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Sir Joseph Copley Bart.

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Imprimatur.

Jan. 3. 169^t.

John Hoskyns, V. P. R. S.

10/7/1926/collected

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An ESSAY toward a
Natural History
OF THE
EARTH:
AND
Terrestrial Bodies,
Especially
MINERALS:
As also of the
Sea, Rivers, *and* Springs.
With an Account of the
UNIVERSAL DELUGE:
And of the *Effects* that it had upon the
E A R T H.

By *John Woodward*, M. D. Professor of Physick in
Gresham-College, and Fellow of the *Royal Society*.

LONDON: Printed for *Ric. Wilkin* at the
Kings-Head in *St. Paul's Church-yard*, 1695.

AMNH
26-109793. Oct 18
CANCELLED

*The Right Hon^{ble} Charles Viscount Bruce of
Ampthill (Son & Heir Apparent of Thomas Earl
of Ailesbury) & Baron Bruce of Whorleton*

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To the Honourable

Sir Robert Southwell, Knight,

President of the *Royal Society*.

S I R,

THE Subject of these following Papers being *Philosophical*, and so not foreign to the Conversations you frequent, I could not direct them better than to the Person whom the *Royal Society* have so often made choice of to fill their Chair. For tho' your Business hath been much in the open World, yet am I well assured that Things of this Nature have always been your Recreation

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and

and Delight. The Truth is,
your Attention to hear me
discourse of my Travels under
Ground, and the Uses I pro-
posed of what there I found,
gave me no small Encourage-
ment to expose my Observati-
ons to the publick View: And 'tis
my Hope, that those Things
may find Pardon from others,
which have had Approbation
with you. I am very truly,

S I R,

Your most humble Servant,

J. WOODWARD.

P R E F A C E.

HAVING in the Essay it self given some Intimation both of the Design of it, and the Reasons which induced me to make it publick, I shall not here keep the Reader in suspense much longer than only while I acquaint him that, proposing to draw a considerable number of Materials into so narrow a Compass that they might all be contained in this small Volume, I was obliged to be very brief and concise. And therefore, as Pieces of Miniature, Sculpture, or other Workmanship in little, must be allowed a closer Inspection, so this Treatise will require some Care and Application in the Perusal.

Not but that I have endeavoured, as far as was practicable in so little room, so

Preface.

to dispose and order things, by interweaving with the *Assertions* some of the *Proofs* whereon they depend, and occasionally scattering several of the more important *Observations* throughout the *Work*, that it will be no very hard *Task* for any one to discover the main *Grounds* whereon all that I here advance is founded.

That this may be the more clearly apprehended, I shall beg leave to illustrate it by one or two *Instances*. It will perhaps at first sight seem very strange, and almost shock an ordinary *Reader* to find me asserting, as I do, that the whole *Terrestrial Globe* was taken all to pieces and dissolved at the *Deluge*, the *Particles* of *Stone*, *Marble*, and all other solid *Fossils* dissevered, taken up into the *Water*, and there sustained together with *Sea-shells* and other *Animal* and *Vegetable Bodies*: and that the present *Earth* consists, and was formed out of that promiscuous *Mass* of *Sand*, *Earth*, *Shells*, and the rest,
falling

Preface.

falling down again, and subsiding from the Water. But whoever shall duely attend to what I elsewhere lay down, viz. that there are vast Multitudes of Shells, and other Marine Bodies, found at this day incorporated with and lodged in all sorts of Stone, in Marble, in Chalk, and to be short, in all the other ordinary Matter of the Globe which is close and compact enough to preserve them: that these are found thus repositied amongst this Terrestrial Matter from near the Surface of the Earth downwards to the greatest Depth we ever dig or lay it open, and this in all Parts of it quite round the Globe: that the said terrestrial Matter is disposed into Strata or Layers, placed one upon another, in like manner as any earthy Sediment, settling down from a Fluid in great quantity, will naturally be: that these Marine Bodies are now found lodged in those Strata according to the Order of their Gravity, those which are heaviest lying deepest

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deepest in the Earth, and the lighter sorts (when there are any such in the same place) shallower or nearer to the Surface: and both those and these amongst terrestrial Matter which is of the same specifick Gravity that they are, the heavier Shells in Stone, the lighter in Chalk, and so of the rest; I say, whoever shall but rightly weigh all this, he'll have no need to go further for Proof that the Earth was actually so dissolved, and afterwards framed a-new, in such manner as I have set forth. And if to this he shall think fit to add the other Arguments of the same Thing which he will meet with in their Place, they also will I hope not fail of doing their Part in convincing him still more of the Truth and Certainty of this Matter.

The other Instance I make choice of shall be of the Universality of the Deluge, which is another Proposition that I insist upon. And for this, let but the Reader please to consider, what I deliver from authentick
Rela-

Preface.

*Relations, that the marine Bodies afore-
said are found in all Parts of the known
World, as well in Europe, Africa, and
America, as in Asia, and this even to
the very tops of the highest Mountains; and
then I think he cannot reasonably doubt of
the Proposition: but more especially if
hereunto he shall joyn what I offer concern-
ing the Great Abyſs, and thence learns that
there is at this day resident, in that huge
Conceptacle, Water enough to effect such a
Deluge, to drown the whole Globe, and lay
all, even the highest Mountains under Wa-
ter. But if he should be at a loss to know
how I got such Notice of that subterranean
Reservatory, as to enable me to make a
Computation of the Quantity of Water now
conceal'd therein, if he carefully peruse the
Propositions concerning Earthquakes, and
some others in the Third Part, he cannot
but discover at least some of the ways
whereby I got light thereinto: and at the
same time find why it is that I am so par-
ticular*

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particular in relating the Phænomena of Earthquakes, and dwell so long upon that Subject in this shorter Work.

These I intend for Example and Direction to the Reader how he may satisfy himself in any of the other Heads. 'Tis impossible for me to foresee the Difficulties and Hesitations of every one: they will be more or fewer, according to the Capacity of each Peruser, and as his Penetration and Insight into Nature is greater or less. They who have Attention enough to take in the intire Platform as here laid down: who see the Chain which runs through the whole: and can pick up and bear in mind the Observations and Proofs here and there as they lie, and then confer them with the Propositions, will discern (in great measure) how these Propositions flow from them: but they who cannot so easily do this must be intreated to have a little patience, untill the Thing be further unfolded, and more amply and plainly made out.

A few

Preface.

A few Advances there are in the following Papers, tending to assert the Superintendence and Agency of Providence in the Natural World: as also to evince the Fidelity and Exactness of the Mosaick Narrative of the Creation, and of the Deluge. Which 'tis not improbable but some may be apt to stumble at, and think strange that in a Physical Discourse as this is, I should intermeddle with Matters of that kind. But I may very safely say, that, as to the former, I have not entered farther into it than meerly I was lead by the necessity of my Subject: nor could I have done less than I have, without the most apparent Injury and Injustice to Truth. And for Moses, he having given an Account of some Things which I here treat of, I was bound to allow him the same Plea that I do other Writers, and to consider what he hath delivered. In order to this I set aside every thing that might byass my Mind, over-awe, or mislead me in the
Scrutiny,

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Scrutiny, and therefore have regard to him here only as an Historian. I freely bring what he hath related to the Test, comparing it with Things as now they stand: and finding his Account to be punctually true, I fairly declare what I find; wherein I do him but simply Right, and only the same that I would to a common Historian, to Berosus or Manetho, to Herodotus or Livy, on like occasion.

The

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E R R A T A.

PAge 19. Line 6. after *Buccina* add (,) p. 32. l. 3. for *Crustaneous* read *Crustaceous* p. 61. l. 23. after. *firm* add (,) p. 75. l. 14. after *precipitated* add (,) p. 94. l. 6. after *been* add *given*. p. 168. l. 25. f. *Alargatis* r. *Atargatis*. p. 173. l. 10. (in the Margin) f. *it* r. *the said Stone*. p. 184. l. 13. f. *Cochitæ* r. *Conchitæ*. p. 243. l. 21. f. *the* r. *that*. p. 270. l. 2. f. *frigitivæ* r. *fugitivæ*. p. 275. l. 12. (in the Margin) f. *the* r. *that*.

I

A N
ACCOUNT
OF THE
OBSERVATIONS

Upon which this

DISCOURSE

Is Founded.

FROM a long train of Experience, the World is at length convinc'd, that Observations are the only sure Grounds whereon to build a lasting and substantial Philosophy. All Parties are so far agreed upon this matter, that it seems to be now the common sense of Mankind.

For which reason, I shall in the Work before me, give my self up to

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be guided wholly by *Matter of Fact*; as intending to steer that course which is thus agreed of all hands to be the best and surest: and not to offer any thing but what hath due warrant from Observations; and those both carefully made, and faithfully related.

And that each Reader may the better inform himself, not only of what sort my present Observations are, but see in what manner also, and with what kind of Accuracy they were made, 'twill be convenient to give some light into that matter, and to begin with an Account of them; whereby he may be enabled to judge how far they may be relyed upon, and what measure of Assent the Propositions which I draw from them may claim.

But before I go any farther, I ought to put in a Caution, that an ample and prolix Relation either of the Observations themselves, or of the Deductions from them, is not to be expected here. I design *this* but for a Sample of what I hope, in good time, more fully to discuss and make out: proposing no more in this Treatise, than only, in a few plain words, to deliver my Sentiments on certain Heads of Natural History,

History, with some of the Reasons and Grounds of them, in order to give somewhat of present Satisfaction to the Curiosity and Demands of some of my Friends.

The Observations I speak of were all made in *England*; the far greatest part whereof I travelled over on purpose to make them: professedly searching all places as I pass'd along, and taking a careful and exact view of *Things* on all hands as they presented, in order to inform my self of the present condition of the Earth, and all Bodies contained in it, as far as either Grotto's, or other Natural Caverns, or Mines, Quarries, Colepits, and the like, let me into it, and displayed to sight the interiour Parts of it; not neglecting, in the mean time, the exterior or surface, and such Productions of it as any where occurred, Plants, Insects, Sea, River, and Land Shells; and, in a word, whatever either the Vegetable or Animal World afforded.

Nor did I confine these Observations to Land, or the Terrestrial Parts of the Globe only, but extended them to the Fluids of it likewise, as well those within it, the Water of Mines, of

Grotto's, and other such like Recesses, as those upon the surface of it, the Sea, Rivers, and Springs.

My principal Intention indeed was to get as compleat and satisfactory information of the whole Mineral Kingdom as I could possibly obtain. To which end, I made strict enquiry wherever I came, and laid out for intelligence of all Places where the Entrails of the Earth were laid open, either by Nature (if I may so say) or by Art, and humane Industry. And wheresoever I had notice of any considerable natural Spelunca or Grotto; any digging for Wells of Water, or for Earths, Clays, Marle, Sand, Gravel, Chalk, Cole, Stone, Marble, Ores of Metals, or the like; I forthwith had recourse thereunto: and taking a just account of every observable Circumstance of the Earth, Stone, Metal, or other Matter, from the Surface quite down to the bottom of the Pit, I entered it carefully into a Journal, which I carry'd along with me for that purpose. And so passing on from Place to Place, I *noted* whatever I found memorable in each particular Pit, Quarry, or Mine: and 'tis out of these *Notes* that

that my Observations are compiled.

After I had finish'd these Observations, and was returned back to this City, such were the Commotions which had then so unhappily invaded *Europe*, that I saw I must necessarily desist here, and sit down (for the present at least) with what I had already done; having little prospect of an opportunity of carrying on these Observations any farther, or of going beyond Seas, to consider the state of the Earth, and of all sorts of Fossils, in more distant Countries.

But to supply, as far as possible, that Defect, I made Application to Persons who had already travelled, and I knew were of such *Integrity*, that they would not impose uncertain or false Relations upon me: as also of so much *Curiosity* as to be likely to give me some tolerable insight into the condition of *these things* in Foreign Regions. I likewise drew up a *List* of *Queries* upon this Subject; which I dispatch'd into all parts of the World, far and near, wherever either I myself, or any of my Acquaintance, had any Friend resident to transmit those *Queries* unto.

The Result of this was, that in time I was abundantly assured, that the Circumstances of *these Things* in remoter Countries were much the same with those of ours *here*: that the Stone, and other terrestrial Matter, in *France, Flanders, Holland, Spain, Italy, Germany, Denmark, Norway, and Sweden*, was distinguished into *Strata*, or Layers, as it is in *England*: that those *Strata* were divided by parallel Fissures: that there were enclosed in the Stone, and all the other denser kinds of terrestrial Matter, great numbers of Shells, and other Productions of the Sea, in the same manner as in that of this Island. To be short, by the same means I got sufficient intelligence that *these Things* were found in like manner in *Barbary, in Egypt, in Guiney, and other parts of Africa; in Arabia, Syria, Persia, Malabar, China, and other Asiatick Provinces; in Jamaica, Barbadoes, Virginia, New-England, Brasil, Peru, and other Parts of America*. But I reserve the more particular Relation hereof to its proper place.

So that though my own Observations were confined to *England*, yet by this means I was made acquainted with
the

the state of *these Bodies* in other Countries ; even in almost all parts of the World wherewith the *English* maintain any Commerce or Correspondence: and learn'd from all hands, that the state of them *there* was conformable to that of ours *here*, in the main, and as far as I shall lay any stress upon it in my Conclusions ; which indeed are not built upon any Niceties, or solitary and uncommon Appearances, but on the most simple and obvious Circumstances of these terrestrial Bodies.

As to the Certainty and Accuracy of my Observations, thus much may modestly and very truly be said, that I do not offer any one before I had first thoroughly and clearly informed my self in all material Circumstances of it, and had opportunity of observing it in more places than one, that I might be satisfied there was nothing casual or contingent in any of those Circumstances. This will not be thought an over-great exactness, or any thing more than was needful, by *those* who have noted how much Philosophy hath suffered by the neglect and oversight of some Naturalists in

this respect. A transient and perfunctory Examination of things, frequently leads Men into considerable Mistakes, which a more correct and rigorous Scrutiny would have detected and avoided. The truth is, I have been the more scrupulous and wary in regard the Inferences drawn from these Observations are of some importance: 'twas but necessary that the Foundation should be firm, when a Superstructure of Bulk and Weight was to be raised upon it. And therefore I advance nothing from any Observation that was not made with this Caution, and that any Man may not, as well as my self, without any great pains, inform himself of the truth of: And as long as the next Cole-pit, or Mine, the next Quarry, or Chalk-pit, will give abundant Attestation to what I write, *these* are so ready and obvious in almost all places, that I need not be any where far to seek for a Compurgator; and to these I may very safely appeal.

Concerning the Observations themselves therefore, there cannot well arise any doubt but what may be easily satisfied: And what I propose in this Essay being founded upon these Observations,

ons, every Reader will be judge of the truth and probability of it, and whether that which I do so propose naturally follows from them or not.

I shall distribute *them* into two general Classes or Sections, whereof the *former* will comprehend my Observations upon all the Terrestrial Matter that is naturally *disposed into Layers*, or *Strata*; such as our common Sandstone, Marble, Cole, Chalk, all sorts of Earth, Marle, Clay, Sand, Gravel, with some others.

Of this various Matter, thus formed into *Strata*, the far greatest part of the Terrestrial Globe consists, from its Surface downwards to the greatest depth we ever dig or mine. And it is upon my Observations on *this* that I have grounded all my general Conclusions concerning the Earth; all that relate to its Form; all that relate to the *Universal* and *other* Deluges; in a word, all that relate to the several Vicissitudes and Alterations that it hath yet undergone. Nay, upon the same Observations I have also founded several Conclusions touching Metalls, Spar, and other Minerals, which are found lodged either in these *Strata*, amongst
the

the Sand, Chalk, Earth, and the rest ; or in the perpendicular Intervals of the *Strata* of Stone, Marble, or other solid Matter.

For upon the *particular* Observations on the said Metallick and Mineral Bodies, (which are the Subjects of the *second* Section,) I have not founded any thing but what purely and immediately concerns the Natural History of those Bodies.

To proceed therefore to the Account of my Observations upon Sand-stone. And in *these*, though I do not neglect to note the several Kinds or Varieties of it : Free-stone, Ragg-stone, Limestone, and the rest : the different Hardness, or Solidity, of each : as also its Colour, Texture, and the peculiar matter which constitutes it : yet I confine my self more strictly to consider the manner how 'tis disposed in the Earth : the *Strata*, into which, by

¶ I call those Fissures, which distinguish the Stone into *Strata*, Horizontal ones ; and those which intersect these Perpendicular : not so much with respect to the present site of the *Strata*, which (as I shall shew) is altered in many places, as to its original situation ; concerning which, see Part 2. Consect. 5.

means of horizontal || and parallel Fissures, it is divided : the Order and Number of these *Strata* : their situation in respect of the Horizon : the Thick-

Thickness, Depth, and other Circumstances of each: the Interruptions of the *Strata*, I mean the *perpendicular* || Fissures, which intersect the horizontal ones: the different Capacity or Largeness of these perpendicular Intervals: their Distances from each other: and the Spar, and other Mineral and Metallick Matter, usually contained in them.

But, because I saw that Deductions of considerable import and consequence might be drawn from them, I have with great Care and Intention observed the Condition of such heterogeneous Bodies, which I found immersed and included in the mass of this Sandstone; particularly the Shells of Oysters, Muscles, Scallopes, Cockles, Periwinkles, and very many other marine Productions. I have, I say, very diligently noted all Circumstances of these Shells: the vast Numbers of them; the several kinds that are thus lodged in the substance of the Stone: the Order and Manner of their position in it: the several Depths at which they are found: the Matter which they contain in them, and wherewith their Cavities are usually filled.

These

The Natural History

These Observations about Stone are succeeded by others, of like nature, concerning Marble, Cole, and Chalk : their Fissures : the Situation of their *Strata* : the Shells, and other heterogeneous Bodies lodged therein.

In the next place, those which concern Marle, Clay, the several kinds of Earth, Sand, Gravel, and some other Fossils : the Shells and other like Bodies, lodged in their *Strata* : the Position of those *Strata* : their Order ; their Distinctions from each other, by the difference of the Matter of each, and by its different Consistence and Colour ; the *Strata* of these laxer kinds of Matter being not ordinarily divided from each other by interposition of horizontal Fissures ; as those of Stone, and such other solid Matter, constantly are.

And lastly, those which relate to the upper or outmost *Stratum* of all : I mean that blackish Layer of Earth or Mould which is called by some *Garden-Earth*, by others *Under-turf Earth*, wherewith the Terrestrial Globe is almost every where invested, unless it be disturbed, or flung off by rains, digging, plowing, or some other external force ;

force; infomuch, that whatsoever lies deeper, or underneath, whether Stone, Marble, Chalk, Gravel, or whatever else, this *Stratum* is still expanded at top of all; serving, as it were, for a common Integument to the rest: and being (as shall be shewn in due place) the Seminary or Promptuary that furnisheth forth Matter for the formation and increment of Animal and Vegetable Bodies; and into which all of them successively are again finally returned.

The Observations being thus dispatch'd, my next step should have been to have propos'd the Deductions from them; to have determin'd how these Sea-shells were brought to Land, and how they became interr'd in the bowels of the Earth, in the manner described in those Observations. But before I could proceed any farther towards *that*, I found my self necessarily obliged to take off a difficulty not long since started by some learned Men, who suspect that these Shells are not real; that they were never bred at Sea; but are all of Terrestrial Original, being meer Stones, though they bear a resemblance of Shells, and formed, in the places where they are now found,

found, by a kind of Lusus of Nature, in imitation of Shells.

How nearly I am concerned to remove this Obstacle, before I pass on any farther to the prosecution of my Design, any one may presently see. For to go about to enquire at what time, and by what means these Shells were conveyed out of the Sea to dry Land, when a Doubt hath been moved whether they are Shells or not, or ever belonged to the Sea, without first clearing this Matter, and putting it quite out of doubt; would be senseless and absurd. In order therefore unto this, I premise

A Differ-

A Dissertation concerning Shells and other marine Bodies, found at Land; Proving that they were originally generated and formed at Sea: that they are the real spoils of once living Animals: and not Stones, or natural Fossils, as some late Learned Men have thought.

I Shall be the more brief and sparing in my Extract of this Dissertation, in regard that coming on thus in order before the other Parts of this Work, it will it self, of course, see the Light somewhat sooner than they, any of them will. For which reason, I shall at present only say thus much of it in general; that *therein* I first fairly lay before the Reader the Arguments that have been urged by these Gentlemen to perswade us that these Bodies are mere Mineral Substances; and having detected the insufficiency of them, by evincing from the most plain and simple Reason, how far they are from being conclusive, and how much they
fall

fall short of proving what they are alledged for; I then proceed to lay down my own, and offer those Reasons which have induced me to believe that these are the very *Exuvia* of Animals, and all owing to the Sea.

I would not be thought to insinuate that the Opinion of these Gentlemen carries no shew of Truth, nor umbrage of Reason of its side. 'Tis not to be supposed, that Persons of their Learning and Abilities would ever have espoused it, were it not in some measure plausible: and had not at least a fair appearance of probability. The very finding these Bodies included in Stone, and lodged in the Earth together with Minerals, was alone enough to move a Suspicion that *these* were Minerals too: the finding them even to the very bottom of Quarries and Mines: in the most retired and inward *Parts* of the most firm and solid Rocks: in the deepest bowels of the Earth, as well as upon the surface of it: upon the tops of even the highest Hills and Mountains, as well as in the Valleys and Plains: and this not in this or that Province only, not only in one or two Fields, but almost everywhere:

where: in all Countries and Quarters of the Globe, wherever there is any digging for Marble, for Stone, for Chalk, or any other Terrestrial Matter that is so compact as to fence off external Injuries, and shield them from Decay and Rottenness. *This*, together with their “being lodged in company” of the Belemnites, Selenites, Mar-
 “chafits, Flints, and other like Bo-
 “dies, which were incontestibly na-
 “tural Fossils, and, as *they* supposed,
 “in the place of their formation,” was enough to stagger a Spectator, and make him ready to entertain a belief that *these* were so too. ’Tis a *Phænomenon* so surprizing and extraordinary, that ’tis not strange that a Man should scarcely credit his very Senses in the case: that he should more readily incline to believe that they were Minerals, as the Belemnites, and the others recited, are: or indeed almost any thing else rather than Sea-shells; especially in such Multitudes, and in places so unlikely: so deep in the Earth, and far from the Sea, as these are commonly found.

Nor was this, as indeed they tell us, the only difficulty these worthy
 C Persons

1.

2.

Persons had to surmount; “ They
 “ found, together with these, certain
 “ Bodies that bore the shape and resem-
 “ blance of Cockles, Muscles, and other
 “ Shells, which yet were *not really such*;
 “ but consisted intirely, some of them,
 “ of Sand-stone: others of Flint, and
 “ others of Spar: or some other kind
 “ of Mineral Matter. ”

3. Nay, they met with some, “ That
 “ were in all appearance Shells: that
 “ were of the same bigness, figure, and
 “ texture, with the common Echini,
 “ Scallops, and Perewinkles; but had
 “ notwithstanding Flint, Native-Vi-
 “ triol, Spar, Iron-Ore, or other Me-
 “ tallick or Mineral Matter, either ad-
 “ hering firmly in lumps to the out-
 “ sides of them, or insinuated into their
 “ substance, into their pores, and in-
 “ ner parts, so as to disguise them very
 “ much, and give them a face and mien
 “ extremely unlike to that of those
 “ Shells which are at this day found at
 “ Sea. ”

4. They observed also, that “ amongst
 “ the Shells, that were fair, unaltered,
 “ and free from such Mineral Insinua-
 “ tions, there were some which could
 “ not be match'd by any species of
 “ Shell-

“ Shell-fish now found upon the Sea-shores.

And that on the contrary, “ there were several Shells found commonly upon the said Shores, such as the larger Shells of the *Buccina* of the *Conchæ Veneris* ; of Crabs, Lobsters, and others, both of the Cruftaceous and Testaceous kind, which yet we never met with at Land, or in our Quarries. ”

Nay there were some other Difficulties which they have urged, and which (though they be of lesser weight) shall all of them be recounted and considered more particularly in the Dissertation it self.

Upon the whole therefore 'tis very plain, that these Authōrs did not espouse *this* Opinion without some grounds: without some countenance of probability: and that they have charged the *opposite* with a large crowd of Difficulties. Yea, so far are they from being destitute of an handsome Apology, that they very well deserve the Thanks of the world for what they have done. For although they have not succeeded in their Attempts about the Origin of these Bodies, yet they

have made Discoveries in other respects concerning *them*, and in *other parts* of Nature likewise, of that moment and consequence, as to have thereby laid a great and lasting Obligation upon the intelligent and discerning part of Mankind.

I. But that they have failed notwithstanding in this Enterprize, 'tis, I think, not over difficult to prove. And *this* is the Subject of the present Discourse. Wherein I hope clearly to

† Part 4.
Consect. 2.

make out, that the Sea gave Birth to these Bodies: that *they* are so far from being formed in the Earth, or in the places where they are now found, that I shall evince, † that even the Belemnites, Selenites, Marchasits, Flints, and other natural Minerals, which are lodged in the Earth, together with these Shells, were not formed *there*, but had Being before ever they came thither: and were fully formed and finished before they were reposed in that manner.

2. That the above-mentioned Bodies which consist of Stone, of Spar, Flint, and the like, and yet carry a resemblance of Cockles, Muscles, and other Shells, were originally formed in the Cavities

Cavities of Shells of those kinds which they so resemble ; these Shells having served as Matrices or *Moulds* to them ;
the Sand, Sparry and Flinty Matter being then soft, or in a state of solution, and so, susceptible of any form, when it was thus introduced into these shelly-Moulds : and that it consolidated, or became hard afterwards *.

* Concerning these Conchitæ, Cochlitæ, &c. see Part 4. Conf. 2. and Part 5. Conf. 5.

That for the Metallick and Mineral Matter which sometimes adheres to the Surfaces of these Shells, or is intruded into their Pores, and lodged in the Interstices of their Fibres, 'tis all manifestly *adventitious* † ; the mineral Particles being plainly to be distinguished from the testaceous ones, or the texture and substance of the Shell, by good Glasses, if not by the naked Eye. That though the thing had been so that this Accretion had not been thus discernible, and consequently the Alteration of these Shells could not have been accounted for, so that we had been perfectly in the dark as to the Origin of the Bodies thus altered, and that nothing at all could have been determined concerning *them* ; yet this would not have been any the least Impediment or objection against that which

3.
† Part 4. Conf. 2.

I insist upon; there being so very few of these in comparison of those which have undergone no such Alteration. There being, I say, besides *these*, such vast multitudes of Shells contained in Stone, &c. which are intire, fair, and absolutely free from any such mineral Contagion: which are to be match'd by others at this day found upon our Shores, and which do not differ in any respect from them: being of the same size that those are of, and the same shape precisely: of the same substance and texture; as consisting of the same peculiar Matter, and this constituted and disposed in the same manner, as is that of their respective fellow-kinds at Sea: the tendency of the Fibres and *Striæ* the same: the composition of the *Lamellæ*, constituted by these Fibres, alike in both: the same *Vestigia* of Tendons (by means whereof the Animal is fastned and joyned to the Shell) in each: the same *Papillæ*: the same *Sutures*, and every thing else, whether within or without the Shell, in its Cavity or upon its Convexity, in the Substance, or upon the Surface of it. Besides; these Fossil Shells are attended with the ordinary Accidents of the

the *marine ones*, *ex. gr.* they sometimes grow to one another, the lesser Shells being fix'd to the larger : they have *Balani*, *Tubuli vermiculares*, Pearls, Coral, and the like, *still* actually growing upon them. And which is very considerable, they are most exactly of the same specifick Gravity with their fellow-kinds now upon the shores. Nay farther, they answer all Chymical tryals in like manner as the Sea-shells do: their parts when dissolved have the same appearance to view, the same smell and taste : they have the same *vires* and effects in Medicine, when inwardly administrated to Animal Bodies: *Aqua fortis*, Oyl of Vitriol, and other like *Menstrua*, have the very same effects upon both. In one word, so exactly conformable to the marine ones are these Shells, Teeth, and Bones, which are digged up out of the Earth, that though several Hundreds of them, which I now keep by me, have been nicely and critically examined by very many Learned Men, who are skill'd in all parts of Natural History, and who have been particularly curious in, and conversant with, Shells, and other marine Productions, yet never any

Man of them went away dissatisfied, or doubting whether these are really the very *Exuvia* of Sea-fishes or not. Nay, which is much more to my purpose, some of the most eminent of those very Gentlemen who formerly were doubtful in this Matter, and rather inclinable to believe that these were natural Minerals, and who had *wrote* in defence of that Opinion, do notwithstanding upon strict and repeated Inspection of these Bodies in my Collection, and upon farther Enquiry, and procuration of *plain* and *unalter'd* Shells from several parts of this Island, fully assent to me herein, and are now convinced that these are the spoils and remains of Sea-Animals. And, being thus satisfied, such is the Ingenuity of these worthy Persons, and so great their Affection to Truth, when, where, and by whomsoever manifested, that they have personally requested me to publish my Thoughts in order to the fuller clearing of this matter. But to proceed.

That although I can *pair*, with Sea-Shells, several of these Fossil ones that these Gentlemen have pronounc'd altogether unlike any thing that the Salt-Water

Water produceth ; yet 'tis indeed very true, that there are found some Shells at Land, in Stone, and in Chalk, which cannot probably be match'd by any species of Shells now appearing upon our Shores. But notwithstanding this, I cannot but affirm that *these*, even the most strange and enormous of them, have all the essential Notes and Characters of Sea-Shells, and shew as near a relation to some now extant upon the Shores, as the different Species of *those* themselves do to one another : that they are of the very same specifick Gravity with those to which they are so generically allied : and of the same Texture and Constitution of parts ; the substance of *these* being as plainly testaceous, as that of *those* is ; insomuch that any Man that compares them, can no more doubt of the reality of the *one* than of the *other* ; whence it must needs follow, that there were such Shell-fish *once in being* ; which is enough for my purpose ; I being no ways concerned to make out that there are of the same kinds *still* actually *living* in the Ocean. Though if I *was*, 'twould be no very hard task ; it being evident from the Relations of Dyvers, and
Fishers

Fishers for Pearls, that there are many kinds of Shell-fish which lye perpetually concealed in the *Deep*, skreen'd from our Eyes by that vast world of Water, and which have their continual abode at the bottom of the Ocean, without ever approaching near the Shores, it being as unnatural for *these* to desert this their native station, as 'tis for those that are the inhabitants of the Shores, to quit theirs, and retire into the deep: that for this reason *these* are called by Naturalists *ὑπερὸ θύρας*, and *Pelagie*, as the others, that reside nearer to the Shores, are by them called *Littorales*. Now the Shells which we find exposed upon our Shores, are only those which are cast up and stranded by tides and by storms; and consequently are all of them *Exuvie* of those kinds that live near the Shores, and not of those that inhabit the *Main*, or the deeper and remoter parts of the Ocean; it being certain from the Relations also of Dyvers, that the Tides and Storms, even the most tempestuous and turbulent, affect only the superficial parts of the Ocean, the Shallows, and Shores, but never reach the greater Depths, or disturb the bottom
of

of the *Main*: *these* are as quiet, and free from Commotion in the midst of storms, as in the greatest calm; so that the Shell-fish, which are resident in these places, live and dye there, and are *never* dislodged or removed by storms, nor cast upon the Shores, which the *Littorales* usually are. When therefore I shall have proved more at large, that those which we find at Land, that are not matchable with any upon our Shores, are many of them of those very kinds which the forecited Relations particularly assure us are found no where but in the deeper parts of the Sea: and that as well those which we can match, as those we cannot, are all Remains of the universal Deluge, when the Water of the Ocean, being boisterously turned out upon the Earth, bore along with it, Fishes of all sorts, Shells, and the like moveable Bodies, which it left behind at its return back again to its Chancel, it will not, I presume, be thought strange, that amongst the rest, it left some of the *Pelagia*, or those kinds of Shells which naturally have their abode at main-sea, and which therefore are now never flung up upon the Shores:
and

and it may very reasonably be concluded, that all these *strange* Shells, which we cannot so match, are of these *Pelagiae* : that the several kinds of them are at this day living in the huge bosom of the Ocean : and that there is not any one intire species of Shell-fish, formerly in being, now perish'd and lost.

5. That it is also very true that there are some Shells, such as those of the larger *Buccina*, and *Conchæ Veneris*, of Lobsters, Crabs, and others of the crustaceous kind, that are very rarely found at Land ; so *rarely*, that some of these Gentlemen have asserted that they are *never* found ; but *that* I shall shew to be a mistake, all the Shells in their whole List having been found in the Earth in one place or other. But that these are very *seldom* found any where, I most readily grant ; and this is so far from being an Argument against what I am going to advance, that 'tis as full and substantial a Proof of the truth of it as I could possibly wish. For the Shells in this List are all lighter than Stone, Marble, and the other ordinary Terrestrial Matter. Now both these and all other sorts of
Shells

Shells that are *so light*, occur very seldom at Land, or in the Earth, in comparison of the Shells of Cockles, Perewinkles, and the rest which are more ponderous, so as to equal the Stone, and the other Terrestrial Matter in Gravity. The Reason of which will be very plain, when I shall have shewn * that at the time of the Deluge * *Vid. Part 2. Conf. 2.* (when these Shells were brought out upon the Earth, and reposed therein in the manner we now find them) Stone, and all other solid Minerals, lost their solidity: and that the sever'd Particles thereof, together with those of the Earth, Chalk, and the rest, as also Shells, and all other Animal and Vegetable Bodies, were taken up into, and sustained in, the Water: that at length all these subsided † again promiscuously, and without any other order than that of the different specific Gravity of the several Bodies in this confused Mass, those which had the greatest degree of Gravity sinking down first, and so settling lowest; then those Bodies which had a lesser degree of Gravity fell next, and settled so as to make a *Stratum* upon the former; and so on, in their several turns, to the

the lightest of all, which subsiding last, settled at the Surface, and covered all the rest: that this very various Miscellany of Bodies being determined to subsidence in this Order meerly by their different specifick Gravities, all those which had the same degree of Gravity subsided at the same time, fell into, and composed, the same *Stratum*; so that those Shells, and other Bodies, that were of the same specifick Gravity with Sand, sunk down together with it, and so became inclosed in the *Strata* of Stone, which that Sand formed or constituted: those which were lighter, and of but the same specifick Gravity with Chalk (in such places of the Mass where any Chalk was) fell to the bottom at the same time that the Chalky Particles did, and so were entombed in the *Strata* of Chalk; and in like manner all the rest: that accordingly we now find in the Sand-stone of all Countries (the specifick Gravity of the several sorts whereof is very little different, being generally to water as $2\frac{1}{2}$ or $2\frac{2}{5}$ to 1) only those *Concha*, *Pectines*, *Cochleæ*, and other Shells that are nearly of the same Gravity, (*viz.* $2\frac{1}{3}$ or $2\frac{5}{7}$ to 1) but these are ordinarily found

found enclosed in it in prodigious numbers ; whereas of Oyfter-shells, (which are in Gravity but as about $2\frac{1}{3}$ to 1) of *Echini* (which are but as 2 or $2\frac{1}{8}$ to 1) or the other lighter kinds of Shells, scarce one ever appears therein ; but, on the contrary, in Chalk (which is lighter than Stone, being but as about $2\frac{1}{10}$ to 1) there are only found *Echini*, and the other lighter sorts of Shells ; it being extreamly unusual to meet with so much as one single Shell of any of all the heavier kinds amongst Chalk ; but for the said *Echini*, and other the lighter sorts of Shells, they are very numerous and frequent, in all the Chalk-pits of *Kent*, *Surrey*, *Essex*, *Hartfordshire*, *Barkshire*, *Oxfordshire*, and all others that I have search'd ; being found indifferently in the beds of Chalk from the top quite down to the bottom of the Pit ; I having my self commonly observed them to the very bottom of all, in Pits that were an hundred foot deep, and in Wells much deeper. To conclude, those Shells, and other Bodies, that were still lighter than *these*, and consequently lighter than Stone, Chalk, and the other common Matter of the Earth, such as
the

the Shells of Lobsters (which are but as $1 \frac{1}{3}$ to 1) of Crabs, ($1 \frac{1}{4}$ to 1) and the rest of the Crustaneous kind: the Teeth and Bones of the cartilaginous and squammose Fishes, and many other Bodies, would subside last of all, and so, falling above the rest, be lodged near, if not upon the Surface; where being continually exposed to Weather, and other Injuries, they must in tract of time needs decay and rot, and at last quite vanish and disappear; and 'tis not to me any great wonder, that at this distance of four thousand years, we find so very few of them remaining. So that I think I may now safely appeal to any ingenuous and impartial Looker on, whether this, *That we find all those kinds of Shells (now extant upon our Shores) which have nearly the same Gravity with Stone, and the other ordinary Matter of our Earth, that is so tight and compact as to preserve them, enclosed in great plenty therein, and only those, the rest which are lighter being so very rarely found,* can reasonably be supposed to have happened by meer chance, with this Constancy and Certainty, and that in so many and distant Places: as also; whether *this* be any
Objection

Objection against my Hypothesis ; or rather be not the strongest necessary Confirmation of it that could well be expected, or even desired.

To this Dissertation I shall subjoin an Appendix, which will consist of several Sections, touching the Bodies called *Unicornu Fossile*, *Lapis Judaicus*, *Entrochus*, *Asteria*, or the Star-stone-Columns : with some farther Reflections upon the *Bufonites*, *Glossopetra*, and *Cornu Ammonis* : proving that these, and several more, which have been (for many Ages) reputed Gemms, and meer Stones, are really nothing else but the Teeth, Bones, and other parts of Sea-Animals, and (as the rest were) left behind by the Universal Deluge.

PART I.

An Examination of the Opinions of former Writers on this Subject. The Means whereby they thought these Marine Bodies brought out upon the Earth. Of certain Changes of Sea and Land, and other Alterations in the Terraqueous Globe, which they suppose to have happened.

THIS so considerable a point being thus gained: the Legitimacy or Reality of these Marine Bodies vindicated and asserted: and my Way so far effectually cleared by the foregoing Dissertation; I now re-assume my original Design, and pass on to enquire by what means they were hurried out of the Ocean, the place of their native Abode, to dry Land, and
even

even to Countries very remote from any Seas.

And this is a Question of great Antiquity ; and which hath, for many Ages, given no small Fatigue to Learned Men. Nor hath the *present* been less inquisitive into this Affair than the *former* Ages were. We have seen several hands employed herein ; and many of them very excellent ones too. The great number of the Undertakers : the Worth of some of them : and their Zeal to bring the Matter to a Decision, are sure Arguments of the Dignity and Importance of it : and that it is not hitherto decided, is as certain a proof of its difficulty.

Some were of Opinion, that these Shells were fetch'd from Sea, by the ancient Inhabitants of those Countries where they are now found ; who, after they had used the included Fishes for Food, flinging forth the Shells, many of them became petrified, as they speak ; being thereby preserved down to our times, and are the same which we at this day find in our Fields and Quarries.

Others rather thought that they were only Reliques of some former

great Inundations of the Sea ; which, furiously rushing forth, and overflowing the adjacent Territories, bore these Bodies out upon the Earth along with it : but returning at length more leisurely and calmly back again, it left them all behind.

Many were of Opinion, that the Sea frequently flitted and changed its place : that several parts of the Globe which are now dry Land, and habitable, lay heretofore at the bottom of the Sea, and were covered by it: that particularly the very Countries, which present us with these *Spoils* of it, were anciently in its possession; being then an Habitation of Sharks and other Fishes : of Oysters, Cockles, and the like ; but the Sea, in tract of time, retreating thence, and betaking it self into new Quarters: gaining as much ground on the opposite Coasts, as it lost upon those, left these Shells there as Marks of its ancient bounds and seat.

Amongst the rest there were indeed some who believed these to be Remains of the General Deluge, and so many Monuments of that calamitous and fatal Irruption. These last assuredly were

were in the right ; but the far greater part of them rather asserted than proved this : rather deliver'd it as their Opinion, than offered any rational Arguments to induce others to the same Belief : And for the rest, who did offer any, so unhappy were they in the Choice, and unsuccessful in the Management of them, by reason of the shortness of their Observations, and their not having duely informed themselves of the state of these Things, that none of the other Partizans appeared with less Applause : none less strenuously maintained their ground, than these did.

The Truth is, as Matters were ordered amongst them, no Man could receive much Light or Satisfaction from what was advanced by any of them. They little more than clashed with one another : each could demolish the others. Work with ease enough, but not a Man of them tolerably defend his own ; which was sure never to outstand the first Assault that was made. Yea upon so equal Terms did they all stand, that no one could well lay claim to a larger share of Truth for his side : no one had a fairer pre-

tence of *right*, than the rest; and it being impossible to imagine that all could be in the right; some Learned Men began to suspect that none of them were so.

These thereupon laid out on all hands for some new Expedient to solve and put an end to the perplexity; and 'twas this last Effort that brought forth the Opinion, that these Bodies are not what they seem to be; that they are no Shells, but meer Sportings of active Nature in this subterraneous Kingdom; and only Semblances or Imitations of Shells; they imagining that this shortned the Difficulty, because it spared them the trouble of accounting for their Conveyance from Sea; which was what had so severely exercised all the former; though in reality, this only heightened and enhanced it, and render'd it still more intricate; as will appear more at large when I shall have published the preliminary Dissertation, whereof I have already given some Account above. And this was the most received and prevalent Opinion when I first brought my Collection of these Things up to *London*.

There

There have been, besides these recited, some other Conjectures proposed about the removal of these Bodies to Land : which I choose, rather than trouble the Reader with a detail of them here, to deferr to their proper place, that I may proceed directly onwards in my Design. Now the more effectually to smooth my way, and that this very great diversity of Opinions may not be any longer an Amusement to the World, 'twill be very convenient that I look into the Reasons and Pretensions of each, and shew upon what ground 'tis that I embrace that of the Deluge, and set aside all the rest.

Why I adhere to them who suppose these Marine Productions brought out by the Universal Deluge, will be best learn'd from the succeeding part of this Essay, which is wholly dedicated to that purpose: and whereunto I shall prefix, An Historical Account of the Labours of *Fab. Columna*, *Nic. Steno*, *P. Boccone*, *Jac. Grandius*, *Mr. John Ray*, and other Learned Men, on this Subject: shewing what they have already done in it, wherein they failed, and what remains still to be done.

Why I reject all the other Conjectures, falls under our present Consideration; and to make as short of the Matter as possible, 'tis because they will none of them abide the Test: because they have not due warrant from Observation, but are clearly repugnant thereunto: in a word, because the present Circumstances of these Marine Bodies do not square with those Opinions, but exhibit *Phænomena* that thwart them, and that give plain Indications that they could never have been put into the Condition we now find them by any such short and partial Agents as those they propose.

Now in regard that the said Circumstances are impartially related in my Observations, we need only have recourse to them to put an end to this Business. For, as Mathematicians say of a streight Line, that 'tis as well an Index of its own Rectitude, as of the Obliquity of a crooked one; so *these* may serve indifferently to detect the erroneous ways, and to point forth the *true*; and it is from these Observations: from the Number, Order, Variety, Situation, Depth, Distance from
the

Part I. *of the Earth.*

41

the Sea, and other Accidents of these Bodies, that I shall shew

1. That *they* were not brought from Sea to the Parts where they are now found, by Men, the ancient Inhabitants of those Parts, as some Authors have been of Opinion; they presuming that these Shells were at first only flung out upon the Surface of the Earth; and that those which we now find buried in it, were, in tract of time, covered, either by that Terrestrial Matter which falls down along with rain, or by the Earth which is wash'd from off the Hills by Land floods.

2. That *they* were not carry'd together with the Water, which some suppose to pass continually from the bottom of the Sea, to the Heads of Springs and Rivers, through certain subterranean Conduits or Channells, untill they were by some Glut, Stop, or other means arrested in their Passage, and so detain'd in the Bowels of the Earth; as others have rather inclined to believe.

3. That *they* were not born forth of the Sea, and laid upon the Land by particular Inundations; such as were the *Ogygean*, the *Deucalionian*, and others of fresher date: such as are those

those which usually attend Earthquakes: or those which are sometimes occasioned by very high Tides, by impetuous Winds, and the like; as other Writers have thought.

4. That *they* were not left behind at the *beginning* of the World, when the Sea overspread the whole Globe, till its Retreat into its assigned Chanel, and that *the Waters* were *gathered together unto one place*, the third day from the Commencement of the Creation; which others believed.
5. That *they* were not left by the Seas being constrained to withdraw from off certain tracts of Land, which lay till then at the bottom of it, but being raised to an higher pitch, so as to surmount the Level of the Seas surface, they, by that means, became Islands and habitable: the said tracts being thus elevated by Earthquakes, or the like subterraneous Explosions; in such manner as *Rhodes, Thera, Therasia*, and many other Islands were supposed to have been raised; which is the Conjecture of others.
6. That *they* were not left by the Seas changing its place, receding from the Parts it anciently possessed, and betaking
it

it self to new Quarters : *this change* being occasion'd by some accidental Emotion or Transposition of the common Center of Gravity in the Terraqueous Globe ; and thereupon the Fluids of it, the Sea, and the rest, immediately shifting likewise, as being the more easily moveable parts of the Mass, and coming to another *Æquilibrium* ; that they might thereby the better accommodate themselves to their new Center. As others.

That *they* were not left upon the Seas being protruded forwards, and constrained to fall off from certain Coasts, which it formerly possessed, by the Mud or Earth which is discharged into it by Rivers ; the said Mud being reposed along the Shores near the *Ostia* of those Rivers, and by that means making continual Additions to the Land, thereby excluding the Sea, daily invading and gaining upon it, and preserving these Shells as Trophies and Signs of its new Acquests and Encroachments ; which *others* have imagined : they concluding that the Islands *Echinades*, the Lower *Egypt*, *Thessaly*, and many other Countries, were thus raised out of the Mud brought down
by

7.

by *Achelous*, the *Nile*, *Peneus*, and other Rivers.

8. Lastly. That *they* were not left by the Seas continual flitting and shifting its Chanel: this Progression being occasioned by the Seas wearing and gaining upon one Shore, and flinging up Mud, and, together with it, these Shells, upon the other, or opposite Coasts, thereby making perpetual Additions unto them; which is the Opinion of other Authors.

These Propositions (which are no other than so many Confectaries drawn from the Observations) are, we see, all *Negative*; as being directed against the Mistakes of some who have formerly engaged in this research. The ways they have taken to account for the Conveyance of these Marine Bodies to Land, are very many, as well as different from each other. For so eager and solicitous hath the inquisitive and better part of Mankind been to bring this Matter to a fair issue and determination, that no Stone hath been left unturned, no way, whereby these things could ever possibly have been brought forth of the Sea, but one or other of them hath pitch'd upon

on it. So that by this Refutation of all these, I might prove my own (which is the only one remaining) by Induction; but this kind of proof is not needful, where more cogent and *positive* Arguments are not wanting.

And thus much of this Part I get over by the sole guidance of my Senses. A View of the present state of these Bodies alone convinced me sufficiently that the means, proposed by these Authors, were not the true ones: that they were both levelled wide, and fell all short of the Mark. Now though this was enough for my present purpose; and when I had evinced that, although such Alterations, as those which these Gentlemen suppose: Transitions, and Migrations of the Center of Gravity: Elevations of new Islands: whole Countries gained from the Sea: and other like Changes had *actually* happened, yet these Shells could never possibly have been reposed thereby in the manner we now find them: I say, when I had proved this, I was not immediately concerned to enquire whether such Alterations had really ever happened or not; yet partly for a fuller and more effectual Disproof of the recited

cited Opinions: and partly because I am more especially obliged by my *general* design to look into all Pretences of Changes in the Globe we inhabit, and I saw very well, that scarce any, of all these alledged, had the least countenance either from the present face of the Earth, or any credible and authentick Records of the ancient state of it, I resolved to pursue this Matter somewhat farther, and to shew that, although there do indeed happen some Alterations in the Globe, yet they are very slight and almost imperceptible,

* *Part 5.*
* *Cons. I. &c.*

* and such as tend rather to the benefit and conservation of the Earth and its Productions, than to the disorder and destruction both of the one and the other, as all these supposititious ones most manifestly would do, were there really any such; but from clear and incontestible Monuments of Antiquity: from History and Geography: and from attentive Consideration of the present state of those Countries where these Changes were supposed to have been wrought, I prove that they are imaginary and groundless, and that such in earnest never happened; but that the bounds of Sea and
Land

Land have been more fix'd and permanent: and in short, that the terraqueous Globe is to this day nearly in the same condition that the Universal Deluge left it: being also like to continue so till the time of its final ruin and dissolution, preserved to the same end for which 'twas first formed, and by the same Power which hath secured it hitherto. But, with respect to my present Design, I more particularly make out,

That although Rain-water be indeed (as these Writers suppose) very plentifully saturated with terrestrial Matter, and (as I shall make appear) that peculiar Matter out of which the Bodies of Vegetables, and consequently of Animals, are formed, nourished, and augmented, Water being the common Vehicle and Distributer of it to the Parts of those Bodies, and all Water (especially that of Rain) being, more or less, stored with this, it being light in comparison of the common Mineral earthy Matter, and therefore easily assumed into Water, and moved along with it; yet that this Matter being all originally derived from the surface of the Earth, either by the Va-
pour

† *Part* 3.
Sect. 1.
Cons. 8.

pour that continually issues out, and ascends from all parts of it, † or wash'd off by Land-floods, and conveyed into Rivers and the Sea, and thence elevated up, together with the Vapour, which, as the former, constitutes the Rain that falls: I say, it being thus originally all rais'd from the Earth, when restored back again thereunto, 'tis but where it was before, and does not enlarge the Dimensions of the Globe, or augment the surface of the Earth, and only lye idly and unserviceably there, but part of it is introduced into the Plants which grow thereon, for their Nutrition and Increment, and the rest, which is superfluous, either remounts again, with the ascending Vapour, as before, or is wash'd down into Rivers, and transmitted into the Sea, and does not make any sensible Addition to the Earth, as some have believed.

That the terrestrial Matter, which is thus carried by Rivers down into the Sea, is sustained therein, partly by the greater Crassitude and Gravity of the Sea-water, and partly by its constant Agitation, occasioned by the Tides, and by its other Motions, and
 is

is not permitted to sink to the bottom ; or, if any of it do, 'tis raised up again by the next Storm, and being supported in the Mass of Water, together with the rest, 'tis by degrees exhaled, mounted up with the Rain that rises thence, and returned back again to the Earth in fruitful Showers. That by this perpetual Circulation a vast many things in the System of Nature are transacted : and two main Intentions of Providence constantly promoted ; the *one* a Dispensation of Water promiscuously and indifferently to all parts of the Earth ; this being the immediate Agent that both bears the constituent Matter to all formed Bodies ; and, when brought to them, insinuates it in, and distributes it unto the several parts of those Bodies, for their Preservation and Growth : *the other*, the keeping a just *Æquilibrium* (if I may so say) betwixt the Sea and Land ; the Water, that was raised out of the Sea, for a Vehicle to this Matter, being by this means refunded back again into it : and the Matter it self restored to its original Fund and Promptuary, the Earth ; whereby each is restrained, and kept to due Bounds ; so that the Sea may

E not

not encroach upon the Earth, nor the Earth gain ground of the Sea. That there never were any Islands, or other considerable parcels of Land, amassed or heap'd up : nor any enlargement, or addition of Earth made to the Continent, by the Mud that is carried down into the Sea by Rivers. That although the Ancients were almost unanimously of Opinion that those Parts, where *Egypt* now is, were formerly Sea : and that a very considerable portion of that Country was *recent*, and formed out of the Mud discharged into the neighbouring Sea by the *Nile* ; that yet this tract of Land had no such *Rise*, but is as old, and of as long a standing, as *any* upon all the whole Continent of *Africa* : and hath been in much the same Natural Condition, that it is at this day, ever since the time of the Deluge ; its Shores being neither advanced one jot further into the Sea for this three or four thousand Years, nor its Surface raised by additional Mud deposited upon it by the yearly Inundations of the *Nile*. That neither the *Palus Maotis*, nor the *Euxine*, nor any other Seas, fill up, or by degrees grow shallower. That *Salmydessus*, *Themiscyra*,

Scyra, *Sidene*, and the adjacent Countries, upon the Coasts of the *Euxine* Sea, were not formed out of the Mud brought down by the *Ister*, *Thermodon*, *Iris*, and the other Rivers which discharge themselves into that Sea. That *Theffaly* was not raised out of the Mud born down by the River *Peneus*: the Islands *Echinades*; or *Curzolari*, out of that brought by the River *Achelous*: *Cilicia*, by the River *Pyramus*: *Mysia*, *Lydia*, *Ionian*, and other Countries of *Anatolia*, by the *Caicus*, *Hermus*, *Cayster*, and the other Rivers which pass through them. To be short, That no Island or Country in the whole World was ever raised by this means, notwithstanding that very many Authors, and some of considerable note, have believed that all the abovementioned Countries were so raised; nay, to so strange a height of Extravagance do some, otherwise Learned and Curious, Persons run, when they indulge Fancy too far, and rely wholly upon Probabilities and Conjectures, there is hardly any one single Island or Country all round the Globe, that one Writer or other hath not thought to have been formed after this manner, or

at least, some very large part of it.

That there is no authentick Instance of any considerable tract of Land that was thrown up from the bottom of the Sea, by an Earthquake, or other subterranean Explosion, so as to become an Island, and be render'd habitable. That *Rhodus*, *Thera*, *Therassia*, and several other Islands, which were supposed by the Ancients, and, upon their Authority, by later Authors, to have been thus raised, had really no such Original, but have stood out above Water as long as the rest of their Fellow Islands, and stand now just as the Universal Deluge left them.

That as to that affection of Bodies which is called their *Gravity*, it clearly surpasses all the Powers of meer Nature, and all the Mechanism of Matter. That as any one Body, or part of Matter, cannot be the Cause of its own Gravity: so no more can it ever possibly be the Cause of the Gravity of another Body, or part of Matter. That neither the Earth's diurnal Revolution upon its Axis: nor any magnetick Effluvia of the Earth: nor the Air, or Atmosphere which environs the Earth: nor the *Æther*, or *Materia subtilis* of the

the *Cartesians*, in what manner soever moved or agitated: (all which have been proposed by several Learned Men as the Causes of Gravity) nor any other Fluid or Matter whatever, can of it self produce such an Effect as is that of the Gravity of Bodies. That it does not proceed from the Efficiency of any such contingent and unstable Agents, but stands on a Basis more firm and stedfast, being intirely owing to the direct Concourse of the Power of the Author of Nature, immediately in his hand, and the main Engine whereby this stupendous Fabrick of the Universe is managed and supported: the prime Hinge whereon the whole frame of Nature moves: and is principally concerned, if not the sole Efficient in the most remarkable *Phænomena* of the Natural World; which, should Gravity once cease, or be withdrawn, would instantly shiver into Millions of Atoms, and relapse into its primitive Confusion. That the common Center of Gravity in the terraqueous Globe is steady, immovable, and not liable to any accidental Transposition, nor hath it ever shifted or changed its Station. And that there is no declina-

tion of Latitude: nor variation of the Elevation of the Pole; notwithstanding what some Learned Men have asserted.

What concerns the raising of new Mountains: Deterrations, or the Devolution of Earth down upon the Valleys, from the Hills and higher Grounds: and Islands torn off from the main Continent by Earthquakes, or by the furious and impetuous insults of the Sea; these, I say, will fall more properly under our Consideration on another Occasion *. And for the Mutations of lesser moment, which some have fancied to have happened within this Interval, I mean, for the last four thousand Years since the Deluge, I chuse rather to pass them over at present, than to crowd and encumber this short Tract with the account of them.

* Part 2.
and
Part 5.

I must needs freely own, that when I first directed my Thoughts this way, 'twas matter of real Admiration to me, to find that a Belief of so many, and such great Alterations in the Earth, had gained so large footing, and made good its ground so many Ages, in the World; there being not the least signs nor footsteps of any such thing upon
the

the face of the whole Earth : no tolerable Foundation for such a Belief either in Nature or History. But I soon saw very well, that the Moderns generally entertained it meerly upon the Credit and Tradition of the Ancients, and *that* without due Examination, or Enquiry into the Truth and Probability of it ; and 'twas not long e're I discovered what it was that so generally misled the Ancients into these Mistakes. But of that more by and by.

Those ancient Pagan Writers were indeed very much excusable as to this matter. Philosophy was then again in its Infancy : there remaining but few marks of the old *Tradition*, and those much obliterated and defaced by Time ; so that *they* had only dark and faint Idea's, narrow and scanty Conceptions, of Providence : and were ignorant of its Intentions, and of the *methods* of its Conduct in the Government and Preservation of the Natural World. They wanted a longer Experience of *these things* : a larger stock of Observations, and Records of the state of the Earth before their times ; having, as things then stood, nothing to assist them in their Enquiries besides their

* *Part 2.*

own Gueſſes and Fancy. For their Progenitors, and thoſe who had lived in the earlier Ages, were almoſt entirely taken up with Buſineſs of another kind. That fatal Calamity, the Deluge, had wrought ſuch a Change, * that *they* beheld every where a new face of things : and the Earth did not *then* teem forth its Encreaſe, as *formerly*, of its own accord, but required Culture, and the Aſſiſtance of their Hands, much more than before it did. The proviſion of Bread for Food : Clothing to ward off the Injury and Inclemency of the Air : and other like Employſ for the Comfort and Support of Life, being of indiſpenſible neceſſity, were to be firſt look'd after ; and theſe Employſ, being then for the moſt part *new* to them, and ſuch as they were unſkill'd in, were alone enough to take up the greateſt part of their time. The methods they uſed of Agriculture, and other Arts of like importance, were ſo aukward and tedious, as to afford them little leiſure for *Works of the Brain*, for Hiſtory, or Contemplations of that nature. And till better Experience had led their Poſterity to the Improvements of Arts :
till

till the Plow, and other useful Instruments, were found out: and they had learn'd more compendious and expeditious ways of dispatching those Affairs, whereby they shortned their Labours, and so gained time, there was no *shew* of *Learning*, or Matters of Speculation among them; and we hear little or nothing of *Writing*, nay 'twas a very considerable time before *Letters* themselves were found out. I know very well, there are some who talk of Letters before the Deluge; but that is a matter of meer Conjecture, and I think nothing can be peremptorily determined either the one way or the other; though I shall shew, that 'tis highly probable they had none. Be *that* how it will, I shall plainly make out, that the Ages which next succeeded the Deluge *had none*; so far from it, that they knew nothing at all of them; and the first Writing they used was only the simple Pictures, and Gravings of the things they would represent, Beasts, Birds, and the like; which way of Expression was afterwards called Hieroglyphick. But *this* fell into disuse, when Letters were afterwards discovered; they being, in all respects, a
far

far more excellent and noble Invention. We see therefore that there were several Reasons why those early Ages could not transmit Accounts of the state of the Earth and of these Marine Bodies, in their times, down to the succeeding Generations. So that *these* having little more to trust to than their own Imagination, and no surer a Guide in their Reasonings about *these things* than bare Conjecture, 'twas no wonder that they fell into gross and palpable Mistakes concerning them.

Nor much more wonder is it that an *Epicurus* : one who could ever espouse a Notion so enormously absurd and senseless, as that the World was framed by Chance : that this vast, regular, and most stupendous Pile was owing to no higher a Principle than a fortuitous Congress of Atoms : and that either there was no God at all, or, which is much the same thing, that he was an impotent and lazy Being, and wholly without concern for the Affairs of this lower World : I say, 'tis in no wise strange that such a one should believe, as he did, that things were blindly shuffled and hurled about in the World : that the Elements were
at

at constant Strife and War with each other : that in some places, the Sea invaded the Land : in others, the Land got ground of the Sea : that all Nature was in an Hurry and Tumult : and that as the World was first made, so should it be again dissolved and destroyed, by Chance : that it had already made large Advances that way, being infirm and worn with Age, shattered and crazy, and would in time dwindle and fall back again into its original Chaos.

Did Gravity, the Inclination of Bodies towards the same common Center, to which Inclination they owe their respective order, and site in regard of each other, very many of their Motions and Actions, and in a great measure, their present Constitution : did this, I say, happen from so contingent, precarious, and inconstant Causes as many have believed : or did it stand upon so ticklish and tottering a Foundation as some Mens fancy hath placed it, 'twould be no wonder should it frequently vary : its Center swerve and shift, upon every turn : and that there should ensue thereupon, not only such Motions and Alterations of the
Bounds

Bounds of the Sea as they imagine ; but likewise many other, and not less pernicious, Perturbations of the course of *even universal* Nature.

Or was the Universe left to its *own* Conduct and Management : the whole Mass of created Matter to its *proper* Disposition and Tendency : were there no restraint of Bounds to the Earth, nor Curb to the fury of the Ocean : was there not *One* who had *set bars and doors to it, and said hitherto shalt thou come, but no farther, and here shall thy proud Waves be staid* ; then indeed might we well expect such Vicissitudes and Confusions of things : such Justlings and Clashings in Nature : such Depredations, and Changes of Sea and Land.

But if the same mighty Power, which in the beginning produced this vast System of Bodies out of Nothing, and disposed and ranged them into the most excellent and beautiful order we now behold : which at first framed an Earth of a Constitution suitable to the innocent state of its primitive Inhabitants : and afterwards when Man had degenerated, and quitted that Innocence, altered that Constitution of the
Earth,

Earth, by means of the Deluge*, and reduced it to the Condition 'tis now in, thereby adapting it more nearly to the present Exigencies of things, to the laps'd and frail state of humane Nature: If that same Power be yet at the Helm: if it preside in the Government of the Natural World: and hath still the same peculiar Care of Mankind, and, for their sake, of the Earth, as heretofore, (all which shall be evidently made out:) then may we very reasonably conclude 'twill also continue to preserve this Earth, to be a convenient Habitation for the future Races of Mankind, and to furnish forth all things necessary for their use, Animals, Vegetables, and Minerals, as long as Mankind it self shall endure; that is, till the Design and Reason of its Preservation shall cease; and till then, so steady are the Purposes of Almighty Wisdom, so firm establish'd, and constant the Laws, whereby it supports and rules the Universe; the Earth, Sea, and all natural things will continue in the state wherein they now are, without the least Senescence or Decay, without jarring, disorder, or invasion of one another, without in-
version

* Part 2.
Conf. 2. &c.

version or variation of the ordinary Periods, Revolutions, and Successions of things: and we have the highest security imaginable, that *While the Earth remaineth, Seed-time and Harvest, and Cold and Heat, and Summer and Winter, and Day and Night shall not cease.*

And whatever may be urged in behalf of the *Ancients*, I cannot well see, I confess, what can be said for the *later Authors*, who have embrac'd the same Tenets, more than that these Learned Men took up those Tenets *on trust*, their over-great deference to the Dictates of Antiquity betraying them into a persuasion of such Changes in the Earth. I have given my Reasons above why I cannot think the Ancients competent Judges in this Case. We have, at this time of day, better and more certain means of Information than *they* had; and therefore it were to have been wish'd, that these Gentlemen had not thus obsequiously followed *them*, but gone another way to work. It would certainly have been much better, had they taken the pains to have look'd a little into *Matter of Fact*: had they consulted History and Geography, in order duely to acquaint
them^s

themselves with the *past* and *present* state of the terraqueous Globe; and not to have pass'd Sentence till they had first compared the most ancient Descriptions of Countries with the Countries themselves as *now* they stand. Nay, had they but read and attended to the Accounts which the very Authors, from whom they borrow these Opinions, have left us, they might have discovered, even from them, the Errors and Oversights of their Authors: and have learn'd, that the Face of Sea and Land is the very same at this day that it was when those Accounts were compiled: and that the Globe hath not sustained any considerable Alterations, either in the *whole*, or any of its *Parts*, in all this time.

Those who can content themselves with a Superficial View of Things: who are satisfied with contemplating them in gross: and can acquiesce in a general, and less nice Examination of them: whose Thoughts are narrow and bounded: and their Prospects of Nature scanty, and by piecemeal, must needs make very short and defective Judgments, and, oftentimes very erroneous, and wide of truth. Some
fanciful

fanciful Men have expected nothing but Confusion and Ruin from those very means whereby both *that* and *this* is most effectually prevented and avoided. One imagines that the terrestrial Matter, which is showered down along with Rain, enlarges the Bulk of the Earth, and that it will in time bury, and lay all things under ground. Another, on the contrary, fancies that the Earth will ere long all be wash'd away by Rains, and borne down into the Sea by Rivers; and, its Chanel being thereby quite filled up, the Waters of the Ocean turned forth to overwhelm the dry Land. Whereas by this Distribution of Matter, continual Provision is every where made for the supply of Bodies: the just state of Sea and Land preserved, and the Bounds of each secured; quite contrary to the preposterous Reasonings of those Men, who expected so different a Result of these things. And should this Circulation (from which they dreaded those dismal Consequences) once cease, the Formation of Bodies would be immediately at an end: and Nature at a perfect stand. But I am aware that I transgress: and that this is a Prolixity
not

not allowable in a Treatise of this nature ; wherefore I shall conclude, after I have performed my Promise of discovering what it was which led the ancient Historians, Geographers, and others, so generally into a belief of these frequent Changes betwixt Sea and Land ; and 'twas this.

They observed, almost wherever they cast their eyes, vast multitudes of Sea-shells, at Land, in their Fields, and even at very great distance from any Sea. This, *Erataſthenes*, *Herodotus*, *Xanthus Lydus*, *Strabo*, *Pausanias*, *Pomponius Mela*, *Theophrastus*, *Strato* the Philoſopher, *Plutarch*, and others of them aſſure us. They found them upon the Hills, as well as in the Valleys and Plains: they obſerved that they were immerſed in the Maſs of the Stone of their Rocks, Quarries, and Mines, in the ſame manner as they are at this day found in all known Parts of the World.

Nay in those Elder Times, and which were so much nearer to the Deluge than ours are, they found these Marine Bodies more frequently, and in much greater plenty than we now do; and most, if not all of them, fresh, entire,

entire, and firm. The whole crustaceous kind, and the lighter ones of the testaceous, which together would be a vast number, subsiding last, fell upon the Surface of the Earth; * whilst the heavier, which settled down before, were entombed in the bowels of it. *Those* therefore must then lye everywhere strewed upon the ground; whereas now very few, if any, of them appear; † the Shells which we find at present upon the face of the Earth being principally of the heavier sorts, which were at first lodged within it, and since disclosed and turned out, by what means we shall see hereafter ||. And indeed, 'tis not conceivable how the generality of them could endure so many Hundreds of Years as have since past: how they could lye so long exposed to the Air, Weather, and other Injuries, without vast numbers of them, and especially the finer and tenderer Species, being, long e're this, perish'd and rotten, some of them quite dissolved and vanish'd, and the rest so damaged, many of them, and altered by time, as not to appear the things they then were, and so create a doubt amongst some of *us* whether they are really Shells or not. This

* *Pag.* 29,
&c. *supra*,
and *Part* 2.
Cons. 3.

Cons. *pag.*
2. and
Part 2.
Cons. 3.

|| *Part* 5.
Cons. 4.

This was a Scruple that never entered into *their* Heads. The Shells, being then fair, sound, and free from decay, were so exactly like those they saw lying upon their Shores, that they never made any question but that they were the *Exuvie* of Shell-fish, and that they once belonged all to the Sea. But the Difficulty was how they came thither, and by what means they could ever arrive to places oftentimes so remote from the Ocean.

The Ages that went before knew well enough how these Marine Bodies were brought thither. But such were the Anxieties and Distresses of the then again infant World: so incessant their Occupations about Provision for Food, Rayment, and the like, that (even after Letters were discovered) there was little leisure to commit any thing to Writing; and, for want *thereof*, the memory of this extraordinary Accident was in great measure worn out and lost. 'Tis true there was a general and loud Rumour amongst them of a mighty Deluge of Water that had drowned all Mankind except only a very few Persons. But there had also happened very terrible Inundations of later date,

and which were nearer to the Times when these Authors lived. Such was that which overflowed *Attica* in the days of *Ogyges*: and that which drowned *Thessaly* in *Deucalion's* time. These made cruel Havock and Devastation amongst them: their own native Country, *Greece*, was the Theatre whereon these Tragedies were acted: and their Progenitors had seen and felt their Fury. And these happening nearer home, and their Effects being fresh, and in all Mens mouths, they made so sensible and lasting Impressions upon their Minds, that the old great Deluge was eclipsed by that means, its Tradition mightily obscured, and the Circumstances of it so interwoven and confounded with those of these later Deluges, that 'twas e'en dwindled into nothing, and almost buried in the Relations of those Inundations.

In their Enquiries therefore into this Matter, scarcely a Man of them thought, or so much as dream'd, of the Universal Deluge. They concluded indeed unanimously, that the Sea had been there, wherever they met with any of these Shells, and that it had left them

them behind. And so far they were in the right: this was an Inference rational and natural enough. But when they began to reason about the means how the Sea got thither, and a way back again, there they were perfectly in the dark; and, both Tradition and Philosophy failing them, they had recourse to Shifts, and to the best Conjectures they could think of; concluding that it was either forced forth, as in particular Inundations, such as those lately mentioned: or that those *Parts*, where they found the Shells, had been formerly in the Possession of the Sea, and the place of its natural Residence, which it had since quitted and deserted.

Upon this they began to seek out by what means, most probably, the Sea might have been dispossessed of those Parts, and constrained to move into other Quarters. And if 'twas an Island where they found the Shells, they straitways concluded that the whole Island lay originally at the bottom of the Sea: and that 'twas either hoisted up by some Vapour from beneath: or that the Water of the Sea, which formerly cover'd it, was in time exhaled,

and dried up by the Sun, the Land thereby laid bare, and these Shells brought to light. But if 'twas in any part of the Continent where they found the Shells, they concluded that the Sea had been extruded and driven off by the Mud that was continually brought down by the Rivers of those parts.

That I may not be over-tedious here, I will only add, that I shall clearly shew, from plain Passages of their own Writings yet extant, that 'twas meerly the finding these Sea-shells at Land that occasioned this Stir, and raised all this Dust amongst the Ancients; and upon which principally they grounded their Belief of the Vicissitudes and Changes of Sea and Land, wherewith their Writings are so filled. But how little reason they had for it: and how far those have been over-seen who have followed them herein, hath been intimated already, and will appear farther from the following part of this Essay, to the Account of which I now hasten.

PART II.

*Concerning the Universal Deluge.
That these Marine Bodies were
then left at Land. The Effects
it had upon the Earth.*

THE Confectaries of the former part of this Discourse are all negative; *that* being only introductory, and serving but to clear the way to this second part: to free the Enquiry from the Perplexities that some Undertakers have encumber'd it withall: and to set aside the false Lights they used in quest of the Agent which transposed these Sea-shells to Land.

Having therefore discharged my hands of that Task, and, from Observation of the present state of the Earth, and of the site and condition of the Marine Bodies which are lodged within and upon it, shewn that they could

not possibly be reposed in that manner by particular Inundations : by the Seas receding and shifting from place to place : nor by any of the other means there proposed : I pass next on to search out the true means : and to discover the Agent that did actually bring them forth, and disposed them into the Method and Order wherein we now find them. To which purpose I have recourse again to the Observations ; for by their Assistance this Matter may be rightly and fully adjusted. So that I shall only proceed, as hitherto, to make Inferences from them ; which Inferences, in this Part are all *affirmative*. Of these, the first is,

I.

* Confer.

Part 3.

Sect. 2.

Conf. 2, 3.

That these Marine Bodies were born forth * of the Sea by the Universal Deluge : and that, upon the return of the Water back again from off the Earth, they were left behind at Land.

This is a Proposition of some weight and consequence ; upon which Account I shall be somewhat prolix and particular in the Establishment of it : careful and exact in conferring every Circumstance of these Marine Bodies, to see how they square with it : and shall not dismiss it till I have evinced
that

that those which I prest, in the precedent Part, as Objections against the several ways there propounded, all fall in here, and are the clearest and most convincing Arguments of the truth hereof: that this, and this alone, does naturally and easily account for all those Circumstances: and fairly takes off all Difficulties. Which Difficulties I propose at large, and particularly those which have of late been urged, by some Learned Men, as proofs that these Bodies were not left behind by the Deluge; shewing of how little Validity they are.

Which being dispatch'd, I return back to my Observations; and proceed upon them to represent the *Effects* that the Deluge had upon the Earth, and the *Alterations* that it wrought in the Globe; some whereof were indeed very extraordinary. *These* I distribute into two Classes; the *first* of which will contain *those* that are *only* probable, and of which we have some reasonable Intimations, but not an absolute and demonstrative Certainty, the Proofs whereon they depend being more remote. And these I shall wholly wave at present, and not crowd
this

this shorter Treatise with the Relation of them, reserving that room for *those* of the *second* Class, which are those whereof we have a plain and undeniable Certainty: those which flow directly and immediately from the Observations: and which are so evident, that 'tis impossible these Marine Bodies could have been any ways lodged in such manner, and to so great depths, in the Beds of Stone, Marble, Chalk, and the rest, had not these Alterations all happened. Namely,

2.

That during the time of the Deluge, whilst the Water was out upon, and covered the Terrestrial Globe, All the Stone and Marble of the Antediluvian Earth: all the Metalls of it: all Mineral Concretions: and, in a word, all Fossils whatever that had before obtained any Solidity, were totally dissolved, and their constituent Corpuscles all disjoyned, their Cohæsion perfectly ceasing. That the said Corpuscles of these solid Fossils, together with the Corpuscles of those which were not before solid, such as Sand, Earth, and the like: as also all Animal Bodies, and parts of Animals, Bones, Teeth, Shells: Vegetables, and parts

parts of Vegetables, Trees, Shrubs, Herbs: and, to be short, all Bodies whatsoever that were either upon the Earth, or that constituted the Mass of it, if not quite down to the Abyfs*, * *Vid.* yet at least to the greatest depth we *Part 3.* ever dig: I say all these were assumed *Sect. 1.* up promiscuously into the Water, and *Consect. 1.* sustained in it, in such manner that the Water, and Bodies in it, together made up one common confused Mass.

That at length all the Mass that was thus borne up in the Water, was again precipitated and subsided towards the bottom. That this Subsidence happened generally, and as near as possibly could be expected in so great a Confusion, according to the Laws of Gravity †: *that* Matter, Body, or Bodies, which had the greatest quantity or degree of Gravity, subsiding first in order, and falling lowest: *that* which had the next, or a still lesser degree of Gravity, subsiding next after, and settling upon the precedent: and so on in their several Courses; *that* which had the least Gravity sinking not down till last of all, settling at the Surface of the Sediment, and covering all the rest. That the Matter,

3.

† *Confer.*
p. 29. &c.

Matter, subsiding thus, formed the *Strata* of Stone, of Marble, of Cole, of Earth, and the rest; of which *Strata*, lying one upon another, the Terrestrial Globe, or at least as much of it as is ever displayed to view, doth mainly consist. That the *Strata* being arranged in this order meerly by the disparity of the Matter, of which each consisted, as to Gravity, that Matter which was heaviest descending first, and all that had the same degree of Gravity subsiding at the same time: and there being Bodies of quite different Kinds, Natures, and Constitutions, that are nearly of the same specific Gravity, it thence happened that Bodies of quite different kinds subsided at the same instant, fell together into, and composed the same *Stratum*. That for this reason the Shells of those Cockles, Escalops, Perewinkles, and the rest, which have a greater degree of Gravity, were enclosed and lodged in the *Strata* of Stone, Marble, and the heavier kinds of Terrestrial Matter: the lighter Shells not sinking down till afterwards, and so falling amongst the lighter Matter, such as Chalk, and the like, in all such parts
of

of the Mass where there happened to be any considerable quantity of Chalk, or other Matter lighter than Stone; but where there was *none*, the said Shells fell upon, or near unto, the Surface: and that accordingly we now find the lighter kinds of Shells, such as those of the *Echini*, and the like, very plentifully in Chalk, but of the heavier kinds scarcely one ever appears; these subsiding sooner, and so settling deeper, and beneath the *Strata* of Chalk. That Humane Bodies, the Bodies of Quadrupeds, and other Land-Animals, of Birds, of Fishes, both of the Cartilaginous, Squamose, and Crustaceous kinds; the Bones, Teeth, Horns, and other parts of Beasts, and of Fishes: the Shells of Land-Snails: and the Shells of those River and Sea Shell-Fish that were lighter than Chalk &c. Trees, Shrubs, and all other Vegetables, and the Seeds of them: and that peculiar Terrestrial Matter whereof these consist, and out of which they are all formed: I say all these (except some Mineral or Metallick Matter happened to have been affix'd to any of them*, whilst they were sustained together in the Water, so as to augment

* *Part 4.*
Consect. 2.

ment the weight of them) being, bulk for bulk, lighter than Sand, Marl, Chalk, or the other ordinary Matter of the Globe, were not precipitated till the last, and so lay above all the former, constituting the supreme or outmost *Stratum* of the Globe. That *these* being thus lodged upon the rest, and consequently more nearly exposed to the Air, Weather, and other Injuries; the Bodies of the Animals would suddenly corrupt and rot: the Bones, Teeth, and Shells, would likewise all rot in time, except those which were secured by the extraordinary Strength and Firmness of their Parts, or which happened to be lodged in such places where there was great plenty of bituminous or other like Matter to preserve, and, as it were, embalm them: that the Trees would in time also decay and rot, unless such as chanced to be reposed in, and secured by the same kind of Matter: that the other more tender Vegetables, Shrubs, and Herbs, would rot likewise and decay: But the Seeds of all kinds of Vegetables, being by this means reposed, and, as it were, planted near the Surface of the Earth, in a convenient and natural Soil,

Soil, amongst Matter proper for the Formation of Vegetables, would germinate, grow up, and replenish the face of the Earth : And that vegetative terrestrial Matter, that fell, along with these, into this uppermost *Stratum*, and of which principally it consists, hath been ever since, and will continue to be, the standing fund and promp-
 tuary out of which is derived the Matter of all Animal and Vegetable Bodies, and whereinto, at the Dissolution of those Bodies, that Matter is restored back again successively for the Constitution and Formation of others.

That the *Strata* of Marble, of Stone, and of all other *solid* Matter, attained their Solidity, as soon as the Sand, or other Matter whereof they consist, was arrived at the bottom, and well settled there : And that all those *Strata* which are solid at this day, have been so ever since that time.

That the said *Strata*, whether of Stone, of Chalk, of Cole, of Earth, or whatever other Matter they consisted of, lying thus each upon other, were all originally parallel : that they were plain, eaven, and regular ; and the Surface of the Earth likewise eaven
 and

and spherical: that they were continuous, and not interrupted, or broken: and that the whole Mass of the Water lay then above them all, and constituted a fluid Sphere environing the Globe.

6. That after some time the *Strata* were broken, on all sides of the Globe: that they were dislocated, and their Situation varied, being elevated in some places, and depressed in others.

7. That the Agent, or force, which effected this Disruption and Dislocation of the *Strata*, was seated *within* the Earth.

8. That all the Irregularities and Inequalities of the Terrestrial Globe were caused by this means: date their Original from this Disruption, and are all entirely owing unto it. That the natural *Grotto's* in Rocks, and those Intervals of the *Strata*, which, in my Observations, I call the *Perpendicular Fissures*, are nothing but these Interruptions or *Breaches* of the *Strata*. That the more eminent Parts of the Earth, *Mountains* and *Rocks*, are only the Elevations of the *Strata*; these, wherever they were solid, rearing against and supporting each other in
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the posture whereinto they were put by the bursting or breaking up of the Sphere of Earth || : and not falling ^{|| Conf.} down again, nor returning to their ^{Conf. 5.} former and more level site, as did the ^{supra.} *Strata* of Earth, and other Matter that was not solid, and had no *Strata* of Stone, or other consistent Matter, interposed, amongst their *Strata*, underneath, to uphold them in the posture they were then raised into. For which reason 'tis, that Countries which abound with Stone, Marble, or other solid Matter, are uneven and mountainous: and that those which afford none of these, but consist of Clay, Gravel, and the like, without any Stone &c. interposed, are more champaign, plain, and level. That the lower parts of the Earth, *Vallies*, the *Chanel of the Sea*, and the rest, are nothing but Depressions of the *Strata*. That *Islands* were formed and distinguished by the Depression or sinking down of the *Strata* lying betwixt each of them, and betwixt them and the Continent. In one word, that the *whole terraqueous Globe* was, by this means, at the time of the Deluge, put into the Condition that we now behold.

Here was, we see, a mighty Revolution: and *that* attended with Accidents very strange and amazing: the most horrible and portentous Catastrophe that Nature ever yet saw: an elegant, orderly, and habitable Earth quite unhinged, shattered all to pieces, and turned into an heap of ruins: Convulsions so exorbitant and unruly: a Change so exceeding great and violent, that the very Representation alone is enough to startle and shock a Man. In truth the thing, at first, appeared so wonderful and surprizing to me, that I must confess I was for some time at a stand; nor could I bring over my Reason to assent, untill, by a deliberate and careful Examination of all Circumstances of these Marine Bodies, I was abundantly convinced that they could not have come into those Circumstances by any other means than such a Dissolution of the Earth, and Confusion of things. And were it not that the Observations, made in so many, and those so distant, places, and repeated so often with the most scrupulous and diffident Circumspection, did so establish and ascertain the thing, as not to leave any room for Contest or Doubt,

Doubt, I could scarcely ever have credited it.

And though the whole Series of this extraordinary *Turn* may seem at first view to exhibit nothing but Tumult and Disorder : nothing but hurry, jarring, and distraction of things : though it may carry along with it some slight shew that 'twas managed blindly and at random : yet if we draw somewhat nearer, and take a closer prospect of it : if we look into its retired Movements, and more secret and latent Springs, we may there trace out a steady Hand, producing good out of evil : the most consummate and absolute Order and Beauty, out of the highest Confusion and Deformity : acting with the most exquisite Contrivance and Wisdom : attending vigilantly throughout the whole Course of this grand Affair, and directing all the several Steps and Periods of it to *an End*, and that a most noble and excellent one ; no less than the Happiness of the whole race of Mankind : the Benefit, and universal Good, of all the many Generations of Men which were to come after : which were to inhabit this Earth, thus modulated anew, thus suited to their

present Condition and Necessities.

But the Presidence of that mighty Power in this Revolution: its particular Agency and Concern therein: and its Purpose and *Design* in the several Accidents of it, will more evidently appear, when I shall have proved,

That, altho' one Intention of the Deluge was to inflict a deserved Punishment upon *that Race* of Men, yet it was not solely levelled against Mankind, but principally against the Earth that then was; with design to destroy and alter that Constitution of it, which was apparently calculated and contrived for a state of Innocence: to fashion it afresh, and give it a Constitution more nearly accommodated to the present Frailties of its Inhabitants.

That the said Earth, though not indifferently and alike fertil in all parts of it, was yet generally much more fertil than *ours* is. That the exterior *Stratum* or Surface of it, consisted entirely of a kind of terrestrial Matter proper for the Nourishment and Formation of Plants, and this in great *Plenty* and *Purity*; being little, or not at all, entangled with an Intermixture of meer Mineral Matter that was unfit
for

for Vegetation. That its Soil was more luxuriant, and teemed forth its Productions in far greater plenty and abundance than the present Earth does. That the Plough was then of no use, and not invented till after the Deluge; that *Earth* requiring little or no Care or Culture; but yeilding its encrease freely, and without any considerable Labour and Toil, or assistance of Humane Industry; by this means allowing Mankind that time, which must otherwise have been spent in Agriculture, Plowing, Sowing, and the like, to far more divine and noble Uses: to Purposes more agreeable to the Design of their Creation; there being no hazard, whilst they continued in that state of Perfection, of their abusing this Plenty, or perverting it to any other end than the sustenance of Nature, and the necessary support of Life.

That when Man was *fallen*, and had abandoned his primitive Innocence; the Case was much altered, and a far different Scene of Things presented; that generous Vertue, masculine Bravery, and prudent Circumspection

which he was before Master of, now deserted him, together with that Innocence which was the Basis and Support of all : and a strange imbecility immediately seized and laid hold of him : he became pusillanimous, and was easily ruffled with every little Passion within : supine, and as openly exposed to any Temptation or Assault from without. And *now* these exuberant Productions of the Earth became a continual Decoy and Snare unto him : they only excited and fomented his Lusts, and ministred plentiful Fuel to his Vices and Luxury ; and the Earth requiring little or no Tillage, there was little occasion for Labour ; so that almost his whole time lay upon his hands, and gave him leisure to contrive, and full swing to pursue his Follies ; by which means he was laid open to all manner of Pravity, Corruption, and Enormity ; and we need not be much surprized to hear *That the wickedness of Man was great in the Earth, and that every imagination of the thoughts of his heart was only evil continually* * : nor more, that that Generation of Men was more particularly addicted to In-

tempe-

Gen. vi. 5.

temperance, Sensuality, and Unchastity: that they spent their time in Gluttony, in *Eating and Drinking*, in Lust and Wantonness, or, as the sacred Writer cleanly and modestly expresses it, in *marrying, and giving in marriage* ||, || *Matth.*
and this without Discretion or Decency: without regard to Age or Affinity: but promiscuously, and with no better a Guide than the Impulses of a brutal Appetite, *They took them Wives of all which they chose* *; Plenty and Abundance, Idleness and Ease, so naturally cherishing and promoting those particular Vices: nor lastly, that the Apostacy was so great, the Infection so universal: that *the Earth was filled with violence*, and that *all flesh had corrupted his way* †; the Cause of this Corruption, the Fertility of that Earth, being so universal, so diffusive and epidemic. And indeed, 'twould be very hard to assign any other single Cause, besides this, that could ever possibly have had so spreading and general an Effect as this had. The Pravity of humane Nature is not, I fear, less than it was then: The Passions of Men are yet as exorbitant, and their Inclinations as vicious: Men have been wicked since

xxiv. 38.

* *Gen. vi. 2.*† *Gen. vi. 11, 12.*

the Deluge: they are so still: and will be so, but not universally; there are now bounds set to the Contagion, and 'tis restrained by removing the main cause of it; but *there*, the Venom manifested it self on all hands: spread far and near: and scarcely stop'd till 'twas insinuated into the whole mass of Mankind, and the World was little better than a common fold of Phren-ticks and Bedlams.

That to reclaim and retrieve the World out of this wretched and forlorn state, the common Father and Benefactor of Mankind seasonably interposed his hand: and rescued miserable Man out of the gross Stupidity and Sensuality whereinto he was thus unfortunately plunged. And this he did partly by tying up his hands, and shortning the power of sinning: checking him, in the Career of his Follies, by Diseases and Pains: and setting Death, the King of Terrors, which before stood aloof off, and at the long distance of eight or nine hundred Years now much nearer to his view, ordaining * that *his days shall be but an hundred and twenty years* †: and partly by removing the Temptation,
and

* Confer.
Part 6.
Dis. 3.
† Gen.
6. 3.

and cause of the Sin :
by *destroying* * that
Earth which had fur-
nish'd forth Mainte-
nance in such store un-
to it : by changing that
Constitution of it, and
rendring it more agree-
able to the laps'd and
frail state of Mankind.
That this Change was
not wrought by alter-
ing either the form of
the Earth, or its Posi-
tion in respect of the
Sun, as was not long
ago surmised by a very
Learned Man †, but
by dissolving || it : by
reducing all the Mat-
ter of it to its first con-
stituent Principles : by mingling, and
confounding them : the Vegetative
with mineral Matter, and the different
kinds of mineral Matter with each
other ** : and by retrenching a consi-
derable quantity of the vegetable Mat-
ter, (which lay in such plenty and
purity at the Surface of the Antedilu-
vian Earth, and rendred it so exube-

* Gen. vi. 13. *And behold I will DESTROY them with THE EARTH.* And again, at the Co-
venant made with Noah, after
the Deluge, more distinctly
Gen. ix. 11. *Neither shall all
flesh be cut off any more by the
waters of a flood : neither shall
there any more be A FLOOD
TO DESTROY THE EARTH;*
the latter part whereof is ren-
der'd somewhat more expresly
by the Septuagint *ὃ ἐκ ἔτι
ἔσται κατακλυσμὸς ὅσας
καταφθίσει Πᾶσαν τὴν
γῆν.* i. e. *And there shall not
be any more a Deluge of Water
to destroy the WHOLE EARTH.*
And the vulg. Lat. *Neque erit
deinceps Diluvium dissipans
terram,* i. e. *Neither shall
there be hereafter a Deluge to
dissipate [or dissolve] the
Earth.* And of this *Dissolution*
of the Earth there was a *Tra-
dition* amongst the *Ancients*,
both *Jews* and *Gentiles*.

† Dr. Bur-
net. *Theo-
ry of the
Earth.*

|| *Vid.*
*Conf. 2. su-
pra.*

** *Part 4.*
Conf. 3.

rantly

rantly fruitful) and precipitating it,
 || *Vid. Conf.* (at the time of the subsidence || of the
 3. *supra.* general Mass of Earth and other Bo-
 dies, which were before raised up in-
 to the Water) to such a depth as to
 bury it, leaving only so much of it
 near the Surface as might just suffici-
 ently satisfy the Wants of humane Na-
 ture, but little or no more; and even
that not pure, not free from the inter-
 mixture of meer steril mineral Matter,
 and such as is in no wise fit for the
 Nutrition of Vegetables; but so that
 it should require Industry and Labour
 to excite it, and not yeild a competent
 Crop without Tillage and Manure.
 That by this means, a great part of
 that time, which the Inhabitants of
 the former Earth had to spare, and
 whereof they made so ill use, was em-
 ployed, and taken up in Digging and
 Plowing, in making provision for
 bread, and for the Necessities of Life;
 and the Excess of Fertility, which con-
 tributed so much to *their* Miscarriages,
 was retracted and cut off.

That had the Deluge been aimed
only at Mankind: and its utmost design
 meerly to punish that Generation, and
 thereby to deterr Posterity from the
 like

like Offences; this might have been brought about by means much more compendious, and obvious too, and yet equally terrifying and exemplary. Mankind, I say, might have been taken off at a far cheaper rate: without this ransacking of Nature, and turning all things topsie-turvy: without this battering of the Earth, and unhinging the whole frame of the Globe. The Business might have been done as effectually by Wars; the Heart of every Man of them was in the hand of God, and he could easily have made them Executioners of his Wrath upon one another. He had the command of Famine, of Pestilence, and a thousand other Disasters, whereby he could have carried them off by sholes, yea swept them all clear away. Besides, he had the whole Artillery of the Sky in his power, and might presently have Thunder struck them all, or destroyed them by Fire from Heaven. But none of all *these* were used, though 'tis most apparent that any of them would have been as fatal and pernicious to Man as the Deluge was, for the Design lay a great deal deeper, and *these* would have fallen short of it: *these* would

would never have reach'd the Earth, nor affected *that* in the least: they could never have touch'd the Head, or stop'd the source of these unhappy misdemeanours, for which the Punishment was sent. *That* was what nothing but a Deluge could reach; and as long as the Cause remained: as long as the old Temptation was still behind, every Age would have lain under fresh Inducements to the same Crimes: and there would have been a new necessity to punish and reclaim the World: to depopulate the Earth, and reduce it again to a vast Solitude, as constantly as there succeeded a new Age and Race of Men. For the terror of the Calamity would not have extended it self much farther than the Men which suffered under the weight of it: and a few Years would have worn out, in great measure, the Impressions it made. This we see even from the Example of the Deluge it self. As formidable as *this* was to those who lived at, or near, the time of it: who saw the prodigious Devastations it made: the horrible Methods by which 'twas brought about: and the Reason why 'twas inflicted; and to their Posterity

sterity, for a few Generations; yet the Fright was not lasting: 'twas not long e're the Sting of it was worn out. And though the Elder Ages knew full well that there had been such a Deluge: and had some Tradition of the cruel Desolation it made; yet by degrees the Particulars of it were drop'd, and the most frightful Passages bore the least share in the Relation; being probably so strange as to be hardly credible; and carrying rather an appearance of Figment and Invention, in those that handed down the memory of it, than of Truth and Reality. So that upon the whole 'tis very plain that the Deluge was not sent only as an Executioner to Mankind: but that its prime Errand was to reform and *new-mold the Earth.*

That therefore as much Harshness and Cruelty as this great Destruction of Mankind seemingly carries along with it: as wild and extravagant a thing as that Dissolution of the primitive Earth appeared at first sight, yet all the Severity lay in the Punishment of that Generation, (which yet was no more than what was highly just, yea and necessary too:) and the *whole*
of

of the Tragedy terminated there. For the *Destruction* of the *Earth* was not only an Act of the profoundest Wisdom and Forecast, but the most monumental proof that could ever possibly have been, of Goodness, Compassion, and Tendernefs, in the Author of our *Being*; and *this* so liberal too and extensive, as to reach all the succeeding Ages of Mankind: all the Posterity of *Noah*: all that should dwell upon the thus renewed Earth to the End of the World; by this means removing the old Charm: the Bait that had so long bewildred and deluded unhappy Man: setting him once more upon his Legs: reducing him from the most abject and stupid Ferity, to his Senses, and to sober Reason: from the most deplorable Misery and Slavery, to a Capacity of being happy.

That notwithstanding that this Remedy struck as deep at the Intellectuals, as at the Morals of Mankind: that Ignorance and Rudeness would be as necessary a Consequence of it, as Reformation of Life: and that this so general Employ and Expence of their time would as assuredly curtail and retrench the ordinary means of Knowledge

ledge and Erudition*, as 'twould shorten the Opportunities of Vice: And so accordingly it fell out; An universal Rusticity presently took place, spread on all hands, and stop'd not till it had over-run the whole stock of Mankind. Those first Ages of the new World were simple, and illiterate to Admiration; and 'twas a long time e're the Cloud was withdrawn: e're the least spark of Learning (I had almost said of Humanity) broke forth, or any Man betook himself to the promotion of Science. Nay the Effects of it are visible to this hour: a general Darkeness yet prevails, and hangs over whole Nations, yea the far greater part of the World is still barbarous and savage. I say, tho' 'twas most evident that this Remedy must needs have *this* Consequence also as well as the *other*, yet it was not suspended or chang'd upon that account; An egregious and pregnant instance how far Vertue surpasses Ingenuity: how much an honest Simplicity, Probity of Mind, Integrity and Incorruptness of Manners, is preferable to fine Parts, profound Knowledge, and subtile Speculations. I would not have this interpreted an invective
against

* Confer.
p. 55. &
seq.

against Humane Learning, or a decrying any commendable Accomplishments either of Body or Mind, (that is what no Man will, I hope, suspect me of) but only an intimation that *these* are not of any solid use, or real advantage, unless when aiding and serviceable to the *other*.

Nor does this grand Catastrophe only present us with Demonstrations of the Goodness, but also of the Wisdom and Contrivance of its Author. There runs a long train of Providence thro' the *whole*: and shines brightly forth of all the various Accidents of it. The Consolidation of the Marble, and of the Stone, immediately after their Settlement to the bottom: the disruption of the *Strata* afterwards: their Dislocation, the Elevation of some, and Depression of others of them, did not fall out at random, or by *chance*, but were managed and directed by a more steady and discerning Principle; for proof whereof, this is indeed the proper place: but, in regard that there are some things advanced in the succeeding, or third, Part of this Discourse, which give some farther light to this matter, I shall beg leave to break off here, and
to

to deferr it a while, untill I have first propos'd them.

Thus have I drawn up a *brief Scheme* of what befell the Earth at the *Deluge*: and of the *Change* that it then underwent. I have, by comparing its Antediluvian * with its present state, found where ** Conf. Part 6.* chiefly the *Difference* lay; viz. in degree of Fertility. I have endeavour'd also to discover the *Reason* why this Change was made in it. For since that the Process of it was so solemn and extraordinary: that there were so many, and those so strange things done: that the *first Earth* was perfectly unmade again, taken all to pieces, and framed a-new; and indeed, the very same Method that was used in the original Formation of it, used likewise in this Renovation; *our Earth* standing the first step after its Dissolution, in the same posture that the *Primitive Earth* did the first step after its *Rise* out of Nothing; which the Reader will easily find by conferring the fifth Proposition of this Part with *Gen. i. v. 2. and 9:* since likewise there was so mighty an Hand † concerned, and which does *† Conf. Part 3. Sect. 2. Conf. 7.* not act without great and weighty Reasons, there could be no doubt but
H that

that there was some real and very necessary Cause for the making that Alteration. Nor was such a Cause very hard to be found out. The first Earth was suited to the first state of Mankind ; who were the Inhabitants of it, and for whose use 'twas made. But when Humane Nature had, by *the Fall*, suffer'd so great a Change, 'twas but necessary that the Earth should undergo a Change too, the better to accommodate it to the Condition that Mankind was *then* in : and *such* a Change the Deluge brought to pass.

But least that the *Brevity* which I have above used, and which indeed I am tied up to, in my Representation of this matter, should render it liable to Misconstruction : or that any one should suspect, that what I have delivered concerning the Fertility of *that Earth*, does not well square with the Mosaick Description of it, I must beg leave to make a Digression here, that I may explain my self a little more upon that Head. And that the Reader may himself be Judge in the Case, I shall fairly lay down *Moses's* sense of it in his own words.

Ver. 17. *And unto Adam he said, be- Gen. iii.*
cause thou hast hearkned unto the Voice
of thy wife, and hast eaten of the Tree
of which I commanded thee, saying,
thou shalt not eat of it: Cursed is the
ground for thy sake; in sorrow shalt
thou eat of it all the days of thy life.

Ver. 18. *Thorns also and Thistles shall it*
bring forth to thee: and thou shalt eat
the herb of the field.

Ver. 19. *In the sweat of thy face shalt*
thou eat bread, till thou return unto the
ground; for out of it wast thou taken:
for dust thou art, and unto dust shalt
thou return.

Ver. 23. *Therefore the Lord God sent him*
forth from the Garden of Eden, to till
the ground from whence he was taken.

Ver. 2. *Cain was a tiller of the ground.* Gen. iv.

All which may be well reduced to
 two plain and short Propositions,

1. That *Adam's* Revolt drew down
 a Curse upon the Earth.

2. That there was some sort of
 Agriculture used before the Deluge.

As to the former, the Curse upon
 the Earth, I shall not in the least go
 about to extenuate the Latitude of it:
 or to stint it only to the Production of
 Weeds, of *Thorns, Thistles*, and other

the less useful kinds of Plants : but shall give it its full scope, and grant that no less than an universal Restraint and Diminution of the primitive Fruitfulness of the Earth was intended by it; this indeed seeming to be the plain and genuine meaning of the words. But the Question is, whether this Curse was presently inflicted or not : whether it was succeeded with an universal Sterility, and the Earth's native and original Exuberance all straitways check'd, and turn'd to as general a Desolation and Barrenness. And here I entreat it may be taken notice, that *this* was but *one*, and that much the lesser, part of the Sentence past upon *Adam*. The *other* was Death *; which, 'tis most certain, was not immediately inflicted. And yet *this* was pronounc'd at the same time and with the same breath, that the other was : *Unto dust shalt thou return*. Nay and much more emphatically a little before ||, *In the day that thou eatest thereof thou shalt surely dye*. This was exceedingly peremptory : and the very day fix'd likewise. Notwithstanding, through the Clemency and Goodness of God, Execution was delayed for a long time ; *Adam* being reprieved

* *Conf.*
Rom. v.
12. and
1 Cor. xv.
21, 22.

¶ Gen. ii. 17.

reprieved for eight or nine hundred years †. The Dominion of Death over him commenc'd indeed not only † Gen.v. 5. the same day that Sentence was past, but the very minute that he tasted the forbidden Fruit: and Mortality went hand in hand with the Transgression: but 'twas a long time before it had raised any Trophies, or made a final and absolute Conquest.

Why therefore may we not as well suppose the other part of the Sentence, the Sterilizing the Earth, was also suspended for some time, and deferr'd till the Deluge happened, and became the Executioner of it? 'Tis certainly very hard to imagine that God should destroy the Work of his hands almost as soon as he had finish'd it: that all things should be unhinged again by such time as they were well ranged and put in order: and that the Fragrancy and lovely Verdure which then appeared every where, and which had but just shewed it self, should be nip'd in the bud, and blasted all of a sudden. To be short, 'tis, I think, most apparent, that as on the other part Mortality did presently enter and take place, but got not full possession of many

Ages after: so here, Thorns, Thistles, and other the like Consequences of this Curse, immediately sprung out of the Ground, and manifested themselves on every side, but it had not its full effect, nor was the Earth impoverish'd, or its Fertility, sensibly curb'd, till the Deluge. And for proof of this I appeal to the Remains of *that Earth*: the Animal and Vegetable Productions of it still preserved; the vast and incredible Numbers whereof notoriously testify the extreme Luxuriance and Fœcundity of it; and I need but produce *these* as Evidences that at the time that the Deluge came, the Earth was so loaded with Herbage, and throng'd with Animals, that such an Expedient was even wanting to ease it of the burden, and to make room for a succession of its Productions. For this also I appeal to *Moses* himself, who openly acknowledgeth that this Curse did not take place effectually till the Deluge. For he tells us, that, after the Deluge was over, and *Noah* and his Family come forth of the Ark, *He builded an Altar unto the Lord, and offered burnt-offerings on the Altar: and the Lord smelled a sweet savour, and the Lord said in his heart, I will not again*
Curse

Curse the Ground *any more, neither will I again smite any more every thing living as I have done* *. Wherein he ^{* Gen. viii.} plainly refers to the Curse denounc'd ^{20, 21.} above, at the Apostacy of *Adam*: implying that it was not fulfilled till the Deluge. And a little after he as plainly intimates, that the fulfilling of it lay in the Destruction of the Earth then wrought. For, speaking again of the same thing, instead of the Expression [*Curse the Ground*] here used, he makes use of [*Destroy the Earth.*] The whole Passage runs thus; *And I will establisb my Covenant with you, neither shall all flesh be cut off any more by the waters of a flood: neither shall there any more be a Flood to destroy the Earth* *. ^{* Gen. ix.}

Nor is it indeed in any wise strange that this Curse had not it's Effect sooner: especially since 'twas not limited to any time. There are so many Presidents on Record in Holy Writ of this way of proceeding, that no one can be well ignorant of them; so that I shall not need to charge this place with more than one, and that shall be the Case of *Ham*, for which we are likewise beholden to the same Author,

Moses. This Person, by his indiscreet and unnatural Irrision and exposing of his Father, incurs his Indignation, and Curse. But, which is very remarkable, *Noah* does not lay the Curse upon *Ham*, who was actually guilty of the Crime, whether out of greater Tenderneſs, he being of the two nearer allied unto him, or for what other reason I ſhall not here enquire, but transferrs it to Canaan: *Cursed be Canaan, a Servant of Servants ſhall he be to his Brethren: to Shem and to Japhet.* Nay, which is ſtill more, this was never inflicted upon *Canaan* in perſon, but upon his Poſterity; and that not till many Generations afterwards, at ſuch time as the *Iſraelites* returning out of *Egypt*, poſſeſt themſelves of the Country of the *Canaanites*, and made *them* their Servants. The Story is ſo well known, that I ſhall not need to point it out to the Reader, who may peruſe it at his leiſure. 'Twas well on-wards of a thouſand Years before ever this Curse began to take effect: before the *Canaanites* were brought under Servitude by the *Iſraelites*, who were deſcended from *Shem*: and a great many more before 'twas finally accompliſhed, and *they* ſubjected unto the Poſterity

|| Gen ix.
25, 26, 27.

rity of *Japhet*. To conclude, 'twas really a longer time before *this*, than it was before *the other*, the Curse upon the Earth, was fully brought about.

To proceed therefore to the other Point, the Tillage of the Earth before the Deluge. That there was Tillage bestowed upon it *Moses* does indeed intimate in general and at large: but whether it was bestowed on all, or only upon some parts of that Earth: as also what sort of Tillage that was, and what Labour it cost, is not exprest; so that for all this we are at liberty, and may use our Discretion. For the present I must pass by the Enquiry: but in due place I hope to give some Satisfaction in it, and to shew that *their* Agriculture was nothing near so laborious, and troublesome, nor did it take up so much time as *ours* doth. That's a Consequence of the Proof of the greater Fertility of that Earth; it being plain that the more it exerted that Fertility, the less need there was of Manure, of Culture, or Humane Industry to excite and promote it. Nor can any Man reasonably suspect, because of this mention of Tillage, that the Curse upon the Ground was come
on,

on, or that the primitive Exuberance of the Earth was lessened and abridged, before the Deluge ; for *Moses* makes mention of Tillage before ever *Adam* † *Gen. ii. 5.* was created : *There was not*, says he †, *a man to till the ground* : and consequently, there would have been requisite such a Tillage as this which he speaks of in these three Chapters, tho' the Curse had never been denounc'd, or Man had not fallen. But 'tis highly probable that upon *Adam's* Disobedience, Almighty God chafed him out of Paradise, the fairest and most delicious part of that Earth, into some other the most barren and unpleasant of all the whole Globe ; the more effectually to signify his Displeasure, and to convince that unhappy Man how great a Misfortune and Forfeiture he had incurred by his late Offence. And here, above all other Parts of the Earth, there would be Work and Employ for him, and for his Son *Cain*.

And thus much may serve for the present, to shew that my Account of the Antediluvian Earth is so far from interfering with that which *Moses* hath given us, that it holds forth a natural and unforc'd Interpretation of his Sense

Sense on this Subject. There are a few other Passages in the same Author which may require some Explication: but they are none of them such that a Reader of moderate Understanding may not easily clear them, without my Assistance, so that I shall not crowd this Piece with them; for I fear 'twill be thought that I have already taken too great a liberty. The Compass that I am confined unto, by *the Rules* of this kind of Writing, is so narrow, that I am forced to pass over many things in silence, and can but just touch upon others. To lay down every thing at length, and in its full light, so as to obviate all Exceptions, and remove every Difficulty, would carry me out too far beyond the Measures allowed to a Tract of this Nature. That's the Business of the Larger Work, of which this is only the Module or Platform. In that Work I hope to make amends for these Omissions, and particularly shall consider

What was the immediate Instrument or Means whereby the Stone, and other solid Matter of the Antediluvian Earth was dissolved, and reduced to the Condition mentioned *Consect.* 2. of this Part.

Why

Why the Shells, Teeth, Bones, and other parts of Animal Bodies : as also the Trunks, Roots, and other parts of Vegetables, were not dissolved, as well as the Stone, and other Mineral Solids of *that Earth*. Of this I shall assign a plain and Physical Reason, taken meerly from the *Cause* of the Solidity of these Mineral Bodies; which I shew to be quite *different* from *that*, whereunto Vegetables and Animals owe the Cohæsion of their parts : and that *this* was suspended, and ceased, at the time that the Water of the Deluge came forth ; which the *other* (I mean the Cause of the Cohæsion of the Parts of Animals and Vegetables) did not ; with the reason of this.

What was the Reason that (in case the Terrestrial Globe was entirely dissolved, and there be now, and was then, a Space or Cavity, in the Central parts of it, so large as to give reception to that mighty Mass of Water which covered the Earth at the Deluge *) the Terrestrial Matter which first subsided, (as in *Consect. 3. supra*) did not fill the said Cavity, and descend quite down to the *Center*, but stop'd at that distance from it, forming an arch-
ed

* *Vid.*
Part 3.
Sect. 1.
Consect. 1.
and
Sect. 2.
Consect. 2, 3

ed *Expansum*, or rather a Sphere around it; which is now the lowest *Stratum*, and Boundary of that vast Conceptacle of Water. As also how this Water was raised at the Deluge: by what Issues or Outlets it came forth: what succeeded into the room of it, whilst absent: and which way it returned back again.

By what means the *Strata* of Stone, and Marble, acquired such a Solidity, as soon as the Matter, whereof they consist, had subsided, and was well settled to the bottom, as in *Consect.* 4. of this Part.

What was the immediate Agent which effected that Disruption of the *Strata*, and their Dislocation afterwards; whereof in *Consect.* 6. of this Part.

And because there have been some *Conjectures* formerly started by Learned Men about the Formation of Sand-Stone, the Origin of Mountains, and of Islands, that are repugnant to what I have *here* advanc'd upon those Subjects, I am obliged to look a little into the *Reasons* of them; and, that they may not remain as Obstacles to those who are less skilfull in these things, I shall

shall weigh their Arguments, detect the Invalidity of them, and prove, against them, -

That the Sand-Stone now in *being* is not as old as the Earth it self: nor hath it been consolidated ever since the Creation of the World, as some Authors have believed.

That Sand-Stone does not now grow by *Juxtaposition*, as they speak; that is by continual Addition of new Matter; in like manner as the Bodies of Animals and of Vegetables grow, and are augmented; as others were of Opinion.

That Sand-Stone does not still consolidate: *i. e.* that Matter which was, a few Years ago, lax, incoherent, and in form of Earth, or of Sand, does not become daily more hard and consistent, and by little and little acquire a perfect Solidity, and so turn to Stone; as others have asserted.

That the Mountains of our Earth have not had *being* ever since the Creation: and stood as long as the Earth it self; as some Writers have thought.

That the said Mountains were not raised successively, and at several times, being flung up or elevated by Earth-quakes, some at one time, and some at another,

Another, as those Earthquakes happened. That *these* are so far from raising Mountains, that they overturn and sling down, some of those which were before standing; and undermine others, sinking them into the Abyss underneath †. That of all the Mountains of the whole Globe, which are very numerous, and many of them extremely large, and consequently cannot be supposed to have been all thus raised without the Notice of Mankind, yet there is not any authentick Instance, in all History, of so much as one single Mountain that was heaved up by an Earthquake. That the new Mountain in the *Lucrine Lake*, not far from *Pozzuolo* in *Italy*, called *Monte di Cinere*, which is alledged by the Fautors of this Opinion, as an instance in behalf of it, was not raised thus; the Relators of that Accident, as well those who were then living, as they who wrote since, unanimously agreeing that this *Tumulus*, or Hill, is no other than an huge heap of Stones, Cinders, Earth, and Ashes, which were spued up out of the bowels of the Earth, by the Eruption of a *Volcano*, which happened there, in the Year 1538. And though

† Confer.
Part 3.
Sect. 1.
Conf. 12.

though this Eruption was preceded by several Earthquakes (the Country all round having been frequently shaken for almost the space of two years before) as those of *Ætna*, *Vesuvius*, and *Hecla* usually are, yet this Hill was not elevated or heaved up by any of those Earthquakes, but the Matter, whereof 'tis compiled, discharged out of the *Volcano*, as aforesaid; in like manner as *Ætna*, *Vesuvius*, and the rest, fling forth Stones, Cinders, &c. upon any extraordinary Eruption of them.

That there have not been any *Islands* of note, or considerable extent, torn and cast off from the Continent by Earthquakes, or severed from it by the boisterous Allision of the Sea. That *Sicily*, *Cyprus*, the *Negropont*, and many more, which have been supposed by some to be only dismembered parcels of the Main-land, and anciently parted from it by one or other of these means, yet really never were so; but have been Islands ever since the time of the Noetick Deluge.

Unto this Second Part I shall annex,

A *Discourse* concerning the Trees, which are commonly called *Subterranean Trees*, or *Fossil Wood*, and which
are

are found in great plenty buried amongst other Vegetable Bodies in Mosses *, Fens, or Bogs, not only in several Parts of *England*, but likewise in many Foreign Countries ; wherein I shall shew, from Observations made upon the Places where these Trees are digg'd up : upon the Trees themselves : their Position in the Earth, and other Circumstances, that they were lodged thus by the *Deluge*, and have lain here ever since. That there are found great numbers of these Trees, and many of them very large, so buried in several *Islands* where no Trees at all do, or will, now grow : the Winds being so fierce, and the Weather so severe, as not to suffer any thing to prosper or thrive beyond the height of a Shrub, in any of all those *Islands*, unless it be protected by Walls, as in Gardens, or other like Coverture. That the said Trees are in some places found enclosed in the Stone of Quarries and of Rocks : buried amongst Marle, and other kinds of Earth, as well as in this Peat or Moss-Earth. That they were originally lodged indifferently amongst all sorts of Earth, or other Matter, which lay near the Surface of the Earth † : and

* Moss is the Name used all over the North of *England* instead of Fens.

† Conf.
Conf. 3.
that supra.

that they are at this day found very seldom unless in this Peat-Earth, is meerly accidental; this Earth being of a bituminous and mild Nature; so that the Trees lay all this while, as it were, embalmed in it, and were by that means preserved down to our times; whilst those which chanced to be longed in other Earth, that was more lax and pervious, decayed in tract of time, and rotted at length, and therefore do not now appear at all, when we dig and search into those Earths; or if any thing of them do appear, 'tis only the Ruins, or some slight Remains of them; there being very rarely found any Trunks of Trees, in these laxer Earths, that are intire, or tolerably firm and sound. To conclude, from several of the aforesaid Circumstances I shall evince that these Trees could never possibly have been reposed thus by any other means than the Deluge: neither by Men: nor by Inundations: nor by Deterations*: nor by violent and impetuous Winds: nor by Earthquakes; which are the several ways whereby Learned Men have thought they were thus buried.

* Confer.
Part 5.
Consect. 2.

PART

PART III.

Concerning the Fluids of the Globe.

SECT. I.

*Of the great Abyss. Of the Ocean.
Concerning the Origine of Springs,
and Rivers. Of Vapours, and
of Rain.*

HAVING thus done with the more bulky and Corpulent Parts of the Globe, the next place in course is due unto Metalls and Minerals, which are the only remaining part of the Terrestrial Matter of it not yet treated of. And accordingly I should now pass on to these; but the present Oeconomy and Disposal of some of them being wholly owing to the Motion and Passage of *Water* in the interiour parts of the Earth, I have for that reason cho-

sen rather, that I may be as brief as possible, and avoid all needless Repe-titions, to wave *them* for a while, till I have first offered what I have to say about *that*.

The *Water* therefore of the Globe, as well that resident in it, as that which floats upon it, is the Subject which I purpose here to prosecute. In order whereunto, I shall sub-divide this third Part into two Sections; the former whereof will comprehend what relates to the present and natural State of the Fluids in and upon the Earth: the other, what concerns that extraordinary Change of this State which happened at the Deluge, and how that Change was wrought.

At the Head of the first of these Sections I prefix a new set of *Observations touching the Fluids of the Terraqueous Globe*: the Sea, Rivers, and Springs: the Water of Mines, of Cole-pits: of Caves, Grotts, and the like Recesses: as also concerning Vapours, Rain, Hail, and Snow.

And because this is a Subject of that vast Latitude that the Strength of one single Man will scarcely be reckoned sufficient effectually to cultivate and
carry

carry it on, I have taken in the joint Assistance of *other Hands*, and super-added, to my own, all such *Relations* as I could procure from Persons whose Judgment and Fidelity might safely be relied upon, about the Sea, Lakes, Rivers, Springs, and Rain, not only of this Island, but many other Parts of the World besides. Nor do I neglect those which are already extant in the *Published Discourses* of diligent and inquisitive Men.

From all which Observations, joyned with those made by my self, I prove,

That there is a mighty *Collection of Water* inclosed in the *Bowels of the Earth*, constituting an *huge Orb* in the interior or central Parts of it; upon the Surface of which Orb of Water the terrestrial *Strata* are expanded. That this is the same which *Moses* calls the *Great Deep*, or *Abyss*: the ancient Gentile Writers, *Erebus*, and *Tartarus*.

That the Water of this Orb *communicates* with that of the *Ocean*, by means of certain *Hiatus's* or *Chasmes* passing betwixt it and the bottom of the Ocean. That they have the same common Center, around which the Water of

1.

2.

both of them is compiled and arranged; but in such manner, that the ordinary Surface of this Orb is not level with that of the Ocean, nor at so great a distance from the Center as that is, it being for the most part restrained and depressed by the *Strata* of Earth lying upon it; but wherever those *Strata* are broken, or so lax and porose that Water can pervade them, there the Water of the said Orb does ascend: fills up all the Fissures whereinto it can get Admission or Entrance: and saturates all the Interstices and Pores of the Earth, Stone, or other Matter, all round the Globe, quite up to the *level* of the Surface of the Ocean.

3.

That there is a perpetual and incessant *Circulation* of *Water* in the *Atmosphere*: it arising from the Globe in form of *Vapour*, and falling down again in *Rain*, *Dew*, *Hail*, and *Snow*. That the quantity of Water thus rising and falling is *equal*; as much returning back in *Rain*, &c. to the whole terraqueous Globe, as was exhaled from it in *Vapours*: and reciprocally as much mounting up again in *Vapour* as was discharged down in *Rain*. That tho' the quantity of Water thus rising and falling

falling be nearly certain and constant as to the *whole*, yet it varies in the several *Parts* of the Globe; by reason that the Vapours float in the Atmosphere, sailing in Clouds from place to place, and are not restored down again in a Perpendicular upon the *same* precise Tract of Land, or Sea, or both together, from which Originally they arose, but *any other* indifferently; so that some Regions receive back more in Rain than they send up in Vapour: as, on the contrary, others send up more in Vapour than they receive in Rain: nay, the very same Region at *one Season* sends up more in Vapours than it receives in Rain, and at *another* receives more in Rain than it sends up in Vapour; but the Excesses of one Region and Season compensating the Defects of the others, the quantity *rising* and *falling* upon the *whole* Globe is equal, however different it may be in the several *Parts* of it.

That the Rain which falls upon the Surface of the Earth partly runs off into *Rivers*, and thence into the *Sea*: and partly *sinks* down into the Earth, insinuating it self into the Interstices of the Sand, Gravel, or other Matter of the

exteriour or uppermost *Strata*; whence *some of it* passes on into *Wells*, and into *Grotts*, and stagnates there, till 'tis by degrees again exhaled: *some of it* glides into the perpendicular Intervalls of the solid *Strata*; where, if there be no *Outlet* or Passage to the Surface, it stagnates, as the other: but if there be such *Outlets*, 'tis by them refunded forth together with the ordinary Water of *Springs* and *Rivers*: and *the rest*, which, by reason of the compactness of the terrestrial Matter underneath, cannot make its way to *Wells*, the perpendicular Fissures, or the like *Exits*, only saturates the uppermost *Strata*: and in time remounts up again in Vapour into the Atmosphere.

5. That although *Rains* do thus fall into, and augment *Springs* and *Rivers*, yet neither *the one* nor *the other* do derive the Water, which they ordinarily refund, from *Rains*; notwithstanding what very many Learned Men have believed.

6. That *Springs* and *Rivers* do not proceed from *Vapours* raised out of the *Sea* by the Sun, borne thence by *Winds* unto *Mountains*, and there condensed, as a modern ingenious Writer is of Opinion. That

That the abovementioned great subterranean Magazine the *Abyss*, with its Partner the *Ocean*, is the *Standing Fund* and *Promptuary* which supplies Water to the Surface of the Earth: as well *Springs* and *Rivers*, as *Vapours* and *Rain*.

7.

That there is a nearly uniform and

8.

constant Fire or *Heat* || disseminated throughout the Body of the Earth, and especially the interior Parts of it; the bottoms of the deeper Mines being very *sultry*, and the Stone and Ores there very sensibly *hot* even in Winter,

|| Heat and Fire differ but in degree: and Heat is Fire only in lesser quantity. Fire I shall shew to be a Fluid consisting of Parts extremely small and light, and consequently very subtil, active, and susceptible of Motion. An Aggregate of these Parts in such number as to be visible to the Eye, is what we call Flame and Fire: a lesser, thinner, and more dispers'd Collection, Heat and Warmth.

and the colder Seasons. That 'tis *this Heat* which evaporates and elevates the Water of the *Abyss*, buoying it up indifferently on every side, and towards all parts of the Surface of the Globe: pervading not only the Fissures and Intervals of the *Strata*, but the very *Bodies* of the *Strata* themselves, permeating the Interstices of the Sand, Earth, or other Matter, whereof they consist: yea even the most firm and dense

dense Marble and Sand-stone; for these give Admission to it, though in lesser quantity, and are always found saturated with it; which is the reason that they are softer, and cut much more easily, when first taken out of their Beds and Quarries, than afterwards, when they have lain some time exposed to the Air, and that Humidity is evaporated.

That this *Vapour* proceeds up directly towards the Surface of the Globe on all sides, and, as near as possible, in right Lines, unless impeded and diverted by the Interposition of *Strata* of Marble, the denser sorts of Stone, or other like Matter, which is so close and compact that it can admit it only in smaller quantity, and this very slowly and leisurely too.

That when it is thus *intercepted* in its passage, the *Vapour*, which cannot penetrate the *Stratum* diametrically, *some of it* glides along the lower Surface of it, permeating the horizontal Interval which is betwixt the said dense *Stratum* and that which lies underneath it: *the rest* passing the Interstices of the Mass of the subjacent *Strata*, whether they be of laxer Stone, of Sand, of Marble,

Marle, or the like, with a Direction parallel to the Site of those *Strata*, till it arrives at their perpendicular Intervalls.

That the Water being thus approach'd to these *Intervalls*, in case the *Strata*, whereby the ascending Vapour was collected and condensed into Water (as we usually speak) in like manner as by an Alembick, happen to be raised above the *level* of the Earth's ordinary Surface, as those *Strata* are whereof Mountains consist, then the Water, being likewise got above the said *level*, flows forth of those Intervalls or Apertures, and, if there be no Obstacle without, forms *Brooks* and *Rivers*: but where the *Strata*, which so condense it, are not higher than the mean Surface of the Earth, it stagnates at the Apertures, and only forms *Standing-Springs*.

That though the Supply from this great Receptracle below be *continual*, and nearly the *same* at all *Seasons*, and *alike* to all *parts* of the Globe, yet when it arrives at or near the *Surface of the Earth*, where the *Heat* (the Agent which evaporates and bears it up) is *not so constant* and uniform as is that re-
sident

sident *within* the Globe, but is subject to Vicissitudes and Alterations, being at certain Seasons greater than at others: being also greater in some Climates and Parts of the Earth than in others: it thence happens that the quantity of *Water at the Surface* of the Earth, though sent up from the Abyss with an almost constant Equality, is *various and uncertain*, as is the Heat there; at *some Seasons*, and in *some Countries*, the Surface *abounding*, and being even drowned with the plenty of it, the *Springs full*, and the *Rivers high*: at *other Seasons*, and in *other Countries* both *Springs and Rivers exceeding low*, yea sometimes *totally failing*.

That when the *Heat* in the *exteriour Parts* of the Earth, and in the ambient Air, is as intense as that in the *interiour* Parts of it, all *that Water* which passes the Strata *directly*, mounting up in separate Parcels, or in form of *Vapour*, does *not stop* at the Surface, because the Heat *there* is *equal* both in quantity and power to *that* underneath, which brought it out of the Abyss. This Heat therefore takes it here, and *bears it up*, part of it immediately out
at

at the Surface of the Earth: the rest, through the Tubes and Vessels of the Vegetables which grow thereon, Herbs, Shrubs, and Trees, and along with it a sort of vegetative terrestrial Matter, which it detaches from out the uppermost *Stratum* wherein these are planted; this it depofes in them, for their Nutriment, as it paffes through them †; and iffuing out at the tops and extremities of them, it marches still on, and is *elevated* up into the *Atmosphere* to fuch height that, the *Heat* being there *lefs*, it becomes *condensed*, unites and combines into fmall Maffes or Drops, and at length falls down again in *Rain*, *Dew*, *Hail*, or *Snow*. And for the *other part* of the *Water*, which was condensed at the Surface of the Earth, and fent forth collectively into *Standing-Springs* and *Rivers*, *this* alfo fufains a *Diminution* from the *Heat* above, being *evaporated*, more or lefs, in proportion to the greater or leffer *Intenfeness* of the *Heat*, and the greater or leffer *Extent* of the Surface of the *Water* fo fent forth.

That as thefe *Evaporations* are at *some times greater*, according to the *greater heat* of the *Sun*, fo wherever they alight

alight again in *Rain*, 'tis as much superiour in *quantity* to the Rain of *colder Seasons*, as the *Suns* power is *then* superiour to its power in *those* Seasons. This is apparent even in these *Northern Climes*, where the *Suns* power is never very great, our Rains in *June*, *July*, and *August*, being much greater than those of the colder Months: the Drops larger, and consequently heavier: falling thicker, faster, and with greater force: striking the ground, at their fall, with violence, and making a mighty noise: beating down the fruit from the Trees, prostrating and laying Corn growing in the Fields: and sometimes so filling the Rivers as to make them out-swell their Banks, and lay the neighbouring Grounds under Water. But much more apparent is it in the more *Southern Regions*: in *Abassinia*, *Nigritia*, *Guinea*: in the *East-Indies*: in *Brasil*, *Paraguay*, and other Countries of *South America*, to instance in no more. In these the Sun shews a much greater force: and their Rains (which are periodical, happening always much about the same time, and lasting several Months) fall in such quantities as to be more like Rivers descend.

descending, than Showers; and by *these* are caused those mighty *periodical Inundations* of the *Nile*, the *Niger*, the *Rio da Volta*: the *Ganges*: the *Rio de las Amazonas*, the *Rio de la Plata*, and other Rivers of those Countries; to which *Inundations* *Egypt*, through which the *Nile* flows, the *Indies*, and the rest, owe their *extraordinary Fertility*, and those *mighty Crops* they produce after these Waters are withdrawn from off their Fields; *Rain-water*, as we have already noted *, ** Pag. 47.* carrying along with it a sort of terrestrial Matter that fertilizes the Land, as being proper for the Formation of Vegetables.

That when the *Heat* in the exterior Parts of the Earth, and in the ambient Air, is *less* than that in the interior, the *Evaporations* are likewise *less*; and the *Springs* and *Rivers* thereupon do not only *cease* to be *diminished* †, proportionably to the *Relaxation* † *Conf.* of the *Heat*, but are much *augmented*; *pag. 125.* a great part of the Water, which ascends to the Surface of the Earth in *Vapour*, *stopping* there, for want of *Heat* to mount it thence up into the Atmosphere, and *saturating* the superficial
or

or uppermost *Strata* with *Water*; which by degrees *drains* down into *Wells*, *Springs*, and *Rivers*, and so makes an *Addition* unto them. And this is the reason that *these* abound with *Water* in the colder *Season* so much more than they do in the *hotter*.

9. That the *Water*, which is thus dispens'd to the *Earth* and *Atmosphere* by the *Great Abyss*, being carried down by *Rains* and by *Rivers* into the *Ocean*, which, as we have said, communicates, and stands at an *Equilibrium* with that subterranean *Conservatory*, is by that means restored back to the *Abyss*; whence it returns again, in a continual *Circulation*, to the Surface of the *Earth*, in *Vapours*, and *Springs*.

10. That the *final Cause* of this Distribution of *Water*, in such quantity, to all parts of the *Earth* indifferently in *Springs*, *Rivers*, and *Rain*: and of this *perpetual Circulation* and Motion of it, is the *Propagation of Bodies*, *Animals*, *Vegetables*, and *Minerals*, in a continued Succession. That for *Animals*, they either feed upon *Vegetables* immediately: or, which comes to the same at last, upon other *Animals* which have fed upon them; so that *Vegetables*

bles are the first and *main Fund*, and fit *Matter* being supplied unto *these*, *Provision* is thereby made for the *Nourishment* of *Animals*; *these* Vegetables being no other than so many *Machines* serving to derive that *Matter* from the *Earth*, to digest and prepare it, for *their food*, leisurely and by little and little, as they can admit and dispose of it, and as it is brought to them by the *Ministration* of *this Fluid*. That Vegetables being naturally fix'd and tyed always to the same place, and so not able (as *Animals* are) to shift, and seek out after *Matter* proper for their *Increment*, 'twas indispensably necessary that it should be *brought to them*: and that there should be some *Agent*, thus ready and at hand in all places, to do them that *Office*, and so carry on this great and important *Work*. For this *Matter* being impotent, sluggish, and inactive, hath no more power to stir, or move it self to *these Bodies*, than they themselves have to move unto it; and therefore it must have lain eternally confined to its *Beds of Earth*, and then none of these *Bodies* could ever have been formed, were there not this, or the like, *Agent* to educe it thence,

and bear it unto them. Nor does the *Water*, thus hurried about from place to place, serve only to *carry the Matter* unto these Bodies, but the parts of it being very voluble and lubricous, as well as fine and small, it easily insinuates it self into, and placidly distends the Tubes and Vessels of Vegetables, and by that means *introduces* into them the Matter it bears along with it, conveying it to the several Parts of them; where each Part, by a particular Mechanism in the Structure of it, detaches and assumes those Particles of the Mass so conveyed which are proper for the Nutrition and Augmentation of *that Part*, incorporating these with it, and letting all the rest pass on with the Fluid; those Particles which are either superfluous, and more than the parts of the Plant can admit and manage at one time: or that are not suitable and proper for the Nourishment of any of the parts of a Plant of that kind, passing out at the Extremities of it along with the Water *. And this latter

Office it does likewise to Animals; Water, and other Fluids, serving to *convey the Matter*, whereby they are *nourished*, from their Stomachs and Guts,

* Confer.
pag. 125.

Guts, through the *Lacteals* and other finer Vessels, to the several parts of their Bodies. But the Formation of Animals and Vegetables; being a thing somewhat foreign to my present purpose, I shall adjourn the fuller Consideration of it to another Occasion. How far Water is concerned in the Formation of *Minerals*, will appear more at large in the succeeding Part of this Work.

That 'tis this *Vapour*, or *subtile Fluid*, that ascending thus incessantly out of the Abyss, and *pervading the Strata* of Gravel, Sand, Earth, Stone, and the rest, by degrees *rots* and decays the *Bones, Shells, Teeth*, and other parts of Animals: as also the *Trees*, and other Vegetables, which were lodged in those *Strata* at the *Deluge* †; this Fluid, by its continual Attrition as it passes successively by them, fretting the said Bodies, by little and little wearing off and dissipating their constituent Corpuscles, and at length quite dissolving and destroying their Texture. That yet it hath not this Effect indifferently upon all of them; those which happened to be reposed in the firmer and compacter *Strata*, e. g. of Marble, the closer kinds of Sand-stone, Chalk, and

† 1.

† Part 2.
Cons. 3.

* *Vid. Conf.*
8. *supra.*

the like, being thereby protected in great measure from its Attacks; it passing through these only in lesser quantity, and that slowly and with difficulty *; so that its Motion *here* being more feeble and languid, the Shells and other Bodies enclosed *in these* are usually found very *firm* and *entire*, many of them retaining even their natural Colours to this day, though they have lain thus above four thousand years; and may doubtless endure much longer, even as long as those *Strata*, to which they owe their Preservation, shall themselves endure, and continue entire and undisturbed: whilst those which were lodged in Marle, Sand, Gravel, and the like, more *loose* and *pervious* Matter, are so *rotted* and *decayed*, that they are now not at all, or very difficultly, distinguishable from the Marle, or other Matter in which they lye. Not but that there are sometimes found, even in these laxer *Strata*, Shells, Teeth, and other Bodies that are still tolerably firm, and that have escaped pretty safe; but these are only such as are of a more than ordinary *robust* and durable Constitution, whereby they were enabled the better to with-

withstand the repeated Assaults of the permeating Fluid, and to maintain their Integrity, whilst the other tenderer kinds perish'd and were destroyed.

That this same subtile Fluid exerts the same power upon the Surface of the Earth, that it does in the Bowels of it: and as it is instrumental to the *Formation* of Bodies here *, so is it like-
 * *Confer.*
 wise (by a different Operation, which *Conf. 10.*
Supra.
 I have not room to describe in this place) of the *Destruction* of them; and that Corrosion and Dissolution of Bodies, even the most solid and durable, which is vulgarly ascrib'd to the *Air*, is caused meerly by the *Action* of this *Matter* upon them; the *Air* being so far from injuring and preying upon the Bodies it environs, that it contributes to their Security and Preservation, by impeding and obstructing the *Action* of this *Matter*: and were it not for the Interposition of the *Air*, they could never be able to make so long and vigorous Resistance as now they do.

That this *Subterranean Heat* or Fire, 12.
 which thus elevates the Water out of the *Abyss*, being in any part of the Earth stop'd, and so diverted from its

ordinary course, by some accidental Glut or Obstruction in the Pores or Passages through which it used to ascend to the Surface: and being by that means preternaturally assembled, in greater quantity than usual, into one place, it causes a great Rarification and Intumescence of the Water of the Abyss, putting it into very great *Com-motions* and Disorders: and at the same time making the like Effort upon the *Earth*, which is expanded upon the face of the Abyss, it occasions that Agitation and Concussion of it, which we call an *Earthquake*.

That this *Effort* is in some Earthquakes so *vehement* that it splits and tears the Earth, making Cracks or *Chasmes* in it some Miles in length, which open at the instants of the Shocks, and close again in the Intervalls betwixt them: nay, 'tis sometimes so extremely violent, that it plainly *forces* the superincumbent *Strata*: breaks them all throughout, and thereby perfectly *undermines* and ruins the Foundations of them; so that these failing, *the whole Tract*, as soon as ever the Shock is over, *sinks* down to rights into the *Abyss* underneath, and is swallowed

lowed up by it, the Water thereof immediately rising up, and forming a Lake in the place where the said Tract before was. That several considerable Tracts of Land, and some with Cities and Towns standing upon them: as also whole Mountains, many of them very large, and of a great height, have been thus totally *swallowed up*.

That this Effort being made in *all Directions* indifferently: upwards, downwards, and on every side; the Fire dilating and expanding on all hands, and endeavouring, proportionably to the quantity and strength of it, to get room, and make its way through all Obstacles, falls as foul upon the *Water of the Abyss* beneath, as upon the Earth above; *forcing it forth* which way soever it can find vent or passage: as well through its ordinary Exits, Wells, Springs, and the Outlets of Rivers: as through the Chasmes then newly opened: through the *Camini* or Spiracles of *Ætna*, or other near *Vulcanoes*: and those *Hiatus's* at the bottom of the Sea †, whereby the Abyss † *vid. Conf. 2. supra.* below opens into it, and communicates with it.

That as the Water resident in the Abyſs is, in *all Parts* of it, ſtored with a conſiderable quantity of Heat, and more eſpecially in *thoſe* where theſe extraordinary Aggregations of this Fire happen, ſo likewise is the Water which is thus forced out of it; inſomuch that, when thrown forth, and mix'd with the Waters of Wells, of Springs, of Rivers, and the Sea, it renders them very ſenſibly hot.

That it is uſually expelled forth in *vaſt quantities*, and with *great Impetuofity*; inſomuch that it hath been ſeen to ſpout up out of deep Wells, and fly forth, at the tops of them, upon the face of the ground. With like rapidity comes it out of the Sources of Rivers, filling them ſo of a ſudden as to make them run over their Banks, and overflow the neighbouring Territories, without ſo much as one drop of Rain falling into them, or any other concurrent Water to raiſe and augment them. That it ſpues out of the Chafmes, opened by the Earthquake, in great abundance: mounting up, in mighty *Streams*, to an incredible *height* in the Air, and this oftentimes at many Miles diſtance from any Sea. That it likewise flies
forth

forth of the *Volcanoes* in *vast floods*, and with wonderful *violence*. That 'tis forced through the *Hiatus's* at the bottom of the *Sea* with such vehemence, that it puts the *Sea* immediately into the most horrible Disorder and Perturbation imaginable, even when there is not the least breath of Wind stirring, but all, till then, calm and still: making it rage and roar with a most hideous and amazing Noise: raising its Surface into prodigious Waves, and tossing and rowling them about in a very strange and furious manner: over-setting Ships in the Harbours, and sinking them to the bottom; with many other like Outrages. That 'tis refunded out of these *Hiatus's* in such *quantity* also that it makes a vast Addition to the Water of the *Sea*: *raising* it many Fathoms higher than ever it flows in the highest Tides, so as to pour it forth far beyond its usual Bounds, and make it overwhelm the adjacent Country; by this means ruining and destroying Towns and Cities: drowning both Men and Cattel: breaking the Cables of Ships, driving them from their Anchors, bearing them along with the Inundation several Miles

Miles up into the Country, and there running them a-ground : stranding Whales likewise, and other great Fishes, and leaving them, at its Return, upon dry Land.

That these *Phænomena* are not new, or peculiar to the Earthquakes which have happened in our times, but have been observed in *all Ages*, and particularly these exorbitant Commotions of the Water of the Globe. This we may learn abundantly from the Histories of former Times: and 'twas for this Reason that many of the Ancients concluded, rightly enough, that *they* were caused by the Impulses and Fluctuation of Water in the Bowels of the Earth; and therefore they very frequently called *Neptune* $\Sigma\upsilon\omicron\iota\chi\theta\omicron\nu$, as also $\text{Ἐρῶς}\chi\theta\omicron\nu$, $\text{Ἐρῶς}\chi\alpha\iota\theta\omicron$, and $\text{Τῶαν}\lambda\omicron\gamma\omicron\upsilon\alpha\iota\omicron\varsigma$; by all which Epithets they denoted his Power of *Shaking the Earth*. They supposed that he presided over all Water whatever, as well that within the Earth, as the Sea, and the rest upon it: and that the Earth was supported by Water, its Foundations being laid thereon; on which account it was that they bestowed upon him the Cognomen $\text{Ῥαῖος}\chi\theta\omicron$, or *Supporter of the Earth*,
and

and that of $\Theta\epsilon\mu\epsilon\lambda\iota\chi\Theta$, or *The Sustainer of its Foundations*. They likewise believed that he, having a full Sway and Command over the Water, had Power to still and compose it, as well as to move and disturb it, and the Earth, by means of it; and therefore they also gave him the Name of Ἀσφαλις , or *The Establisher*; under which Name several Temples were consecrated to him, and Sacrifices offered whenever an Earthquake happened, to pacifie and to appease him; requesting that he would allay the Commotions of the Water, secure the Foundations of the Earth, and put an end to the Earthquake.

That the *Fire* it self, which, being thus assembled and pent up, is the Cause of all these Perturbations, makes its own way also forth, by what Passages soever it can get vent: through the Spiracles of the next *Vulcano* ||: through || Conf.
the *Cracks* and Openings of the Earth Consect. 13.
above-mentioned: through the Aper- infra.
tures of *Springs*, especially those of the *Thermæ* †: or any other way that it † Vid.
can either find or make; and being Conf. 14.
thus discharged, the Earthquake cea- infra.
seth, till the *Cause* returns again, and
a fresh

a fresh Collection of this *Fire* commits the same Outrages as before.

That there is sometimes in Commotion a Portion of the Abyſs of that *vaſt Extent*, as to ſhake the Earth incumbent upon it for ſo very large a part of the Globe together, that the Shock is felt the ſame Minute precisely in Countries that are many hundreds of Miles diſtant from each other, and this even though they happen to be parted by the Sea lying betwixt them : nay, there want not Inſtances of ſuch an univerſal *Concuſſion of the whole Globe* as muſt needs imply an Agitation of the *whole Abyſs*.

That though the Abyſs be liable to theſe Commotions in all parts of it, and therefore no Country can be wholly exempted from the Effects of them ; yet theſe Effects are no where very remarkable, nor are there uſually any great damages done by Earthquakes, except only in thoſe Countries which are *mountainous*, and conſequently *ſtony*, and *cavernous* underneath * ; and eſpecially where the Diſpoſition of the *Strata* is ſuch that thoſe Caverns open into the Abyſs, and ſo freely admit and entertain the Fire, which aſſembling

* *Vid.*
Part 2.
Conf. 8.

bling therein, is the Cause of the Shock; it naturally steering its course that way where it finds the readiest Reception, which is towards these Caverns; this being indeed much the case of *Damps* in Mines, whereof more by and by. Besides that those Parts of the Earth which abound with *Strata* of Stone, or Marble, making the strongest Opposition to this Effort, are the most furiously shattered, and suffer much more by it than those which consist of Gravel, Sand, and the like laxer Matter, which more easily give way, and make not so great resistance; an Event observable not only in this, but all other Explosions whatever. But, above all, those *Countries*, which yeild great store of *Sulphur* and *Nitre*, are by far the most injured and incommoded by Earthquakes; these Minerals constituting in the Earth a kind of Natural Gunpowder, which, taking fire, upon this assembly and approach of it, occasions that murmuring noise, that subterranean Thunder (if I may so speak) which is heard rumbling in the bowels of the Earth during Earthquakes, and, by the assistance of its explosive Power, renders the Shock much

much greater, so as sometimes to make miserable Havock and Destruction. And 'tis for this reason that *Italy, Sicily, Anatolia*, and some parts of *Greece* have been *so long and so often* alarmed and harassed by Earthquakes; these Countries being all Mountainous, and Cavernous, abounding with Stone and Marble, and affording Sulphur and Nitre in great Plenty. But for a more particular History of the several *Phænomena* which precede, which accompany, and which follow after Earthquakes: for the Causes of those *Phænomena*: and for a more exact Account of the Origine, and the Oeconomy of this subterranean Fire, I must beg the Reader's Patience till the larger Work be made publick.

13. That *Ætna, Vesuvius, Hecla*, and the other *Volcanoes*, are only so many *Spiracles*, serving for the discharge of this *subterranean Fire*, when 'tis thus preternaturally assembled. That where there happens to be such a Structure and Conformation of the interiour Parts of the Earth as that the Fire may pass freely and without impediment from the Caverns, wherein it assembles, unto these *Spiracles*, it then readily

dily and easily gets out, from time to time, without shaking or disturbing the Earth; but where such Communication is wanting, or the Passages not sufficiently large and open, so that it cannot come at the said Spiracles without first forcing and removing all Obstacles, it heaves up and shocks the Earth, with greater or lesser Impetuosity, according as the quantity of the Fire thus assembled is greater or less, till it hath made its way to the Mouth of the *Vulcano*; where it rusheth forth, sometimes in mighty Flames, with great Velocity, and a terrible bellowing noise. That therefore there are scarcely any Countries, that are much annoyed with Earthquakes, that have not one of these Fiery Vents; and *these* are constantly all in Flames whenever any Earthquake happens; they disgorging that Fire, which, whilst underneath, was the cause of the Disaster; and were it not for these *Diversicula*, whereby it thus gains an *Exit*, 'twould rage in the Bowels of the Earth much more furiously, and make greater havock than now it doth. So that though those Countries, where there are such *Vulcano's*, are usually,
more

more or less, troubled with Earthquakes ; yet, were these *Vulcano's* wanting, they would be much more troubled with *them* than now they are : yea in all probability to that degree, as to render the Earth, for a vast space around them, perfectly uninhabitable. In one word, so beneficial are *these* to the Territories where they are, that there do not want Instances of *some* which have been rescued and wholly delivered from Earthquakes by the breaking forth of a new *Vulcano* there ; this continually discharging that Matter, which, being till then barricaded up, and imprisoned in the Bowels of the Earth, was the occasion of very great and frequent Calamities. That most of these Spiracles perpetually and at all Seasons send forth Fire, more or less ; and though it be sometimes so little that the Eye cannot discern it, yet even then, by a nearer Approach of the Body, may be discovered a copious and very sensible Heat continually issuing out.

14. That the *Thermæ*, *Natural Baths*, or *Hot Springs*, do not owe their Heat to any Colluctation or Effervescence of the Minerals in them, as some Naturalists

ralists have believed : but to the before-
 mention'd *Subterranean Heat* or Fire.
 That these Baths continually emit a
 manifest and very sensible Heat : nay
 some of them have been observed at
 some times to send forth an actual and
 visible Flame. That not only these,
 but all other Springs whatever, have
 in them some degree of Heat *, (none
 of them ever Freezing, no not in the
 longest and severest Frosts) but more
 especially those which arise where
 there is such a Site and Disposition of
 the *Strata* within the Earth as gives
 free and easie Admission to this Heat,
 and favours its Ascent to the Surface;
 where perspiring forth at the same
 Outlets with the Water of the Spring,
 it by that means heats it, more or less,
 as it chanceth to be dispensed forth in
 greater or lesser quantity. That as the
 Heat of all Springs is owing to this
 subterraneous Fire, so wherever there
 are any extraordinary Discharges of
 this Fire, there also are the neighbour-
 ing Springs hotter than ordinary ; wit-
 ness the many Hot-Springs near *Ætna*,
Vesuvius, *Hecla*, and all other *Vulca-*
noes. That the Heat of the *Therma* is
 not constant, and always alike ; the

* It is in-
 deed by
 this very
 heat that
 their Water
 is borne
 unto them
 from out
 the Abyss.
 Vid. Conf.
 8. supra.

† *Vid. Conf.*
12. and 13.
supra.

same Spring suffering at some times a very manifest Failure and Remission of its Heat : at others as manifest an Addition and Encrease of it ; yea sometimes to that Excess as to make it boil and bubble with extream Heat, like Water when boyling over a common Fire. That particularly during Earthquakes, and Eruptions of *Vulcano's* †, when there is a more copious Accession of this subterraneous Fire, the *Thermæ* all thereabouts become much hotter than before: yeilding also a far greater supply of Water than they were wont to do : and a murmuring Noise is usually heard, below them, in the Bowels of the Earth ; all which is occasioned meerly by the then rapid Motion, and Ascent of the Fire, in greater plenty than before, to the Apertures of these Springs.

I have now finish'd the Account of this Section : and was just going to take off my hand here ; but recollecting that in the foregoing Part of this Work || I promised some further *Proofs* of *Contrivance* in the Structure of the Globe we dwell upon: and such too as may satisfie any fair and unbyass'd Spectator that the framing and Composition

position of it out of the Materials of the former Earth was a work of Counsel and Sagacity: a Work apparently above the highest reaches of Chance, or the Powers of Nature; and this being a proper place wherein to produce those Proofs, I shall give such Hints of them as the Brevity I am tyed up to will permit me, and then conclude.

I am indeed well aware that the Author of the *Theory of the Earth* * differs * Lib. I. c. 9. to 12. very much from me in Opinion as to this matter. He will not allow that there are any such Signs of Art and Skill in the Make of the Present Globe as are here mentioned: or that there was so great Care, and such exact Measures taken in the re-fitting of it up again at the Deluge. He reckons it no other than an huge disorderly Pile of *Ruines and Rubbish*: and is very unwilling to believe that it was the Product of any Reasoning or Designing Agent. The Chanel of the Ocean appears to him *the most ghastly thing in Nature*, and he *cannot at all admire its beauty or elegancy*: for 'tis, in his judgment, *as deformed and irregular as it is great*. And for the Caverns of the Earth, the Fissures and Breaches of the

Strata, he cannot fancy that they were formed by any work of Nature, nor by any immediate Action of God, seeing there is neither use, that he can discover, nor beauty in this kind of Construction. Then for the Mountains, these, he says, are placed in no order one with another, that can either respect Use or Beauty, and do not consist of any proportion of Parts that is referable to any Design, or that hath the least footsteps of Art or Counsel. In fine, he thinks there are several things in the Terraqueous Globe that are rude and unseemly : and many that are superfluous. He looks upon it as incommodious, and as a broken and confused heap of Bodies, placed in no order to one another, nor with any correspondency or regularity of Parts : and it seems to him nothing better than a rude Lump, and a little dirty Planet. I have given his Opinion in his own Words, though I have upon all like Occasions taken a shorter Course, and contented my self with giving only the sense of others ; but this I have done here, least any Man should suspect that I mistake the Author's Sentiments, or do not represent them fairly.

Now

Now though it were really so, that there were some such Eye-sores in our Earth as are here suggested : and that we could not presently find out all the Gayeties and Embelishments that we might seek for in it, the matter would not be great : and we might very well be contented to take it as we find it. But after all the thing is in truth quite otherwise, and there are none of all these wanting : nor any such Deformities as are here imagined ; but, on the contrary, so very many real Graces and Beauties, that 'tis no easie thing to overlook them all. Even this very variety of Sea and Land, of Hill and Dale, which is here reputed so inelegant and unbecoming, is indeed extremely charming and agreeable. Nor do I offer this as any private Fancy of my own, but as the common Sense of Mankind, who are the true and proper Judges in the Case, both the Ancients and Moderns, giving their Suffrages unanimously herein ; and even the Heathens themselves, have esteemed this variety not only ornamental to the Earth, but a Proof of the Wisdom of the Creator of it, and alledged it as such ; whereof more in due place.

And, as I cannot admit that there is any thing unhandsome or irregular : so much less can I grant that there is any thing incommodious and Artless, or useless and Superfluous, in the Globe. Were I at full Liberty to do it here, 'twould be no hard thing to make appear that there are no real Grounds for any such Charge. For how easie were it, by taking a minute and distinct Survey of the Globe, and of the very many and various Limbs and Parts of it, to shew that all these are ordered and digested with infinite Exactness and Artifice; each in such manner as may best serve to its own proper End, and to the use of the whole? How easie were it to shew, that the Rocks, the Mountains, and the Caverns, against which these Exceptions are made, are of indispensable Use and Necessity, as well to the Earth, as to Man and other Animals, and even to all the rest of its Productions? That there are no such Blemishes, no Defects: nothing that might have been altered for the better: nothing superfluous: nothing useless, in all the whole Composition? and so finally trace out the numerous Footsteps and Marks of the Presence and
Inter-

Interposition of a most wise and intelligent Architect throughout all this stupendous Fabrick? But I must reserve *this* for the larger Work, and content my self for the present with only giving some brief Hints of it in the following Propositions. Namely,

That 'twas absolutely necessary for the well-being both of the Earth it self, and of all terrestrial Bodies, that some of the *Strata* should consolidate, as they did, immediately after the Subsidence of their Matter at the Deluge: that *these* should afterwards be broken in certain places: and lastly, that they should be dislocated, some of them elevated, and others depressed.

That had not the *Strata* of Stone and Marble become solid *, but the Sand, ^{* As Part 2.} or other Matter whereof they consist, ^{Cons. 4.} continued lax and incoherent, and they consequently been as pervious as those of Marle, Gravel, and the like, the Water which rises out of the Abyfs, for the Supply of Springs and Rivers, would not have stop'd at the Surface of the Earth, but march'd directly, and without impediment, up into the Atmosphere, in all parts of the Globe wherever there was Heat enough in

the Air to continue its Ascent, and buoy it up; so that there then must needs have been an universal failure and want of Springs and Rivers all the Summer-Season, in the colder Climes: and all the Year round in the hotter; and those that are near the *Æquator*, where there is much the greatest need of both the one and the other; and this meerly for want of the Interposition of such dense and solid *Strata*, to arrest the ascending Vapour to stop it at the Surface of the Earth: and to collect and condense it there.

That though the *Strata* had become solid, so as to have condensed the rising Vapour, yet if they had not been broken also, || the Water must have lain eternally underneath those *Strata*, without ever coming forth; so that there then could have been neither Springs nor Rivers for a very considerable part, or indeed, almost the whole Earth; the Water, which supplies these, proceeding out at those Breaches*. This Water therefore would have been wholly intercepted, all lock'd up within the Earth, and its Egress utterly debarr'd, had the *Strata* of Stone and Marble remained continuous, and with-

|| As Part 2.
Conf. 6.

Conf. 8.
supra.

without such Fissures and Interruptions. That these Fissures have a still further use, and serve for Receptacles of Metalls, and of several sorts of Minerals; which are arrested by the Water in its passage thither through the *Strata* wherein the single Corpuscles of those Metalls and Minerals were lodged †, and borne along with it into these Fissures; where, being by this means collected, they are kept in store for the use of Mankind. † *Part 4. Conf. 5.*

That though there had been both *solid Strata* to have condens'd the ascending Vapour: and *those* so broken too as to have given free Vent and Issue to the Water so condensed; yet had not the said *Strata* been dislocated likewise ||: some of them elevated, and others depress'd, there would have been no Cavity or Chanel to give Reception to the Water of the Sea: no Rocks, Mountains, or other Inequalities in the Globe; and without these, the Water, which now arises out of it, must have all stagnated at the Surface, and could never possibly have been refunded forth upon the Earth: nor would there have been any Rivers, or running Streams, upon the face of the *Part 2. Conf. 6, 7, 8.*

the whole Globe, had not the *Strata* been thus raised up, and the Hills exalted above the neighbouring Valleys and Plains; whereby the Heads and Sources of Rivers, which are in those Hills, were also borne up above the ordinary Level of the Earth, so as that they may flow upon a Descent, or an inclining Plane, without which they could not flow at all †.

† *Conf.*
Conf. 8.
supra.

That this Affair was not transacted unadvisedly, casually, or at random: but with due Conduct, and just Measures. That the quantity of Matter consolidated: the Number, Capacity, and Distances of the Fissures: the Situation, Magnitude, and Number of the Hills, for the condensing, and discharging forth the Water; and, in a word, all other things were so ordered as that they might *best* conduce to the *End* whereunto they were *designed* and ordained: and such provision made that a Country should not want so many Springs and Rivers as were convenient and requisite for it: nor, on the other hand, be over-run with them, and afford little or nothing else; but a Supply every where ready, suitable to the Necessities and Expences of each Climate

Climate and Region of the Globe. For example, those Countries which lye in the Torrid Zone, and under or near the *Line*, where the Heat is very great, are furnished with Mountains answerable: Mountains which both for Bigness and Number surpass those of colder Countries as much as the Heat there surpasses that of those Countries. Witness the *Andes*, that prodigious Chain of Mountains in *South America*: *Atlas* in *Africa*: *Taurus* in *Asia*: the *Alpes* and *Pyrenees* of *Europe*, to mention no more. By these is collected and dispensed forth a quantity of Water proportionable to the Heat of those Parts; so that although, by reason of the Excess of this Heat there, the Evaporations from the Springs and Rivers are *very great*, yet they, being, by these larger Supplies, continually stock'd with an Excess of Water *as great*, yeild a Mass of it for the use of Mankind, the Inhabitants of those Parts, of the other Animals, and of Vegetables, not much, if at all, inferiour to the Springs and Rivers of colder Climates. That besides this, the Waters thus evaporated and mounted up into the Air, thicken and cool it,

it, and, by their Interposition betwixt the Earth, and the Sun, skreen and fence off the ardent Heat of it, which would be otherwise unsupportable: and are at last returned down again in copious and fruitful Showers to the scorched Earth; which, were it not for this remarkably Providential Contrivance of Things, would have been there perfectly uninhabitable: labour-ed under an eternal Drought: and have been continually parched and burnt.

To this former Section I shall add, by way of Appendix,

- I. A Dissertation concerning the *Flux and Reflux of the Sea*: and its other *Natural Motions*; with an Account of the *Cause* of those *Motions*: as also of the *End* and *Use* of them: and an Enquiry touching the *Cause* of the *Ebbing* and *Flowing*, and some other uncommon *Phænomena* of certain *Springs*.
2. A Discourse concerning the *Saltneß* of the *Sea*.
3. A Discourse concerning *Wind*: the *Origin*, and *Use* of it in the *Natural World*.

PART III. SECT. II.

*Of the Universality of the Deluge.
Of the Water which effected it.
Together with some further Particulars concerning it.*

IN the precedent Section I consider the present and natural State of the Fluids of the Globe. I ransack the several Caverns of the Earth: and search into the Storehouses of Water; and this principally in order to find out where that mighty Mass of Water which overflowed the whole Earth in the days of *Noah*, is now bestowed and concealed: as also which way 'tis at this time useful to the Earth and its Productions, and serviceable to the present Purposes of Almighty Providence.

Such a Deluge as that which *Moses* represents, whereby *All the high Hills that were under the whole Heaven were covered* †, would require a portentous † *Gen. 7. 19.* quantity of Water; and Men of Curiosity, in all Ages, have been very much

much to seek what was become of it, or where it could ever find a Reservoir capable of containing it. 'Tis true there have been several who have gone about to inform them, and set them to rights in this Matter ; but for want of that Knowledge of the present System of Nature : and that insight into the Structure and Constitution of the Terraqueous Globe, which was necessary for such an Undertaking, they have not given the Satisfaction that was expected. So far from it that the *greatest part* of these, seeing no where Water enough to effect a *General Deluge*, were forced at last to mince the Matter, and make only a *Partial* one of it ; restraining it to one single Country : to *Asia*, or some lesser portion of Land ; than which, nothing can be more contrary to the *Mosaic Narrative*.

For *the rest*, they had recourse to Shifts which were not much better ; and rather evaded than solved the Difficulty ; some of them imagining that a quantity of Water, sufficient to make such a Deluge, was created upon that Occasion, and, when the business was done, all disbanded again and annihilated.

ted. Others supposed a Conversion of the Air and Atmosphere into Water, to serve the turn. Many of them were for fetching down I know not what supercœlestial Waters for the purpose. Others concluded that the Deluge rose only fifteen Cubits above the Level of the Earth's ordinary Surface, covering the Valleys and Plains, but not the Mountains : all equally wide of Truth, and of the Mind of the Sacred Writer.

One of the last Undertakers of all seeing this, began to think the Cause desperate ; and therefore, in effect, gives it up. For considering how unsuccessful the Attempts of those who were gone before him had proved : and having himself || also employed his *Theory of*
last and utmost endeavours to find out *Earth,*
Waters for the Vulgar Deluge : having *1. I. C. 2.*
mustered up all the Forces he could think of, and all too little : *The Clouds above, and the Deep below, and in the bowels of the Earth ; and these, says he, are all the Stores we have for Water, and Moses directs us to no other for the Causes of the Deluge :* he prepares for a Surrender, asserting, from a mistaken and defective Computation, that *all these* will not come up to near the
quan-

quantity requisite: and that in any known parts of the Universe, to find Water sufficient for this effect, as it is generally explained and understood, is, he thinks, impossible: that is, sufficient to cause a Deluge, to use his own Words, overflowing the whole Earth, the whole Circuit, and whole Extent of it, burying all in Water, even the greatest Mountains: which is, in plain terms, such a one as was explained and understood by Moses, and the Generality of Writers since.

Having therefore thus over-hastily concluded that such a Deluge was impossible: and that all Nature could not afford Water enough to drown the whole Globe, if of the Circuit and Extent that now it is: he flies to a new Expedient to solve the Matter, and supposes an Earth of a Make and Frame much like that imaginary one of the Famous Monsieur *Des Cartes* ||, which he makes to fall all to pieces, at the Deluge, and to contract it self into a lesser room, that the Water might the better surround and encompass it.

|| *Princ.*
Philos. 1. 4.

The sober and better sort of the Standers-by, and those who were Well-wishers to Moses, began to be under

under some Concern and Uneasiness to see him thus set aside only to make way for a new Hypothesis: and so serious and weighty a Matter, as is this Tradition of the Universal Deluge, plac'd after all upon so very unsteady a Bottom. But that Concern encreas'd when they further heard him so zealously decrying all former Notions of a Deluge: refusing to grant one upon any Terms but his own: and so peremptorily declaring, *That all other ways assigned for the Explication of Noah's Flood are false or impossible.* This was to reduce the Thing to a very great Streight: and surely an exposing and venturing of it a little too far. For if all the other Ways be false and impossible, should this, the only one left, prove at last so likewise, the Opinion of a Deluge would be left very precarious and defenceless, and we might either believe or disbelieve it at pleasure; nay the negative part would of the two have much the Advantage, there being no reasonable Foundation to believe that the Deluge did come to pass this way.

Some Men there are who have made a very untoward use of *this*, and such

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a one that I am willing to persuade myself he never intended they should; yet it were to have been wish'd that he had been somewhat more wary. These cryed up this Computation of the Water as indisputable and infallible: and then boldly gave out that such a Deluge as that described by *Moses* was altogether incredible, and that there never was nor could be any such Thing. Nothing was talk'd of amongst them under Mathematical Demonstrations of the Falshood of it; which they vented with all imaginable Triumph, and would needs have it that they had here sprung a fresh and unanswerable Argument against the Authentickness of the *Mosaick* Writings; which indeed is what they drive at, and a Point they very fain would gain.

For my part, my Subject does not necessarily oblige me to look after this Water: or to point forth the place whereinto 'tis now retreated. For when, from the Sea-shells, and other Remains of the Deluge, I shall have given undeniable Evidence that it did actually cover all Parts of the Earth, it must needs follow that there was then Water enough to do it, wherever it
may

may be now hid, or whether it be still in being or not. Yet the more effectually to put a stop to the Insults and Detractions of these vain Men, I resolved to enter a little farther into the Examination of this Matter; and that produced the former Section of this 3d Part; wherein I enquire what proportion the Water of the Globe bears to the Earthy Matter of it; and upon a moderate Estimate and Calculation of the Quantity of Water now actually contained in the Abyſs, I found that this alone was full enough, if brought out upon the Surface of the Earth, to cover the whole Globe to the height assigned by *Moses*; which is, fifteen Cubits above the Tops of the highest Mountains*; the Particulars of which * *Gen. vii.* Calculation, shall be laid before the Reader at length in the *Larger Work*; for any one will easily see that there is so great an *Apparatus* of Things only previous, which must needs be adjusted before I can come to the Calculation it self, that to descend to Particulars here, further than I have already || done, || *Conf. Sect. 1. Conf. 12.* would not only carry *this Discourse* out beyond all reasonable Bounds, and make the Parts of it disproportionate

to each other, but, which is not less to be thought of, would be an Anticipation of the *Other Work*.

This done, I again set aside the Observations about the Fluids of the Globe, introduced upon this Occasion in the other Section, as now of no further use: and reassume the Thread of the other Observations which I propose at the Beginning of this Work; and from them I shew,

1. That the *Deluge* was *Universal*, and laid the whole Earth under Water: covering all, even the highest, Mountains, quite round the Globe.

2. That at the time of the Deluge the Water of the *Ocean* was first born forth upon the Earth: That it was immediately succeeded by *that* of the *Abyss*; which likewise was brought out upon the Surface of the Globe.

3. That upon the Disruption of the *Strata*: and the Elevation of some, and Depression of others of them, which followed after that Disruption, towards the latter end of the Deluge †, this Mass of Water fell back again into the deprest and lower parts of the Earth: into Lakes and other Cavities: into the *Alveus* of the Ocean: and through the
Fissures

† *Part 2.*
Cons. 6.

Fissures whereby *this* communicates with the Ocean *, into the Abyſs; * *ſett. 1.* which it filled till it came to an *Equi-ſupra.* *Conf. 2.* *librium* with the Ocean.

That there muſt have paſs'd a conſiderable number of *Years* betwixt the Creation and the Deluge: and moſt probably about ſo many as *Mofes* hath assigned. 4.

That the Deluge commenc'd in the *Spring-ſeaſon*: the Water coming forth upon the Earth in the Month which we call *May* †. † *Confer. Part 6. ſub finem.* 5.

That not only Men, Quadrupeds, Birds, Serpents, and Inſects; the Inhabitants of the Earth and Air: but the far greateſt part of all kinds of *Fiſh* likewise, the Inhabitants of the Sea, of Lakes, and of Rivers, ſuffered under the Fury of the Deluge, and were killed and *deſtroyed* by it. 6.

That the Deluge did not happen from an accidental Concourse of Natural Cauſes as the Author above-cited is of Opinion ||. That very many Things || *Theory of the Earth. l. 1. c. 6. 8. &c.* were then certainly done, which never poſſibly could have been done without the Aſſiſtance of a *Supernatural Power*. 7.

That the ſaid Power acted in this Matter with *Deſign*, and with the higheſt

Wisdom. And that, as the System of Nature was then, and is still, supported and established, a Deluge neither could then, nor can now, happen naturally.

I close up this Section with two additional Discourses.

The first concerning the *Migration of Nations* : with the several Steps whereby the *World* was re-peopled after the Deluge by the Posterity of *Noah*, and particularly that mighty Tract of *America*. Wherein I shall make out,

1. Who they were that first peopled it. 2. When they departed thitherwards. 3. What Course they took : and by what means both Men and Beasts, as well Serpents and the other noxious and more intractible kinds of them, as the more innocent and useful, got thither. 4. Whether there remain any certain *Vestigia* of a Tradition, in the Writings of the Ancients, about these *Americans* : and what Country they intended under the Name of *Atlantis*. 5. Whether the *Phœnicians*, or any other Nation of the old World, maintained anciently any Commerce or Correspondence with them. 6. How it happened that both the Inhabitants

of

of *that*, and of *our* World, lost all memory of their Commigration hence.

7. Whence came the Difference in Person, or in the external Shape and Lineaments of the Body: in Language: in Dyet, and manner of Living: in Clothing: in Arts and Sciences: in Customs Religious, Civil, and Military, betwixt these *Americans*, and their old Relations in *Asia*, *Europe*, and *Africa*. With Animadversions on the Writings of *Grotius*, *De Laet*, *Hornius*, and others, upon this Subject.

The Second concerning the unanimous Tradition of an *Universal Deluge* amongst all the most ancient *Gentile Nations*: particularly the *Scythians*, the *Persians*, and *Babylonians*: the *Bithynians*, *Phrygians*, *Lydians*, *Cilicians*, and other People of *Asia Minor*: the *Hierapolitans*, *Phœnicians*, and other Inhabitants of *Syria*: the *Egyptians*, *Carthaginians*, and other *African Nations*: the most ancient Inhabitants of the several Parts of *Greece*: and of the other Countries of *Europe*: the old *Germans*: the *Gauls*: the *Romans*: the ancient Inhabitants of *Spain*, and even the *Britains* themselves, the first Inhabiters of this Island: Proving that the great De-

vastation and Havock the Deluge made, both of the Earth it self, of the Generality of Mankind, of Brutes, and all Animals, had wrought a deep and verry sensible Impression upon the Minds of these ancient Nations, who lived nearer to the time of it. That they had not only a Memory and Tradition of it in general and at large: but even of severall the most remarkable particular Accidents of it likewise; which they handed downwards, to the succeeding Ages, for some time, with Notes of the greatest Terror, Amazement, and Consternation expressible. That it was commemorated chiefly by certain Religious Rites and Ceremonies used by them in the Worship of the EARTH: which Superstitious Adoration was first instituted upon this Occasion in those simple and ignorant Ages †, and address'd to the Earth, not only expressly and by Name, but also under the feigned and borrowed Names of *Alargatis*, *Derceto*, *Astarte*, *Dea Syria*, *Herthus*, *Isis*, *Magna Mater*, *Cybele*, and *Rhea*, with severall more; by all which, they intended the Earth. That at length the Tradition, for want of Letters,

which

† *Vid.*
pag. 55.
& seq. ut
& pag. 95.

which were not then invented, or some other like means to preserve it, wearing out, and the reason of the Institution of this Worship being by degrees forgot, the After-Ages perverted it to a somewhat different Sense and Intention: supposing that this was only a reverential Duty and Gratitude paid to the Earth as the Common Parent of Mankind, and because both Man, and all other Creatures proceed out of it; by which means the true Notion of the Institution being lost, the Tradition of the Deluge, which was couched under it, was also thereupon at length suspended and lost; none of all these many Nations, in the latter Ages of the World, having any Memory or Knowledge of it, besides what they afterwards recovered from the Jews and ancient Christians, who had it from the Writings of *Moses*. In *Greece* indeed there were some other Accidents which perplex'd and impeded the Tradition of it in that Country, whereof I have already † given such Hints as this Discourse will bear.

† Part I.
pag. 68.

PART

PART IV.

*Of the Origin and Formation of
Metalls and Minerals.*

WHat I can advance, with competent Certainty, about the Fluids of the Globe: the Sea, Springs, Rivers, and Rain, I propose in the immediately foregoing, or Third Part of this Essay: As in the Second Part of it I dispatch the Solids: Stone, Marble, Gravel, and all the other Terrestrial Matter of it, which is digested into *Strata*. That Part therefore comprehends the far greater share of that Matter; and indeed all, excepting only *Metalls* and *Minerals*; which are found much more sparingly and in lesser Parcels; being either enclosed in those *Strata* (lying amongst the Sand, Earth, or other Matter whereof they consist) or contained in their perpendicular Fissures. And *these* remaining still

still to be considered, I have allotted this Fourth Part to that Purpose.

To write of Metalls and Minerals intelligibly and with tolerable perspicuity, is a Task much more difficult than to write of either Animals or Vegetables. For these carry along with them such plain and evident Notes and Characters either of Disagreement, or Affinity with one another, that the several Kinds of them, and the subordinate Species of each, are easily known and distinguish'd, even at first sight; the Eye alone being fully capable of judging and determining their mutual Relations, as well as their Differences.

But in the Mineral Kingdom the Matter is quite otherwise. Here is nothing *regular*, whatever some may have pretended: nothing *constant* or *certain*: insomuch that a Man had need to have all his Senses about him: to use repeated Tryals and Inspections, and that with all imaginable Care and Wariness, truly and rightly to discern and distinguish Things, and all little enough too. Here is such a vast variety of *Phænomena*, and those, many of them, so delusive, that 'tis very hard to escape Imposition and Mistake.

Colour,

Colour, or outward Appearance, is not at all to be trusted. A common *Marcasite* or *Pyrites* shall have the Colour of Gold most exactly: and shine with all the Brightness of it, and yet upon tryal, after all, yield nothing of worth, but *Vitriol*, and a little *Sulphur*: whilst another Body, that hath only the Resemblance of an ordinary Peble, shall yield a considerable quantity of Metallick and valuable Matter. So likewise a Mass, which, to the Eye, appears to be nothing but meer simple Earth, shall, to the Smell or Taste, discover a plentiful Admixture of *Sulphur*, *Alum*, or some other Mineral.

Nor may we with much better Security rely upon *Figure*, or external Form. Nothing more uncertain and varying. 'Tis usual to meet with the very same Metall or Mineral, naturally shot into quite different Figures: as 'tis to find quite different kinds of them all of the same Figure. And a Body, that has the shape and appearance of a Diamond, may prove, upon Examination, to be nothing but *Cryстал*, or *Selenitis*: nay perhaps only common Salt, or *Alum*, naturally cryсталized and shot into that Form.

So

So likewise if we look into their *Situation*, and place in the Earth; sometimes we find them in the perpendicular Intervalls: sometimes in the Bodies of the *Strata*, being interspers'd amongst the Matter whereof they consist: and sometimes in both; even the gemmeous Matter it self, (if I may so speak) with this only difference, that those Gemms, *e. g.* Topazes, Amethyfts, or Emeralds, which grow in the Fissures, are ordinarily crySTALLIZED, or shot into angulated Figures: whereas in the *Strata* they are found in rude Lumps, and only like so many yellow, purple, and green Pebles. Not but that even these that are thus lodged

in the *Strata* are also sometimes found crySTALLIZED †, and in form of Cubes, † *The CrySTALLIZED Bodies found in the perpendicular Intervalls are easily known from those which are lodged in the Strata, even by one who did not take them thence, or observe them there. The former have always their Root, (as the Jewellers call it) which is only the Abruptness at that end of the Body whereby it adhered to the Stone, or sides of the Intervalls, which Abruptness is caused by its being broke off from it. Those which are found in the Strata of Earth, Sand, or the like, (having lain loose therein) are intire, and want that Mark of Adhesion: but those which are inclosed in Stone, Marble, or such other solid Matter, being difficultly separable from it, because of its Adhesion to all sides of them, have commonly some of that Matter still adhering to them, or at least Marks of its Abruption from them, on all their sides; wherein these differ from those found in the perpendicular Intervalls, they adhering, as we have noted, by only one end. Vid. Conf. 6. &c. infra.*

Rhombs,

* *Vid.*
Conf. 2.
infra.

Rhombs, and the like *. Or if we have respect to *the terrestrial Matter wherein they lye* in those *Strata*, here we shall meet with the same Metall or Mineral embodied in Stone, or lodged in Cole, that elsewhere we found in Marle, in Clay, or in Chalk ||.

|| *Vid.*
Consect. 3.
infra.

As much Inconstancy and *Confusion* is there in their *Mixtures with each other*, or their Combinations amongst themselves; for 'tis rare to find any of them pure, simple, and unmixt: but Copper and Iron together in the same Mass: Copper and Gold: Silver and Lead: Tin and Lead: yea sometimes all the six promiscuously in one Lump. 'Tis the same also in Minerals; Nitre with Vitriol: Common Salt with Alum: Sulphur with Vitriol: and sometimes all five together. Nor do Metalls only sort and herd with Metalls in the Earth: and Minerals with Minerals: but both indifferently and in common together: Iron with Vitriol, with Alum, with Sulphur: Copper with Sulphur, with Vitriol, &c. yea Iron, Copper, Lead, Nitre, Sulphur, Vitriol, and perhaps some more in one and the same Mass. In a word, the only standing Test, and discriminative Characteristick

characteristick of any Metall or Mineral must be sought for in the constituent Matter of it: and it must be first brought down to *that* before any certain Judgment can be given. And when that is once done, and the several kinds separated and extracted each from the other, an homogeneous Mass of one kind is easily distinguishable from any other: Gold from Iron: Sulphur from Alum: and so of the rest. But without *this*, so various are their Intermixtures, and so different the Face and Appearance of each, because of that Variety, that scarcely any thing can be certainly determined of the particular Contents of any single Mass of Ore by meer Inspection. I know that by Experience and Conversation with these Bodies, in any Place or Mine, a Man may be enabled to give a near Conjecture at the Metallick or Mineral Ingredients of any Mass commonly found there; but this meerly because he hath before made tryal of other like Masses, and thereby learned what it is they contain. But if he remove to another place, though perhaps very little distant, 'tis ten to one but he meets with so different a face of Things, that he'll be

be there as far to seek in his Conjectures as one who never before saw a native Ore, untill he hath here made his tryals as before, and so further informed himself in the matter.

Metalls being so very useful and serviceable to Mankind, great Care and Pains hath been taken, in all Ages, in searching after them, and in separating and refining of them. For which reason 'tis that *these* have been accurately enough *distinguish'd*, and reduced to six kinds, which are all well enough known. But the like pains hath not been taken in Minerals; and therefore the Knowledge of them is somewhat more confused and obscure. These have not yet been well reduced, or the number of the simple original ones rightly fixt; some, which are only Compounds, the Matter of two or more kinds being mix'd together, and, by the different Proportion and Modulation of that Matter, variously disguised and diversified, having been reputed all different kinds of Minerals, and thereby the Number of them unnecessarily multiplied. Of this we have an Instance in the Gemm-kind; where, of all the many sorts reckoned
up

up by *Lapidaries*, there are not above three or four that are *Original*; their *Diversities*, as to Lustre, Colour, and Hardness, arising from the different Admixture of other adventitious Mineral Matter. But the farther and clearer Adjustment of this Affair I am constrained to adjourn to the larger Treatise.

In the mean time 'tis sufficient for my present Design, to remark in general, that those *Minerals* and Ores of *Metalls* which are repositied in the *Bodies of the Strata*, are either found in *Grains*, or small Particles, dispersedly intermix'd with the Corpuscles of Earth, Sand, or other Matter of those *Strata*: or else they are *amass'd* into *Balls*, *Lumps*, or *Nodules*. Which *Nodules* are either of an *irregular* and uncertain Figure, such as are the common *Pyrites*: *Flints*, *Agates*, *Onyx's*: *Pebbles*, *Cornelions*, *Jaspers*, and the like: or of a Figure somewhat more *regular* and observable, such as the *Belemnites*: the several sorts of *Mineral Coral*, of the *Stelechites*, and of the *Lapis Mycetoides*||: || *Vulgarly call'd Fungites.*
the *Astroites*, or *Starry-Stone*, as well
that sort with the *Prominent*, as that
with the *Concave Stars*: the *Selenites*:

the *Echinated Crystalline Balls*, with many more analogous Bodies.

Those which are contained in the *Perpendicular Intervalls* of the *Strata* are, either such as are there accumulated into a *rude Heap*, without any particular Form or Order, being only included betwixt the two opposite Walls or Sides of the said Intervalls, which they wholly or partly fill, as there is a greater or less quantity of them; in which manner *Spar* is usually found herein, and other Minerals, as also the common Ores of *Lead*, *Tin*, *Iron*, and other *Metals*: or else such as are of some *observable Figure*; of which sort are the *Sparry Stiria*, or *Iceycles* called *Stalactita* *: the *Native Saline Iceycles*, or *Sal Stalacticum*: the *Vitriolum Stalacticum Nativum*: the *Vitriolum Capillare*: the *Alumen Stalacticum*, and *Capillare*: *Minera ferri Stalactica*, which, when several of the *Cylindrick Stiria* are contiguous, and grow together into one Sheaf, is called *Brush-Iron-Ore*: *Argentum Arborescens*, & *Capillare*: as also the *Crystallized Ores and Minerals*, e. g. the *Iron-Rhombs*, the *Tin-Grains*: the *Mundick-Grains*: *Crystallized Native Salt*, *Alum*, *Vitriol*, and *Sulphur*:
of

* Or rather *Stagonitæ*.

of which sort likewise are the *Gemms* or *Stones* that are here shot into *Cubes*, into *Pyramidal Forms*, or into *angulated Columns*, consisting of *six Sides*, and *mucronated* or *terminating in a Point*: being either *opaque*, or *pellucid*: or *partly pellucid*, and *partly opaque*, and *coloured*, *black*, *white*, *grey*, *red*, *purple*, *blue*, *yellow*, or *green*: e. g. *Crystall*, the *Pseudo-Adamantes*, the *Cornish-Stones*, the *Bristow-Stones*, *Crystallized Sparrs*, the *Iris*, the *Amethyst*, the *Sapphire*, the *Topaz*, the *Emerauld*, and *several others*.

My Business here is to enquire into the *Origin* and *Production* of these *Metallick* and *Mineral Bodies*: to enquire how they came into this condition, and attained these *Figures*. And as my *Observations* have been the light whereby I have hitherto steered my *Course*, so I here betake my self unto them again; and 'tis from them that I prove,

That as the more gross and massive parts of the *Terrestrial Globe*: the *Strata* of *Stone*, *Marble*, *Earth*, and the rest, owe their present *Frame* and *Order* to the *Deluge* *: so likewise do *Metalls* and *Minerals* too; the far

i.
* *Vid.*
Part 2.

greater part of them, I mean all those which we now find lodged in those *Sirata* amongst the Sand, Earth, &c. being actually reposed therein during the time that the Water covered the Earth: and the Earth it self then put into such a condition that the rest, I mean those we now find in the perpendicular Intervalls, should be collected thither by degrees, and be formed almost of course, meerly by the ordinary Motion of the Water, and its Passage to and fro in the Earth *.

* *Vid. Conf.*
4. and 5.
infra.

2.

That whilst the Corpuscles of Metals and Minerals, together with those of Stone, Marble, Cole, Chalk, and the like courser Matter: as also the Shells, Teeth, and other parts of Animals and Vegetables: were sustained in the Water, at the Deluge †; after some time, that the violence of the Hurry and Commotion was over, and the Water come to a state somewhat more calm and sedate, such of those Corpuscles, as happened to occur or meet together, affix'd to each other: and, many of them convening, uniting, and combining into one Mass, formed the Metallick and Mineral Balls or Nodules which we now find.

† *Part 2.*
Confess. 2.

That

That all Metallick and Mineral *Nodules* whatever: as well those which are in *rude* Lumps, such as the common *Pyritæ*, Flints, Agates, Onyxes, Pebles, Jaspers, Cornelions, and the like: as those which are of a more *regular* and observable Shape, such as the Selenites, Belemnites, Stelechites, Mineral Coral: and, in one word, all others whatsoever, were formed at this time and by this means.

That in such parts of the Water where the *Corpuscles* so sustained chanced to be all of the same kind *: or, at ^{* *Vid. Part*} least, where there were fewer kinds ^{5. *Cons.* 1.} or varieties of them, the *Nodules*, which were thus formed out of them, were more *simple*, pure, and homogeneous, as are the Selenites, and some kinds of Pebles and Flints, to name no more: But where (as indeed it generally fell out) there happened to be a greater variety of *Corpuscles*, as suppose of Sulphur, of Vitriol, of Alum, of Iron, of Copper, or whatever else, sustained promiscuously together, there the *Nodules*, formed out of them, were *mixt*, and consisted of a greater variety of Matter confusedly associated into the same Lump. Of this the *Pyritæ*

N 3 may

may serve for an Example; whereof some yield Iron, Sulphur, and Vitriol: others Copper and Alum: yea some of them contain all these, and several more, in the same Nodule.

|| Part 2.
Cons. 2.

That the Bones, Teeth, Shells, and other like Bodies, being sustained in the Water together with these Metallick and Mineral Corpuscles||, and the said Corpuscles meeting with, and hitting upon those Bodies, they affix'd unto them, and became conjoyned with them: some of them (though this very rarely) passing into their Pores and Interstices: others adhering in Lumps, or Masses, to their Out-sides, and indeed oftentimes combining in such numbers upon the exterior Surface of the Shell, Tooth, &c. as wholly to cover and involve it in the Mass they together constituted: and others of them entering into the Cavities of the *Echini*, *Cochleæ*, *Conchæ*, and other Shells, till they had quite filled them up; those Shells, by that means, serving as Proplasmes, or Moulds, to the Matter which so filled them, limiting and determining both the Dimensions and Figure of it. That accordingly we at this day find some few of these
fos-

fossil Shells, and other Animal Substances, with Iron-ore, Spar, Vitriol, Sulphur, and the like, intruded into their Pores: but far greater numbers of them with Lumps of Flint, Ores of Metalls, and Minerals, growing firmly to the Out-sides of them, and oftentimes in such quantity as that the Shell or Tooth is wholly covered by those Minerals, being immers'd or included in the Mass they constitute; insomuch that 'tis very usual, upon breaking Flints, *Pyritæ*, &c. to find *Pectines*, *Conchæ*, and the like, enclosed, even in the very middle of them. As common is it to find *Echini*, *Cochleæ*, *Conchæ*, and other Shells, having their Cavities fill'd up with Ores of Metalls, Flint, Spar, Native Vitriol, Sulphur, and other Minerals. Not but that these Minerals many times survive the Shells which gave them their Forms, and are found even after *they* are rotted and disappeared; for though, when lodged in Chalk, or the like close Matter, which preserves and secures them against external Injuries, these Shells are constantly found upon, and actually investing the Flint, Spar, or other Mineral, and are commonly as fair and

* *Vid. Part*
3. *Señ. 1.*
Conf. 11.

|| *Conf.*
Part 5.
Conf. 5.

entire as any of their fellow Shells at Sea: yet when they happened to be lodged amongst Sand, Gravel, or the like laxer Matter, the Shells are usually perish'd and gone *, and so the Flint, Spar, &c. left uncover'd. In which case the said Flint, Spar, or other Mineral, is of a constant, regular, and specifick Shape, as is the Shell whence it borrows both that Shape, and indeed its Name; these being the Bodies which are called, by Naturalists, *Echinite*, *Cochlite*, and *Cochite* ||, as resembling the Shells of those names: and truly many of them very nearly, they having taken the *Impresses* of the Insides of these Shells with that exquisite Niceness as to express even the smallest and finest Lineaments of them: insomuch that no Metall, when melted and cast in a Mould, can ever possibly represent the Concavity of that Mould with greater Exactness than these Flints, and other Minerals, do the Concavities of the Shells wherein they were thus moulded.

3. That at length all this Metallick and Mineral Matter, both that which continued asunder, and in single Corpufcles, and that which was amals'd and
concre-

concreted into Nodules, *subsided* down to the bottom : at the same time that did the Shells, Teeth, and other like Bodies, as also the Sand, Cole, Marle, and other Matter whereof the *Strata* of Sand-stone, Cole, Marle, and the rest are for the most part composed †, and so were included in, and lodged amongst, that matter. † Conf.
Part 2.
Conf. 3.

That in regard that both the ordinary Terrestrial Matter, and the Mineral and Metallick Matter which was assumed up into the Fluid was *different* in different parts of it, being in some places all chiefly of one kind, suppose Sand : in others of a different kind, e.g. Chalk : and in others of several kinds together, as Sand, Chalk, and many more : and there being no other Place or Apartment in the Globe assigned to any of this Matter than that whereinto its own natural Gravity bore it, which was only directly downwards, whereby it obtained that place in the Globe which was just underneath that part of the Fluid where it was sustained when the Subsidence began ; it thence happened that the *Strata*, which were afterwards constituted by this Matter thus subsiding, are

are also *different* in different places: in some all, or most of them, of Sand-stone: in others of Chalk: and in others of both Sand-stone and Chalk, and perhaps many more, lying each upon other. And the Case of Metalls and Minerals being the same, 'tis for that reason that in some places we now get Iron, or Vitriol; but no Copper, or Alum: in others we find these, but not those: and in others both these, and those, and perhaps many more.

That the *Place*, both of the several sorts of Terrestrial Matter, and of Metalls and Minerals, whilst sustained in the Fluid, being thus contingent and uncertain, their *Intermixtures* with each other, and with the Terrestrial Matter, in the Sediment, or *Strata*, which subsiding they together composed, must consequently be uncertain likewise; that Metall or Mineral, of whatever kind it chanced to be, which was sustained in any part of the Fluid, settling only directly downwards, was lodged amongst the Terrestrial Matter which chanced to be sustained together with it in the same part, of what kind soever that Matter was. And accordingly we now find them uncertainly
mixt:

mixt : the same Metall or Mineral lodged, in some places, in Stone : in others, in Cole : and in others, in Clay, Marle, or any other Matter indifferently †. ^{† Vid. Pag. 174. supra.} And as we find the same Metall or Mineral lodged amongst different sorts of the common Terrestrial Matter, so do we, for still the same reason, also find different kinds of Metalls and Minerals, Copper, Iron, and Sulphur, Tin, Lead, and Vitriol, with several more, lodged all confusedly together in the very same sort of Terrestrial Matter ||. ^{|| Vid. Pag. 174. supra.}

That the *quantity* of the Metallick or Mineral Matter taken up into the Fluid was various and uncertain : there being in some parts little or perhaps none of it : in others a very great abundance. And so we at this day find it ; in some places, little, or none : in others, in such plenty as to exceed even the ordinary Terrestrial Matter, and of it self to compose whole *Strata*, without any considerable Admixture of Sand, Clay, or other common Matter. Thus we sometimes see whole *Strata* compiled of Metallick and Mineral *Pyritæ* : others of Pebles, and of Flints, without the Interposition of any other Matter : that finer Matter
com-

commonly found amongst these, and vulgarly called *Sand*, being really no other than very small Pebles; as may appear to any one who shall carefully examine and observe it, especially with a good Microscope. Thus likewise we find *Strata* consisting almost entirely of Common Salt: others of Ochre: and others of several Metalls and Minerals, Tin, Lead, Vitriol, Nitre, and Sulphur, promiscuously, without any considerable Intermixture of coarser Terrestrial Matter.

4. That the metallick and mineral Matter, which is now found in the perpendicular Intervalls of the *Strata*, was all of it originally, and at the time of the Deluge, lodged in the Bodies of those *Strata*: being interspersed or scattered in single Corpuscles, amongst the Sand, or other Matter, whereof the said *Strata* mainly consist. That it was educed thence, and transmitted into these Intervalls, since that time; the Intervalls themselves not existing till the *Strata* were formed, and the metallick and mineral Matter actually lodged in them; they being only Breaches of the *Strata*, and not made till the very conclusion
of

of the Catastrophe, the Water there-
upon immediately withdrawing again
from off the Earth *.

* Conf.
Part 2.
Conf. 3. & 6.
and Part 3.
Sect. 2.
Conf. 3. uti
& Part 4.
Conf. 3.

That the *Water* which ascends up
out of the Abyss, on all sides of the
Globe, towards the Surface of the
Earth †, incessantly pervading the
Pores of the *Strata*, I mean the Inter-
stices of the Sand or other Matter
whereof they consist, detaches and
bears along with it all such metallick,
mineral, and other Corpuscles which
lye loose in its way, and are withal so
small as to be able to pass those Inter-
stices: forcing them along with it in-
to the perpendicular Intervalls; to
which it naturally directs its course, as
finding there a ready Exit and Dis-
charge ||, being partly exhaled thence ||
up into the Atmosphere, and partly
flowing forth upon the Surface of the
Earth, and forming Springs and Ri-
vers.

5.
† Part 3.
Sect. 1.
Conf. 8.

|| *Ibid.*

That the Water which falls upon
the Surface of the Earth in *Rain*, bears
also some, though a lesser, share in this
Action; this, soaking into the *Strata*
which lye near the Surface, straining
through the Pores of them, and ad-
vancing on towards their perpendicu-
lar

* Part 3.
 Sect. 1.
 Conf. 4.

lar Intervalls *, bears thither along with it all such moveable Matter as occurs in those Pores, in much the same manner as does the Water which arises out of the Abyss; with this only difference, that *this* passes and pervades none but the superficial and uppermost *Strata*, whereas *the other* permeates also those which lye lower and deeper.

That the metallick and mineral Corpuscles, being thus conveyed into these Intervalls; and the Water there having more room and freer passage than before, whilst it only penetrated the Pores of the Stone, it deserts the said Corpuscles, leaving them in these Intervalls; unless it flow forth with a very rapid and precipitate Motion; for then it hurries them out along with it, till its Motion becomes more languid and remiss, when it quits and abandons them †.

† Conf.
 Conf. 12. &
 13. infra.

6. That by the Water, thus passing through the Stone to its perpendicular Intervalls, was brought thither all the metallick and mineral Matter which is now lodged therein: as well that which lyes only in an indigested and confused Pile ||, in which manner the far greatest part of it is found, and particularly the

|| Vid. Pag.
 178. supra.

the common Ores of Metalls, Iron, Tin, Lead, and the rest, as also Spar, Alum, Vitriol, Sulphur, and other Minerals: as that which is disposed and formed into some observable Figure, such as the metallick and mineral *Stalactite*, the angulated or Crystallized Metalls and Minerals *, and, to be short, all others whatever.

* *Vid. Pag.*
178. *supra.*

That there is not, whatever some Men may have fancied, any thing very strange or extraordinary in the Production of the said formed Metalls and Minerals, which are found in these Intervalls: nor other plastick Vertue concerned in shaping them into those Figures than meerly the Configurations of the Particles whereof they consist, and the simple Motion of the Water to bring those Particles together. That particularly the common *Stalactites*, *Lapis Stillatitius*, or Dropstone, which consists principally of Spar, and is frequently found, in form of an Icicle, hanging down from the tops and sides of Grotto's, and of the lesser perpendicular Intervalls, was formed by the Water which continually is passing through the *Strata* into these their Intervalls; *this* taking the
Sparry

Sparry Particles as they lay dispersedly mingled with the Sand, or other Matter whereof those *Strata* consist, and bearing them on with it to the said Intervalls; where issuing leisurely out of the *Strata*, and having now free passage, it deserts these Particles, falling down from the tops and sides of the Grotto's, to which the Particles affixing by little and little, incrust them over with a Sparry Cover, and also from these *Stalactitæ*, from which the Water is continually falling and distilling drop by drop; which gave occasion to that Mistake of those who suppose these Bodies to be only Water petrified, as they speak, or converted into these Sparry or Stony Icecycles, in the same manner as it is by Frost congealed into the Icy ones which hang down from the Eaves of Houses, from Pipes, or other conveyances of Water. That the *Iron*, and other *metallick Stalactitæ*: the *Aluminous*, and the *Vitriolick Stalactitæ*: the *Saline* ones, or those which consist of common Salt, and *all others*, are found suspended in the same manner, and their Matter conducted out of the *Strata* to their Fissures by the same means.

That

That the Iron-Rhombs, Tin-Grains, and other Ores of Metalls, which are found in these Intervalls naturally formed into Cubick, Pyramidal, or other Figures: as likewise the Minerals which are there shot into the like Figures, such as the Mundick-Grains, crystallized native Salt, Alum, Vitriol, and Sulphur: the Gemms also which are thus figured, *e. g.* Crystal, the Pseud-Adamantes, the Amethyst, Emerald, and the rest: I say these, and all other natural metallick and mineral Crystallizations, were effected by the Water, which first brought the Particles whereof each consists out from amongst the Matter of the *Strata*, into these their Intervalls, in much the same manner that the common, or artificial, Crystallizations of Alum, Vitriol, and the like, are now effected in the Water wherein they were before dissolved: and as are the Chymical Crystallizations of other Minerals and Metalls in their several *Menstrua*; whereof more in its place.

That the Corpuscles of Metalls and of Minerals being *smaller* than those of Sand and of the other common Terrestrial Matter, and consequently the

* Confer.
Consect. 3.
Pag. 188.
supra.

Pores of the *Strata* which consist mainly, or at least contain in them a considerable quantity of these *, being lesser and narrower than those of the *Strata* of Sand-stone, and the like common and crasser Matter, the Water which ascends from beneath towards the Surface of the Earth is admitted into them, if at all, only in lesser quantity, passes them slowly and difficultly, and therefore hath not Scope and Power sufficient to dislodge the Corpuscles, and bear them off with it into the perpendicular Intervalls, as it does in those *Strata* which consist chiefly of Stone, and the like grosser Matter, where the metallick and mineral Corpuscles lye thinner, and so the Pores are more wide and open. That, for this reason, in the Intervalls of those *Strata* which abound plentifully with Iron, Tin, Spar, common Salt, Alum, or the like, we ordinarily find a lesser quantity of these Metalls and Minerals resident, than we do in the Intervalls of some other *Strata* which now shew little, or perhaps nothing in the Bodies of them besides Sand and such like coarser Matter; there being so admirable a Contrivance in this Affair, that
the

the Water does not disturb and remove that metallick or mineral Matter which lyes in the *Strata* in great plenty, and so is there ready collected to the hand of Man: but only *that* which needs such an Agent to collect it: *that* which is so sparingly and dispersedly intermix'd with the common Terrestrial Matter, as not to be discoverable by humane Industry, or, if discoverable, so diffused and scattered amongst the crasser and more unprofitable Matter, that 'twould never be possible to separate and extract it: or, if 'twas, it would not defray the Charge and Labour of the Extraction, and therefore must needs have been all irretrievably lost, and useless to Mankind, was it not here by this means collected and brought into one Mass.

That therefore the Metalls and Minerals which are lodged in the *perpendicular Intervalls* of the *Strata*, do still grow, (to speak in the Mineralists phrase) or receive additional Encrease from the Corpuscles which are yet daily born along with the Water into *them*: and have grown so ever since the time of the Deluge, in all such places where those Intervalls are not al-

10.

ready so filled, that they cannot receive any more ; or where the Stock of metallick and mineral Corpuscles, originally lodged in the *Strata*, is not quite exhausted, and all borne thither already. That yet this Encrease is not now any where very great ; the Corpuscles, which were capable of being stirred and removed, being, by the continual Passage of the Water for so many Ages, in most places exhausted, educed forth of the *Strata*, and transmitted into these their Fissures.

- II. That the metallick and mineral Matter which lyes in the *Bodies* of the *Strata* does *not* now grow : nor hath it ever received any Addition since 'twas first reposed in those *Strata* at the time of the Universal Deluge: but, on the contrary, hath been diminished and lessened by so much as hath been conveyed into their perpendicular Intervalls, and as hath been brought forth upon the Surface of the Earth by Springs, Rivers *, and Exhalations † from the Abyss, ever since that time. That notwithstanding there have, and do still, happen, Transitions and Removes of it, in the *solid Strata*, from one part of the same *Stratum* to another

* *Vid. Conf.*

12. *infra.*

† *Vid.*

Conf. 14.
infra.

ther part of it, occasioned by the Motion of the Vapour towards the perpendicular Intervalls of *these**: and, ^{* Part 3. Conf. 8.} in the *laxer* Strata, such as those of Sand, Clay, and the like, from the lower ones to those which lye above them, and even to the very Surface of the Earth, occasioned by the Motion of the Vapour directly towards the Surface, it pervading these looser *Strata* diametrically †. But of this I have ^{† *ibid.*} not room to enlarge more particularly in this place.

That the Bitumen which is found in 12. Lumps, or coagulated Masses, in some *Springs*; and which is, in others, found floating in form of an Oyl upon the Surface of the Water; when 'tis called by Naturalists *Naphtha*, and *Petroleum*: the Salt wherewith the *Salinæ*, or Salt-Springs, abound: the Vitriol, Alum, Nitre, Sulphur, Spar, and other Minerals, wherewith the *Acidula*, or Medicinal-Springs are saturated: I say, all these Minerals were originally lodged in the *Strata* of Stone, Cole, Earth, or the like: that they were educed thence, and conveyed into these Springs, by the ^{|| Conf. Part 3. Sect. 1. Conf. 8. and Part 4. Conf. 5.} Water pervading those *Strata* in its passage from the Abyss towards the said Springs ||.

13.

That when the Water of *Rivers* issues out of the Apertures of them with more than ordinary Agitation and Rapidity, it usually bears forth along with it such Particles of Spar, Argilla, or other loose and moveable Matter as it met with in its Passage through the Stone, Marble, or other solid *Strata*: that it sustains these Particles, and carries them on together with it till such time as its Motion begins to remit and be less rapid than it was at, and near its Source; when by degrees it lowers them, and lets them fall, depositing and affixing them upon any thing which occurs in the way, as Stones, Shells, Sticks, or other like Bodies; especially those which lye in the Sinus's or Creeks of those Rivers where the Motion of the Water is more sluggish and languid than in the Stream, or middle of the Chancel. That some Rivers do thus bring forth Spar, and other mineral Matter in great quantity, so as to cover and incrust the Stones, Sticks, and other Bodies lying therein, to a very considerable Thickness. That sometimes the Water of Standing-Springs does the same: precipitating the mineral Matter which it brought forth

forth of the *Strata*, upon the Stones at the bottoms and sides of the said Springs: and affixing it upon Sticks, Straws, and other Bodies, and upon the Moss, or other Plants which happen to grow therein, incrusting them over, in like manner as does the above-mentioned Water of Rivers.

That when the Heat at, and upon, 14.
the Surface of the Earth is great, it not only mounts up the Water sent from beneath, and, along with it, the lighter Terrestrial Vegetative Matter *, but likewise the very mineral Matter it self, Sulphur, Nitre, Vitriol, and the like; the Atoms, or single Corpuscles where-
of being detach'd from their respective Beds in the Earth, it bears quite to the Surface of it, and the light and more active sorts of them up into the Atmosphere, (together with the Vapour, which, when condensed, falls down again in Rain) in greater or lesser plenty, and to a greater or lesser height, answerably to the greater or lesser quantity or Intensity of the Heat.

That wherever there happen to be any extraordinary Discharges of the Subterranean Heat: either *Vulcano's*, or lesser Spiracles, such as those about

O 4 *Naples,*

* *Part I.*
Pag. 47.
and *Part 3.*
Sect. I.
Conf. 8.

Naples, Pozzuolo, and in other Parts of the World : *Thermæ*, or *Hot-springs* : or fiery Eruptions, such as burst forth of the Earth during Earthquakes : I say wherever there are such or the like Discharges of this Subterranean Fire, there likewise is mineral Matter, more or less, hurried up along with it. That even the Heat of the Sun, and indeed any other, though but an accidental Heat, hath the same Effect, and contributes to the raising of mineral Matter out of the Earth.

That *Ætna, Vesuvius*, and the other *Vulcano's* discharge forth, together with the Fire, not only metallick and mineral Matter in great quantity, but Sand likewise, and huge Stones, tossing them up sometimes to a very great height in the Air.

That the Heat, which arises out of the *lesser Spiracles*, also brings forth along with it mineral Matter, and particularly Nitre, and Sulphur ; some of which it affixes to the tops and sides of the Grotto's as it passes, which Grotto's are usually so hot as to serve for natural Stoves, or Sweating-Vaults : some it depofes near unto, and even upon, the Surface of the Earth ; in-
much

much that in some places the *Flores Sulphuris* are gathered in considerable plenty near these Spiracles: some it bears in Steams up into the Air, and this in such quantity too as to be manifest to the Smell, especially the Sulphur, *that* Mineral so particularly affecting *this* Sense.

That the Heat which is continually passing up towards the *Thermæ*, brings thither along with it Particles of Spar, Alum, Sulphur, Nitre, and other Minerals in such quantity, that these ordinarily as much exceed the common *Acidula* * in plenty of this mineral ^{* Vid.} Matter as they do in Heat. That this ^{Conf. 12.} Heat, ascending out of the *Thermæ*, ^{supra.} bears up with it not only Water, in form of Vapour, but likewise mineral Matter; some whereof it affixes to the Sides and Arches of the *Grotto's*, where these *Thermæ* arise in *such*: or, if they be covered with *Buildings*, to the Walls and Roofs of those Buildings: to the Pipes through which the Water is conveyed, or the like. That Sulphur is in some places collected very plentifully adhering to the Stone of these Grotts, and Buildings: yea sometimes Spar, and other crasser Minerals, are thus mounted

mounted up, and affix to the Walls and Roofs, incrust them over, and, being stop'd and reverberated thereby, form *Stalactitæ*, or Sparry Icecycles hanging down from the Arches of the Grotto's, from the Capitals of the Pillars, and Roofs of the Buildings. That where these *Thermæ* are not thus covered and vaulted over, so that the mineral Matter is not stop'd and hinder'd in its Ascent, a great part of it advances directly up into the Atmosphere.

|| Part 3.
Sect. I.
Cons. 12.
pag. 139.
& 141.
supra.
* *Ib.* pag.
135.

That the Heat which is discharged out of the Earth at the time of *Earthquakes* || brings forth Nitre, Sulphur, and other mineral Matter along with it. That the Water also which is at the same time spued out *, through the Cracks or Chasmes opened by the Earthquake, and through the Apertures of Springs and Rivers, is turbid and stinking, as being highly saturated with mineral Matter. That the *Acidula*, or Medical Springs emit *then* likewise a greater quantity of their Minerals than usual: and even the ordinary Springs, which were before clear, fresh, and limpid, become thick and turbid, and are impregnated with Sulphur

phur and other Minerals as long as the Earthquake lasts. That these Minerals do not issue out only at these larger *Exits*, but steam forth likewise through the Pores of the Earth, occasioning those sulphureous and other offensive Stenches which usually attend Earthquakes, and are the Cause of the *Fevers* and other *malignant Distempers* which commonly succeed them: bringing on oftentimes great Mortalities, not only amongst Men, but even the very Beasts and Fishes. That these mineral Eruptions arise in such quantity up into the Atmosphere as to thicken, discolour, and darken it sometimes to a very great degree.

That *any Heat* whatsoever, even an accidental one, such as is that which proceeds from the Bodies of *Animals*, and from their Excrements, promotes the Ascent of mineral Matter, but more especially of that which is subtile, light, and active, and is consequently moveable more easily, and with a lesser Power. That by this means *Nitre* (wherever there happens to be any in the Earth underneath) is raised in Stables, Pigeon-Houses, and other like Receptacles of Animals: and in those places

places where their Dung lyes heap'd up. That 'twas this which occasioned, in some, an Opinion that Nitre proceeds forth of those Animals, and their Excrements; whereas it is found raised up, and convened or collected indifferently and as well in Buildings where Animals rarely or never come, as in those they ordinarily frequent; not to mention *that* which is found sometimes in considerable plenty at great depths in the Earth: in the Water of Springs, of Rivers, of Lakes, and, in some Parts, even of the Sea it self; whereof more largely hereafter. That, in such places where the Earth contains Nitre within it, though there be no such adventitious Heat, if that Heat which is almost continually steaming out of the Earth be but preserved, its Dissipation prevented, and the Cold kept off by some Building or other like Coverture, *this* alone is ordinarily sufficient to raise up the Nitre, and bear it out at the Surface of the Earth, (unless its Egress be impeded by Pavements, or the like Obstructions) and mount it up into the Air, as far as those Buildings will permit. For, the Cielings and Walls stopping it in its Ascent,

Ascent, it usually affixes, unto them, and settles there. And accordingly 'tis frequently found thus affix'd to the Walls and Cielings of Ground-Rooms, Cellars, and Vaults; and this sometimes in such quantities as to form nitroſe *Stalactitæ* †, hanging down from them in form of Iceycles, eſpecially from the Tops and Arches of Cellars and Vaults.

† Confer.
Pag. 202.
ſupra.

That the Heat of the *Sun* in the hotter Seasons being very intense, and penetrating the exterior or ſuperficial parts of the Earth, it thereby excites and ſtirſ up thoſe mineral Exhalations, in ſubterraneous Caverns, in Mines, and in Cole-pits, which are commonly called *Damps*. That it is for this reaſon that *theſe* ſeldom or never happen but in the Summer time; when, the hotter the Weather is, the greater and more frequent are the Damps. That beſides *this* of the Sun, they are alſo ſometimes raiſed by the Acceſſion of *other Heat*, and particularly by the Fires which the *Miners* uſe in the Grooves, for breaking the Rocks, and for other Ends. That the Quantity of mineral Matter thus raiſed is according as there is more or leſs of it in thoſe Mines,
eſpeci-

especially of Sulphur, Nitre, and the like subtile and easily moveable Minerals: and as the Heat is *there* more or less intense. That this mineral Matter being sustained in the Air there, and floating about in the Mines, and Pits, it hits upon, and affixes it self unto, the Workmens Tools, to their Cloaths, Candles, or any other Bodies that occur. That where there is any considerable quantity of Sulphur in the Exhalation thus floating too and again, it takes fire at the Candles, burns with a blue Flame, and emits a strong sulphureous Smell. That these Damps differ in their Effects according to the different Minerals that are the Cause of them; ours in *England* being generally reducible to two kinds; whereof one is called the *Suffocating*, the other the *Fulminating Damp*. That the former of these extinguisheth the Candles, makes the Workmen faint, and vertiginous, and, when very great, suffocates, and kills them. The Fulminating Damp will take fire at a Candle, or other Flame, and, upon its Accension, gives a Crack or Report like the Discharge of a Gun, and makes likewise an Explosion so forcible as some-

sometimes to kill the Miners, break their Limbs, shake the Earth, and force Coles, Stones, and other Bodies, even though they be of very great Weight and Bulk, from the bottom of the Pit or Mine, up through the Shaft, discharging them out at the Top or Mouth of it, sometimes striking off the *Turn* which stands thereon, and mounting all up to a great height in the Air; this being succeeded by a Smoak, which both in Smell, and all other respects, resembles that of fired Gunpowder; and is, as may appear from these and other *Phænomena* of it, nothing but an Exhalation of Nitre and Sulphur, which are the principal Ingredients of that Composition we call Gunpowder. That as these Damps are caused by Heat, so they are remedied by withdrawing that Heat, and by conveying forth the mineral Steams; which the Miners effect by Perflations with large Bellows: by letting down Tubes, and sinking new Shafts; whereby they give free passage and motion to the Air, which ventilates and cools the Mines, purges and frees them from these mineral Exhalations.

That

That at such time as the Sun's power is so great as thus to penetrate the exterior Parts of the Earth: to disturb these mineral Particles: and raise them from out the *Strata* wherein they lay, it does not only sustain them in the Air of Grotto's, Mines, and other Caverns under ground, but likewise bears them out through the Mouths of those Caverns, and through the ordinary Cracks and Pores of the Earth, mounting them up, along with the watery Exhalations, into the Atmosphere †, especially Sulphur, Nitre, and the other more light and active Minerals; where they form *Meteors*; and are particularly the Cause of *Thunder*, and of *Lightning*. That, this mineral Matter requiring a considerable degree of Heat to raise it, the most Northern Climes, and the Winter Seasons are, for that reason, little or not at all troubled with Thunder; it seldom happening, in any great measure, but in the hotter Months, and in the Southern Countries, as in *Congo*, *Guinea*, and other Parts of *Africa*, and in the Southern Parts of *Asia* and *America*; where 'tis, during the Season of their great Rains||, horribly loud and astonishing, and as much exceeds the

† *Vid. Part*
3. *Seet. 1.*
Conf. 8.

|| *Vid. Pag.*
126. *supra.*

the Thunder of these Northern Climes, as the Heat there exceeds that of these Climes. That the mineral Matter which is discharged forth of *Vulcano's*, and other like Spiracles: and out of the *Thermæ*, ascends up into the Air, and contributes to the Formation of these Meteors. That likewise the Nitre and Sulphur, which are belch'd forth of the Earth at the time of Earthquakes (the Countries which are most obnoxious to this Malady abounding, as I have already intimated †, with these † *Vid. pag. 141. supra.* two Minerals particularly;) in such plenty as to thicken and darken the Air, constitute there a kind of Aerial Gunpowder, and are the Cause of that dismal and terrible Thunder and Lightning which commonly, if not always, attend Earthquakes; even when all was till then calm and clear, and not the least Sign or Presage of any such thing before the Earthquake began.

That as the mineral Eruptions which happen during Earthquakes *: and the Steams and Damps of Mines || are detri- * *Vid. pag. 203. supra.* || *Vid. pag. 206. supra.* mental to *Health*, hurtful and injurious to the Bodies of *Men* and other *Animals*, so likewise are the *Mineral Exhalations* which are thus raised by the

San out of the Body of the Earth up into the Atmosphere: but more especially in those Parts of it where there are Arsenical, or other like noxious Minerals lodged underneath. That *these* mingling with, and being disseminated in, the Air, and passing together with it into the Lungs in Respiration, are by them transmitted into the Body, where they infect the Mass of Blood, create Perturbations and disorderly Motions therein, and lay the Foundation of *Pestilential Fevers*, and other malignant *Distempers*. That 'tis for this reason that the Southern Countries are more frequently molested and incommoded by these Distempers than the Northern are: and that they are more rife and stirring in the hotter Months, in *July* and *August*, than in the colder, *December*, *January*, and the rest. That 'tis indeed true, that in *September* and *October*, which are none of the hottest Months, these Diseases are oftentimes as epidemical as in the precedent and warmer Season: and do not abate and remit in proportion to the remission of the Sun's Heat in those Months; but this is purely accidental, and happens meerly because the Heat

with-

within the Surface of the Earth is not liable to so sudden Vicissitudes, or so quickly spent and dispersed, as is that which is upon it, and in the Air. *This* therefore, the Pores of the Earth remaining still as free, and open, as ever, continues to send out the mineral *Steams* as before, but in lesser and lesser quantity, answerably to the gradual Diminution of this Heat. Which Steams, though now sent up to the Surface of the Earth only in lesser plenty, may be much more offensive and mischievous than in the hotter Months when it came forth in far greater. For the Sun's power being in those Months also greater, it then straitways hurries these Steams up into the Atmosphere: whereas in the colder, its power being lessened, it cannot bear it up so fast; so that it stays and stagnates near the Surface of the Earth, swimming and floating about in that Region of the Air wherein we breath; where it must needs be much more pernicious than when born up to a greater height, and so farther out of the way. And this is indeed much the *Case of Fogs*: particularly of those which we frequently observe after Sun-setting, even in our

hottest Months. These being nothing but a Vapour, consisting of Water, and of such mineral Matter as this met with in its passage, and could well bring up along with it. Which Vapour was sent up in greater quantity all the foregoing Day, than now in the Evening; but the Sun, *then* being above the Horizon, taking it at the Surface of the Earth, and rapidly mounting it up into the Atmosphere, it was not discernible, as *now* it is; because, the Sun being now gone off, the Vapour stagnates at and near the Earth, and saturates the Air till 'tis so thick as to be easily visible therein. And when at length the Heat there is somewhat further spent, which is usually about the middle of the Night, it falls down again in a *Dew*, alighting upon Herbs and other Vegetables, which it cherishes, cools, and refreshes, after the scorching Heat of the foregoing Day. But if it happens, as sometimes it does, that this Vapour bears up along with it any noxious mineral Steams, it then *blasts Vegetables*, especially those which are more young and tender: blights Corn and Fruits: and is sometimes injurious even to *Men* who chance to be
then

then abroad in the Fields. 'Tis also the *Case of Water* at the Surface of the Earth * ; where the Springs and Rivers * *Conf.* are very low, yea some of them cease *Part 3.* to yield any Water at all, in the Sum- *Seet. 1.* mer Months, because the Sun's Power *Conf. 8.* is then so great as easily and speedily to bear up into the Atmosphere, in small and invisible parcels, and in form of an extremely fine and thin Vapour, a very great part of the Water which is sent up out of the Abyss: whereas in the Winter-time the Sun is withdrawn farther off, and its power lessened, so that it cannot then buoy it up as before; for which reason 'tis that so much more of it *then* stands at the Surface of the Earth, and stagnates there. So likewise for Rain; we learn from Experiment that there commonly falls in *England*, in *France*, and some other Countries, more Rain in *June* and *July*, than in *December* and *January*; but it makes a much greater *Shew* upon the Earth in *these* Months than in *those*, because it lyes longer upon it; the Sun now wanting power to exhale and bear it up so quickly and plentifully as then it did. 'Tis also the *Case of the Halitus* emitted forth of the *Lungs* of

Men and other Animals. In a *Physiological Treatise*, which I have by me, concerning the *Structure and Use of the Parts of Animals*, discoursing of the Lungs, I shew that they are the grand Emunctory of the Body : that the main End of *Respiration* is continually to discharge and expell an excrementitious Fluid out of the Mass of Blood : and prove from several Experiments that there passes out of the Body a greater quantity of Fluid Matter this way, I mean upwards, and through the Lungs, than there does of Urine, by the Kidneys, downwards. Now the Fluid, which is thus secreted, and expired forth along with the Air, goes off with it in insensible parcels, in the Summer Season, when the ambient Air contains Heat enough to bear it quickly away, and so disperse it. But in the Winter, when the Heat without is less, it oftentimes becomes so far condensed as to be visible, flowing out of the Mouth in form of a Fume, or crasser Vapour : and may, by proper Vessels, set in a strong freezing Mixture, the better to condense this Vapour, be collected in considerable quantity. But to return. That 'tis not without a very extraordinary

nary Providence that there so constantly happens, in the Month of *September* (the time when chiefly these mineral Steams stagnate thus at and near the Surface of the Earth) a very nipping and severe Season of *Cold*, far beyond what might, from the Sun's height and power, be then expected : beyond that of *October* and *November* : and sometimes equal to that of *January* and the coldest Months : as also that there then so constantly happens very blustering and turbulent *Winds* ; the Cold serving to check and put a stop to the Ascent of this mineral Matter : and the Wind to dissipate and convey away that which was before raised out of the Earth ; which, was it not thus carried off, would be infinitely more fatal and pernicious to Man and other Animals than now it is. But I must be contented here to give only short Hints of these, as of other, Things : and to write but obscurely and reservedly, untill I have opportunity to express my Sentiments of them with greater Copiousness, Freedom, and Perspicuity.

Thus much of the Scheme of my Design in this Part have I run over :

and lead my Reader a long and tedious Jaunt in tracing out these metallick and mineral Bodies : in pursuing them through their several Mazes and Retreats : through the Earth, the Water, and the Air. And yet, long as it is, we are not got much further than the Borders of the Mineral Kingdom, and have done little more yet than settled and adjusted Preliminaries ; so very ample is this Kingdom, so various and manifold its Productions. For the foregoing Conclusions relate only to the *Origin* and *Growth* of these Bodies ; the *Natural History* of each *particular* Metall and Mineral, with the *Observations* whereon that History is grounded, being still to come. But I must be forced wholly to wave and supersede the Detail of these ; for I perceive, do what I can, this Abstract will swell much beyond the bounds which I at first designed.

This Fourth Part will be followed by several *Treatises*, serving to confirm, and to illustrate some Passages in it : whereof I shall at present only mention the *four* following.

1. Rules and Directions for the *Discovery* of *Metalls* and *Minerals* latent in
the

the Earth: with an Enquiry why these lye sometimes so near the Surface, and did not, (because of their greater Gravity) at the General Subsidence in the Deluge †, fall to a much greater depth than we now find them: even to such a depth as to have lain quite out of humane reach, and so have been all buried, and irrecoverably lost.

† Part 2.

Conf. 3.

Or Part 4.

Conf. 3.

2. An Examination of the Common Doctrine about the *Generation* of *Metalls* and *Minerals*: and particularly that of the *Chymists*; with an Appendix, relating to the *Transmutation* of *Metalls*: detecting the Impostures and Elusions of those who have pretended to it: and evincing the Impossibility of it from the most plain, simple, and Physical Reasons: proving likewise that there are no such natural *Gradations*, and *Conversions* of one Metall and Mineral into another, in the Earth, as many have fancied. As also an Account of the *Mineral Juices* in the Earth, which some Writers have imagined to be I know not what *Seeds* of Minerals, shewing that they are, for the far greatest part, nothing but Water strongly impregnated with Mineral Matter, which it derives from the

the *Strata* as it passes through them ||.

|| *Conf.* 5. &c.
supra.

3. Relations, obtained from several Hands, concerning the State of Metalls and Minerals in *Foreign Countries*: in divers Parts of *Asia*, *Africa*, and *America*, as well as in *Hungary*, *Germany*, *Sweden*, and other Parts of *Europe*: and particularly of those which are not found in *England*; shewing that the *Condition* of these Bodies in those remoter Regions is exactly conformable to that of ours here: and that they were all put into this Condition by the very same means †.

† *Conf.*
Conf. 1.
supra.

4. *Observations* concerning English *Amber*: and *Relations* from abroad, about the Amber of *Prussia* and other distant Places: with a *Discourse* founded upon them, proving that Amber is not a *gummos* or resinous Substance drawn out of Trees by the Sun's Heat; and coagulated and hardened by falling down into Rivers, or the Sea, as the Ancients generally believed: but is a *Natural Fossil*, as Pebles, Flints, *Pyritæ*, and the like, are: formed at the same time, and by the same means that they were: and all of it originally reposed in the *Strata* of Earth, Sand, &c. together with them. That

it

it is indeed found in some places lying upon the Shores of the Sea, and of Rivers: but 'tis also found at Land, and dug up (sometimes at very great depths) in the Earth; and this as well in Places very remote from any Sea, or River, as in those which are nearer unto them. That 'tis digged out of even the highest Mountains, and indeed all other Parts of the Earth contingently and indifferently, as the *Pyrita*, Agates, Jaspers, Pebles, and the rest, are. That wherever 'tis found upon the Sea-Shores, there also is it as certainly found at Land, up in the neighbouring Country: and particularly in *Prussia*, upon whose Shores so great a quantity of Amber is yearly collected, 'tis dug up almost all over the Country. That even that which now lyes loose upon the Sea-Shores, was all of it originally lodged in the Earth: in the *Strata* of Sand, Marle, Clay, and the like, whereof the neighbouring Land, and the Cliffs adjacent to those Shores, do consist; and wherever 'tis so found scattered upon the Shores, there is it as constantly found lodged in the Cliffs thereabouts. That when the Sea, at High-water, comes up unto,
and

and bears hard upon, the said Cliffs, and is agitated by Winds and Storms, it frequently beats down huge pieces of Earth from them ; which Earth, falling into the Water, is, by its continued Agitation and Motion dissolved, and borne by degrees down into the Sea, being loose, and light, and so easily reduced into lesser Parcels, dissolved, and wash'd away : but the Pebles, *Pyritæ*, Amber, or other like Nodules, which happened to be reposed in those Cliffs, amongst the Earth so beaten down, being hard, and not so dissoluble, and likewise more bulky and ponderous, are left behind upon the Shores, being impeded, and secured, by that their bulk and weight, from being born along with the Terrestrial Matter into the Sea. That therefore the Sea is no ways concerned in the Formation of these Bodies : no more in the Formation of Amber, than of the *Pyritæ*, Flints, and other mineral Masses that are found together with it : but only dislodges and discovers them, bears away the Earth wherein they were buried, washes off the Soil and *Sordes* wherein they were involved and concealed, and thereby renders them more confpi-

conspicuous, apparent, and easie to be found. That this is so known and experienced amongst the People who are employed to gather the Amber, that they always run down to the Sea-side after a Storm, for that purpose; and, if it hath been so great as to beat down part of the Cliffs there, they assuredly find Amber, more or less, upon the Seas Ebb and Retirement, and after every Retreat of the Sea for some Tides after; the Sea not bearing down the Earth immediately and all at once, but washing it off by little and little, and so discovering the Amber by degrees, some after one Tide, and some after another. That particularly the Amber, Vitriolick *Pyritæ*, and other like Bodies, that are found upon the Shores of *Kent*, *Essex*, *Hampshire*, and elsewhere, all came first from the bordering Cliffs, and were dislodged by this means; and are found in the Earth, as well as upon the Shores, whenever 'tis laid open, as in sinking Wells, Pits, and the like. That not only the Sea, but Rivers and Rains also, are instrumental to the Detection of Amber; and other Fossils, by washing away the Earth and Dirt that before covered
and

* Part 5.
Conf. 2.

* Vid.
Part 3.
Sect. 1.
Conf. 8.
Pag. 126.

and concealed them. Thus the Golden *Pyrite*, or, as they are commonly called, Gold-grains, Amethystine Pebbles, Amber, and other Stones of Worth, are uncovered by such Rivers as chance to run through the Grounds which contain those Bodies in them. Thus likewise Rains, by their washing the Earth down from off the Hills*, clear, and disclose such *Pyrite*, *Selenita*, or other Bodies that happen to be lodged, near the Surface of the Earth, in those Hills: and 'tis by this means chiefly that the Grain-Gold, upon all the *Golden Coast* (as 'tis called) in *Guinea*, is displayed; the Rains falling there in great Abundance, and with incredible Force, thereby the more powerfully beating off the Earth. This the *Negroes*, Natives of those Parts, know full well; and therefore do not expect to find much of it unless after the Season of their Rains ||; when they never fail to find of it, no more than the Amber-Gatherers fail of finding *that* upon the Sea-Coasts after a Storm. And if those Persons who are curious in *collecting* either *Minerals*, or the *Shells*, *Teeth*, or other Parts of Animal Bodies that have been buried in
the

the Earth, do but search the *Hills* after *Rains*, and the *Sea-Shores* after *Storms*, I dare undertake they will not lose their Labour. But to return. That Amber is not only lodged in the *Strata* of Earth, and of Sand together with the other mineral Nodules, but is sometimes found actually growing unto, and combined into the same Mass || with the *Pyrites*, and others of them. That it likewise sometimes contains in it pieces of Straws, Flies, Shells, and other heterogeneous Bodies, in like manner as the *Pyrite*, Flints, and all other analogous Fossils do †. That although Amber be most commonly of a yellowish Colour, and therefore not unlike some kinds of Gums, yet there is found of it also of several other Colours, as black, white, brown, green, blue, and purple, to name no more. Yea the very same Lump is frequently of different Colours. That these Colours are all accidental, even the yellow it self, and owing to the Intermixture of foreign Matter, which concreted into the same Mass with the proper Matter of this Stone, and with the heterogeneous

Vid. Conf.
2. *supra.*

† *Ibid.*

† *Ibid.*

neous Bodies which are included in it, at the time of its Coalition †. That this is the Case of Agates, of Cornelians, of Topazes, and many other coloured Stones; the *Colours* of several whereof, and even *that* of Amber it self, may by a very easie process, be in great measure, if not wholly, extracted, and taken from them: and the Bodies of these Stones rendered almost, if not quite, as pellucid as Crystal, without sensibly damaging the Texture of them. That even the most obvious and ordinary Minerals are not free from this Contagion of adventitious Matter: Common Salt it self, when found naturally crystallized amongst other Minerals and Metalls, in the perpendicular Intervalls of the *Strata* of Stone, being, not only pellucid, as it naturally is when pure and simple, but white also, and like the white crystallized Spar: yellow, and nearly resembling the Topaz: blue, and not unlike the Sapphire; and yet these specious Bodies, and Gemms as to outward shew, upon tryal, yield nothing but meer Salt, with an extremely

tremely small Admixture of other Matter, which gave them their Tincture. Which may serve for a further Instance of the confused state of Minerals in the Earth : and of the Uncertainty of their Colours and Figures †.

† Conf.

Pag. 172.

¶ Pag.

174.

Q. PART

PART V.

Of the Alterations which the Terraqueous Globe hath undergone since the time of the Deluge.

IT now remains that we take a view of the *Postdiluvian State* of this our Globe: that we examine how it hath stood for this last four thousand years: that we enquire what Accidents have befallen it, and what *Alterations* it hath suffered since that wonderful Change it underwent at the Deluge.

There have been some who have made a mighty Outcry about Changes and Alterations in the Terraqueous Globe. The Pretences and Pleas of each I consider in the first Part of this Essay: shewing that they are without any just ground: and that there are no Signs or Footsteps, in all the whole Globe, of any such Alterations. And indeed 'tis well for the World that there

there are not ; for the Alterations which they have fancied are such as turn all the wrong way : such as are without use, and have no end at all, or, which is worse than none, a bad one : and tend to the *damage* and *detriment* of the *Earth* and its *Productions*.

Notwithstanding, some Alterations there are which it hath, and doth still undergo. This is what we may pronounce with Certainty : and there want not Instances enough sufficiently to vouch and attest it. But these Alterations are of a quite different Strain: these are as *amicable* and *benificent* to the *Earth* and *Terrestrial Bodies*, as the other, were there really any such, would be pernicious and destructive to both. I have already * given some * *Part 4.*
Conf. 4. Intimations of the Changes which happen in the *interiour* parts of the Earth, I mean the Transitions and Removes of Metalls and Minerals there : and shewn of what *use* and *advantage* those Changes are to the *World* †. So that † *Ibid.*
Conf. 9. I may now pass freely on to consider those which befall the *exteriour*, or Surface of it. And *these* are brought about silently and insensibly ; and, which is the constant Method of Nature, with

all imaginable Benignity and Gentleness. Here is none of the Hurry and Precipitation: none of the Blustering and Violence: no more than any of the direful and ruinous Effects, which must needs have attended those *Supposititious* Changes. And as these Alterations are not *great*, so neither are they *numerous*. I have made careful search on all hands, and canvass'd the Matter with all possible Diligence, and yet there are none that I can advance from my own Observations, but

- I. That the upper or outermost *Stratum* of Earth: that *Stratum* whereon Men and other Animals tread, and Vegetables grow, is in a perpetual Flux and Change; this being the common Fund and Promptuary that supplies and sends forth Matter for the Formation of Bodies upon the face of the Earth. That all Animals, and particularly Mankind, as well as all Vegetables, which have had *Being* since the Creation of the World, derived all the constituent Matter of their Bodies, successively, in all Ages, out of this Fund.

That the Matter which is thus *drawn* out of this *Stratum* for the Formation of these Bodies, is at length
laid

laid down again in it, and *restored back* unto it, upon the Dissolution of them; where it lies ready to be again assumed, and educed thence for the fitting forth of other like Bodies in a continual *Succession*.

That the constituent Matter of any one Body being proper, and turning thus naturally, when again refunded into this *Stratum*, to the Constitution of another like Body, there is a kind of Revolution or *Circulation* of it; so that the Stock or Fund can never possibly be exhausted, nor the Flux and Alteration sensible.

That as the Bodies which arise out of this Fund are *various*, differing very much, not only from one another, but the Members, Organs, or Parts of each individual amongst themselves: so likewise is the Matter of this Fund whereof they all consist. For though when confusedly blended and mingled, as it is whilst lying in this *Stratum*, it may put on a Face never so uniform and alike, yet it is in reality very different, and consists of *several Ranks, Sets, or kinds of Corpuscles*.

That all the Corpuscles that are of the *same Set, or Kind*, agree in every thing,

thing, and are most exactly like unto each other in all respects: but those that are of *diverse kinds*, differ from one another, as well in Matter or Substance, in Specifick Gravity, in Hardness, in Flexibility, and several other ways, as in Bigness and Figure. That from the various *Composures* and Combinations of these Corpuscles together, happen all the Varieties of the Bodies formed out of them: all their Differences in Colour and outward Appearance, in Taste, in Smell, in Hardness, in specifick Gravity, and all other Regards; in much the same manner as that vast variety we see of Words arises from the various Order and Composition of the twenty four Letters of the Alphabet. But of this Matter, and of the Process and Method of Nature in the Formation of Bodies out of it, I shall treat more at large in the *Discourse it self*: wherein I shall also consider the Opinions of *Others*, particularly the *Ancients*, and, amongst the rest, of *Thales* and *Pythagoras*, about the *Elements* or *Principles* of Natural Things: for I now hasten to propose the other Alterations that happen in the Terraqueous Globe.

That

That *Rocks, Mountains*, and the other Elevations of the Earth (especially those whose Surfaces are yearly stirr'd and disturbed by digging, plowing, or the like) suffer a continual Decrement, and *grow lower* and lower; the superficial parts of them being by little and little wash'd away by *Rains*, and *born down* upon the subjacent Plains and Valleys. That even the *Stone* it self (whether naked and uncovered as in *Rocks*, or invested with a *Stratum* of Earth as is that in our ordinary Hills) is not, by its Solidity, priviledg'd and secured against them, but is dissolved by degrees, and wash'd also down, in its turn, as well as the looser Earth.

That the Matter which thus devolves from the Hills down upon the lower Grounds, does not considerably *raise* and *augment* them; a great *part* of it, viz. the vegetative and lighter Terrestrial Matter, being either mounted up into the Atmosphere by the ascending Vapour *, or carried along with the Rain-water into Rivers, and, by them, into the Sea †; whence 'tis returned back again to the Earth dispersedly by Rain †, and serves for the

3.

* *Vid. Part 3. Sect. 1.*

Conf. 8.

† *Confer.*

Pag. 47.

& *seq. uti*

& *Pag.*

128. &

Q 4

Nutri-*seq.*

Nutrimment and Formation of the Plants which grow thereon: and *the rest* of it, being more crass and ponderous, does not move far, but lodges in the Clefts, Craggs, and sides of the Rocks or Mountains, and at or near the Roots or Bottoms of them.

4.

That the Stone of Rocks and Mountains being by degrees in this manner dissolved, and the Sand born off, the *Shells*, and other Marine Bodies which were originally included therein *, are by that means let loose, turned out, and exposed upon the Surface of the Earth. That 'tis for this reason that these Marine Bodies are now most commonly found upon Hills, and the higher Grounds; those few which are found below and at the bottoms of them, being for the most part only such as have fallen down from above, and from the tops of them; those which were, at the time of the Deluge, reposed upon the Surface of the Earth, being most of them perish'd and gone||: and indeed these, which are yet existent, only accidentally preserved by their being at first enclosed in the *Strata* of Stone, and so secured by it as long as it was it self secure, I mean, untill

* Part 2.
Cons. 3.

|| Vid. Pag.
65. & 66.
supra,

untill it was thus dissolved, and so could not any longer contribute any thing to their Preservation.

That these *Shells* and other Bodies, being thus turned out of the Stone, and exposed loose upon the Surface of the Earth, to the Injuries of Weather, and of the Plough, to be trod upon by Horses and other Cattel, and to many other external Accidents, are, in tract of time, *worn*, *fretted*, and *broken* to pieces.

That the Shells being so broken, struck off, and gone, the *Stone included* in them is thereby *disclosed* and set at liberty; which Stone consists of the *Sand* wherewith the Cavities of those Shells were filled when they were sustained together with it in the Water at the Deluge ||, and which at length subsided in them, and was lodged with them in the *Strata* of Sand-stone; the Sand contained within the Shell becoming *solid* and consistent at the same time that the ambient, or that of the *Stratum* without it, did †.

That therefore the Shells served as *Plasms* or *Moulds* to this Sand; which, when consolidated, and afterwards in tract of time by this means freed from its

|| Part 2.

Conf. 2. & 3.

† Part 2.

Conf. 4.

* Those
which consist
of Spar,
Flint, &c. I
have considered
above, Part
1. Conf. 2.
Vulgarly
Pectinitæ.

its investient Shell, is of the same shape and size as is the Cavity of the Shell, of what kind soever that Shell happened to be. That this is the true Origin of those Stones (consisting of Sand *) which are called, by Authors, *Cochlite*, *Conchite*, *Muite*, *Ostracite*, *Ctenite* ||, &c. and which are of constant, regular, and specifick Figures; as are the *Cochlea*, *Concha*, and the other Shells in which they were moulded, and from which, by reason of their so near resemblance of the insides of them, they borrow their several Denominations.

6. That these *formed Stones* being by this means despoiled of their Shells, and exposed naked, upon the Surface of the ground, to the Injuries before recited, do also themselves in time decay, wear, and moulder away, and are frequently found defaced and broken to pieces: in like manner as the *Strata* of Stone wherein they were originally lodged first did: and afterwards the Shells wherein these Stones were enclosed and formed.

This *Deterration*, as 'tis called, or Devolution of Earth and Sand from the Mountains and higher grounds, is not in equal quantity and alike in all places,

places, but *varies* according to the different *height* of those Mountains, and to the *extent* of the Plane at top of them: to the different *consistence* and durableness of the *Strata* whereof they consist: and according as they are more or less disturbed by *Showrs* †, † *Which are much more violent in some Countries than in others.* *Ploughing*, or other *Accidents*. Nay this Deterration varies in different parts of even the same Mountain; those which lye nearer to the Brink or Margin of it suffering a quicker and greater Decrement than those which are more remote therefrom, and towards the middle of it. But though this Devolution be thus different, 'tis not any where, even where greatest, very considerable; and therefore does not make any great Alteration in the Face of the Earth. This I have learn'd from Observations purposely made in several Parts of *England*; and when I shall, in the larger Work, propose the *Standard* whereby I give Judgment of it, any one may presently and easily inform himself of the quantity and measure of it, either here, or in any other part of the World.

There are indeed some other *Casualties* that the Globe is obnoxious unto; such

such as *Earthquakes*, and the burning Mountains, or *Vulcanoes*. But of these, I thank God, and the good Constitution of this happy Island, I have not had any opportunity of Observation. Yet something I have to offer concerning these, and the Causes of them, from the Observations of others. Not that the Thing is so very material, or that they make such havock of, and Alterations in, the Globe as some Men fancy. We have assurance from History, that *Ætna* and *Vesuvius* have sent forth Flames, by fits, for this two or three thousand years, and no doubt but they have done so much longer; and yet we see both *Sicily* and *Campania*, the Countries wherein those two Mountains stand, are still where they were: nay the very Mountains themselves are yet in Being, and have not suffered any considerable Diminution or Consumption, but are at this day the two highest Mountains in those Countries. What they have really suffered: by what means both *these*, and *Earthquakes*, are occasioned: and what are their *Effects* upon the *Globe*, shall be fully and carefully considered in due place; from which Considerations

tions it will appear, that even *these* have their uses: and that, although they do make some lesser Alterations in some few Parts of the Earth, and sometimes molest and incommode the Inhabitants of those Parts, yet the Agent, whereby both the one and the other is effected, is of that indispensable *Necessity* and *Use* both to the Earth it self, to Mankind, and to all other the Productions of it, that they could not subsist without it. I have already given some brief Intimations that *Winds* and *Hurricanes* at Land *, *Tempests* and *Storms* at Sea †, (things that have always been look'd upon with as evil an eye as Earthquakes, and pointed at as only disastrous and mischievous to the World) are yet not without a very necessary and excellent Use: the same have I also done concerning *Vulcano's* ||; but I must not dwell upon these things too long, wherefore I shall only now dispatch what is further necessary to be hinted here about this *Decrement* of Mountains, and then conclude this Part.

And *this*, as it does not make any great Alteration, so neither doth that, which it really does make, any ways
endamage

* Part 4.

Cons. 14.

pag. 215.

† Part 1.

Pag. 49.

|| Part 3.

Sect. 1.

Cons. 13.

endamage or disorder the Globe: nor is it any the least Detriment or Disadvantage to the Productions of it, to Vegetables, to Animals, and particularly to Mankind: nor does it thwart and interfere with the grand Design of Providence, *viz.* the *Conservation* of the Globe, and the Propagation of Bodies upon it, for the use of Man. So far from this, that it is very highly beneficial and serviceable to both; which will further appear if we consider,

That in the first Ages after the Deluge, when the number of Mankind, of Quadrupeds, and of the other Animals was but small, the Vallies and Plains were more than sufficient for their Habitation and Use. And, by such time as that Stock of them was enlarged, that they were further spread and multiplied, and thereby the Earth so far peopled and replenish'd that the Hills and higher Grounds began to be needed; those Rocks and Mountains which in the first Ages were high, steep, and craggy, and consequently then inconvenient and unfit for Habitation, were by this continual Deterioration brought to a lower pitch, rendered

dered more plain and even, and reduced nearer to the ordinary Level of the Earth; by which means they were made habitable by such time as there was occasion for them, fit for Tillage, for the Production of Vegetables, of Corn, and other Necessaries, for the use of their Inhabitants.

That although the *principal Intention* in the Precipitation of the Vegetative Terrestrial Matter *, at the Deluge, * *Part 2.* and the burying it in the *Strata* *pag. 89, 90.* underneath amongst the Sand, and other mineral Matter, was to *re-trench* and abridge the *Luxury* and Superabundance of the Productions of the Earth, which had been so ingratefully and scandalously abused by its former Inhabitants, and to cause it to deal them forth for the future more frugally and sparingly; yet there was a still *further Design* in that Precipitation: and the Matter so buried was to be brought up upon the Stage once more; being only reserved in store for the benefit of Posterity, and to be, by this Deterration, fetch'd out to light again to supply the Wants of the latter Ages of the World. For had these *Strata* of Stone, and other mineral

|| *Vid.*
Consect. 5.
supra.

* *Confer.*
Conf. 1.
supra.

neral Matter, which lay then underneath, been altogether destitute of this Vegetative Intermixture, and had not contained some, though a smaller and more parsimonious Supply of it in them: had there not been also vast numbers of Shells, Teeth, Bones, and the like, lodged in them, which are, when rotted and dissolved, || a proper and natural Manure to the Earth, as all Parts whatsoever of Animals, as well as Vegetables, are; they consisting of such Matter as the upper and Vegetative *Stratum* it self contains, and therefore such as is fit for the Constitution of Plants and of Animals*; I say, had it not been for this, when the upper and Vegetative *Stratum* was once wash'd off, and born down by Rains, the Hills would have become all perfectly barren, the *Strata* below yielding only meer steril and mineral Matter, such as was wholly inept and improper for the Formation of Vegetables. Nay, the Inconvenience would not have stop'd there, but have spread it self much further. For, the Vegetative *Stratum* being carried off, and the Devolution still continuing, the Matter of the lower or mineral *Strata* being

being likewise by degrees borne down successively to the Roots and Bottoms of the Hills, and upon the neighbouring parts of the Valleys and Plains, it would, as far as it reach'd, have cover'd and buried the upper and vegetative *Stratum* that was expanded over those Valleys and Plains, and render'd as much of them as it so covered also frustrate, steril, and unfruitful. So that by this means, in the latter Ages of the World, when the Earth should be fully peopled, and all Quarters and Corners of it stock'd with Inhabitants, and when consequently there would be the greatest need and occasion for its Productions every where, for supply of the Necessities of these its numerous Inhabitants, there would have been then much less than ever, a great part of the Earth being rendered entirely barren; so that they might have e'en starved, had it not been for this Providential *Reserve*: this Hoord, if I may so say, that was stowed in the *Strata* underneath, and now seasonably disclosed and brought forth.

PART VI.

*Concerning the State of the Earth,
and the Productions of it, before
the Deluge.*

THE Thread of this Discourse draws now near to an End; and I have reason to fear that, by this time, the Reader, as well as my self, thinks it high time that it were quite spun out. For which reason I shall not any longer presume upon his Patience farther than needs I must.

In the five foregoing Parts of this Essay I lay down what I have to propose relating to the Condition of the Earth during the time of the Deluge, and ever since that time. And here I am to make a Stand: to look a great way back: and make some Reflections upon the Posture of Things before the Deluge.

The

The Method I take may perhaps be censured by some as preposterous, because I thus treat last of the *Antediluvian* Earth, which was first in order of Nature. But they will, I hope, let fall that Censure, when they are acquainted that 'tis a thing of Constraint, and not of Choice: and that 'twas for want of Footing, and good ground to go upon, that I did not take that Earth under Consideration sooner. The truth is, there was no way for me to come to any competent Knowledge of it, or to give any sure Judgment concerning it, but meerly by Induction: and by Contemplation of the Shells, Bones, and other Remains of it, which are still in being. Now before I could inferr any thing from *these*, it lay upon me to make out that they all belonged to the Earth, and were the genuine Products of it: to shew likewise how they became buried and disposed in the manner we now find them: and by what means they were preserved till now. And that is what I have been hitherto about; so that this is indeed but the proper place for this Disquisition concerning the *Antediluvian* Earth: and

it could not well have been brought in before.

* Part 2.
Conf. 2.

Had there not been still remaining a great many Animal and Vegetable Bodies that were the legitimate Offsprings of that Earth, 'twould have been an extravagant and impracticable Undertaking to have gone about to have determined any thing concerning it; and the more so because the Earth it self was dissolved and destroyed *. But I prove that there are such Remains of it, enclosed in great plenty in the Marble, Stone, and the other compacter *Strata* of the present Earth; whereby they have been preserved, through so many Ages, quite down to our Times: and are like to endure, many of them, much longer; even as long as the *Strata* themselves continue in the Condition they now are; and so will be a sure and lasting Monument and Witness of the Truth of that extraordinary Accident (the Destruction of the Earth and of Mankind by the Deluge) to Posterity, quite down to the End of the World.

Now because the Observations which I make use of in the former Parts of this Work give an Account of
the

the said Productions thus preserved, I proceed upon those Observations, as hitherto, and, by Inferences which easily, clearly, and naturally flow from them, shew what was the Condition and State of *that* Earth, and wherein it differ'd from *this* we now inhabit.

And in regard that, from a *Theory* which, how much soever it may relish of Wit and Invention, hath no real Foundation either in Nature or History, the Author so often mentioned already hath set forth an imaginary and fictitious Earth: whose Posture to the Sun he supposes to have been much different from *that* which the Earth at present obtains, and *such* that there could be no Alteration of Heat and Cold, Summer and Winter, as now there is, but a constant Uniformity of Weather and Equality of Seasons †: † *Theory of the Earth,*
An Earth without any Sea: without *l. 1. c. 6. &*
Mountains, or other Inequalities ||: *l. 2. c. 3.*
and without either Metalls or Mine- || *l. 1. c. 5.*
rals*: in few words, *one* perfectly un- * *Ibid.*
like what the *Antediluvian* Earth was *l. 2. c. 6.*
in truth and reality: and perfectly
unlike that which *Moses* hath repre-
sented; I shall therefore interpose
some Confectaries which would have

been otherwise needless and superfluous: which are directly levelled against these Mistakes: and evince that where-ever he hath receded from the *Mosaick Account of that Earth*, he hath at the same time also receded from Nature, and Matter of Fact; and this purely from the aforesaid Observations; from which I shall prove,

1. That the Face of the Earth, before the Deluge, was *not smooth*, eaven, and uniform: but *unequal*, and distinguish'd with *Mountains, Valleys, and Plains*: as also with *Sea, Lakes, and Rivers*.
2. That the *Quantity of Water* upon the Surface of the Globe was nearly the same as now: the *Ocean* of the same *Extent*, and posselt an equal share of the Globe; intermixing with the Land so as to checquer it into Earth and Water, and to make much the same Diversities of Sea and Land that we behold at present.
3. That the Water of the Sea was saturated with *Salt*, in like manner as now it is: that it was agitated with *Tides*, or a Flux and Reflux: with Storms, and other Commotions.
4. That the Sea was very abundantly *replenished with Fish* of all kinds: as well

well of the cartilaginous and squamose, as of the testaceous and crustaceous kinds: and that the *Lakes* and *Rivers* were as *plentifully* furnish'd with Lake and River-Fish of all sorts.

That the Earth was very *exuberantly* beset with *Trees*, *Shrubs*, and *Herbs*: and stock'd with *Animals* of all sorts, *Quadrupeds*, *Insects*, and *Fowls*: and this on all sides, and in all parts of it, quite round the Globe. 5.

That the Animal and Vegetable Productions of the *Antediluvian* Earth did not in any wise *differ* from those of the present Earth. That there were then the very *same kinds* of Animals and Vegetables, and the same subordinate *Species* under each kind that now there is. That they were of the *same stature* and size, as well as of the *same shape*: their Parts of the *same Fabrick*, Texture, Constitution, and Colour, as are those of the Animals and Vegetables at this day in being. 6.

That there were both *Metalls* and *Minerals* in the *Antediluvian* Earth. 7.

That the Terraqueous Globe had the *same Site* and Position in respect of the *Sun* that it now hath. That its *Axis* was not parallel to that of the 8.

Ecliptick, but inclined in like manner as it is at present : and that there were the same Successions of *Heat* and *Cold*, *Wet* and *Dry* : the same Vicissitudes of *Seasons*, Spring, Summer, Autumn and Winter, that now there is.

It hath been already noted, that these Propositions are founded on Observations made upon the Animal and Vegetable *Remains* of the *Antediluvian Earth*. From those Remains we may judge what sort of Earth *that* was : and see that it was not much different from *this* we now inhabit *. Now though 'tis not to be expected that I *here* formally lay down those Observations, that being not the Business of *this Tract*, yet untill I have Opportunity both of doing so, and of shewing in what manner the foregoing Propositions flow from them, it may be very convenient that I give some short Directions how the Reader, for his present Satisfaction, may, of himself, and without my Assistance, make out the principal Articles of these Propositions from the Observations already delivered in the several Parts of this Discourse, and from one or two more that I shall add upon this Occasion. And that he may
at

* Conf.
Pag. 84.
& seq.

at one View discover how consonant the Account which *Moses* hath left us of the Primitive Earth, is to *this* which we have from *Nature*, and how much the late *Theory of the Earth* differs from both, I will set down that Writer's Sense of the Matter under each Head as we pass along.

To begin therefore with the *Sea*; That there was *one* before the Deluge, there needs not, I think, any other Proof than the Productions of it yet in being: the Shells, the Teeth, and Bones of Sea-Fishes ||. And for *Moses*, || *Conf.*
he is not at all averse hereto; but as *Part 2.*
expresly asserts that there was then a Sea, as the *Theory* does, that there was none. Take it in his own words.

† And God said, Let the Waters under † *Gen. 1.*
the Heaven be gathered together unto one 9, 10.
place, and let the Dry-land appear: and it was so. And God called the Dry-land Earth, and the gathering together of the Waters called he SEAS: and God saw that it was good. And though the Theorist flatly denies that there was then any such thing, yet he does not go about to dispute the Translation of this Passage, but readily owns*, that Mo- * *L. 1. c. 7.*
ses hath here used a word that was com-

mon

mon and known to signifie the Sea. According to *him* therefore, we see the Sea was formed at the beginning of the World, and after its Formation approved of as *good*: that is, very necessary and serviceable to the Ends of Providence in the Kingdom of Nature; and this indeed it is so many ways, that it must needs be granted that *that* would have been a very wild World had it been without any Sea. The separating of the Sea and Land, and determining the set Bounds of each, is here

† *Vers.* 13. † reckoned part of the Work of the third Day: as the stocking of the Sea

‖ *Vers.* 21, 22. ‖ of the fifth. *And God created great Whales, &c. and blessed them, saying, be fruitful and multiply, and fill the Waters in the SEAS.* And when on the sixth Day the finishing Hand was set to the Work, and Man created, God gives him

* *Vers.* 28. *minion over the Fish of the SEA* *.

'Twould have been but a scanty and narrow Dominion, and *Adam* a very mean Prince, had there then been neither any Fish existent nor Sea to contain them. Nay, this had been little better than a downright Illusion and abusing of him: and what is more,

that

that World had been so far from excelling *ours* in the Abundance of its Productions, which is what the Theorist contends for on another Occasion, that 'twould have fallen far short of it: have wanted a very noble and large share of the Creation which we enjoy: been deprived of a most excellent and wholesome Fare, and very many delicious Dishes that we have the use and benefit of. But the Case was really much otherwise: and we have as good proof as could be wish'd that there were not any of all these wanting. The things many of them yet extant speak aloud for themselves: and are back'd with an early and general Tradition. For *Moses* is so far from being singular in thus relating that the Sea is of as old a *Date* and *Standing* as the Earth it self is, that he hath all, even the first and remotest Antiquity of his side; the *Gentil Account* of the Creation making the *Ocean* to arise out of the *Chaos* almost as soon as any thing besides. But we have in store a yet further Testimony that will be granted to be beyond all Exception. 'Tis from the mouth of God himself, being part of the *Law* promulgated by him in a most solemn

solemn and extraordinary manner. Exod. 20. 11. *In six days the Lord made Heaven and Earth, the SEA, and all that in them is.* 'Tis very hard to think the Theorist should not know this: and as hard that, knowing it, he should so openly dissent from it.

† Conf.

Pag. 6.

Part 2.

Then for the Dimensions of the Sea; that it was as *large*, and of as great *extent* as now it is, may be inferr'd from the vast Multitudes of those Marine Bodies which are still found in all Parts of the known World †. Had *these* been found in only one or two places: or did we meet with but some few Species of them, and such as are the Products of one Climate or Country, it might have been suspected that the Sea was then, what the *Caspian* is, only a great Pond or Lake, and confined to one part of the Globe. But seeing they are dug up at Land almost every where, and in at least as great variety and plenty as they are observed at Sea: since likewise the fossil Shells are *many of them* of the same kinds with those that now appear upon the neighbouring Shores, and *the rest* such as may well be presumed to be living at the bottom, or in the interior and deeper Parts

Parts of the adjacent Seas †, but never † *Conf.*
any that are peculiar to remoter Seas *Pag. 26.*
or to the Shores of distant Countries, *supra.*
we may reasonably conclude, not only
that the Sea was of the same bigness
and *capacity* before the Deluge, but that
it was of much the same *form* also, and
interwoven with the Earth in like
manner as at this time: that there was
Sea in or near the very *same places* or
Parts of the Globe: that each Sea had
its *peculiar Shells*, and those of the *same*
Kinds that now it hath: that there was
the *same diversity of Climates*, here
warmer and more agreeable to the
Southern Shells, there colder and bet-
ter suited to the Northern ones: the
same *variation of Soils*, this Tract af-
fording such a Terrestrial Matter as is
proper for the Formation and Nourish-
ment of one sort of Shell-fish, *that* of
another: in few words, much the same
Appearance of Nature, and Face of
Things that we behold in the present
Earth. But of this more by and by.

That the Water of the Sea was *salt*,
as now it is, may be made out like-
wise from those Shells and other the
Productions of it; they being of the
same Constitution, and consisting of
the

the same sort of Matter that do the Shells at this day found upon our Shores *. Now the Salt wherewith the Sea-water is saturated, is part of the Food of the Shell-fish residing therein, and a main Ingredient in the Make of their Bodies; they living upon this, and upon the Mud and other Earthy Matter there.

* *Vid. pag.*
22. & 23.
supra.

† *Conf.*
pag. 48.
& 156.

And that the Sea *Ebbed and Flowed* before the Deluge, may be inferr'd, not so much from the Necessity of that Motion, and the many and great Uses of it in the Natural World †, as from certain Effects that it had upon the Shells, and other like Bodies yet preserved. 'Tis known that the Sea, by this Access and Recess, shuffling the empty Shells, or whatever else lies exposed upon the Shores, and bearing them along with it backward and forward upon the Sand there, frets and wears them away by little and little, in tract of time reducing those that are concave and gibbose to a flat, and at length grinding them away almost to nothing. And there are, not uncommonly, found Shells so worn enclosed, amongst others, in Stone.

As the Sea-shells afford us a sure Argument

gument of a Sea, so do the River-ones of *Rivers* in the *Antediluvian* Earth. And if there were Rivers, there must needs also have been *Mountains*; for they will not flow unless upon a Declivity, and their Sources be raised above the Earth's ordinary Surface, so

that they may run upon a Descent ||; the *Swiftness* of their *Current*, and the *Quantity* of *Water* refunded by them, being proportioned generally to the *height* of their *Sources*, and the *Bigness* of the *Mountains* out of which they arise. *Mountains* being proved, nothing need be said concerning *Valleys*; they necessarily following from that Proof, as being nothing but the *Intervalls* betwixt the *Mountains*. But let us see what *Moses*

hath on this Subject *. *And the Waters* (he is treating of the Deluge)

|| Part 3. Sect. 1. Pag. 153. & 154. The Theorist, I know, supposes both the *Antediluvian* and the present Earth to be of an *Oval Figure*, and protended towards the *Poles*, as thinking that such a Figure would afford him a Plane so much inclined towards the *Æquator*, that the *Rivers* might flow upon it though there were no *Mountains*. But 'tis plain they could not. Nor are there any the least Grounds to believe that the first Earth was of that Figure. If he had had any thing that had look'd like a Proof of it, he had done well to have produced it. But 'tis manifest though we imagine the Earth formed that way he proposes, it would not have fallen into any such Figure. And for the present Earth, 'tis of a Figure as different from that which he assigns as it well could be; it being a *Sphæroides Prolatus*, as appears from the late Discoveries concerning it.

* Gen. vii.
19. & seq.

pre-

prevailed exceedingly upon the Earth; and all the HIGH HILLS that were under the whole Heaven were covered. Fifteen Cubits upwards did the Waters prevail; and the MOUNTAINS were covered. And all flesh dyed: --- all in whose Nostrils was the breath of Life. The Theorist averrs, that there were no Mountains in the first Earth. I am not willing to suppose that he charges a Falshood or Mistake upon the Passage, but rather that he would have *this* to be understood of those Mountains which were raised afterwards. Which yet cannot be; for the Historian here plainly makes these Mountains the Standards and Measures of the Rise of the Water; which they could never have been had they not been standing when it did so rise and overpour the Earth. His Intention in the whole is to acquaint us that all Land-Creatures whatever, both Men, Quadrupeds, Birds, and Insects, perish'd and were destroyed by the Water, *Noah* only excepted, and they that were with him in the Ark. And at the same time, to let us see the Truth and Probability of the Thing: to convince us that there was no way for any to escape, and particularly

ticularly that none could save themselves by climbing up to the tops of the Mountains that then were, he assures us that *they*, even the highest of them, were all covered and buried under Water. Now to say that there were then no Mountains: and that *this* is meant of Mountains that were not formed till afterwards, makes it not intelligible, and indeed hardly common Sense.

The extreme *Fertility* of both Sea and Land before the Deluge, appears sufficiently from the vast and almost incredible Numbers of their Producti-

ons yet extant *; not to insist upon those which are long ago rotted and gone †. Nor need we much wonder at this their *abundant Fruitfulness*, when we know from what Source it proceeded; which our Historian hath opened to us in very significant words ||. *And God said, let the Waters bring forth abundantly the moving Creature that hath life, &c. --- And God blessed them, saying, be fruitful and multiply, and fill the Waters in the Seas: and let Fowl multiply in the Earth, &c.* Here was we see a Blessing, handed out with the first Pairs of Animals at the moment of

* *Vid.**Part 2.*† *Conf.**Pag. 32.*

66. 77. &

*Part 3.**Seç. 2.**Conf. 11.*|| *Gen. i. 20.*& *seq.*

their Creation, very liberal and extensive; and it had effect with a Witness. A Man that does but behold the mighty Sholes of Shells, to take them for an Instance, that are still remaining, and that lye bedded and cumulated in many places heap upon heap, amongst the ordinary Matter of the Earth, will scarcely be able to believe his Eyes, or conceive which way *these* could ever live or subsist one by another. But yet subsist they did: and, as they themselves testifie, well too; an Argument that *that Earth* did not deal out their Nourishment with an over-sparing or illiberal Hand.

That these Productions of the *Original Earth*, differ not from those of the *Present*, either in Figure, in Magnitude, in Texture, or any other respect, is easily learn'd by comparing of them.

The exact *Agreement* betwixt the *Marine Bodies* I have shewn already*:

and shall in due place shew the same of the *Terrestrial ones*.

And as there were such great Numbers of Animals and Vegetables in the *Primitive Earth*, so that there were also *Metalls* and *Minerals*, and these in no less plenty than in *ours*, is very clear

* Pag. 22,
23. Conf.
Gen. i. 11,
12, 21, 24,
25. & vi.
20.

clear from what hath been delivered in the Fourth Part of this Essay, which need not be repeated here. Nor is *Moses* defective in this Point †. And † *Gen. iv.* *Zillah, she also bare Tubal-Cain, an In-^{22.}structor of every Artificer in Brass and Iron.* The *Theorist*, quite contrary, says, *As for Subterraneous Things, Metalls and Minerals, I believe they had none in the first Earth; and the happier they; no Gold, nor Silver, nor coarser Metalls.* Amongst these coarser Metalls are Copper, or Brass, and Iron. Now if there were none of these, 'tis a great Mystery to me, I confess, how *Tubal-Cain*, who certainly died either before or at the Deluge ||, could ever have || *Confer. Gen. vii.* taught the Workmanship and Use of ^{23. &} them. And yet if this Theory be true, ^{1 Pet. iii.} there neither was nor could be any ^{20.} within their reach, or that they could ever possibly come at. For the truth of the Theory I am in no wise concerned: the Composer of it must look to that; but that there were really both Metalls and Minerals before the Deluge, is most certain. For besides the Testimony that we have of the Thing from Nature, and the Passage already alledged out of *Moses*, there is

another for which we are also obliged to the same Author, that acquaints us there were *both* even in *Paradise* it self 'Tis in his second Chapter*. *The name of the first River is Pison: that is it which compasseth the whole Land of Havilah, where there is Gold. And the Gold of that Land is good: there is Bdellium and the Onyx-stone.* He speaks here, I grant, only in the Present Tense, *there is Gold*: but must mean not only that there was Gold and Gemms there in his time, but that there was so likewise from the beginning of the World, of which he is giving an Account in these two Chapters, or, with Submission, I conceive 'twould not be any thing to his purpose. He is here speaking of *Paradise*; which he represents as a most charming and delightful Place: besett with *every Tree that is pleasant to the sight, and good for food* ||: watered with refreshing Streams and excellent Rivers: and abounding with Things not only useful and convenient, but even the most rare and valuable, the most costly and desirable: particularly *Gold, Precious Stones, and Perfumes*; which were all much esteemed and admired by the Jews, to whom he

* Gen. ii.
11, 12.

|| Vers. 9.

he wrote this. Nor is it any Paradox, notwithstanding that *Dissolution* of the Earth which happened at the Deluge*, * *Part 2.* to suppose there was this or that Metall or Mineral in the same Part of the Globe afterwards where it was before *that* happened. The Water of the Abyss indeed changed its Place, during the time: So did the Sea, and bore the Bodies it contained, many of them, out along with it. But for the Terrestrial Parts of the Globe, Metalls, Minerals, Marble, Stone, and the rest, they, though dissolved, and assumed up into the Water, did not flitt or move far, but, at the general Subsidence, settled down again in or near the same Place from which they were before taken up. For the Water was all out upon the Face of the Earth before ever *these* stirr'd, or were fetch'd up out of their native Beds: and they were all sunk down into the same Beds again, before the Water began to shift away back to its old Quarters; so that it could not contribute any thing to the Removal of them. Even the very Vegetables, and their Seeds, which were many of them naturally lighter than the Water, assisted by the

heavier Terrestrial Matter that had in this Jumble and Confusion fasten'd and stuck to them, fell all to the bottom: and the Water was in great measure clear, and disengaged from the Earthy Mass, before it went off. And 'twas well it was so; for had the Mineral Matter of the Globe not been held to its former Station, but hurried about and transposed from place to place, 'tis scarcely to be conceived how many and great Inconveniencies it would have occasioned. The same likewise for Vegetables. Had the Seeds of the Pepper Plant, the Nutmeg, the Clove, or the Cinnamon Trees, been born from *Java*, *Banda*, the *Moluccoes*, and *Ceylon*, to these Northern Countries, they must all have starved for want of Sun: or had the Seeds of our colder Plants shifted thither, they wou'd have been burnt up and spoil'd by it. But *Things* generally kept to their proper Places: to their old natural Soil and Climate; which had they not done, all would have been confounded and destroyed. 'Tis true, the Vegetables, being comparatively lighter than the ordinary Terrestrial Matter of the Globe, subsided last †; and consequently

† *Confer.*
Pri 2.
Cons 3.

sequently lying many of them upon the Surface of the Earth, those which were of considerable Bulk, as the bigger sorts of Trees, which had large and spreading Heads, would lye with their Branches stretch'd up to a great height in the Water, (and, when *that* was withdrawn in the Air ||,) and so being very much in the Waters way, when it began to depart and retire back again, would be apt to be removed and driven forward along with it, especially those which lay in such places where the Current happened to run strong. Accordingly we now find of these Trees in Islands, and the other bleaker and colder Parts of the Earth, where none now do, or perhaps ever did, grow *. And there they are of mighty use to the Inhabitants, affording them a Supply of Timber which their own Country doth not yield, and which they employ not only for Fewel, which yet is much needed in those cold Countries, but for Building likewise, and many other Purposes; whereas in the Places whence they were thus driven they would have been useless, yea but an Incumbrance, and might be easily spared, for as long as the *Seeds*

|| *In which Posture 'tis probable the Olive-Tree lay from which the Dove pluck'd off the Leaf that she brought unto Noah, Gen. viii. 11.*

* *Conf. pag. 113. supra.*

remained behind, lodged in a natural and agreeable Soil, all was safe enough: *they* would soon vegetate, and send forth a *new* Sett of Trees there, so that 'twas not much matter what became of the Old ones. But to the Parts whereunto they were thus removed, they are of great advantage. And, which is in truth very remarkable, and an Argument that there was something more than meer Chance in this Affair, there are hardly any Countries that are destitute of Timber of their own growth, which have not a very large Supply of these Stray-Trees, if I may so call them. But to proceed. After that the Terrestrial Matter was once sunk down into its several Beds, and well settled there, the Mountains were cast up, and the Springs and Rivers burst forth, in such Numbers, and at such Distances from one another, in all Parts of the Globe, as best answered the Necessities and Expences of *each*: and therefore undoubtedly in much the same Places that they were before the Deluge. All Things were so contrived and ordered in the re-fitting up the Globe at this time, that they might best execute and perform each their
seve-

several Ends and Offices. There were the same Measures taken, and the same Process used in this Re-formation of it, that were when 'twas first built: and much such an Earth arose out of the *Deluge*, as at the Creation, sprung out of Nothing ||. But the Reader || Vid. pag. 97. *supra*. will more clearly discover all this, with the Reasons of it, if he give but himself the trouble to compare *Part 2. Conf. 2. & seq. Part 3. Sect. 1. pag. 154. & seq. & Sect. 2. Conf. 2, 3, & 7. Part 4. Conf. 3. & Part 6. Conf. 9.* This premised, 'twould be, I think, not strange should we find *Paradise* at this Day where *Adam* left it: the same Rivers: the same Face of the Ground: the same *Metalls* and *Minerals*, that then there were. And I the rather Note this, because I see there are some so earnest in quest of it. Learned Men have been now a long time a searching after the happy Country from which our first Parents were exiled. If they can find it, with all my heart: and there have been some that have sought it with that Industry that I think they deserve it for their pains whenever they make the Discovery.

To

To deal freely, I am of opinion there's no part of the present Earth that does come up fully to the *Mosaick* Description of Paradise. The Country about *Babylon*, or *Bagdet*, bids fairest for it: and I am persuaded that it was thereabouts. But if so, whoever shall compare this Country, as now it stands, with *that* Description, will find that it sustained some Alterations from the Deluge, perhaps more than any Part of the Earth besides. And there's an obvious Reason why it should. There was a Paradise before, but was to be none after the Deluge. The Case was altered, and the Reason of the thing ceased. So that *all* that denominated it Paradise, and that distinguish'd it from the rest of the Globe, was lop'd off by the Deluge, and *that* only left which it enjoyed in common with its neighbour Countries. Upon the whole, 'tis, I think, apparent that what I offer in this Discourse is so far from doing any Diskindness to the Cause these Gentlemen are, and have been so long, engaged in, that it does them a real Service, and helps them out with the main thing whereat they
stuck:

stuck: fairly solving all Difficulties in the *Mosaick* Relation of Paradise. Wherefore now to proceed to the last Head to be discuss'd, the Vicissitude of Seasons, Summer and Winter, Hot and Cold, in the *Antediluvian* World.

And that there really was such a *Vicissitude* we need not go any further for proof than to the aforesaid Animal and Vegetable Bodies still preserved; the general Tenour of them speaking it out so plainly as to leave no room for doubt. There are, we know, some sorts of Vegetables which consist of Particles very fine, light, and active: and which therefore require only a smaller degree of Heat to raise them * *Vid. Part 3. Sect. 1. Conf. 8. Pag. 125.* from out the Earth up into the Seeds, Roots, or Bodies of those Vegetables, for their growth and nourishment. So that for the raising of *these*, the Suns Power, when only lesser, is sufficient. And therefore they begin to appear in the earlyer Months, in *February* and *March*; when they first peep forth of the Ground: after a while they display themselves, shewing their whole Tire of Leaves: then their Flowers: next their Seeds: and lastly

lastly when, in the following Months, *April* and *May*, the Sun is further advanc'd, and (to speak in the Phrase of the Vulgar, which I choose all along for the sake of plainness) hath gained a greater strength, the Heat becomes too powerful and boisterous for them; it now mounting up the Terrestrial Matter with such force and rapidity, that the Plants cannot assume that part of it which is proper for their Nourishment, as it passeth through them, nor incorporate it with them, as before they were wont when it pass'd more gently and leisurely. Nay the Heat at length grows so great, that it again dissipates and bears off those very Corpuscles which before it brought; the Parts of these Plants being very tender, as consisting of Corpuscles which are extremely small and light, and therefore the more easily dissippable. So that then these Plants dye away, shrink down again into the Earth, and all, save only their Roots and Seeds, vanish and disappear. But when the Sun's Heat is thus far advanc'd, 'tis but just come up to the pitch of another Sett of Vegetables:
and

and but great enough to excite and bear up the Terrestrial Particles, which are more crass and ponderous. And therefore those Plants which consist of *such*, begin then to shoot forth, and display themselves. So that the Months of *April* and *May* present us with another Crop and Order of Plants. For the same reason also, *June*, *July*, and *August* go farther, and exhibit a still different Shew of Vegetables, and Face of Things. But when, in the Months of *September* and *October*, the Sun's Power is again diminish'd, and its Heat but about equivalent to *that* of *March* and *April*, it again suits the Plants which were *then* in season, so that they many of them spring up afresh in *these* Months, and flourish over a-new, in like manner as before they did in *those*; till being check'd by the Cold of the succeeding Winter, the Sun being gone off, and having now no longer Power great enough to bring up and supply them with fresh Matter, they presently begin to decline for want thereof, and at length quite dwindle away and disappear, untill the Arrival of the Spring Season, when they take their

their *Turns* over again as formerly. Yea the more tender and frigitive Parts, the Leaves, and the like, of many of the more sturdy and vigorous Vegetables, Shrubs, and Trees, suffer the same Fate, and fall off for want of the Supply from beneath; those only which are more tenacious, consistent, and hardy, enduring the Brunt, and making a shift to subsist for the time without such Recruit and Reparation. 'Tis therefore, we see, most apparent that this Succession of *Things* upon the Face of the Earth, is purely the Result and Effect of the Vicissitude of Seasons: and is as constant and certain as is the Cause of that Vicissitude, the Sun's Declination: so certain, that were a Man kept for some time blind-fold, in such manner that he could have no Notice how the Year pass'd on, and were at length turn'd forth into the next Field or Garden, he would not need any other Almanack to inform him what Season of the Year it then was.

But if instead of this *Variation* of Heat, we suppose that there was an *Equality* or constant Temperature of it

it before the Deluge, which is what the *Theorist* contends for, the Case would be very much altered, and *that* altogether for the worse. A Man can hardly at first imagine what a Train of ill Consequences would follow from such a Condition and Posture of Things; of which 'twould not be the least that such a Mediocrity of Heat would deprive the World of the most beautiful and the most useful Parts of all the whole Creation: and would be so far from exalting the Earth to a more happy and Paradisiacal State, which is what he brought it in for, that 'twould turn it to a general Desolation, and a meer barren Wilderness, to say no worse. Such an Heat would be too little for some sorts of Vegetables, and too great for others. The more fine and tender Plants, those which will not bear a degree of Heat beyond that of *April*, would be all burnt up, and destroyed by it: whilst it could never reach the more lofty and robust, nor would there be near Heat enough to ripen their Fruits and bring them to Perfection. Nothing would suit and hit
all,

all, and answer every End of Nature, but such a gradual Increase and Decrease of Heat as now there is. I must not descend to the *Animal* World, where the Inconveniences would be as many and as great as in the *Vegetable*: and such a Situation of the Sun and Earth as that which the *Theorist* supposes, is so far from being preferable to *this* which at present obtains, that this hath infinitely the Advantage of it in all respects.

Be that how it will, for I have no need to insist upon it, but may take the thing in his way, and suppose that such a Temperature would have all the happy Effects that he expects from it; yet there is one very considerable *Phenomenon* of the Vegetable Remains of *that Earth*, which affords us a sure and plain Indication that there was not then any such Temperature. From *these* it clearly appears that there was the same Order and Succession of Things upon the Face of the Earth that there is at this time. Now this Succession being, as we have seen, caused meerly by the Variation of the Sun's Heat, it must needs follow

follow, that there was *then* the same Variations of it, and consequently the same Alternations of Seasons, that *now* there is. Had there been an Equality of Heat, if we grant that it could have produced all the Plants in Nature, which 'tis impossible it ever should, it must have done it indifferently and uncertainly. There could be no reason why they should flourish at any one set time rather than another; that's peculiarly the Effect of the Sun's Variation. So that they must needs have been all in Confusion, and this Succession of Things would have been quite overturned. The Plants which now appear in the most different and distant Seasons, would have been all in Prime, and flourishing together at the same time: so that they would have had *February* and *May*, *July* and *September*, all in one Scene. Nay, the several Individuals of the same kind must have been as greatly at odds: one arrived to Seed, and that fully ripe, and ready to shed, whilst another was not so much as come to Flower, but in as differing a State and Hue as can be. In brief, there

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would have been all the Diversity, Uncertainty, and Disorder, in the Vegetable Kingdom that can well be conceived. Which indeed is no more than what he freely owns: telling us that then *Every Season was a Seed-time to Nature, and every Season an Harvest.* This is what he does, and must grant: and this is as much as is needful for the overturning his Hypothesis. For the Vegetable Remains of that Earth say no such thing: they give not any the least Countenance to these Conjectures, but the quite contrary: and *these*, being many of them enclosed in very fine and close Stone, are preserved to this day very curiously and entire to Admiration. By *them* we may easily judge how Things then stood. And there is so great an Uniformity, and general Consent amongst them, that from it I was enabled to discover

† Gen. vii. 11. In the second Month, the seventeenth day of the Month, -- were all the Fountains of the great Deep broken up, and the windows of Heaven were opened. Moses writing to the Jews his Country-men, makes use of the Form of the Year then received amongst them, which

what time of the year it was that the Deluge began †; the whole Tenour of these Bodies thus preserved clearly pointing forth the Month of

of *May* || ; nor have I ever met with so much as one single Plant, or other Body, amongst all those vast multitudes which I have carefully view'd, that is peculiar to any other Season of the Year : or any thing that happens earlier or later : any of them short, or any further advanc'd in Growth, Seed, or the like, than they now usually are in that Month ; which surely I must needs have

done, had there really been such an equality of Seasons, and constant temperature of Heat as is imagined by the Theorist. There are some *Phænomena* of the Animal Remains of *that Earth* which afford us more Arguments to the same purpose, and those not less concluding than the others ; but these I shall wholly wave for the present, there being indeed no occasion to make use of them here.

which was indeed the first and most ancient, but had been disused during the time of their Abode in Egypt, and but newly re-establish'd when this was wrote [Exod. xii. 2.] In this, Nisan, or, as 'twas also call'd, Adib was the first Month: and Ijar the second, upon the 17th day whereof the waters of the Deluge came forth, according to this Relation. And truly the time (which is not a little remarkable) falls within the Compass here chalk'd out by Nature so very punctually, that one can scarcely forbear concluding that these Strokes and Lines of Nature, and those of that Relation, came both from the same Hand ; but this only by the by. The Particulars of the Computation I here use shall be given at full elsewhere, they being too bulky for this place.

|| *Conf. Part 3. Sect. 2. Conf. 5.*

I shall now only look a little into the *Mosaick* Archives, to observe what they furnish us with upon this Subject, and I have done ; for I perceive I have, before I am aware, much exceeded the Measures I design'd, which on so copious a Subject 'twas hard not to do. Gen. 1. 14. *And God said, let there be LIGHTS in the Firmament of the Heaven, to divide the Day from the Night : and let them be for Signs, and for SEASONS, and for Days and Years.* This Passage, we see, does not at all favour the Opinion that there was no Variation of Seasons before the Deluge: so far from it, that should a Man go about with never so set Study and Design to describe such a Natural Form of the Year as is that which is at present establish'd, he could scarcely ever do it in so few Words again that were so fit and proper, so full and express ; especially if, by *Signs*, in this place, *Months* are intended, for then we have here first the *Year*: and that subdivided into its usual Parts, the four Quarters or *Seasons*, the twelve *Signs* or Months, and *Days*; nay at the same time, from the 19th Verse, we learn that this Establishment is, within four days,

days, as old as the World. But further, Gen. viii. 21, 22. *And the Lord said in his heart, I will not again curse the ground, --- neither will I again smite any more every thing living as I have done. While the Earth remaineth, Seed-time and Harvest, and Cold and Heat, and Summer and Winter, and Day and Night, shall not cease.* This was pronounc'd upon Noah's Sacrificing, at his coming forth of the Ark, after the Deluge was over: and implies, that there had indeed then lately been a mighty Confusion of Things, for the time: an Interruption and Perturbation of the ordinary Course of them: and a Cessation and Suspension of the Laws of Nature: but withall gives Security and Assurance that there should never be the like any more to the End of the World: that for the future they should all run again in their old Chancel: and that particularly there should be the same *Vicissitudes of Seasons, and Alternations of Heat and Cold* that were before the Deluge.

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