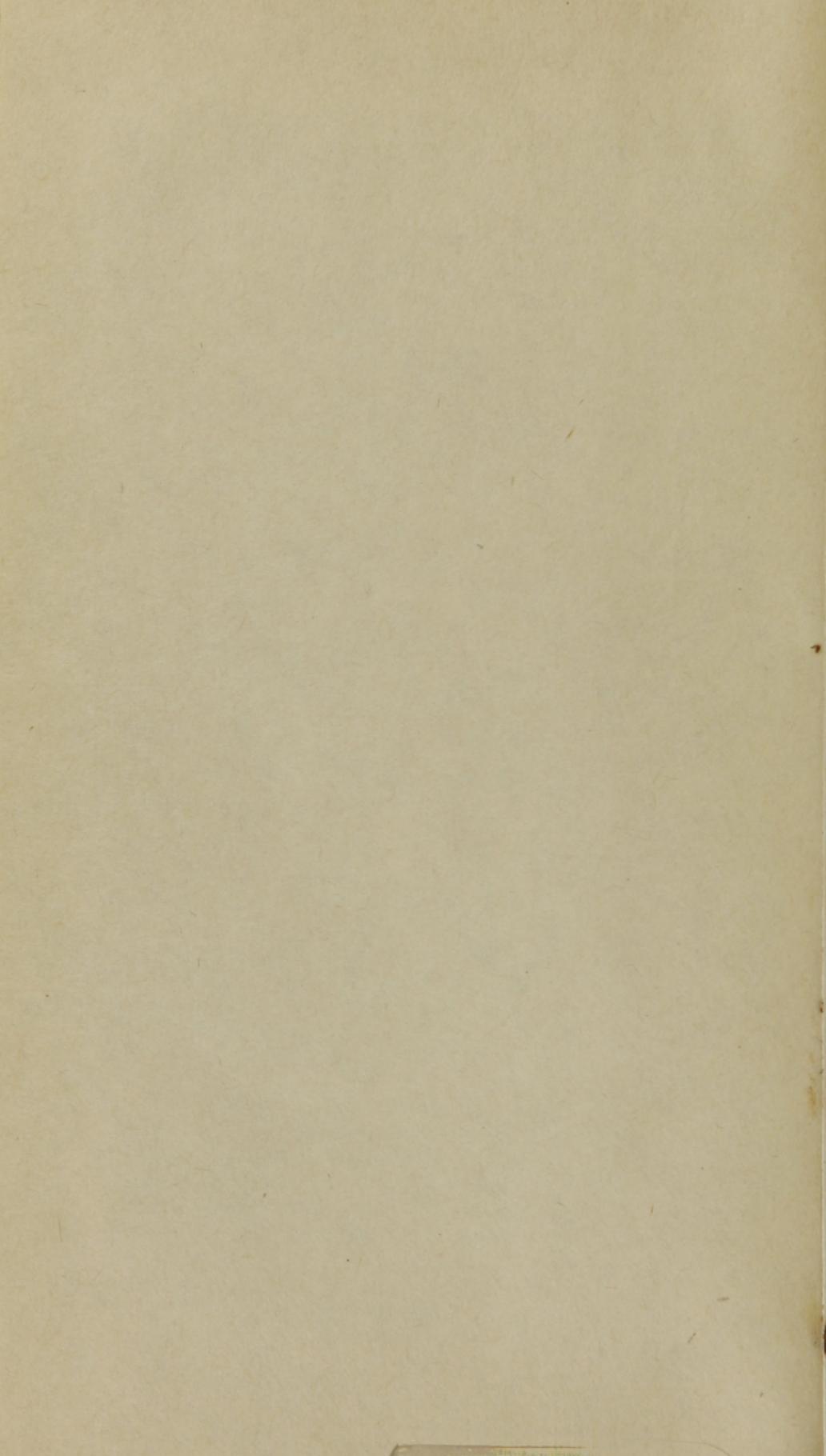
OBSERVE, Sir, that your sacred books exactly agrees with me, in regard to the formation of the globe, and all the animated beings it contains. They denote all the successive states, through which I have shewn that the earth has passed, before it arrived at that in which we see it. They grant, that the earth was originally no more than a rude mass covered with waters, on which the spirit of God moved; that these waters diminished by the separation made of them, and because a part of them was transported into other places; that by means of this separation, the earth at first appeared dry and parched, but was afterwards covered with grass; that after this it was stocked with animals; and that man was the last production of God, who had before made all the rest. Now this is precisely what I think, and what I have explained to you. The expression six days mentioned in your sacred books, for the perfection of all these works, is metaphorical, as you may easily imagine. It cannot so much as denote the time which the earth employs in turning six times round herself, in her annual course about the sun, since, according to these books, the sun was not made till the fourth day. The persons have a particular term to express the days in which God created the world according to the tradition of the ancient magi: But as they do not believe that these days have been consecutive, they have placed these six times in different months of the year, and even ascribed five days to each of them.

You may also conceive, continued TELLIAMED, that what is there said of the use of the sun, moon and stars, ought not to be taken literally. If the sun enlightens our globe, he also renders it warm and fruitful, neither does he refuse the same good offices to the other planets in his vortex. With respect to the moon, besides that she is not luminous of herself, and consequently cannot be called a luminary, if she gives some light to the earth in the absence of the sun, this only happens during the half of the year, and she herself receives the same office from the earth. The stars would have but a diminutive object, and be of little use, if they had been only formed to teach men the knowledge of the seasons. We perceive but the smallest part of them. What can be the end of those, which, on account of the weakness of our eyes, we cannot discover? Of

What use to our forefathers were those which have only lately appeared? What necessity was there, for their advantage, that others should disappear? Of what service could the fatalities of Jupiter be to them, or those of Saturn and his ring, the existence of which they were so long ignorant of? It is too much ignorance or presumption in men to persuade themselves, that the stars were only made for their use, when at the same time they are so useless to them. It would be still more absurd to believe, that they have been only made for their pleasure. What must we then think of this subject? That they were destined to elevate man to his creator, and to declare the glory and marvellous works of God? I readily grant it; but as they have this in common with all other creatures, it must necessarily be allowed, that like them, they must have been created for another end proper to themselves, and must consequently have another use.

It is but to form a mean judgment of this vast universe, only to ascribe an end to it so limited as that of the use of man.—The views of God are as extensive and as incomprehensible as himself. To fix a beginning to his works, or condemn them to annihilation, is to find a measure and an end to him who has none. He is that being who had no beginning, but gave it to all things, and to that infinity of globes with which we are surrounded. Man is in that which we inhabit, the least imperfect image of this eternal and infinite spirit. Other globes may contain others far more excellent. When these images are effaced in one, they appear in another, perhaps with more perfection.—If a sun is extinguished, it is supplied by a new one. If a globe like our's is set on fire, and all the living creatures in it destroyed, new generations will make up the loss in another.—The suns, the inhabited globes, and such as are ready to become so, will subsist for ever, even in the vicissitudes which seem to destroy them. This perpetuity of motion does not destroy either the creation, or the existence of a first cause. On the contrary, it supposes a God as its beginning and its origin. If I attempted to carry my ideas farther they would be lost, as the sight is in a cloud which it tries to pierce.

THE Indian philosopher here ended the philosophical discourses which he had promised me. I thanked him in the most obliging manner I could, for the fresh testimony he had given me of his friendship, and he made a grateful acknowledgment of all the services I had done him. We embraced each other tenderly, and the next day he set out on his journey.



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