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LONDON MEDICAL

A  
 SUPPLEMENT and CONTINUATION  
 OF  
 The ESSAY towards a  
**NATURAL HISTORY**  
 OF THE  
**EARTH.**

Written originally in *Latin*

By **JOHN WOODWARD**, M. D. Professor of Physick in *Gresham College*, Fellow of the *College of Physicians*, and of the *Royal Society* :

And now first Translated

By **BENJ. HOLLOWAY**, LL. B. and F. R. S.

To which is prefixed

**AN INTRODUCTION**, by the Translator,

Wherein are set forth

**PHYSICAL PROOFS** of the **EXISTENCE** of **GOD**, his actual incessant Concurrence to the **SUPPORT** OF THE **UNIVERSE**, and of all *Organical Bodies, Vegetables, and Animals*, particularly **MAN**; with **SEVERAL OTHER PAPERS**, transcribed out of *Dr. WOODWARD'S LARGER WORK*, and never before printed.

**L O N D O N :**

Printed and Sold by **THO. EDLIN**, at the *Prince's-Arms*, over-against *Exeter-Exchange*, in the *Strand*. **M.DCC.XXVI.**

THE HISTORY OF THE  
CITY OF BOSTON  
FROM THE FIRST SETTLEMENT  
TO THE PRESENT TIME  
BY  
NATHANIEL BENTLEY

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# I N D E X

Of the Discourses, transcribed  
out of Dr. WOODWARD'S  
*larger Work*, and now first  
printed, in this Introduction.



*THE Art and Contrivance discernible in the present Earth, and the Evidences, in Nature, of its being new-made, and different from the former, or primitive Earth, give undeniable Proofs of the Existence of God, of his Interposition in the Affairs of Nature, and the Government of the World.*

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*Of the Texture of the Parts of Vegetable and Animal Bodies. The Cohesion of these owing wholly to the Complication of the Fibres of which they all are intirely composed.* p. 159

*Of the Solidity and Cohesion of the Parts of Fossils. This caused wholly by the Power of Gravity.* p. 160

*Gravity ceasing, or the Power of it being remitted, there must happen, in Consequence, a Destruction of the Earth, a total Cessation of the Solidity of Fossils, and a Dissolution of them all. But this would no way affect the Vegetable or Animal Bodies: or, in the least, disturb the Complication of their Fibres.* p. 162

*That the Destruction of the Earth was universal: and that all native Fossils whatever were dissolved, and reduced to their primary constituent Principles.* p. 166

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The first part of the book is devoted to a general history of the world, from the beginning of time to the present day. The author discusses the various ages of the world, and the progress of human civilization. He also touches upon the different religions and philosophies that have shaped the human mind.

The second part of the book is a detailed account of the history of the British Empire. It begins with the reign of King Henry II, and continues through the reigns of King Richard I, King John, King Henry III, King Edward I, King Edward II, King Richard II, King Henry IV, King Henry V, King Henry VI, King Edward IV, King Richard III, King Henry VII, King Henry VIII, King Edward VI, King Mary I, King Elizabeth I, King James I, King Charles I, King Charles II, King James II, King George I, King George II, King George III, and King George IV.

The third part of the book is a history of the American colonies, from their first settlement in 1607 to the Declaration of Independence in 1776. The author describes the various struggles and conflicts that led to the birth of a new nation.

The fourth part of the book is a history of the French Revolution, from its beginning in 1789 to the execution of King Louis XVI in 1793. The author discusses the various phases of the revolution, and the impact it had on the world.

The fifth part of the book is a history of the Napoleonic Wars, from the beginning of the war in 1803 to the final defeat of Napoleon in 1815. The author describes the various battles and campaigns, and the impact of the wars on Europe.

The sixth part of the book is a history of the War of 1812, from its beginning in 1812 to its end in 1815. The author discusses the various battles and campaigns, and the impact of the war on the United States.

The seventh part of the book is a history of the War of 1846, from its beginning in 1846 to its end in 1848. The author discusses the various battles and campaigns, and the impact of the war on the United States.

The eighth part of the book is a history of the War of 1861, from its beginning in 1861 to its end in 1865. The author discusses the various battles and campaigns, and the impact of the war on the United States.

The ninth part of the book is a history of the War of 1898, from its beginning in 1898 to its end in 1902. The author discusses the various battles and campaigns, and the impact of the war on the United States.

The tenth part of the book is a history of the War of 1914, from its beginning in 1914 to its end in 1918. The author discusses the various battles and campaigns, and the impact of the war on the world.





*The Translator's Introduction.*

fected, and the *greater Work* itself set forth compleat; but this Age hath not shewn itself so favourable to Science as to give Hopes that it would support a Work of the great Charge that this, even in one Article, of Graveing all the many Things treated of, would be.

The Discourse before me was written on Occasion of some Objections made against the *Essay* by Dr. *Camerarius*, a Publick Professor abroad, and a Man of great Learning and Accomplishment. Dr. *Woodward* did not think fit to take Notice of the unworthy Opposition made to that Work by some few invidious Men here at Home. Indeed there was the less need of that, since they were so effectually answer'd, and their Attempts repuls'd, by Dr. *Harris*,\* and some other learned Men: but, Dr. *Camerarius* shewing himself an intelligent and generous Adversary, Dr. *Woodward* thought fit to return him

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\* *Remarks on some late Papers, relating to the Universal Deluge: and to the Natural History of the Earth.* 8vo. Lond. 1697.



## *The Translator's Introduction.*

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him an Answer. This he wrote in *Latin*; Dr. *Camerarius* having set forth his in that Language. What made me the more forward to translate it was the Manner in which 'twas wrote, which indeed I think such as may serve for a Pattern to all those who shall enter into Controversy hereafter. In this Method I am sure the World would have more Fruit, and greater Advantage, from such Ingagements, than hitherto it hath been wont to have. Dr. *Woodward* hath every where treated his Adversary personally with Honour: and answer'd all his Objections by laying actual Observations before him, and shewing him that the Fact was every where different from what he imagined. In this Way, the World is not amus'd with Artifice, and Subtilties; or, which is worse, offended with Rudeness and ill-Manners, Things indeed too frequent in Controversy; but further Light every where given to these Studies, and Solid Information in all the most Important Parts of them. With which Dr. *Camerarius*, tho' he set forth at first, as with a good deal of Skill

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and

and Art, so with a Warmth and Eagerness of Opposition, and Presumption of Triumphs very great and uncommon, was so far Satisfy'd that he Acquiesced in this Answer: and ingenuously declar'd to the Publick \* that he gave up the Controversy.

As what the Author of the *Essay* and this *Defense* has wrote is evidently compos'd for the best Judges, 'tis, as the rest of his Works, every where so brief and concise that many Propositions, some of the highest Moment, are made out, frequently, in a very narrow Compass: and all set in a Light so strong and clear, that this Brevity will cause no Difficulty to any Reader who wants not Application, Candour, or a right Mind.

Whoever shall duely consider the Original, will soon see 'tis no easy Task to come up to it in any other Language. I my self was so sensible of this, that, of the best Judges that I know, I thought fit to take in the Assistance of one or two, thorow the whole Work. Tho', with all this, the most I can pretend to is that I have deliver'd

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\* *Ephemerid. Nat. Curios. Cent. 5. Append. 269.*



ver'd the Author's Sense. If I come up to that, 'tis the utmost I can hope for.

They who are well-Wishers to the Promoting of Usefull Knowledge cannot but be pleas'd to see that the Author hath, in this Answer, taken occasion to explain himself further as to the Re-Formation of the Earth at the Deluge. And, in Regard that the Marine Bodies found at Land, particularly the Shells of Sea-Fishes, are the Main Evidence he goes upon, he takes occasion to clear up a Difficulty that had been started against that Doctrine, in Relation to Cavities, in Form of Shells, observ'd frequently in Strata of Stone, but empty, and without any Shell in them: as also Sparry, Marcasitic, and other Mineral Bodies, carrying exactly the Form of Shells, but having really nothing of Shelly or Animal Substance in them. These Instances have been made use of by the Patrons of *Mock-Shells*, and *Lusus's of Nature*, to perswade the World that the real Shells were so too. But Dr. *Woodward* has here prov'd that those Cavities had Originally Shells actually in them, tho' since destroy'd, per-

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rish'd,

rish'd, and gone: and that those Sparry and Mineral Bodies receiv'd the Form of Shells by being cast and moulded in some of those Cavities; shewing both by what Means the Shells were destroyed, and the Mineral Matter cast in their Room.

The Reader will find here some further Advances on the Subject of the Disolution of the Primitive Earth, the Origin of the present Mountains, and of Islands. But that which will most gratify and entertain his Curiosity, is what he will here find concerning the great Abyfs. This is indeed a new Province in Philosophy: and we have here open'd to us a Scene in Nature that had hardly ever been thought of before. Nay and such a one too as greatly concerns us all to inquire into; since this is evidently so much concern'd in the Government of our Atmosphere, bringing about the Changes that happen in it: and consequently since so much of the Good or Bad of Life, and of the happy or unhappy Success of things in the Region wherein we subsist, and in which all Things that are of Use, of Or-  
nament



nament or Pleasure to humane Kind, are produced, depend intirely upon the OEconomy, the Impressions, and Regulations first made in that Subterranean World. Of which there is only a brief Sketch given here; but 'tis to be hop'd the Author will find Leisure to set forth the whole at large, and the numerous Observations, made in all parts of the World, serving to support this new and important Doctrine. One Thing I cannot pass over, without Notice, that, by this Intercourse betwixt the Abyfs and Atmosphere, and the Detachment and Ascent of Steams thence for the Formation of Rain, are so clearly and naturally solv'd the Phænomena of the Barometer, which have so long exercis'd the Thoughts of inquisitive Men, in vain, and without their being able to assign any Cause that has carried with it so much as a Shew of tolerable Probability.

Men of Learning have been hitherto much puzzled to find out where there could be Water sufficient to make such a Deluge as *Moses* has describ'd. All that Difficulty is now at an End: and, from some Phænomena attending

Earth-quakes, † with others hereafter recited, \* 'tis made evident that there is, in Store, in that mighty Subterranean World, a Quantity of that Fluid immensely great, and vastly beyond what they sought for, or ever dream'd of. Indeed from these Phænomena 'tis apparent that the main Bulk of the Globe must needs be compos'd of Water: and the Earth only an Expansum over it serving for Habitation, for furnishing forth Materials for the Formation of Animals, Vegetables, and Minerals, and subservient to the Action of that Water, and the Principles there that operate upon it.

But what is of chief Regard in the *Essay towards a Nat. Hist. of the Earth*, and *this Defense*, is the clear and unquestionable Proof that is given of the Existence of God, and his Government of the Natural World, and of the exact Agreement betwixt Nature and Holy Writ, from Observations, and Facts at this day demonstrable in the whole terraqueous Globe. To which he is pleas'd to give me Leave to make here an Addition out of his  
*larger*

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† *Nat. Hist. Earth. Part. 3.*      \* *Nat. Hist. Earth. illustrated, infra, Part. 2. Sect. 5.*



*larger Work,* which I transcribe and deliver in his own Words. “ There *The Art*  
“ is a Spirit of Scepticism that has *and Contrivance dis-*  
“ lately much prevail'd in the World: *cernible in*  
“ and those risen up who go about *the present*  
“ boldly to overturn all Foundations; *Earth: and*  
“ rejecting all Principles, however *the Evi-*  
“ univervally hitherto receiv'd. They *dences, in*  
“ will have it that, the Laws of *Nature, of*  
“ Nature being fixt permanent and *its being*  
“ unvaryable, this Frame of things is *New-made,*  
“ eternal: that the Earth, and all *and diffe-*  
“ the Apparatus of Bodies in this, *rent from*  
“ and other *Systems* which they fan- *the former,*  
“ cy, were ever in the State they *or primi-*  
“ now are, and will ever continue *tive Earth,*  
“ so. In this their Scheme they think *give unde-*  
“ no God needfull. They do not, *nyable*  
“ and indeed cannot deny but that, *Proof of the*  
“ if it can be shewn there ever was *Existence*  
“ a Time that the Earth, and the *of God, of*  
“ Bodyes round it, had no Being, *his Interpo-*  
“ or were ever in a Form and State *sition in the*  
“ different from that in which they *Affairs of*  
“ are at present, there must be a *Nature, and*  
“ God: and that they could never *the Govern-*  
“ possibly be brought out of that *ment of the*  
“ into the Disposition in which we *World.*  
“ now see them, without the Con-  
“ course and Agency of a most in-  
“ telligent and powerfull Being. Now,  
“ here



*The Translator's Introduction.*

“ here therefore we make a Stand,  
 “ on firm and sure Ground, against  
 “ these Men. From Evidences every  
 “ where apparent in the terrestrial  
 “ Globe, Sea Shells, and various  
 “ other extraneous Bodies, mix'd and  
 “ incorporated with all the constituent  
 “ matter of the Globe, not only the  
 “ loose and earthy, but even the  
 “ most solid, Stones, and Minerals,  
 “ 'tis manifest, and beyond dispute,  
 “ that this, which we now inhabit,  
 “ is new, and not the Original Earth,  
 “ that the present Frame of it is re-  
 “ cent, and the former, the primi-  
 “ tive, demolish'd, utterly destroy'd  
 “ and dissolv'd \*. For the effecting  
 “ that Dissolution, rebuilding this  
 “ Earth out of the Materials of the  
 “ former, and reducing Things from  
 “ the Confusion in which they plainly  
 “ appear to have been, into the pre-  
 “ sent Order, by their own Con-  
 “ cession, there must be a God. In-  
 “ deed the Consequence is so necessa-  
 “ ry that it is not to be withstood by  
 “ any one who attends only to what  
 “ is

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\* *Nat. Hist. Earth. Pref. and Part 2.*

“ is obvious and discernable at first  
“ View : and much less by one who  
“ shall further reflect on the Structure  
“ and Mechanism of this our Globe,  
“ with the Exquisite Art and Sur-  
“ prizing Contrivance that there ap-  
“ pears in the Composure of it.” ]

That Structure and Mechanism is particularly set forth and explain'd in the *Essay*, † and in this *Defense*, \* where 'tis shewn that it is directly such as was necessary to render the Earth capable of answering the End of its Formation, of Furnishing forth the various Kinds of Bodies it was to produce, and of Supplying all the Exigences of them. Nor can I forbear noting that this, here insisted upon, is the very Instance that St. *Peter* ‡ alledges in Defeat of the Allegations of the Libertines and *Scoffers*, that he foretold should *come in the last Dayes walking after their own Lusts, and saying, all Things continue as they were from the Beginning.*

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† Part 3. Sect. 1. *versus finem.*

\* Part 2. Sect. 5.

‡ 2 *Pet.* iii. 5. 6.



ning. He rightly notes that these Objections were not the Result of Reasoning, and do not take their first Rise from the Brain, but begin below, in their Passions, and Vices: and therefore declares plainly they are conscious of better, but wilfully shut their Eyes, and *are willingly ignorant, that by the Word of God the Heavens were of old, and the Earth, standing out of the Water, and in the Water; whereby the World that then was, being overflow'd with Water, perish'd.\** Moses had long before set forth the same, and, indeed, in a Manner more full and particular.

But to proceed with what I was transcribing out of the Authors *larger Work.* [“ We have as firm

*The actual incessant Concurrence of the Divine Power to the Production of Gravity. This the main Instrument whereby all Nature is regulated and governed.*

“ Proof, and clear Evidence of the ordinary and constant Interposition of this great Being in the Affairs of Nature, and of his continual Administration of the Government of the Universe, as we have of his Existence, and of that extraordinary Interposition set forth above. 'Tis agreed, on all Hands, that there is in Body, or Matter, a perfect Inertia, that 'tis passive, “ indiffer-

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\* 2 Pet. iii. 5. 6.

“ indifferent, and equally dispos'd ei-  
“ ther to Motion or Rest. A Body  
“ once at Rest will continue always  
“ so, unless it be put into Motion  
“ by something else: and, when once  
“ put into Motion, it has no Power  
“ of ever again attaining Rest, or of  
“ varying that Motion in the least,  
“ but must move on perpetually with  
“ the Direction, and the Velocity,  
“ given it by the Agent that gave  
“ it that Motion. Whereas we see  
“ all Bodyes, and Matter, both mo-  
“ ved, and the Direction, and Ve-  
“ locity of their Motion varied, re-  
“ gularly and steadily determin'd,  
“ electively, and to an End, by what  
“ we call their Gravity. This great  
“ Principle therefore, that is thus  
“ universal, and inseparable from all  
“ Body and Matter, must be extrin-  
“ sic, impress'd, and imparted by  
“ some Power that is immaterial, ex-  
“ terior to Matter, and that controuls  
“ it. As a Body, or Part of Mat-  
“ ter, cannot be the Cause of its  
“ own Gravity, so, for the same  
“ Reason, it cannot be the Cause  
“ of the Gravity of any other Body  
“ or Matter. 'Tis plain no one Body  
“ can



*The Translator's Introduction.*

“ can impart to another what it has  
 “ not itself. Not but that there have  
 “ been those who, not rightly reflect-  
 “ ing on this, have fancyed that Gra-  
 “ vity, or the Tendency of Bodyes  
 “ towards a Centre, may be effected  
 “ by the Operation of some other Bo-  
 “ dyes upon them. But then, be-  
 “ sides what may be urged, in Dis-  
 “ proof of this, from what is alledged  
 “ above, and holds infallibly in all  
 “ Bodyes whatever, those other Bo-  
 “ dyes must act regularly, and elective-  
 “ ly; which Action can no more be  
 “ compatible to meer Matter than Gra-  
 “ vity can. Nor are the Ends, brought  
 “ about by the Agency of Gravi-  
 “ ty, such as are not truely worthy  
 “ of a Power the very greatest and  
 “ highest that the most exalted Rea-  
 “ son can conceive. 'Tis to this Prin-  
 “ ciple alone that the Globe we inhabit  
 “ owes its Preservation, the conso-  
 “ lidating of its Parts, and the hin-  
 “ dering the Dissipation of them by  
 “ its so necessary diurnal Revolution  
 “ on its Axis. 'Tis to the different  
 “ specific Gravity of Bodyes, par-  
 “ ticularly Fluids, that the various  
 “ Fermentations, the Librations of  
 “ the

“ the Parts amongst themselves, the  
“ numerous Phænomena of the Wa-  
“ ters, Air, Fire, Light, Meteors,  
“ and Things of the highest Mo-  
“ ment transacted in our Atmost-  
“ sphere, are, in great Measure, owing.  
“ As 'tis to their reciprocal Gravi-  
“ tations, each towards other, that  
“ the various noble Globes we be-  
“ hold, the Planets and heavenly Bo-  
“ dies, with this our Earth, are ran-  
“ ged, kept at due Distances, and  
“ regularly make their Revolutions  
“ all in their proper Times. In a  
“ Word, 'tis to this stupendous Prin-  
“ ciple, that the constant and won-  
“ derfull Harmony among the great  
“ Bodyes of the Universe, that the  
“ OEconomy, the Order, the Beauty  
“ so conspicuous throughout all this  
“ mighty Frame, is intirely owing.  
“ Which yet is no more than what  
“ some of the wisest and most dif-  
“ cerning of the Philosophers of old  
“ were lead to the Knowledge of  
“ purely by their like Observations  
“ of Nature, heedfull Attention, and  
“ Reflection on Things. The  
“ greatest Genius, and most refin'd  
“ Reasoner, of any of all the whole  
“ *Roman*



*The Translator's Introduction.*

“ Roman Nation, contemplating and  
 “ admiring the so surprizing *Constan-*  
 “ *cy* observable in *Nature*, the *Sta-*  
 “ *bility* of the *World*, and the *Con-*  
 “ *servation* of the most excellent *Or-*  
 “ *der* of the *Bodies* that constitute  
 “ it, ascribes all directly to the \*  
 “ *uniform Bias and Tendency of*  
 “ *the Parts toward a Center*; this  
 “ serving as a kind of *Tye* to hold  
 “ all together. Which wise *Con-*  
 “ *formation* of Things he expressly  
 “ attributes to *that Being*, which, as  
 “ omnipresent and *diffused through-*  
 “ *out the whole World*, acts every  
 “ every where with the highest  
 “ *Thought and Sagacity, determin-*  
 “ *ing* all Things, from even the  
 “ most *remote Boundaries* of *Mat-*  
 “ *ter*, towards a *Centre*. That the  
 “ *Sea* is kept to its Place, and made  
 “ to constitute one *Globe* together  
 “ with the *Earth*, he plainly ascribes  
 “ to still the same Cause, the *Ten-*  
 “ *dency*

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\* Omnes enim Partes ejus, undique medium Locum  
 capeffentes, nituntur æquabiliter; maxime Corpora au-  
 tem inter fe juncta permanent, cum quodam quasi Vin-  
 culo cirundata colligantur; quod facit ea Natura, quæ  
 per omnem Mundum omnia Mente, & Ratione confici-  
 ens funditur, & ad Medium rapit, & convertit extrema.  
*M. Tull. Cic. de Nat. Deor. L. 2.*



“ dency of the Gravity † of the Parts  
 “ of both toward one common Cen-  
 “ tre ‡; declaring that, upon the whole,  
 “ there's the highest Reason to con-  
 “ clude that all things in this World  
 “ are managed by the Divine Wis-  
 “ dom and Contrivance, in a Man-  
 “ ner truely-wonderfull, so as to con-  
 “ duce to the Security and Preser-  
 “ vation of every Individual\*. So  
 “ likewise the Author of the Book  
 “ de Mundo †, This Part God acts in  
 “ the Universe, preserving the right  
 “ Disposition, and the Well-Being of  
 “ all the Parts of it; adding, --- As is

b

a

† Contentio Gravitatis. Ibid.

‡ Medium Terræ Locum expetens. Ibid.

\* Sic undique omni Ratione concluditur  
 Mente Consilioque Divino, omnia in hoc  
 Mundo, ad Salutem omnium Conservatio-  
 nemque admirabiliter administrari. Ibid.

† Τῆτον ἐν ἔχει τὸ λόγον ὁ θεὸς ἐν κόσμῳ σωζέων  
 τὴν ὅλων ἀρμονίαν τε καὶ σωτηρίαν. And adds,  
 ὅπερ ἐν νηὶ κυβερνήτης, ἐν ἀρμαλὶ ὁ ἡνιοχός, ἐν χορῷ  
 ὁ κορυφαῖός, ἐν πόλει ὁ νόμος, ἐν στρατοπέδῳ ὁ ἡγεμὼν,  
 τὸ θεὸς ἐν κόσμῳ. Lib. de Mundo. c. 6. Which  
 Apuleius renders, Ad hoc instar Mundi Salutem tuetur  
 Deus, apta et revincta sui Numinis Potestate.—Quod  
 est in Triremi Gubernator, in Curru Rector, Præcentor  
 in Choris, Lex in Urbe, Dux in Exercitu; hoc est in  
 Mundo Deus. Budæus renders the former Part thus  
 —Hanc eandem igitur Rationem Deus habet in Mun-  
 do, utpote qui universorum Coagmentationem coherentem  
 cohibeat et coarctet, Incolumitatemque Universitatis con-  
 servet.

*The Translator's Introduction.*

“ a Steersman in a Ship, a Charioteer  
 “ in a Chariot, the Præcentor in a  
 “ Chorus, the Law in a City, the  
 “ General in an Army, such is God  
 “ in the Natural World.” The  
 Reader will do well to compare  
 what is here offer'd, in Relation  
 to Gravity, with what the Author  
 had publish'd, on this Subject, some  
 years ago, in his *Essay* Part. I.

*The actual  
 incessant  
 Concurrence  
 of the same  
 Power to  
 the Produc-  
 tion and  
 Support of  
 all organi-  
 cal Bodyes,  
 Vegetables,  
 and Ani-  
 mals, par-  
 ticularly  
 Man.*

“ As we have, thus, plain Evidence  
 “ of the Concourse of the Divine  
 “ Power to the Support and Preser-  
 “ vation of the Frame and Mechanism  
 “ of the World in general, so have  
 “ we likewise as plain, of the Con-  
 “ course and Aid of the same to  
 “ every particular in it. To pass  
 “ by all others, I shall give an In-  
 “ stance in the Body of Man. Not  
 “ that 'tis peculiar to him; so far  
 “ from it that it holds through the  
 “ whole Animal and Vegetable  
 “ World; being indeed as certain  
 “ in all other Creatures. Every or-  
 “ ganical Body, Plant, or Animal,  
 “ owes its Rise, and Formation, the  
 “ former to a Seed, the latter to an  
 “ Egg. In each of these is a pecu-  
 “ liar Machine, fitted to take in  
 “ Matter



“ Matter proper for the Nourishment  
“ of the Kind, and to distribute it  
“ to the Parts for their Formation  
“ and Growth. By Observation made  
“ on the Eggs of Hens, and other  
“ Fowls, during their Incubation,  
“ we learn that, in Animals, this  
“ Machine is a *System* of Blood-Ves-  
“ sels, Veins, and Arteries, with an  
“ Heart. This is seen to beat with-  
“ in not many Hours after Incubati-  
“ on: and, in a litle Time, to send  
“ forth Blood by the Arteryes, re-  
“ ceiving it back by the Veins. By  
“ this Proceſs the Parts of the Crea-  
“ ture are each gradually form'd,  
“ though not in like Proportion;  
“ ſome being more forward, and  
“ ſhewing themſelves ſooner, others  
“ later, as the Veſſels, ſerving for  
“ the Formation of each, come to  
“ explicate and ſucceſſively diſplay  
“ themſelves. The Eyes and Brain  
“ are the firſt that appear diſtinctly.  
“ Then the Spinal Marrow, and Ca-  
“ rina of the Body. Next the Wings  
“ and the Legs begin to bud forth.  
“ Afterwards the Bowels, the Lungs,  
“ the Liver, the Stomach, and Gutts  
“ ſhew themſelves, by little and little;



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“ but all naked, expos'd, and without  
 “ any the least Coverture over them.  
 “ Even the Heart it self is seen hang-  
 “ ing quite without the Breast for  
 “ several Dayes. At length the Mus-  
 “ cles, Membranes, and Integuments  
 “ of the Thorax, and Abdomen,  
 “ commence in their Turn; but are,  
 “ at first, so very thin, that the  
 “ Parts within appear clearly thorow  
 “ them. By Degrees, growing thicker  
 “ and thicker, they gradually intercept  
 “ the Sight, and finally attain the Con-  
 “ stitution of Ribs, a Sternum, Mus-  
 “ cles, and the rest. In like man-  
 “ ner the remaining Parts are form'd,  
 “ one after another, in their Order,  
 “ till the whole Fabrick be com-  
 “ pleted, and finish'd. But each is,  
 “ at first, a Gelly or Mucus, a mere  
 “ Lump and dead Mass, without  
 “ Sense, Animation, Life, or Mo-  
 “ tion; till the Machine, proceed-  
 “ ing in the Operation, gradually  
 “ imparts what serves for the Pro-  
 “ duction of all these. Thus this  
 “ great, and astonishing Work is  
 “ brought about in every Species of  
 “ living Creatures: and the Female,  
 “ of each, is provided with Organs  
 “ capable

capable of rigging forth Ova, every one of them furnished with a Machine answering all those Ends. The Man, who has a Mind so elevated, so free, and of such vast Extent of Thought, as to take in the Idea of such a Machine, will here find Subject of Admiration greater than can be set forth by Words. On the other Side, the Male, of each Species, is provided with Organs fitted to render the Ova prolific, fetch them down from the Ovary to the Uterus, and put the Operation into Act. Thus this Affair has been carryed on, in every Species, with a continued Succession, through all Ages, Races, and Generations, from the very first. Towards the End of the last Century, Mr. *Leuwenhoeck* discovering, by the Assistance of his Microscopes, certain minute Animalcules in *Semine masculino*, 'twas presently fancyed that the Young of the Kind deriv'd their Origin from these. The Notion, being new, spread strangely; till it became, at last, universal: and, which is still more strange, it holds



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“ its Ground to this Day; though  
 “ contrary to real Fact, and the  
 “ plainest Observations. We see  
 “ the Macula, or Cicatricula, which  
 “ is no other than the Glomus,  
 “ or Clue of these Vessels, actually  
 “ existent in the Egg before the  
 “ Congress with the Male. Then,  
 “ after Impregnation, we see them,  
 “ when under Incubation, explicated,  
 “ displayed, and proceeding in Action,  
 “ in the Manner set forth above.  
 “ The very first Part we descry is  
 “ the Punctum Saliens, as 'tis call'd,  
 “ which appears afterwards to be the  
 “ Heart in the Machine. This shews  
 “ its self, at its first Discovery, which  
 “ is not long after the Beginning of  
 “ the Incubation, to be many thou-  
 “ sand Times as big as the whole  
 “ Body of one of Mr. *Lewenboeck's*  
 “ *Animalcules* \*. But yet this Heart  
 “ is

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\* Tantam in femine virili viventium Ani-  
 malculorum Multitudinem vidi, ut interdum  
 plura quam 1000 in magnitudine arenæ sese  
 moverent. *And a little after*—Minora Glo-  
 bulis Sanguini Ruborem adferentibus hæc  
 Animalcula erant; ut judicem millena millia  
 Arenam grandiore Magnitudine non æqua-  
 tura. *Ant. Lewenboeck. Epist. ad D. Brouncker*  
*Philos. Transact. No. 142.*



“ is but one Part of many that go  
“ to the Composition of the Crea-  
“ ture in Formation : and is not, by  
“ much, the biggest in the Body nei-  
“ ther. So that if the Bulk, of that  
“ Animalcule, be compar'd to the  
“ Whole of the Fætus, or Body now  
“ frameing, and all the severall Parts  
“ be consider'd, 'twill fall so im-  
“ mensely short, as not to be as a  
“ Grain of Sand to the largest Moun-  
“ tain, I had almost said to the  
“ whole Globe of Earth. Such a  
“ Growth, thus *per Saltum*, should  
“ not surely be admitted by any  
“ that reflect, or think regularly.  
“ The Thing is no way conceivable,  
“ or indeed possible, considering the  
“ Elegance, Order, and exquisite Art  
“ discernable in the Fabrick : nor  
“ have we so much as one single  
“ Instance of any Thing like it in  
“ the whole natural World. Besides  
“ the Creature being apparently  
“ form'd, as is above set forth,  
“ by Piece-meal, Organ by Organ,  
“ and Part by Part, gives Evidence  
“ of Sense against this Notion.  
“ Should some wild Patagon, or  
“ other Barbarian, who had never

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“ before seen so magnificent a Structure,  
 “ observing the *Parthenion* at *Athens*,  
 “ the *Colliseum* or *Pantheon* at  
 “ *Rome*, fancy these, and the like,  
 “ sprung and grew up from some  
 “ Hutt, at first, or small Cottage:  
 “ or one who had never before seen  
 “ a Ship, when first he observ'd the  
 “ *Britannia*, or the *Royal Sovereign*,  
 “ imagine each took its Rise from some  
 “ Skiff or Wherry, such Conjectures  
 “ would be receiv'd by an Architect,  
 “ who knew how those Buildings  
 “ were put together, Stone by Stone,  
 “ or a Ship Carpenter, conscious how  
 “ Beam was added to Beam, and  
 “ Plank to Plank in the Fabrick,  
 “ with the same Slight that Mr.  
 “ *Lezwenhoeck's* must, by a wise and  
 “ discerning Naturalist. The Truth  
 “ is, this Notion, like some others,  
 “ was the more readily admitted,  
 “ as it seem'd to give an obvious  
 “ and easy Solution of the Difficulty  
 “ of the Formation of the Body of  
 “ Man, and of other Animals;  
 “ whereas, if it be rightly attended  
 “ to, 'twill be found only an Amuse-  
 “ ment and Elusion; these Animal-  
 “ cules being no other than mere  
 “ Vermin;



“ Vermin; the like of which are  
“ produced in the other Fluids of  
“ the Body, and in various Liquids  
“ without. Tho’, be all that as it  
“ will, for what I am here about to  
“ advance depends not upon it, but  
“ stands wholly on its own Bottom,  
“ That Machine, the *System* of Blood-  
“ Vessels, continues to do the same  
“ Office, as well after the Body of  
“ the Creature is compleated, as be-  
“ fore, ’till it be brought, in Con-  
“ clusion, to full Growth, and Ma-  
“ turity, nay even thence on to the  
“ End of its Life. The Arteryes  
“ still convey that Blood out of  
“ which the nutritious Matter is de-  
“ tach’d, and annexed to the Parts  
“ for their Sustainance; to which  
“ End a Branch, from some main  
“ Trunk, is allotted to each Part  
“ for its Service and Supply. This  
“ Branch is provided with Organs  
“ fitted to dispense, forth of the  
“ common Mass, only such Sorts of  
“ Matter as are proper for the Fa-  
“ brick and Composition of that par-  
“ ticular Part; each Part being of  
“ peculiar Constitution, and Substance  
“ differing from the rest *e. gr.* a  
“ Muscle



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“ Muscle from the Liver, this Bowel  
 “ from the Brain : and, to be short,  
 “ the various constituent subordinate  
 “ Parts of these, and the rest, differ-  
 “ ing commonly each from other.  
 “ Every the minutest Part hath thus  
 “ allotted it a Branch of an Artery,  
 “ conducting and directing the Nou-  
 “ rishment to it : and, by Means  
 “ of particular Organs in it, dispatch-  
 “ ing forth, and annexing to it, on-  
 “ ly such Corpuscles as suit the pe-  
 “ culiar Nature of that very Part †.  
 “ Then the said Branch is likewise  
 “ so fram'd as to regulate the Order  
 “ of those Corpuscles, to range them  
 “ in proper Method, and limit the  
 “ Distribution of them, in such Man-  
 “ ner that each of the several Parts  
 “ attains a Substance, Texture, Bulk,  
 “ and Figure, proper, and suiting to  
 “ its Office and Use. The minutest  
 “ Part in the Compages of each  
 “ Limb, Member, or Organ, thorow-  
 “ out all the whole Body, is provi-  
 “ ded

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† “ *The various Fluids of the Body, the*  
 “ *Lympha, the Bile, and the rest are secreted*  
 “ *and turn'd out of the common Mass of the*  
 “ *Blood, by a much like Mechanism.*

“ ded with a Branch of an Artery,  
“ making such a Detachment of the  
“ Nourishment, such an Election of  
“ Matter thence as is fit for the con-  
“ stituting of that Part, and such a  
“ Circumscription and Limitation of  
“ it to proper Bounds. Every thing  
“ throughout the whole Frame is  
“ transacted, thus, with a perfect  
“ and absolute Geometry and Me-  
“ chanism : and, without this Con-  
“ trivance, no Part could be of Spe-  
“ cific Nature, and Structure, of a  
“ peculiar Size and Figure, or fitted  
“ to a particular Use. The very  
“ Arteryes themselves are not form'd,  
“ nourish'd, and supported, but by  
“ such a Mechanism and Contrivance.  
“ Our Microscopes shew us, in all  
“ Parts of the great Arteryes, a se-  
“ cond smaller Order of Arteryes,  
“ serving for the Distribution, Electi-  
“ on, and Limitation of the Matter  
“ out of which is form'd and nou-  
“ rish'd each Part of the larger Ar-  
“ teryes. This second Order of Ar-  
“ teryes appear manifestly to be of as  
“ Specific Constitution, and regular  
“ Fabrick, as those of the first Order:  
“ and these could no more attain  
“ this



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“ this, than those of the first Order  
 “ could, without a like subordinate  
 “ Mechanical Ministration, or a third  
 “ Order. Nor can this third Order  
 “ be framed, and continually nourish'd,  
 “ without a fourth: or that without  
 “ a fifth: and so on to a fiftyth, or as  
 “ many more as can be suppos'd.  
 “ But it's plain these cannot be in-  
 “ finite; we must come, at length,  
 “ to one last Order: and that can-  
 “ not, itself, or by its own Power,  
 “ attain such a Distribution, Election,  
 “ and Limitation of nutritious Mat-  
 “ ter, as to be its own Framer and  
 “ Maker; any more than the first  
 “ Order can, or indeed than the  
 “ Whole can, or a Man make him-  
 “ self. For 'tis certainly as easy to  
 “ conceive the whole Body, as any  
 “ the minutest Part, forming and sus-  
 “ taining its self without the Assistance  
 “ of proper Organs and Instruments.  
 “ The smallest Part is, as to Texture,  
 “ Figure, and Constitution, exactly  
 “ regular, and compos'd, with Art,  
 “ to answer an End. If any such  
 “ Part can form itself, or be form'd  
 “ without the Aid or Ministry of  
 “ something without, a second may  
 “ likewise,



likewise, and a third, nay all the  
rest of even the whole *System*; so  
that there would be no Need of  
an Egg, with its Machine, to be-  
gin, and carry on that Work.  
Which is apparently as impossible  
as that a Palace should be rais'd  
without any Builder, or a Watch  
produced without a Maker. So  
that for the Formation and Suste-  
nance of this last Order of Arteries,  
the Concourse of some other exte-  
rior Cause is absolutely necessary.  
This is in it self so evident and  
plain, that I cannot see how it can  
be withstood, or evaded by any  
Subtilty or Artifice whatsoever.  
One thing I ought not to pass over  
without Notice. Among other  
Fictions, introduced into the Phi-  
losophy of the last Age, there was  
one that became a great Subject  
of Speculation; I mean the *Materia*  
*subtilis* of the *Cartesians*. The  
Votaries of this, like those of the  
Animal Spirits, have never offer'd  
any the least Proof of even its  
Existence. They only set forth the  
Implements and Offices they destin'd it  
to; nay, and without ever going  
about

*Occasionally*  
*of the Car-*  
*tesian Mate-*  
*ria subti-*  
*lis.*

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“ about so much as to shew how  
 “ it was fitted to answer and execute  
 “ them. That these Gentlemen may  
 “ not bewilder themselves here, or  
 “ imagine that some such Fluid Mat-  
 “ ter, without, may, in some Way,  
 “ operate upon, and support this last  
 “ Order of Arteryes, I shall add  
 “ something on this Subject. I know  
 “ well they suppose their *Materia*  
 “ *subtilis* to be infinitely subtil, pe-  
 “ netrant, and active: and these cer-  
 “ tainly are exceeding fine Proper-  
 “ tyes; but they cannot conduce, in  
 “ the least, to the Purpose now un-  
 “ der Consideration, unless the *Ma-*  
 “ *teria subtilis* be a free Agent, qua-  
 “ lify'd to proceed by Rule and Art  
 “ in its Work, contriving and de-  
 “ termining all steadily to an End.  
 “ Which it never can, except it be  
 “ capable of Reasoning and Judg-  
 “ ing; to suppose which, of the  
 “ *Materia subtilis*, would be too  
 “ great a Paradox. 'Tis plain there  
 “ can never be produced an Effect,  
 “ that is certain and regular, which  
 “ this here is, by any but a Cause  
 “ that acts with Certainty and Re-  
 “ gularity. If it do that, and all  
 “ plainly



“ plainly tend to a particular Purpose,  
“ as in the present Case, 'tis unde-  
“ nyable that that Cause must operate  
“ with Thought, Reflection, and De-  
“ sign. Nor can there be any Dis-  
“ pute but that whatever that be that  
“ acts this Part, and does this last  
“ Office to the Organs in the Body  
“ of Man, and Animals, it discovers  
“ a Power the most absolute, and  
“ a Faculty of Reasoning and Judg-  
“ ing in the most perfect and con-  
“ summate Manner that the Mind of  
“ Man can ever possibly comprehend.

“ Thus 'tis, we see, certain that *Instances*  
“ there are in Nature undeniable *-serving to*  
“ Proofs both of the Existence and *explain the*  
“ the Agency of this great Being: *Reasons of*  
“ and that he *the Divine*  
“ *Procedure*  
“ *in the Go-*  
“ *vernment of*  
“ *both the*  
“ *Moral and*  
“ *Natural*  
“ *World.*  
“ *†*  
“ *left not himself with-*  
“ *out Witness, in that he did Good,*  
“ *and gave us Rain from Heaven,*  
“ *and fruitfull Seasons, filling our*  
“ *Hearts with Food and Gladness. †*  
“ The *Good* here peculiarly specified  
“ is brought about by the Govern-  
“ ment and kindly Conduct of the  
“ Principles and Operations of the  
“ *great Abyss*; to which we owe  
“ particularly,

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† *Acts* xiv. 17.



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“ particularly, our *Rains*, † the  
 “ *Fruitfullness* of the Earth, with  
 “ all the *Good* and Salubrity of the  
 “ Atmosphere and Air we breath,  
 “ which is indeed the Main of the  
 “ *Good* of Life\*. The prime Spring  
 “ of these Operations hath been hi-  
 “ therto a grand Secret; but doubt-  
 “ less, whenever it shall be discover-  
 “ ed, like Gravity, the first Mover  
 “ and Spring in the right Ordinati-  
 “ on of the Bodyes and Parts of the  
 “ Universe, as also like the Capilla-  
 “ ry Vessels, the prime Organs that  
 “ sustain all the rest in the Animal  
 “ OEconomy, this prime Spring and  
 “ Cause of Action in the *Abyss* will  
 “ be found immediately in the Hand  
 “ of God. But, from these,  
 “ and all the other Instances that  
 “ we know, 'tis evident he thinks  
 “ fit to skreen himself from common  
 “ View, to act in great Measure  
 “ under a Veil, so much covered and  
 “ concealed as to be descryed only  
 “ by those that search for him with  
 “ the

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† *Nat. Hist. Earth.* Part. 3.

\* *Vide. Nat. Hist. Earth. illustrated, &c.*  
*infra* p. 109, 110, 111.

“ the greatest Application and Atten-  
“ tion: that *feel after him, and find*  
“ *him; tho' he be not far from every*  
“ *one of us; for in him we live, and*  
“ *move, and have our Being\**. This  
“ is that GOD that, tho' allotted  
“ a solemn Worship by the *Athenians*,  
“ was yet really UNKNOWN †, even  
“ amidst a Nation so very much ce-  
“ lebrated, in all Ages, for the Sa-  
“ gacity of its Philosophers, till the  
“ illustrious Apostle of the *Gentiles*  
“ explained and *declared him unto*  
“ *them ‡*. In which Method of  
“ the Divine Procedure all Things  
“ are ordered with the greatest Wif-  
“ dom, with such Concinnity as right-  
“ ly to comport together, and each  
“ act its Part in the OEconomy and  
“ Administration of the Whole, as  
“ well in the Moral, as in the Na-  
“ tural World. For, should that  
“ mighty and powerfull Being con-  
“ tinually *bare his holy Arm, in the*  
“ *Eyes of all the Nations †*, should  
“ he openly display, shew himself,  
“ and

\* *Acts* xvii. 27, 28.

† *Ibid*, v. 23.

‡ *Ibid*, v. 23.

† *Isai* lii. 10.



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“ and shine forth in his full Lustre;  
 “ ’twould so far influence, and strike  
 “ such a Terror and Awe, as to lay  
 “ all Mankind under a continual Re-  
 “ straint, Force, and Compulsion.  
 “ Were the Case so, there would be  
 “ no Freedom of Will, nor Choice of  
 “ Demeanour and Action: and con-  
 “ sequently no just Foundation for  
 “ Rewards and Punishments. Every  
 “ Thing would have been then wholly  
 “ under an absolute Mechanism, and  
 “ fatal Necessity. All know the Ob-  
 “ servance and Awe that the Presence  
 “ of a temporal Prince excites: and,  
 “ from that, ’tis not hard to judg  
 “ how much greater must needs be  
 “ excited by the Presence of a Being  
 “ so vastly superior, so holy, and just,  
 “ as well as infinite in Wisdom and  
 “ Power. Nor is this a Position ei-  
 “ ther new, or that wants Confirma-  
 “ tion. So far from it, that ’tis support-  
 “ ed by the highest Authority: and we  
 “ have an Oracle, of all others the most  
 “ undoubted, pronouncing, and decla-  
 “ ring expressly to that immense Be-  
 “ ing, *Verily thou art a God that hi-*  
 “ *dest thy self, O God of Israel, the*  
 “ *Saviour!*



“ *Saviour* †! The steady con-  
“ stant Supporter of the Frame of Na-  
“ ture being thus generally, as it were,  
“ retired, not disclosing himself at  
“ every Turn, and never but on ex-  
“ traordinary Occasions, such as the  
“ Re-forming and New-moduling the  
“ Earth, at the Deluge, so as to  
“ make it conduce to the Reclaim-  
“ ing of the degenerous Race of Man-  
“ kind, or as the Promulgation  
“ of some new important Doctrine,  
“ as first that of *Moses*, and after-  
“ wards that of *Christ*; but, other-  
“ wise, making the established Law  
“ of Nature the standing Rule of his  
“ Conduct and ordinary Providence;  
“ I say, things being thus ordered  
“ and appointed, some there are who,  
“ deporting themselves commonly in  
“ Life in such Sort that they may  
“ have Reason to hope and wish that  
“ there was no God, Men rash, dar-  
“ ing, presuming on their own Parts,  
“ tho’ meer Speculators in Philosophy,  
“ having only a superficial Know-  
“ ledge, as looking not deeper than  
“ c 2 “ the

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† *Isai.* xlv. 15.

“ the Outside of Things, and so fall-  
 “ ing far short of the Notices they  
 “ might obtain of the true Agent and  
 “ Cause, did they search deeper, have  
 “ ascribed all to blind Chance, and  
 “ supposed there was no God. This  
 “ is the grand Source of that Atheism,  
 “ Infidelity, and Presumption, that  
 “ must, in History, cast such a Sully  
 “ and Blemish on both the Intellects  
 “ and Morals of the present Age;  
 “ which will be found to have sur-  
 “ passed any of the precedent, as  
 “ in Opiniatry, so in these ill-groun-  
 “ ded and licentious Principles”.

In the *Essay*, and this *Defense*, which I  
 have now made *English* and published,  
 the Author hath laid before us many  
 great Monuments, and Proofs, at this  
 Day extant, and visible in all Parts  
 of the Earth, of the Truth and Cer-  
 tainty of every individual Article  
 throughout the whole *Mosaic* Narra-  
 tive of the Deluge; evincing that  
 every Thing happen'd in the very  
 Manner that the Sacred Writer hath  
 there represented. In particular the  
 Destruction of the Primitive Earth:  
 and, from Reflections on the Condi-  
 tion and various Phænomena of the  
 Bones,



Bones, Teeth, and Shells of Sea-Fishes, of the Plants, and other Remains of the Productions of that Earth, preserv'd in this, 'tis made evident that the Fabrick and Constitution of it was directly such as *Moses* has set forth: and that those who have presum'd to recede from his Account of it, have at the same Time receded as far from Nature and Fact. † By conferring his Relation of the primitive Earth with what follows from Observations made on the present Earth, 'tis made apparent that the Process in the Formation of both was the very same. Then, from comparing the two Earths, the old, and new, and thereby discovering that the Difference lay only in Degree of Fruitfulness, 'tis made evident that the Design of the Deluge was the very same that *Moses* has assign'd, *viz.* to destroy, not only that profligate Race of Men, but likewise the Earth itself, in Order to retrench the greater Fruitfulness of it; which, how rightly soever it might suit a State of Innocence, after

c 3

the

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† *Nat. Hist. Earth.* Part. 2. and 6.

the Fall, furnish'd forth so plenti-  
 full and exuberant Supply of what  
 was then so unhappily turn'd to the  
 Luxury and Vices of its then Inha-  
 bitants. In which whole Transaction  
 we have a most illustrious Instance  
 of the Goodness of God, and of his  
 especial Regard to humane Kind.  
 For, after Man, for whose Use it was  
 first form'd, had made so great a  
 Change in his Nature and Disposition,  
 it was of the highest Importance that  
 the Disposition and Constitution of  
 the Earth should be changed too,  
 its Fertility abated, and Things suited  
 to his now frail laps'd State. From  
 the same Observations 'tis made clear  
 that the Deluge was brought on at  
 the very Season and Time of the  
 Year that *Moses* has set forth: that  
 it was Universal, and that *all the  
 high Hills that were under the whole  
 Heavens were cover'd*: † and that,  
 as the System of Nature then was,  
 and now is, establish'd, nothing of  
 all this could ever possibly have hap-  
 pen'd without the immediate Con-  
 course

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† *Gen.* vii. 19.



course and Interposition of a Supernatural Power; all which *Moses* had before asserted.

This Attestation of Nature to the *Mosaic* Account, and the strict Accord that there is betwixt them in every individual Article, duely weigh'd, gives just Grounds for what the Author of these Papers elsewhere \* suggests, that *both came from the same Hand*. I confess, when I began rightly to consider this, it caus'd in me not a little Surprize; which yet increas'd on my conferring with the Author upon the Occasion, and reflecting on those Things that he then imparted to me, which, 'tis, to be hop'd, will be one Day communicated to the Publick. Among, these was a Passage out of his *larger Work*; which, giving me great Satisfaction, I perswade my self 'twill give not less to others, and therefore I take the Liberty to communicate it, as I have done three already, in his own Words.

“ 'Tis not possible for any rational  
“ Man to think that *Moses* could ever  
“ fall into the Particulars of the Ac-

*The Mosaic  
Account of  
the Deluge  
not from  
Chance, or  
Fancy:*

c 4

“ count

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\* *Nat. Hist. Earth. Part. vi. Sub. fin.*

*The Translator's Introduction.*

“ count he hath set forth of the De-  
 “ luge, by meer Chahce: or advance  
 “ it only from Conjecture and Fan-  
 “ cy. We need no further Proof of  
 “ this, than duely to reflect on those  
 “ two great Articles of that Account,  
 “ the Universality of the Deluge, and  
 “ the Destruction of the Earth. So  
 “ far would these be from coming of  
 “ themselves into the Thoughts of  
 “ any Man, that they are more like-  
 “ ly even to amaze and astonish him  
 “ when proposed. The Truth is, he  
 “ who can bring himself to think  
 “ that *Moses* could ever stumble or  
 “ pitch on these by meer Chance,  
 “ may as easily, and with full as  
 “ great Shew of Probability, think  
 “ that he could draw all the Fea-  
 “ tures of some Man, or the Map of  
 “ a Country, without ever having  
 “ seen or heard of either: nay, that  
 “ an Handfull of the Letters of the  
 “ Alphabet, cast in Metall, and  
 “ flung out at Random, might, by  
 “ Chance, fall into such a Series,  
 “ and Order of Words as exactly to  
 “ compose his Narration and Account  
 “ of the Deluge.

“ Nor



“ Nor could *Moses* receive that  
“ Account from Tradition : or from *Nor from*  
“ any Records, or Historys then re- *Tradition,*  
“ maining and extant. There could *or Records :*  
“ not any such be possibly made, or  
“ drawn up. In such a Deluge as,  
“ we see plainly, from Nature, real-  
“ ly happen'd, no Creature, in which  
“ was the Breath of Life, could ever  
“ be preserv'd, but by some such  
“ Means as *Moses* has set forth. 'Tis  
“ true, Men floating in an Ark, or  
“ other like Vessel, might see a few  
“ Miles round them ; tho', according  
“ to the *Mosaic* Relation, which is  
“ highly consentaneous to Reason,  
“ the better to guard and secure those  
“ shut up in it, from the Rain and  
“ horrible Tempests without, the Ark  
“ was so clos'd that *Noah* could not  
“ do even that. But, if all had been  
“ open, they could never see to any  
“ great Distance : and much less dis-  
“ cern that the Water overflow'd and  
“ environ'd the whole Globe. Now  
“ what they could not possibly attain  
“ any Knowledge, or Information  
“ of, themselves, they could not  
“ transmit to others, or hand down  
“ Records of it to Posterity. Far  
“ more

*The Translator's Introduction.*

“ more impracticable was it still for  
 “ them to judge of what was trans-  
 “ acting underneath that mighty Mass  
 “ of Water, or to get Intelligence  
 “ of the Destruction of the Earth,  
 “ that was at the Bottom of it, vast-  
 “ ly out of all humane Reach and  
 “ View.

Nor from  
 Observa-  
 tions of Na-  
 ture;

“ Neither could *Moses* collect  
 “ these, and the other Propositions  
 “ that he has deliver'd, as we, at  
 “ this Day, evidently, may, from  
 “ Observation of the present State of  
 “ Things in the Earth, and Inferen-  
 “ ces from them. Our Commerce,  
 “ and Navigation quite round the  
 “ whole Globe, gives us Opportunity  
 “ of examining, and searching into  
 “ it, in every Quarter, and on all  
 “ Sides: and the Shells, and other  
 “ Spoils of the Sea, that those Searches  
 “ shew, in even the firmest Stone,  
 “ and hardest Fossils, to the very  
 “ Tops of the highest Mountains,  
 “ and to the Bottoms of the deepest  
 “ Mines, in every Part of the Globe,  
 “ give Proof, and Evidence, of the  
 “ Universality of the Deluge, and  
 “ of the Destruction of the Earth,  
 “ beyond all Question or Doubt. But

“ *Moses*



“ *Moses* could not know this. For  
“ if, as he might, he had made such  
“ Observations in *Ægypt, Midian,*  
“ and *Arabia,* the only Countrys  
“ where he ever was, in all which  
“ these Marine Bodies are, to this  
“ Day, actually found, yet, from  
“ View and Examination of so small  
“ a Part of it, he could reasonably  
“ infer Nothing as to the whole  
“ Globe, the universal overflowing  
“ of it, the Destruction of its Frame,  
“ and total Dissolution of the Com-  
“ pages of it. *Eratosthenes, Hero-*  
“ *dotus,* and others amongst the An-  
“ tients, took Notice, as well as we,  
“ of these Marine Bodies at Land;  
“ but they never dream'd of an Uni-  
“ versal Deluge, or extended their  
“ Thoughts farther than meerly the  
“ Places where they were found;  
“ which those Authors presently con-  
“ cluded had been formerly the Bot-  
“ tom of the Sea, and that this, re-  
“ treating thence, had left these Bo-  
“ dyes behind. As *Moses's* own Ob-  
“ servations could give him little  
“ Light into this Affair, so he could  
“ receive as little from others then  
“ Living. Studyes of this sort had  
“ not

*The Translator's Introduction.*

“ not obtain'd in those early Times.  
 “ The World was not then thorow-  
 “ ly settled, Things sufficiently esta-  
 “ blish'd, or Arts so far advanc'd as  
 “ to afford Leisure to Curiosity, or  
 “ such Kinds of Speculation. These  
 “ prevailed not till many Ages after-  
 “ wards. Tho' indeed, had *Moses*  
 “ been ever so curious or inquisitive,  
 “ it would have been to little Effect,  
 “ as he must have wanted Assistance  
 “ to carry his Enquiries on to a suffi-  
 “ cient Extent. Navigation was then  
 “ in its Infancy, and the Sailing, in  
 “ those Times, and a great while  
 “ afterwards, chiefly near the Shores,  
 “ from Port to Port; the Mariners  
 “ Compass, by which we are con-  
 “ ducted in our long Voyages, be-  
 “ ing not found out. Indeed there  
 “ was then only a small and very  
 “ inconsiderable Part of the World  
 “ known; whereas *Moses* could not  
 “ have Intelligence sufficient to found  
 “ Propositions of so great Extent up-  
 “ on without Accounts and Observa-  
 “ tions procur'd from Countries the  
 “ most distant, and even Antipodes  
 “ to those he had seen, from the re-  
 “ motest Part of *Africa*, and *Europe*,  
 “ from



“ from *China*, and even from *Ame-*  
“ *rica* itself; in all which Parts  
“ these Marine Bodies are found in  
“ great Numbers; tho' 'twas altoge-  
“ ther impracticable for him to ob-  
“ tain the least Notice of them.

“ Now 'tis plain, if *Moses* could *but from*  
“ not fall into these two great im-*Revelation.*  
“ portant and wonderfull Propositions,  
“ by Chance: if he could not come  
“ to the Knowledge of them from  
“ Records, History, or the Traditi-  
“ on of former Ages: or by Infe-  
“ rence from personal Observations,  
“ and Searches made in his own Times,  
“ which 'tis evident he never could,  
“ there remains only one Way more  
“ of coming to the Knowledge of  
“ them, which is by Divine Reve-  
“ lation, and their being comunica-  
“ ted to him by the great Author of  
“ all this mighty and even stupen-  
“ dous Transaction, along with the  
“ weighty Motives that lead to it,  
“ the Extirpation of an enormously  
“ wicked Generation, and making  
“ such a Change in the Earth and  
“ its Productions as should dispose the  
“ ensuing Race to Better. Nor does  
“ *Moses* any where go about to re-  
“ ferr

*The Translator's Introduction.*

“ ferr to Tradition, or Observations;  
 “ but openly acknowledges that the  
 “ Light, he had into this whole  
 “ Affair, was from the Source here  
 “ assign'd, and no other; of which  
 “ there is, we see, the firmest Proof  
 “ that can be had of any Thing  
 “ whereof we have not actual Evi-  
 “ dence of Sense, and which is not  
 “ now in Transaction before our Eyes.  
 “ Nor is this, by many, the only  
 “ Instance we have how directly and  
 “ almost unavoidably a right and ac-  
 “ curate Contemplation of the Works  
 “ of Nature leads us to the Discovery  
 “ and Knowledge of the Author of it.  
 “ To the two Instances alledg'd  
 “ above, the Universality of the De-  
 “ luge, and the Destruction of the  
 “ Earth, may, with equall Justice,  
 “ and Certainty, be added a third,  
 “ I mean what *Moses* has deliver'd  
 “ concerning the great *Abyss*, the  
 “ exceeding Prevalency of its Waters,  
 “ and the vast Height to which they  
 “ rose above the Earth\*. He could  
 “ no more have fallen into the No-  
 “ tion

*The same  
 further e-  
 vinc'd from  
 the Mosaic,  
 Account of  
 the Abyss:  
 and of the  
 immense  
 Quantity  
 of Water  
 sent thence  
 at the De-  
 luge.*

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\* *Gen.* viii. 18. 19. 24.



tion of this Proposition by Chance,  
than of either of the others. Nor  
could he obtain Notice of it from  
Tradition or Records: nor from  
Observations; any more than he  
could the Notice of those two.  
The *Abyss* lyes wholly in the Dark,  
shut up and conceal'd from all Mor-  
tal Eyes. *Aristotle*, and the rest  
of even the most sagacious of the  
*Greek* Philosophers, knew nothing  
of it: and the very first Discovery  
of it is owing to the *Mosaic* Wri-  
tings. As to the Water being sent  
thence out of the Earth, in so great  
Quantity, and rais'd to such Height,  
they who were in the Ark could  
not be conscious or any ways sensi-  
ble of it themselves: and there-  
fore could not send down any Ac-  
count of it to others, or to Posteri-  
ty. Nor could *Moses* inferr this  
from Observation, any more than  
either of the other Propositions.  
The first sure Intelligence we had  
from Nature of such an *Abyss* was  
drawn from comparing the Historyes  
of the Earth-quakes that have hap-  
pen'd in all Ages, and considering  
the Operations of the *Abyss* in the  
Production

*The Translator's Introduction.*

“ Production of them †. The won-  
 “ derfully great Height to which the  
 “ Water of the *Abyss* must have  
 “ risen, above the Surface of the  
 “ Earth, is made out from Reflection  
 “ on the regular Disposition of the  
 “ Strata, on every Side the Globe, each  
 “ upon other, to the greatest Depth  
 “ we ever dig or mine. To range  
 “ all these, in such Method, by means  
 “ of Water, in Quantity sufficient  
 “ for all the Materials that compose  
 “ those Strata to subside in, so as to  
 “ be repositied in the orderly Manner  
 “ we now find them, would require  
 “ a Bulk of that Fluid so immensely  
 “ great as would surpass all humane  
 “ Thought, and Imagination, were  
 “ there not at this day extant so clear  
 “ and unquestionable Proofs of it as  
 “ those Strata themselves every where  
 “ give\*. Nor was *Moses* aware mere-  
 “ ly of the Existence of the *great-*  
 “ *Deep*, or *Abyss*: and this enor-  
 “ mous Excursion of it at the De-  
 “ luge.

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† *Nat. Hist. Earth.* Part. iii.

\* *Of this there is something offer'd in the Nat. Hist. Earth illustrated* pag. 96 & Seq. *infra.*



“ luge. He was as well appriz'd of  
“ the whole Theory of it : its Inter-  
“ course with the Atmosphere : its  
“ numerous and great Uses in the  
“ Natural World : and, particularly,  
“ how far it contributes to the Pro-  
“ duction of Things serviceable to  
“ the Life of Man ; which he there-  
“ fore stiles *Blessings of the Abyfs* or  
“ *Deep that lyeth under the Earth* † ;  
“ an Expression of high Emphasis,  
“ but little hitherto understood, by  
“ any of his Interpreters, by Reason  
“ of their Want of Knowledge of  
“ the OEconomy and Operations of  
“ this great Subterranean Reserva-  
“ tory”.

Now that my hand is in, and that  
the Author, of his wonted commu-  
nicative Disposition, has given me  
Leave, I shall take, out of the same  
Work, two Paragraphs more ; the one  
relating to the *Curse* of the *Ground*,  
and the Production of *Thorns* and  
*Thistles*, set forth by *Moses* on Oc-  
casion of the Fall of *Adam* : the  
other, to the Life of Animals being  
d seated

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† *Gen.* xlix. 25. Confer. *N. H. Earth illustrated*, pag. 106, to III, infra.

seated in the Blood. In this last are several Experiments and Observations made in the Dissection of Live-Animals. The Author, judging these too long to be printed here, would have retrench'd them. I have taken the Liberty to differ from him : and flatter my self that I shall be join'd by every Reader who is curious, and inquisitive into a Matter that I cannot but think highly worthy of Consideration.

*Of the Curse,  
denounc'd  
upon the  
Earth, on  
Account of  
the Fall of  
Adam.*

“ Gen. III. 17, 18, 19. Unto  
 “ Adam he said, because thou hast  
 “ eaten of the Tree of which I com-  
 “ manded 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.  
 “ Thorns also and Thistles shall it  
 “ bring forth to thee : and thou shalt  
 “ eat the Herb of the Field. In the  
 “ Sweat of thy Face shalt thou eat  
 “ Bread till thou return unto the  
 “ Ground. I cannot readily fall in-  
 “ to their Sentiments † who imagin  
 “ that

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† *Vide* Basil. Hexam. Hom. 5. D. Augustin de Genesi contra Manich. l. i. c. 13.



“ that Thorns and Thistles were first  
“ produced upon this Occasion : and  
“ that there were none, in Being, till  
“ after the Fall of *Adam*; any more  
“ than that the *Rainbow* had never  
“ appear'd till the Covenant, made Occasionally  
of the Ori-  
gin of the  
Rainbow :  
and its be-  
ing appoint-  
ed for a  
Memorial  
of the Cove-  
nant made  
with Noah.  
“ with *Noah*, after the Deluge, which  
“ some have likewise fancy'd. This  
“ is a Phænomenon produc'd ac-  
“ cording to the ordinary and esta-  
“ blish'd Laws of Nature : and must,  
“ of Course, happen, as well before  
“ the Deluge, as after it, as often  
“ as the Rays of the Sun were return'd  
“ back to the Eye refracted and re-  
“ flected by innumerable Drops of  
“ falling Rain, in the Manner set  
“ forth and demonstrated by the great  
“ M. *Des Cartes*\*, and some others  
“ since. Nor could there ever have  
“ been appointed a more proper To-  
“ ken, and Sign of that Covenant,  
“ than this is. There was no need  
“ of producing a Thing that had  
“ never had Existence before : or of,  
“ every now and then, working a  
“ Miracle in Confirmation of that  
“ Covenant. This was not at all rea-  
“ sonable  
d 2

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\* Meteor. c. 8. Dioptric. c. 6. Sect. 5.

“ sonable, or agreeable to the Me-  
 “ thods us'd in the Administration  
 “ and Government of the World.  
 “ Any great illustrious standing na-  
 “ tural Token would be sufficient,  
 “ such as the Sun, for Example: and,  
 “ as often as that was seen in the  
 “ Heavens, it might have well serv'd  
 “ as a Monument of this perpetual  
 “ Covenant, so long as that glorious  
 “ Body shall shine and exist. But  
 “ nothing could have been pitch'd up-  
 “ on that was so natural, so fit, and  
 “ direct to the Purpose, as the Rain-  
 “ bow; which is wont to be exhi-  
 “ bited in the Conclusion and Going  
 “ off of Rain. For 'twas Rain that,  
 “ coming on, usher'd in that great  
 “ Catastrophe, the Deluge: and the  
 “ Rainbow, happening on the Cessa-  
 “ tion of Rain, was the most proper  
 “ Memorial of such a Covenant as  
 “ could ever possibly have been made  
 “ Choice of. As to Thorns and  
 “ Thistles, tho', in my Subterranean  
 “ Searches, among the various nume-  
 “ rous Vegetable Remains of the Ori-  
 “ ginal Earth that I met with inclos'd  
 “ and preserv'd in the Stoney and other  
 “ Strata, I cannot recollect that I ob-  
 “ serv'd

*Thorns  
 and Thistles  
 serv'd, in  
 some De-  
 gree, to put  
 the Curse,  
 on the  
 Earth, in  
 Execution.*



serv'd any of these; yet I do not doubt but, if Inquiry was again made; with particular Regard to these, great Numbers would be found. The rather, because there are daily discover'd, under-Ground, Plants of those Kinds that now as much incumber the Earth, and are of full as little Worth. I might allege others, but shall pitch upon the Fern-Kind for Example of this; since no Plant whatever occurs in Stone in greater Plenty, or Variety, than the Fern. Which yet is of as little known Use as perhaps any the meanest upon Earth. Notwithstanding, it is so very exuberant, produces a Crop, of Seeds, so incredibly great, and spreads so fast, that neither Thorns, nor Thistles, nor indeed any one Kind of Weed whatsoever, has so great a Share of the Globe in its Possession as this has. But, tho' Thorns and Thistles were not first brought forth immediately after the Curse, 'twas easy to God, and they might be then render'd more mischievous, troublesome, and molesting than before. They might have new Powers and

d 3                      Propertyes

*The Translator's Introduction.*

“ Propertyes superadded: and, in par-  
 “ ticular, such as should render them  
 “ more prolific than the better Kinds  
 “ of Vegetables and those of greatest  
 “ Use, more apt to propagate, dif-  
 “ perse themselves abroad, and over-  
 “ run the Ground. And 'tis but too  
 “ obvious to observe with how great  
 “ Ease and Freedom Weeds, and  
 “ worthless Vegetables, nay some  
 “ that appear to have little in them  
 “ besides what is noxious and hurt-  
 “ full, run on, and multiply: and  
 “ with how much Pains and Difficul-  
 “ ty, the more necessary and usefull  
 “ are rais'd and increas'd. Indeed  
 “ 'twill be easy to discern how this  
 “ comes about if we look a litle up-  
 “ on the Seeds of the one, and the  
 “ other: and observe how much greater  
 “ natural Provision is made for the  
 “ Growth of Weeds, and the Distri-  
 “ bution and Conveyance of their  
 “ Seeds to all Places, than for the  
 “ Seeds of Plants of the highest Use,  
 “ and Benefit. For Example hereof  
 “ I will pitch upon the Seeds of  
 “ Wheat, and those of Thistles: the  
 “ one the most serviceable, the other  
 “ the most detrimental to Mankind,  
 “ and

*Thistles per-  
 ticularly  
 consider'd.*



“ and particularly pointed out by  
“ *Moses*, so that it is the more pro-  
“ per to instance in. For the Growth  
“ of the Seed or Grain of Wheat, it  
“ requires that it be lodg'd at some  
“ Depth in the Earth; to which it  
“ cannot easily get without humane  
“ Assistance. 'Tis plain it can only  
“ shead, and fall down, from the  
“ Ear, directly upon the Surface of  
“ the Ground; where it would be ex-  
“ pos'd, and ready to be prey'd upon  
“ and devour'd by Birds, Field-Mice,  
“ and various other Vermin: or per-  
“ haps, ly till it perish'd and rotted,  
“ without ever fructifying, or coming  
“ up; miscarrying for want of being  
“ cover'd with Earth. But the Seeds  
“ of Thistles presently strike down  
“ Roots into the Ground, where-ever  
“ they happen to light: and need no  
“ such Care and Aid. Then these  
“ Seeds have greatly the Advantage  
“ of those of Wheat, as to their na-  
“ tural Disposition to be sow'd, distri-  
“ buted about, and convey'd to all  
“ Places. The Grains of Wheat are,  
“ we know, much larger, and more  
“ ponderous, than the Seeds of Thi-  
“ stles are: and have not, like them,

“ an Appendage to remove and carry  
 “ them from the Spot where they  
 “ grow. So that they must all fall  
 “ down, like a dead Weight, at the  
 “ Root of the Plant, that bore them,  
 “ without being inabled to stir farther,  
 “ or shift each to a Place proper for  
 “ their Reception, and Growth. But  
 “ the Case is much otherwise with the  
 “ Seeds of Thistles. These are small,  
 “ and light. Nay, which is more,  
 “ they have a fine downy Train, a  
 “ sort of very light Plume, extended  
 “ to many Times the Dimensions of  
 “ the Body of the Seed. By means  
 “ of this they are buoy'd up, and  
 “ wafted about, by any the least Puff  
 “ of Wind: born from Place to Place,  
 “ and transplanted to every Quarter  
 “ and Corner of the Field where the  
 “ Parent-Thistle grew. Infomuch that,  
 “ at such Time as this Plant is at Ma-  
 “ turity, the Seeds loose, and dis-  
 “ pos'd to fall off, 'tis common to see  
 “ large Fields cover'd all over with  
 “ them, after any little Wind: and a  
 “ White Mantle, display'd over the  
 “ whole Surface of the Ground, con-  
 “ sisting only of these Seeds with their  
 “ white downy Appendages. Indeed  
 “ 'tis



“ 'tis the final and only Use of those  
“ Appendages thus to wing and con-  
“ vey their Seeds about every where.  
“ Nor ought it to be pass'd over with-  
“ out Regard, that there are vast  
“ Odds as to the Multiplication of  
“ their Seeds; a much greater Num-  
“ ber of them being ordinarily pro-  
“ duced by one small Seed of a Thi-  
“ stle, when planted in the Earth,  
“ than by a Grain of Wheat. We  
“ need not go far for Example and  
“ Proof of this. The *Carlina Syl-*  
“ *vestris*, a Thistle, that abounds ex-  
“ ceedingly in *Kent*, and likewise,  
“ on the other Side the *Thames*, in  
“ *Essex*, bears ordinarily 20, nay 30,  
“ or 40 Heads, each holding in it  
“ 100, or perhaps 150 distinct Seeds.  
“ The *Acanthium Vulgare*, is still  
“ nearer us, and in View of all, pre-  
“ senting itself every where in the  
“ Neighbourhood of this City: and  
“ with yet more numerous Heads,  
“ sometimes to above an Hundred,  
“ each of the larger holding in it be-  
“ twixt 3 and 4 Hundred Seeds. In  
“ Order to the passing some Judgment  
“ of the Propagation of this, let it be  
“ suppo-

*The Translator's Introduction.*

“ supposed, at a Medium, that one  
 “ Seed produces only 80 Heads: and  
 “ that each of them holds but 300  
 “ Seeds. Now, in Case those all  
 “ take rightly, come up, and fructi-  
 “ fy, then one Seed will produce, at  
 “ the first Crop, 24 Thousand. Those,  
 “ succeeding in like Manner, will  
 “ produce 576 Millions of Seeds for  
 “ the second Crop. This is an In-  
 “ crease so enormous as could hardly  
 “ be imagined: and 'tis plain that,  
 “ from a very few Crops more, would  
 “ be furnish'd forth a Number of Seeds  
 “ so immensely great as, if not hin-  
 “ dered by some Means, but carryed  
 “ regularly on, every Way, would,  
 “ in a very short Time, stock the  
 “ whole Globe so as scarcely to leave  
 “ Room for the Growth of any Thing  
 “ else: and all these the Descendants  
 “ of only one single original Seed.  
 “ Than which there needs not a more  
 “ firm and convincing Proof how tru-  
 “ ly Thistles are, in their Nature,  
 “ disposed to put in Execution that  
 “ Curse: any more than how great  
 “ and signal the Provocation must  
 “ have been that drew it down so  
 “ unhap-



“ unhappily on the Earth, and Hu-  
“ man-Kind. The *Carduus Polya-*  
“ *canthus Parkinsoni* is as frequent  
“ and obvious in the Grounds about  
“ Town, and falls not short of even  
“ the precedent in the Number of its  
“ Heads. But some Thistles, besides  
“ that of their Seeds, have also other  
“ Wayes of planting and propagating  
“ themselves. Thus the *Ceanothos*,  
“ or *Carduus Vulgatissimus Viarum*,  
“ besides the numerous and almost  
“ infinite Seeds it casts forth, all  
“ plumed and prepared for Flight,  
“ hath its Roots spreading and shoot-  
“ ing to great Lengths, even for fe-  
“ veral Yards, all round, and send-  
“ ing up Suckers, or new Plants, on  
“ every Side. In a little while these  
“ send up others: and they more,  
“ without Tale or End. Infomuch  
“ that, by this Method alone, and  
“ besides the Seeds, one Plant will  
“ over-run a vast Tract of Land, in  
“ a very short Time; suppressing sti-  
“ fleing and destroying all other,  
“ however good and usefull Herbage,  
“ wherever this once gets Footing.  
“ But, besides, 'tis not every Soil, or  
“ Tract of Land, that contains in it  
“ terre-

“ terrestrial Matter fit for the Forma-  
 “ tion and Nourishment of Wheat:  
 “ nay scarcely any will send it forth,  
 “ in sufficient Quantity, without Com-  
 “ post and Manure, whereby the  
 “ Land is furnish'd with a fresh Sup-  
 “ ply of that peculiar Sort of Matter  
 “ out of which the Body of this Corn  
 “ is form'd.\* Whereas there is hard-  
 “ ly any Ground or Soil whatsoever,  
 “ high or low, Hill, Valley, or Plain,  
 “ where Thistles will not take and  
 “ flourish fast enough. Which shews  
 “ us plainly that there is far greater  
 “ Plenty and Provision made, every  
 “ where, of that sort of Matter which  
 “ serves for the Constituting of Thi-  
 “ stles, and Weeds, than of Corn,  
 “ and other the most noble usefull  
 “ and excellent Vegetables. Thus  
 “ Things apparently are, as we all  
 “ find to our Sorrow, in the present  
 “ Earth. In the primitive, 'tis very  
 “ likely they were quite otherwise:  
 “ and Plants of the better Kinds had  
 “ the Advantage; the terrestrial Ve-  
 “ getable

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\* Vid. *Discourse of Vegetation* — Philos. Transact. June 1699.



“ getable Matter, that serv'd for the  
“ Formation and furnishing forth of  
“ such, being then much superior in  
“ Quantity to that which serv'd for  
“ the Formation of those which were  
“ of less Value and Use. At least  
“ the Animal and Vegetable Remains  
“ of that Earth shew it to have been  
“ much more fruitfull and productive †  
“ than ours is: and the Curse, pro-  
“ nounc'd upon it, was compleated,  
“ and finally accomplish'd, at the  
“ Deluge, † by the Diminution and  
“ Retrenchment, which was then  
“ made, of that terrestrial vegetable  
“ Matter, which before caus'd so  
“ great and exceeding Fruitfullness.

“ Many further Instances might be *Of Thorns.*  
“ alledged, but these are sufficient:  
“ and indeed so much hath been said,  
“ of Thistles, that I shall be the  
“ shorter as to Thorns; the rather  
“ because a great deal of what has  
“ been offer'd of those, as to their  
“ growing in almost any kind of  
“ Soil, their running on and increasing  
“ without

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‡ *Nat. Hist. Earth.* Part VI.

† *Ibid.* Part II.

*The Translator's Introduction.*

“ without Number, the troublesome  
 “ Nature and mischievous Qualities  
 “ of those, holds true like wise  
 “ of Thorns. We need go no  
 “ further for Proof of this than to  
 “ the Bramble, which occurs eve-  
 “ ry where, and is but too forward  
 “ to shew itself in all our Grounds,  
 “ to the Damage, Incumbrance, and  
 “ Confounding of all the Good they  
 “ produce. For this runs on amain:  
 “ and throws itself about without  
 “ Measure. The Berries, it bears,  
 “ are innumerable: and each contains  
 “ in it many Seeds. Besides the  
 “ Roots push forwards, very fast,  
 “ under-ground, and send up Suck-  
 “ ers, on every Side, in great plen-  
 “ ty; each becomeing, in a little  
 “ Time, a Plant of itself. Nay  
 “ the very Branches, and Sprayes,  
 “ running on to great Lengths, and  
 “ lying upon the Ground, send down  
 “ Roots into it; by that means diffu-  
 “ sing themselves about, and multi-  
 “ plying beyond all Bounds. But, as  
 “ to Thorns, the Example I make  
 “ Choice of shall be the *Genista*  
 “ *Spinosa Vulgaris*, call'd in some  
 “ Countryses *Gorse*, in others *Furze*,  
 “ or



“ or *Whins*. This is the vilest and  
“ most mischievous Shrub on the Face  
“ of the whole Earth. 'Twill let no-  
“ thing thrive, or prosper, or even  
“ so much as grow, near it. 'Tis so  
“ close set with Pricks, that 'tis hard-  
“ ly possible to approach it, any way,  
“ without Hurt. One of our most  
“ eminent Botanists\* rightly observes  
“ that its *Branches* are set with  
“ *sharp long Thorns*, on all Sides, so  
“ *thick that it seemeth nothing but*  
“ *Thorns*. Another, † that on its  
“ *Branches* are set, in Numbers in-  
“ *finite*, most *sharp Prickles* hurting  
“ *like Needles*. 'Twas for this Rea-  
“ son that the first Writers of Plants,  
“ very fitly, gave it the Name of  
“ the *Scorpion*, ‡ as one of the most  
“ noxious and pernicious of them all.  
“ And yet this is so prolific that,  
“ for almost half the Year, 'tis even  
“ loaded with Flowers, going off in  
“ Pods charg'd with Seeds. Nay,  
“ besides this Way of propagating it-  
“ self

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\* Parkinson. *Theater of Plants*, Tribe 9. c. 20.

† Gerard. *Hist. of Plants* Lib. 3. c. 20.

‡ Σχορμιον. Theophrast.

*The Translator's Introduction.*

“ self by Seeds, it shoots forth Roots  
 “ far and near, from which spring up  
 “ Suckers, and young Plants. These,  
 “ in a little Time, send up others, as  
 “ fast as the Parent whence they were  
 “ first derived. So that we need the  
 “ less wonder to see this odious Ve-  
 “ getable, so plentifully abounding  
 “ almost every where: and vast Tracts  
 “ of Land, wholly cover'd and over-  
 “ run with it. To all which ought  
 “ to be added that 'tis extreamly  
 “ difficult, indeed hardly practicable,  
 “ ever wholly to extirpate and clear  
 “ the Ground of it, where once it  
 “ hath obtain'd and got Footing.

*Plain*  
*Marks of a*  
*Curse on the*  
*whole Vege-*  
*table World.*

“ These Things duely reflected on,  
 “ it must be allow'd that the Sen-  
 “ tence upon Adam, *cursed is the*  
 “ *Ground for thy Sake,---Thorns and*  
 “ *Thistles shall it bring forth to thee,*  
 “ *---- in the Sweat of thy Face*  
 “ *shalt thou eat Bread,* † was effe-  
 “ ctually put in Execution: and not  
 “ only upon him, but upon his Poste-  
 “ rity, thorow all Ages. In the  
 “ whole Vegetable OEconomy there  
 “ are

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† Gen. iii. 17. 18. 19.



are plain Indications, that Things are contriv'd, dispos'd, and design'dly order'd in such sort that the vilest and worst of Plants should have vastly the Advantage of the rest: that they should spread, flourish and grow up a-main, and this upon the ordinary Establishment of Nature, of their own Accord, and without any Assistance; whilst the usefull ones require great Care, Management and Culture. Nor is there need of Labour and Industry meerly in the Raising and Ordering of these; but likewise in the Extirpating and casting out the others, which not only incroach upon the Ground and take up the Place where these should grow, but, running up much easier and faster, stifle and destroy them, if not prevented by humane Toil and Industry; which therefore is constantly necessary and wanting. This is what hath been loudly complain'd of in all Times: and is so finely set forth, by a most elegant Writer of Agriculture, amongst the Antients, that I cannot well contain myself

e

“ from

*The Translator's Introduction.*

“ from giving it in his most beautifull  
 “ Expression.

*Mox & Frumentis Labor additus,  
 ut mala culmos*

*Esset rubigo. Segnisque horreret  
 in Arvis*

*Carduus. Intereunt Segetes, su-  
 bit aspera Sylva,*

*Lappaque, Tribulique. Interque  
 nitentia Culta*

*Infelix Lolium, & Steriles domi-  
 nantur Avenæ\*.*

“ Upon the whole, 'tis but too evident  
 “ that *Thorns* and *Thistles* serve for  
 “ little other than to give Trouble and  
 “ Toil, to cause Sweat and Sorrow:  
 “ and were sent as a *Curse* and Punish-  
 “ ment to the World; so strong Lines  
 “ of Nature, and such unquestionable  
 “ Marks of Truth and Exactness are  
 “ there in this, as in all the other  
 “ Parts of the Account of the great  
 “ Writer of the History of the Crea-  
 “ tion, the Apostacy of the first Man,  
 “ and the Punishment consequent  
 “ thereunto”.

“ *Flesh*

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\* Virg. Georgic. L. I.





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“ sent up to the Brain, there to an-  
 “ swer the various Claims and Exi-  
 “ gences of that important Organ. The  
 “ Salts, acting in the Stomach, make  
 “ various Impressions upon it, upon  
 “ the great Artery whereon it presses,  
 “ and the Blood which this contains;  
 “ whereby a various Impulse, Modu-  
 “ lation, and Action is produc'd in  
 “ the Brain. These Salts therefore  
 “ concurr to the Production of the  
 “ Thoughts: as they do also, of the  
 “ Passions. Falling upon the solid  
 “ Part of the Aliment, sent down in-  
 “ to the Stomach, they divide atte-  
 “ nuate dissolve and digest it; by that  
 “ means rendering it capable of pas-  
 “ sing the Lacteal-Vessels; and thence  
 “ on into the Blood-Vessels. By their  
 “ Conflicts and Colluctations, in the  
 “ same manner that we observe of  
 “ like Salts in our Chymical Tryals,  
 “ they incite and produce an Effervef-  
 “ cence and Heat. Detachments of  
 “ them, from the Stomach, attend  
 “ the Aliment passing into the Blood:  
 “ and, from the Heat, arising from  
 “ their Colluctations, accompanying  
 “ them thro' all the whole Frame,  
 “ the Heat of the Blood and Body  
 “ proceeds.



“ proceeds. To that Aliment, distrib-  
“ uted to the various Parts, is owing  
“ the Growth the Support and Nourish-  
“ ment of the Body. The Fumes,  
“ attending the Salts, hurry'd on in the  
“ Blood-Vessels, and agitated, froath  
“ up and form, out of the Gelatinous  
“ Part of the Aliment, Bubbles, Vesi-  
“ cles, or, as they are commonly  
“ call'd, Globules. These expand,  
“ or contract themselves, as the Heat  
“ and Fumes, included in them, are  
“ more or less intense: and these are  
“ the Instruments of Muscular and  
“ other Motions, and of all the Action  
“ of the Members, Organs and Parts.  
“ By the same Fumes the Blood-  
“ Vessels are, all over the Body,  
“ kept up to a natural Tension: and  
“ the Nerves, every where attending  
“ them, render'd tight as so many  
“ *Chordæ tensæ*. By this Mechanism  
“ Sensation is induc'd: and in this,  
“ with the Warmth, and the Power  
“ of Action and Motion, consists the  
“ Animation and Life of the Whole.  
“ So that it is plain the Life is in-  
“ tirely in the Blood: and 'tis this,  
“ and the Principles contained in it,

*Perturbations of the Animal Life, and OEconomy.*

“ that animates invigorates and moves  
 “ the Frame, the Members, Organs,  
 “ and Parts; which are wholly pas-  
 “ sive, cold, without Sense, lifeless, and  
 “ impotent, whenever the Blood de-  
 “ ferts them, and is wanting. Nay,  
 “ where this happens to be vitious,  
 “ and, instead of the genuine, and  
 “ legitimate, to have receiv'd into it  
 “ Principles that are not natural, Life  
 “ is affected, and incommoded: and  
 “ the Heat, Sense, and Vigour,  
 “ chang'd, in Proportion to the Pre-  
 “ valency of those unnatural Princi-  
 “ ples. Thus, in Case of Indigestion,  
 “ and the Aliment being not duely  
 “ attenuated, but much of it sent,  
 “ into the Blood-Vessels, in Form of  
 “ Phlegm; in the Extremities of  
 “ the Parts, that are most remote  
 “ from the Power of the Heart, and  
 “ where the Blood Vessels are the  
 “ smallest, this Phlegm, being crass,  
 “ and viscid, frequently impacts, and  
 “ makes Glutts and Stops in those  
 “ Vessels; upon which the Part loses  
 “ of its Heat, its Sense, and its  
 “ Strength, in Proportion to the Quan-  
 “ tity of Phlegm, so impacted, and  
 “ to



“ to the Number of Vessels obstructed.  
“ By whatever other Means the  
“ Passage of the Blood is intercep-  
“ ted, and its Access to the Part de-  
“ barr'd, whether internal, or exter-  
“ nal, as by a Ligature, or the like,  
“ the same Symptoms and Accidents  
“ constantly insue; as certainly as  
“ they recede, and the Heat, Sense,  
“ and Strength of the Part, recurr, up-  
“ on the Impediment being remov'd,  
“ and the Blood recovering due Pas-  
“ sage, as before. Unless, by too great  
“ Suspense, and Delay, the Organs  
“ have suffer'd, and the Texture of  
“ the Part be damag'd and hurt. 'Tis *Occasionally*  
“ true a Ligature, being made upon the *of the Ner-*  
“ Nerve, will bring on some of the *ves.*  
“ same Symptoms; which shews,  
“ what no Man ever doubted of, that  
“ the Nerve must concurr, and assist,  
“ in Action, and Motion; but the  
“ Power of the Nerve is nothing  
“ alone: and it is utterly incapable  
“ of exerting itself, in any Action,  
“ further than just as supported, by  
“ its Neighbour Artery, with natu-  
“ ral and rightly constituted Blood  
“ in it.

Instances of  
Life re-  
maining in  
the Parts  
when sepa-  
rated from  
the Body.

“ Tho’ any Part, when united and  
“ continu’d to the Body, and right-  
“ ly join’d with the rest, will be  
“ disabled from doing its Office, when  
“ the Blood is thus intercepted, yet the  
“ very same Part, having the Blood  
“ in it, being cut off, and quite se-  
“ parated from the Body, will con-  
“ tinue to act afterwards, to do its  
“ Office, in some Degree, and in  
“ Proportion to the Blood that re-  
“ mains, so long as this retains any  
“ Thing of its Heat and Fluidity ;  
“ than which there cannot be a fir-  
“ mer Proof given that the Life is  
“ soley in the Blood. But this will  
“ better appear from Instances, and  
“ Historyes of Fact ; of which I shall  
“ here subjoin some, out of my Notes,  
“ and Papers.

“ *Jan.* 26. 1698. Dissecting a  
“ Dog, chiefly with Intention to  
“ make some Observations in the Tho-  
“ rax, I took the *Sternum* quite off,  
“ and laid it aside. Happening, ac-  
“ cidentally, to cast my Eye upon  
“ it, almost a Quarter of an Hour af-  
“ ter, I observ’d various Startings,  
“ Twitchings, and convulsive Jerks  
“ in the Muscles. These Commo-  
“ tions



“ tions continu'd for some Time, till  
“ the Part was near cold : and, when  
“ afterwards they ceas'd, upon my  
“ pricking it, with my dissecting Knife,  
“ the Fibres made very brisk Contra-  
“ ctions anew, shewing as quick and  
“ plain Signs of Sense of acute Pain as  
“ they possibly could have done while  
“ the *Sternum* was united with the  
“ Body, and the Creature alive.  
“ Which they did several Times, af-  
“ terwards, upon my repeating the  
“ Puncture, at Intervalls. Only, after  
“ about an Hour more, they began to  
“ slacken, and gradually decline, as  
“ the Muscles became more and more  
“ cold, stiff and dry ; the Heat being  
“ transpir'd, as also the thinner Parts  
“ of the Blood, and the rest being  
“ coagulated, and wholly useles.  
“ *Sept. 20, 1709.* From a fat Ox,  
“ which had been knock'd down near  
“ an Hour, and his Head cut off half  
“ an Hour. At 29 Minutes past 5,  
“ in the Evening. I cutt, off the Massa-  
“ ter Muscle, a Piece about 8 Inches  
“ in Length, 4 in Breadth, and 1 in  
“ Thickness. Having laid it upon a  
“ Plate, I observ'd all the Fibres  
“ work'd, agitated, and strugled ve-  
“ ry

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“ ry strongly, and in a Manner not  
 “ a little surprizing. Viewing it an  
 “ Hour after, tho’ it lay in a Win-  
 “ dow, and was almost cold, I found  
 “ many of the Fibres continu’d yet  
 “ stirring, but not near so briskly as  
 “ before. Being prick’d, it still  
 “ shew’d a very exquisite Sense: and  
 “ stirr’d with somewhat greater Quick-  
 “ nefs. When afterwards it was cold,  
 “ and did not stir at all upon pricking,  
 “ I held an hot Iron over it, upon  
 “ which it renew’d its Struggles,  
 “ twitching almost as intensely and  
 “ nimbly as at first. This was an  
 “ Hour and half after it was cut off.  
 “ At 25 Minutes past 7, upon hold-  
 “ ing an hot Iron near it again, it  
 “ still shew’d as acute Sense, and  
 “ the Agitations and Struggles, were  
 “ near as strong as before. At 46  
 “ Minutes after 8, upon holding the  
 “ hot Iron near, it stirr’d; but not  
 “ so much as the last Time. At 10,  
 “ the Iron being held, as before, it  
 “ stirr’d not at all; but then it was  
 “ become stiff, Stone-cold, and pretty  
 “ dry. From these Experiments  
 “ ’twas easy to see, that to the  
 “ Warmth, and Humidity, or remain-  
 “ ing



ing Blood, in the Part, were owing its Sense and Power of Action, these slackning, gradually, and in Proportion as the Warmth decreas'd, and the Humidity went off.

“ 9. Sept. 1706. In a fat Ox, three Quarters of an Hour after he was knock'd down, and half an Hour after the Head was cut off, I observ'd the Membrana carnofa, and exterior Muscles of the Abdomen, and Thorax, twitch'd, trembled, and were convuls'd. Being prick'd, or slightly wounded, they contracted as briskly, and discover'd as quick a Sense, as they well could if the Creature had been living. I caus'd two Scewers to be stuck in one of the Masseter Muscles, an Hour after the Head of the Beast was off: and so strong thereupon was the Motion, and Contraction, of that Muscle, caus'd by the Punction and Pain, that it vibrated, tofs'd, and shook the Scewers very much. I observ'd this Motion continuing, but with some Diminution, two Hours after: and the Muscles of the Thorax and Abdomen continu'd still likewise twitching, tho'  
“ very

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“ very feebly, they being now near  
 “ cold. Upon opening the Abdo-  
 “ men, half an Hour after the Head  
 “ of the Creature was off, I took  
 “ Notice that the Peristaltic Motion  
 “ of the Gutts continu'd pretty strong-  
 “ ly. I have observ'd the like, in a  
 “ Calf, half an Hour after the Head  
 “ was cut off: and, in Sheep, at a  
 “ somewhat longer Distance. Nay,  
 “ in some Creatures, the Peristaltic  
 “ Motion will continue, after the  
 “ Gutts are taken quite out of the Bo-  
 “ dy, till they begin to grow cold.  
 “ From numerous Instances, that  
 “ there are extant, and that may, one  
 “ Day, be produced, in their Place,  
 “ it appears that Nature has been,  
 “ from the first Intelligence, Notices  
 “ and Records that we have of it,  
 “ ever invariably the same, as having  
 “ been ever under the same steady  
 “ Administration. 'Tis likewise most  
 “ evident that the Powers and Proper-  
 “ tys of Matter, and of Bodys, orga-  
 “ nized, and others, have been con-  
 “ stantly the same thorow all Ages.  
 “ So that it cannot be thought strange  
 “ that this Phænomenon, of the Vel-  
 “ lications and Tremors of the Parts,  
 “ of



“ of Animals fresh-kill'd, when se-  
“ parated from the Body, should have  
“ been observed, and mention'd by  
“ by a most correct Writer near 1800  
“ Years agoe.

TERGORA *diripiunt Costis & VISC-*  
CERA *nudant.*

*Pars in Frusta secant, Verubusque*  
TREMENTIA *figunt.*

*Æneid. L. I.*

*Tremetia, Servius interprets, pal-*  
*pitantia adhuc.*

“ November 26. 1709. Opening  
“ the Thorax of a Cat, two Months  
“ old, I instantly cut out the Heart,  
“ and laid it, having first stripp'd off  
“ the Pericardium, upon a warm Pew-  
“ ter-Plate. There the Ventricles and  
“ Auricles continu'd to beat, alternatē-  
“ ly, but every Pulse gradually flow-  
“ er than the precedent, for 12 Mi-  
“ nutes; when the Pulsations wholly  
“ ceased. About 5 Minutes after,  
“ strikeing a larger Needle into the  
“ Heart near the Apex, the Venti-  
“ cles made a brisk Systole once; as  
“ they did, upon several other like  
“ Punctions, successively. Afterwards,  
“ pouring

“ pouring upon the Heart warm Wa-  
 “ ter, the Ventricles stirr'd not, but  
 “ the Auricles renew'd their Pulsati-  
 “ ons, very regularly, and briskly,  
 “ as often as the warm Water was  
 “ pour'd on, for a quarter of an Hour,  
 “ and till the Heart had been cut  
 “ forth 27 Minutes; when all wholly  
 “ ceas'd, tho' the Water was conti-  
 “ nu'd to be pour'd on some Minutes  
 “ longer. This serv'd, before, only  
 “ to moisten the exterior Membrane,  
 “ of the Auricles, become glossy, dry,  
 “ and so stark as not easily to yield  
 “ to the Action of the little Blood yet  
 “ continuing within, till this Water  
 “ had soften'd it, and render'd it more  
 “ pliable and obedient to that remain-  
 “ ing Action. But, after this Blood  
 “ was quite spend, the Water avail'd  
 “ nothing. Heat is all of the same  
 “ Kind: and some, passing from the  
 “ Water, might reinforce that in the  
 “ Blood of the Auricles. The Parietes  
 “ of the Ventricles being more dense  
 “ and crass, seem to have refus'd Ad-  
 “ mission to it: and, being withall  
 “ very thick and stiff were not ren-  
 “ der'd, by the Water, sufficiently  
 “ pliable



“ pliable flexil and capable of Pulsa-  
“ tion. Or perhaps there was not  
“ remaining a sufficient Quantity of  
“ Blood in these; they requiring more,  
“ to move and work them; the  
“ Thickness and Substance of these  
“ being greater than that of the Au-  
“ ricles.

“ 6. Nov. 1708. A large tame Pi-  
“ geon. At 12 Minutes after Ten o’  
“ Clock, having taken off the upper  
“ Part of the Scull, I took out the  
“ Brain, excepting only a Part of it so  
“ very little that it could not easily be  
“ rais’d: and this I mash’d and con-  
“ fufs’d, so as to spoil and destroy  
“ the Mechanism and use of it. At  
“ 32 Minutes after x, the Creature  
“ disgorg’d, out of its Crop, some  
“ Tare, and Peas, which it had eaten  
“ a while before. This is one of  
“ many Instances that I have ob-  
“ serv’d of the strict Intercourse and  
“ Reciprocation betwixt the Sto-  
“ mach and Brain, the one seldom  
“ being affected without the other  
“ bearing its Share, and discovering  
“ some Perception of it. The Bird  
“ was still pretty brisk and lively;  
“ but clos’d its Eyes, except when  
“ molested.

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" molested. At xi, and so on till  
 " 5 Minutes after xi, it opened its  
 " Eyes: and gave several Proofs  
 " that it saw, tho' not then with  
 " its usual Quickness. At 10 Mi-  
 " nutes after xi, it fell down, lay  
 " on one Side, and was frequently  
 " convuls'd. At 41 Minutes after  
 " iv, it dyed.

" 6. Nov. 1708. A large Chicken.  
 " The greatest Part of the Brain was  
 " taken out, and the rest mash'd, at  
 " 18 Minutes after x. It shew'd no  
 " Sign of being very uneasy, or in great  
 " Pain: and was lively, opening its  
 " Eyes, commonly, till 35 Minutes  
 " after xii, when it fell down con-  
 " vuls'd: and, about 1, after several  
 " strong Convulsions, it dyed.

" 29. Aug. 1707. A Carp, cut  
 " up alive. The Heart continu'd  
 " beating, strongly, tho' slowly, for  
 " above an Hour after 'twas taken  
 " forth of the Body, and laid upon a  
 " Plate. Longer I had not Leisure  
 " to observe it.

" 27. Aug. 1706. A large Eel,  
 " cut up alive at x o' Clock in the  
 " Morning, mov'd and stirr'd briskly,  
 " for 2 Hours, while I was tracing  
 " the



the Biliofe and other Ducts, and making various Observations on the Bowels. Then, at xii o' Clock, I cut out the Heart, and laid it upon the Table; after which the Body continu'd stirring, and pretty active, for near a quarter of an Hour; when, the Head being cut off, and the Body cut into 5 Pieces, these shew'd Signs of Life, and mov'd for some Time after. Both the Auricle and Ventricle of the Heart continu'd to beat, in Time, and Strength, much as before 'twas cut out, for 500 Pulses; when I left telling. Three Quarters of an Hour after, I observ'd it still beating, but very languidly. In about a Quarter of an Hour more, at i o' Clock, the Ventricle, being become stiff, and dry, ceas'd to beat any longer; but the Pulse of the Auricle was near as intense as ever. Upon moistning the Ventricle, with warm Water, it renew'd the Pulsations again, but faintly, and with some Appearance of Disorder and Convulsion. At half an Hour after iii o' Clock, the Auricle continu'd still beating, tho' stiffly, being much  
f " dry'd.

“ dry'd. The Ventricle had ceas'd  
 “ beating now about half an Hour ;  
 “ it being become stiff, dry, and shrivel'd.  
 “ Upon dropping warm Water  
 “ on the Ventricle, it shew'd still  
 “ some small Signs of Sense and Life ;  
 “ the exterior Membranes moving,  
 “ slightly contracting and relaxing ;  
 “ but it did not beat. At half an  
 “ Hour past iv, I could not, by a  
 “ Live-Coal, Punction with a Needle,  
 “ nor any other Means, excite any  
 “ Signs of Life or Sense in the Ven-  
 “ tricle. But one small Speck in the  
 “ Auricle, of a Colour more red than  
 “ the rest, as haveing accidentally  
 “ more Blood in it, continu'd yet  
 “ beating, regularly, and at due In-  
 “ tervalls, tho' very faintly. This  
 “ was 6 Hours and an half after open-  
 “ ing the Eel : and 4 Hours and an  
 “ half after the Heart was cut out and  
 “ laid upon the Table.

“ 6. Nov. 1708. The common  
 “ Snake, or *Natrix torquata*. The  
 “ Head was cut off, at x, 25'. By x,  
 “ 35', there were remaining no Signs  
 “ of Motion in the Head ; but the  
 “ Body stirr'd pretty briskly. It stirr'd  
 “ in like Manner at x. 55'. At xii, 3',  
 the



the whole Body was in a continual slow peristaltic Motion, tho' nothing touch'd or molested it. If press'd, or struck, it stirr'd with so much Activity, that I could perceive, now, little Difference from the Motion us'd by it before the Head was cut off. Nor did it shew any Signs of Pain, or Convulsions. At 10 Minutes after ii, it mov'd with as much seeming Vigour as ever. 'Twas about 3 Foot long: and the Body, being cut in two, in the Middle, each Piece continu'd to move till about v, when both Parts lost all Sense.

6. *May* 1705. A pretty large Snake, caught 3 dayes before. At x, 9', the Head was cut off, the Heart taken out, and laid upon a Table, the Ventricle and Auricle then beating 13 Pulses in a Minute. At x, 14', the Ventricle and Auricle beat but 7 Pulses in a Minute. At x, 20', the Eyes mov'd in the Head. At x, 22', the Body mov'd spontaneously, very freely. The Auricle and Ventricle beat now only 3 Pulses in a Minute. At x, 30', the

f 2                      " Mouth

“ Mouth open'd pretty wide, and  
 “ had done so, before, several Times.  
 “ At x. 33'. The Auricle ceas'd  
 “ beating; but the Ventricle still  
 “ continu'd to beat, tho' very slowly.  
 “ At x. 53'. The Ventricle beat not  
 “ more than two Pulses in a Minute.  
 “ At x. 55'. On pouring warm Water  
 “ upon the Heart, which had now  
 “ almost left beating, both the Au-  
 “ ricle and Ventricle renew'd their  
 “ Pulsations, in a Manner really  
 “ stronger than when first taken out  
 “ of the Body, and likewise faster,  
 “ viz. 32 Pulses in a Minute. At  
 “ xi, 1'. The Neck being prick'd,  
 “ the Mouth open'd, and the Tongue  
 “ mov'd very quick and fast. At xi.  
 “ 4'. Being struck on the Tail, the  
 “ Body mov'd with a good deal  
 “ of Activity. At xi. 14'. The Au-  
 “ ricle and Ventricle renew'd their  
 “ Pulsation upon warm Water being  
 “ pour'd on: and beat now 19 Pulses  
 “ in a Minute. At xi. 35'. The  
 “ Head had lost all Power of Sense  
 “ and Motion. At xi. 55'. pouring  
 “ on Water somewhat warmer than  
 “ before, both the Ventricle and  
 “ Auricle beat, afresh, strongly,  
 “ 26 Pulses



“ 26 Pulses in a Minute. At XII. 20’,  
“ the Body being struck, stirr’d  
“ little : but, being prick’d with a  
“ dissecting Knife, near the Tail,  
“ mov’d that much and freely. At  
“ XII. 30’. the Heart retain’d but  
“ very little Motion, till, pouring on  
“ some warm Water, it beat, tho’  
“ not regularly, 10 Pulses in a Mi-  
“ nute ; when it again ceas’d, and  
“ shew’d but little Sign of Sense  
“ or Motion, unless the Water was  
“ repeated. At XII. 40’. the Au-  
“ ricle ceas’d, tho’ warm Water was  
“ pour’d on : and the Ventricle did  
“ not beat, but was convuls’d, and  
“ twitch’d pretty strongly. At XII.  
“ 55’, on pouring warm Water into  
“ the Part that was open’d to take  
“ out the Heart, the whole Body  
“ mov’d about very briskly: and  
“ continu’d to do so, till the Water  
“ became cold. At XII. 56’. the  
“ Heart now shew’d not the least  
“ Motion upon pouring on warm  
“ Water, or Puncture with a dis-  
“ secting Knife. At I. 35’. Warm  
“ Water being powr’d on, external-  
“ ly, incited the whole Body to move  
“ pretty freely. At I. 40’. it now  
“ shew’d

“ shew'd not the least Sign of Sense or  
 “ Motion on pouring on warm Water,  
 “ Puncture, or any other Means us'd.  
 “ *May. 3. 1705.* An English  
 “ Viper, or Adder, that had been  
 “ caught a Week, and kept without  
 “ eating any thing. At 35 Minutes  
 “ after ii, I cut off the Head, with near  
 “ an Inch of the Neck; and imme-  
 “ diately after took out the Heart,  
 “ laying it upon a Table. The Auri-  
 “ cle and Ventricle beat, alternately,  
 “ with a Systole as strong as when  
 “ in the Body, just 13 Pulses in a  
 “ Minute. The Head lay still; but  
 “ the Body mov'd with as much  
 “ appearing Easiness, Freedom and  
 “ Strength as before the Head was  
 “ cut off. At 49 Minutes past ii,  
 “ the Auricle and Ventricle beat 11  
 “ Pulses in a Minute; but, presently  
 “ after, the Auricle wholely ceas'd  
 “ beating. At 55 Minutes past ii, the  
 “ Ventricle beat but 6 Pulses in a  
 “ Minute. At iii o'Clock, the Pulse  
 “ of the Ventricle was so little as to  
 “ be but just perceiv'd. At 3 Minutes  
 “ after iii, the Pulse of the Ventricle  
 “ ceas'd; so that, in this Subject, the  
 “ Ventricle beat about 13 Minutes  
 “ after



“ after the Auricle had desisted. 2  
“ Minutes after, pouring on warm Wa-  
“ ter, the Ventricle renewing its Acti-  
“ on, beat, in a Minute, 17 Pulses,  
“ which were quicker than at first, but  
“ much more feeble and languid. At  
“ 11 Minutes after iii, warm Water  
“ pour'd on, produc'd little sensible Pul-  
“ sation ; but there were convulsive  
“ Tremors in both the Auricle and  
“ Ventricle. At 15 Minutes after iii,  
“ on pouring on warm Water, the Pul-  
“ sation of the Ventricle renew'd. At  
“ 18 Minutes, the Auricle made only  
“ two feeble Pulses. At 22 Minutes,  
“ tho' nothing touch'd the Head, the  
“ Mouth open'd, suddenly, very wide ;  
“ but presently shut again. At 33 Mi-  
“ nutes after iii, the Body was lying  
“ quiet and still ; but, on striking the  
“ Tail with my dissecting Knife, it  
“ mov'd with full as great a Shew of  
“ Sense, and of Activity, as at first,  
“ and indeed as it possibly could while  
“ the Creature was well, and before  
“ 'twas cut or hurt. At 24 Minutes  
“ after iii, I observ'd the Mouth to open  
“ pretty Wide. Tho' warm Water  
“ was continu'd to be pour'd on, the  
“ Pulse of the Ventricle was now lan-  
“ f 4 “ guid

“ guid, and little. At 38 Minutes after  
 “ iii, the Pulse of the Ventricle, in warm  
 “ Water, wholly ceas'd. I try'd to  
 “ incite it again, by Punction with  
 “ a Needle, and with a Lancet, but  
 “ in Vain. At 41 Minutes after iii,  
 “ the Body, tho' not touch'd or mo-  
 “ lested, mov'd with great seeming  
 “ Ease and Freedom, spontaneously,  
 “ nothing giving it any Molestation.  
 “ I could not perceive the least Dif-  
 “ order or Convulsion in this Motion.  
 “ At 47 Minutes after iii, the Head and  
 “ adjoining Neck, had wholly lost  
 “ all Sense; none being to be inci-  
 “ ted by Punction, or any other Means.  
 “ At 48 Minutes after iii, the Body  
 “ lay still; but, the Tail being struck,  
 “ the whole mov'd almost as strongly  
 “ as at first. It did the same afterwards  
 “ on strikeing it at the other Extreme.  
 “ At 25 Minutes after iv, strikeing it  
 “ near the Neck, it mov'd, but more  
 “ nimbly when struck near the Tail.  
 “ At 33 Minutes past iv, the Tail  
 “ being struck, the Body shew'd little  
 “ Sign of Sense or Motion. The Vi-  
 “ per is in its Nature comparatively  
 “ cold; but this was now become  
 “ sensibly colder than at first. At 40  
 “ Minutes after v, the whole Body  
 “ mov'd



“ mov'd of its own Accord, and with-  
“ out Incitement. But, immediately  
“ after, it lost all Sense and Power  
“ of Motion. Tho' it was put in  
“ warm Water, and stimulated with  
“ various Punctions, it discover'd not  
“ the least Perception. Upon the  
“ whole, 'tis observable that the Bo-  
“ dy retain'd Life, and Sense, with  
“ a Power of Action, above 3 Hours  
“ after the Head was cut off, and the  
“ Heart taken quite out: and near 2  
“ Hours after the Head had lost all  
“ Sense: 3 Hours, within 10 Mi-  
“ nutes, after the Auricle had ceas'd  
“ beating, and above 2 Hours and  
“ an half after the Ventricle had  
“ ceas'd. In this Computation, I have  
“ no Regard to the Renovation of the  
“ Pulsations of each, faintly, upon  
“ pouring on warm Water.

“ *Octob. 5. 1705.* I took the  
“ Brains out of a Frog; clearing the  
“ Skull of them with great Care.  
“ This was at iii in the Afternoon:  
“ and he lived near 6 Hours after,  
“ *viz.* till within a few Minutes of  
“ ix. During which Time he gave  
“ plain Proofs of his Hearing, Seeing,  
“ and Feeling. Upon any sudden  
“ Noise,

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“ Noife, he ſhew'd Signs of Surprize,  
 “ and Fright. His Eyes were gene-  
 “ nerally open: and, as often as an  
 “ Offer was made of ſtrikeing him,  
 “ he ever avoided the Stroke, leap-  
 “ ing away, with pretty much Strength,  
 “ and not appearing in any Difor-  
 “ der, till within an Hour of his  
 “ Death, when he began to be con-  
 “ vuls'd.

“ 6 Nov. 1708. At 35 Minutes  
 “ after x, in the Morning, Opening  
 “ the Heads of two ſeveral Frogs;  
 “ I took out as much of the Brain  
 “ as well I could; mashing and  
 “ confuſing the little that remain'd.  
 “ At 43 Minutes after xi, one of  
 “ theſe Frogs made ſeveral Leaps  
 “ about the Floor. At xi at Night,  
 “ both were alive: and leap'd about.  
 “ At xi, the next Night, they were  
 “ ſtill alive.

“ 8. Sept. 1714. 34 Minutes paſt  
 “ x, I cut off the Head of a Frog,  
 “ that was pretty lively and brisk.  
 “ Immediately it had convulſive  
 “ Twitchings, and Subſultus's, all  
 “ over. The Hinder Legs lay ex-  
 “ tended, and I ſtabb'd them ſeve-  
 “ ral



“ ral Times, with the Point of my  
“ Dissecting-Knife, as also the Fore-  
“ Legs, he being stunn'd, for the  
“ present, and hardly shewing any  
“ Sign of Sense. But, at 42 Minutes  
“ past x, trying with a Knife again,  
“ I found the Creature much recover'd.  
“ Upon pricking his Hinder Legs, he  
“ pluck'd them up briskly: and rais'd  
“ his whole Body, pushing forward,  
“ as if he intended to take a Leap.  
“ The same he did, as often as he  
“ was prick'd in any Part at xi. 5'. At  
“ xii he continu'd to do the like, but  
“ not so vigorously. At xii. 35', lit-  
“ tle Alteration. At i. 9. he seem'd  
“ to be dead: and shew'd no Sense  
“ of Pain upon pricking his Legs,  
“ or any other Part of his Body, till,  
“ upon a stab into his Gutts, he pull'd  
“ up his Legs strongly. At ii o'Clock,  
“ no Life or Sense appear'd. I held  
“ the Creature some Time near the  
“ Fire, pour'd warm Water upon  
“ him, and wrapp'd him in a warm  
“ Cloth; yet neither these, nor prick-  
“ ing, nor burning with a hot Iron,  
“ made him shew any Sign of Sense  
“ or Motion.

“ Another

*The Translator's Introduction.*

“ Another Frog, something less,  
 “ whose Head I cut off, 5 or 6 Mi-  
 “ nutes after, from that Time for-  
 “ wards continu'd to shew Signs of  
 “ Sense, as often as stimulated, for  
 “ 2 Hours longer than the former.  
 “ 6. *Octob.* 1691. Having cut off  
 “ the Heads of three common Flesh-  
 “ Flyes, one of them flew away,  
 “ the other two run about briskly,  
 “ rubb'd their Legs, as they were  
 “ wont whilst well, and no wayes  
 “ injur'd; only they shew'd, now and  
 “ then, some Signs of a tremulous  
 “ or convulsive Motion in their Legs.  
 “ 12 Hours after, they were still a-  
 “ live: and, being touch'd, run on their  
 “ Legs much as before. Then I left  
 “ them; but found both dead in the  
 “ Morning. The Heads never shew'd  
 “ the least Signs of Life or Motion  
 “ after they were cut off. This was  
 “ a Season of the Year when Flyes  
 “ begin to be torpid, and much less  
 “ vigorous than in the hotter Months.  
 “ Had the Experiment been tryed in  
 “ these, 'tis probable the beheaded  
 “ Bodyes would have shewn greater  
 “ Vigour, and have retain'd Life  
 “ longer.

“ *July.*



“ July.... 1707. With a Pair  
“ of Scissars I clip'd a Wasp in two,  
“ at the Isthmus, betwixt the Thorax  
“ and Abdomen. Both the upper and  
“ lower Parts stir'd very briskly for  
“ some Time after. Indeed the up-  
“ per, the Head, with the Thorax,  
“ whence proceed the Legs, and  
“ Wings, got quite away, and was  
“ lost. The lower Parts retain'd a  
“ very plain Sense 24 Hours after:  
“ and, being touch'd, and molested,  
“ exerted the Sting very nimbly and  
“ fiercely. I have frequently obser-  
“ ved the like in other Wasps that  
“ had been long so cut in two; they  
“ constantly shewing a quick Sense,  
“ and emitting the Sting as oft as  
“ provok'd.--- Another Wasp, feve-  
“ ral Hours after its Head was cut  
“ off, stung a Cat, so as to cause in  
“ her very great Pain. A young  
“ Gentleman of my Acquaintance,  
“ inadvertently resting his Hand, on a  
“ Window, perceiv'd a sudden Pun-  
“ cture and Pain in it. Looking up-  
“ on it, there stuck to it the Hinder-  
“ Parts of a Wasp, with the Sting  
“ infix'd into his Hand. It fester'd  
“ imme-

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“ immediately, swell'd, and gave him  
 “ full as much Pain as he ever re-  
 “ ceiv'd from the Sting of a Wasp  
 “ that was intire and unhurt. The  
 “ Fore-Parts, the Head, and Thorax,  
 “ were gone: and he could find no-  
 “ thing of them upon search. What  
 “ is remarkable, in the Case, is, that  
 “ the Wasp should be capable of ex-  
 “ erting so much Sense, with so great  
 “ Passion, and Rage, in its own De-  
 “ fence, when separated both from  
 “ the Brain, and Heart; there being,  
 “ in this Part of the Body, little be-  
 “ sides the Stomach and Gutts.

“ *Aug. 13. 1699.* Making some  
 “ Observations, with a Microscope,  
 “ on the Spider exhibited by Dr. *Li-*  
 “ *ster, Histor. Animal. Anglia, Tr.*  
 “ *de Araneis, Tab. I. Fig. V,* by  
 “ accident one of its Legs were  
 “ pull'd off: and I observ'd that Leg  
 “ afterwards contracting itself, and  
 “ relaxing, in Turns, upwards of six-  
 “ ty Times.

*Of the Do-*  
*ctrine of*  
*Animal*  
*Spirits.*

“ As the foregoing Experiments  
 “ serve to shew what is real in Na-  
 “ ture, and what the Blood and the  
 “ Salts in it actually do, so they serve  
 “ as surely to detect what is false  
 “ and



“ and Supposititious; in particular, the  
“ Hypothesis of Animal Spirits, set up,  
“ in the last Century, by the Carte-  
“ sians\* for solveing the *Phænomena*  
“ of Life, Sensation, and Animal  
“ Action. They suppos'd these Spi-  
“ rits form'd in the Brain: and dis-  
“ patch'd thence, through the Ner-  
“ ves, to all Parts of the Body, to  
“ answer there the various Exigences  
“ of each. All this they will have  
“ to be steer'd and directed, in Man,  
“ by the Soul; which they imagin  
“ to reside in the *Glandula Penealis*,  
“ there to act that Part, to issue out  
“ her Orders, and execute all her Pur-  
“ poses, by Means of those her Emif-  
“ saries, and Agents. Tho', when  
“ we come to examine the Structure  
“ of the Brain, the *Glandula Pinealis*,  
“ and Nerves, we find nothing that  
“ favours this Hypothesis in the least;  
“ that *Glandule* serving in a much  
“ lower Office, the Secretion of an  
“ Excrementitious Humour, and the  
“ Nerves being not fistulous, or so  
“ fram'd as to suffer such a Fluid,  
“ freely,

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\* Vid. Ren. Des Cartes, *Lib. de Homine.*

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“ freely and quickly to pass and  
 “ repass. But, the Notion serving  
 “ their Turn, the Naturalists of that  
 “ Age run generally into it: and  
 “ especially the *English*. They found  
 “ these Animal Spirits ready to run  
 “ on all their Errands, mighty handy,  
 “ and fitted to do every Thing thorow-  
 “ out the whole Body, that they pleas'd,  
 “ or that they could not otherwise  
 “ find any Solution, or assign any  
 “ Cause of. Not that they have ever  
 “ gone about to shew how these Spi-  
 “ rits were capable of that: nor even  
 “ so much as to give Proof that they  
 “ really had any Existence, other  
 “ than in their Fancy, and that there  
 “ was, in the Body, any such thin  
 “ subtil active Fluid as they define  
 “ these Spirits to be. Be that as it  
 “ will, the Notion taking so much  
 “ with the Naturalists of *England*,  
 “ they grafted upon it another, of a  
 “ *Succus Nutritius* in the Nerves.  
 “ This was as meer a Fiction as the  
 “ other: and deservedly rejected by  
 “ the Naturalists abroad\*. But that  
 “ had no Effect here. The Animal  
 “ Spirits

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\* Vid. G. Schelhammer de *Lympha*.



“ Spirits are still in as much Vogue, and  
“ full Imploy, as ever ; even tho' the  
“ Hypothesis be against common Sense :  
“ and the Experiments, recited above,  
“ with many others that might be al-  
“ ledg'd, give Ocular Demonstration,  
“ that 'tis wholly without Grounds,  
“ that Sensation may be continu'd, and  
“ Animal-Action successively repeated,  
“ without any Intercourse with the  
“ Brain, and after all Communication  
“ with that, and likewise the Heart, is  
“ perfectly intercepted. There are,  
“ indeed, great Numbers of Animals  
“ that, after the Brain is taken quite  
“ out, can see, hear, feel: nay I  
“ have Reason to believe have the  
“ Use of the other two Senses, can  
“ smell, as also tast, did the Uneasi-  
“ nefs they must needs be under allow  
“ them Inclination to do that. They  
“ likewise are capable of Motion, and  
“ of every Kind of Animal-Action.  
“ They observe, reflect, shew Signs  
“ of Passion, Grief, Anger : and of  
“ Fear, if molested, or attacked.  
“ They take Care for their Preserva-  
“ tion ; avoiding every Thing that  
“ offends them, or that seems likely  
“ to indanger or hurt them. But all

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“ this, only for a while; tho’ in-  
 “ deed long enough to evince that  
 “ the Dependence of the Parts upon  
 “ the Brain is not so absolute, and  
 “ incessant, as has been generally ima-  
 “ gined; tho’ that Organ be of too  
 “ great Use and Importance to be  
 “ dispensed with for any considera-  
 “ ble Time: and, much more, to be  
 “ wholly dismissed, as several Ana-  
 “ tomical Tryals have taught us the  
 “ Spleen, and some other Parts, may.  
 “ Nay, from the same Experiments,  
 “ ’tis apparent that Sense, and the  
 “ Power of Motion, are so far from  
 “ depending intirely upon the Brain,  
 “ that this Organ itself, and the Parts  
 “ nearest it, frequently lose all Power  
 “ of Sense and Action, some Time be-  
 “ fore even those that are the most  
 “ distant and remote from it. I am  
 “ a little the more particular on this  
 “ Subject, because some of the Par-  
 “ tizans of Animal Spirits, fill’d with  
 “ Opinion of their own Theories, are  
 “ wont to treat the *Mosaic* Philosophy  
 “ in a Supercilious Manner and with  
 “ Disregard. Whereas, we see, when  
 “ brought to the Standard of Nature,  
 “ theirs appears to be wholly with-  
 “ out



“ out other Foundation than meer  
“ Presumption, and a forward Ima-  
“ gination ; while *Moses* has Evidence  
“ of Sense on his Side : and there  
“ cannot be firmer Proof desir'd, that  
“ *the Blood is the Life of the Flesh,*  
“ than these Experiments give, in  
“ which Pieces of the Flesh of Ani-  
“ mals, of various Kinds, exhibit  
“ plain Signs of Life remaining, with  
“ a Capacity of Sense, and spontane-  
“ ous Motion, so long as they have  
“ in them any Blood remaining, warm,  
“ fluid, and not wholly indispos'd to  
“ answer those Ends. I shall only  
“ now further add, that tho' *Moses*  
“ was thus positive, and surely ap-  
“ priz'd of this Doctrine of the Princi-  
“ ple of Life in Animals, it had lain  
“ hid to Ages, and was known to  
“ no Mortal besides Himself. Nor  
“ has it, that I know, been ever  
“ hitherto explain'd, or set in a due  
“ Light. It may not be impossible,  
“ but the Advocates of Animal Spirits  
“ may retort, and demand of me  
“ what Proofs I have to offer in be-  
“ half of my Doctrine of the Biliose  
“ Salts ? To which I freely answer,  
“ observation, Fact, and the Attestation

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“ tion of our Senses. These Salts ap-  
 “ pear actually existent in all Parts  
 “ of the Body: and present where-  
 “ ever those Effects, Actions and O-  
 “ perations, that I ascribe to them,  
 “ appear. This any one, that will  
 “ be at the Trouble, may inform him-  
 “ self of; so that there's the less Need  
 “ for me to refer, for more particular  
 “ Information, to the *Physiological*  
 “ *Treatise of the Structure and Use*  
 “ *of the Parts in Animals,* \* men-  
 “ tion'd in my *Essay of the Nat.*  
 “ *Hist. Earth* Part IV. pag. 235.  
 “ 3d. Edition.

Some De-  
 gree of Mo-  
 tion of the  
 the Blood  
 continuing,  
 for a short  
 Time, in  
 Parts cut  
 off from the  
 Body.

“ 'Tis a Thing of very high Spe-  
 “ culation, tho' never hitherto taken  
 “ Notice of, that the Blood retains a  
 “ Motion, at least in the capillary  
 “ Extremitiyes of the Vessels, for some  
 “ Time after the Part is cut off, and  
 “ separated from the rest of the Body.  
 “ That Motion is perform'd in the very  
 “ Manner that it is in the ordina-  
 “ ry Circulation, tho' it, indeed, be-  
 “ comes commonly somewhat slower  
 “ presently

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\* From this *Treatise* several considerable  
 Draughts have been made since: and parti-  
 cularly for the *Idea of the Nature of Man*,  
 where this Doctrine is set in a Light some-  
 what fuller than it is here.



“ presently after the Part is so sepa-  
“ rated, and gradually flakens till it,  
“ at last, finally ceases. But in some  
“ Subjects, and particularly in the  
“ Gills of a Muscle, cut out, I have,  
“ with a good Microscope, observ'd  
“ the Globules of the Blood move as  
“ nimbly † as is ever seen in any like  
“ transparent Part while yet united with  
“ the Body: and continuing to move  
“ so long as, I confess, much to sur-  
“ prize me. The same may be ob-  
“ serv'd; tho' not quite so well, in  
“ the Gills of a clear young Oyster:  
“ and in the Tails of Fishes that are  
“ thin and diaphanous. These Ob-  
“ servations make it evident that the  
“ Blood-Vessels have, in themselves,  
“ separately and independent of the  
“ Heart, or Brain, a Power of trans-  
“ mitting and pushing forward the  
“ Blood when transferred into them.  
“ 'Tis hardly needfull for me to ad-

g 3

vertise

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† For both the Space, and the Vessels, be-  
ing immensely magnified, as well as the  
Blood-Globules, they seem to move very  
swift, and thro' a great Space of Vessel, in  
an Instant of Time.

*The Translator's Introduction.*

“ vertise that Care ought to be ta-  
 “ ken that such Subjects be chosen  
 “ for these Observations as are lively,  
 “ in Vigour, and as little impair’d,  
 “ spent, or hurt, as may be. For tho’  
 “ that Motion may be observ’d in  
 “ these, it cannot be with near equal  
 “ Advantage. I have observ’d the  
 “ Blood continuing its Motion in the  
 “ Vessels of the Tail of a Gudgeon  
 “ 10 Minutes after it was cut off and  
 “ parted from the rest of the Body;  
 “ tho’ the Fish had been caught  
 “ several Dayes, and kept only in  
 “ a Bason of Water. I have not  
 “ all the Notes, which I have ta-  
 “ ken of these Things, at Hand: nor  
 “ indeed made so many and vari-  
 “ ous Observations on this Subject as  
 “ it merits. Whoever shall have  
 “ Leisure to do that, with the Appli-  
 “ cation that it requires, will find his  
 “ Labour well repay’d by the Intelli-  
 “ gence and the Light it will give him  
 “ into several Things, very considera-  
 “ ble, in the Animal OEconomy, that  
 “ have been hitherto obscure, and little  
 “ understood. I content myself here  
 “ with only giving a Hint of this;  
 “ chiefly with Design to shew some-  
 “ what



“ what of the Mechanism whereby  
“ the Sense and Action of a Part is,  
“ in some Degree, preserv'd, after 'tis  
“ separated from the rest; as we have  
“ seen in the Case of the Maffeter  
“ Muscle, and some other Instances  
“ recounted above.

“ I am well aware I have run out  
“ out into a much greater Length  
“ than I at first intended; which yet,  
“ on a Subject so fruitfull, 'twas not  
“ easy to avoid. That I may not  
“ transgress further, I shall only take  
“ Notice that 'tis plain, from the re-  
“ cited Experiments, that the Princi-  
“ ple of Life, Sense, and Animal Acti-  
“ on, exists, and is actually present in  
“ the very Parts that live perceive  
“ and act: and that it is not successive-  
“ ly derived from the Brain, as has  
“ been generally imagin'd. 'Tis as  
“ evident that the Life of the whole  
“ Animal, and its Power of Sense,  
“ Action, and answering the Ends of  
“ Life, in every Respect, and of each  
“ particular Member, Organ, and Part,  
“ is exactly commensurate to the Quan-  
“ tity of rightly constituted Blood in  
“ it: and that the Life, and those  
“ Powers, fail and diminish only in

*The Translator's Introduction.*

“ Proportion to the Failure and Di-  
 “ minution of the Blood; so solid  
 “ Foundation in Fact, and Experi-  
 “ ment, hath this great Proposition,  
 “ that *the Life is in the Blood.*”

As there are those who, tho' without any real Cause, so far as I am able to perceive, are forward to criticize upon, and censure Scripture-Philosophy, and the Accounts of Nature there deliver'd, I was the more solicitous to obtain the Author's Leave to set forth the foregoing Papers; in which we have Instances how far those Accounts are from being justly liable to such Censure, when once set in a true Light, and brought to the proper Test, that of Nature, and Things.

But, besides Papers of this Sort, I have in my Eye several Treatises conducing to the Service of the same excellent Design. These the Author has had by him some Years; and, since his other Affairs and Studies do not allow him Leisure, 'twill be a great Satisfaction to me, and I shall be forward to do the best in it I am able, to hand them into the Light; particularly I. *Notes on the first Chapter*  
*ter*



ter of Genesis; wherein he has justified the *Mosaic Account of the Creation*: and, occasionally, repuls'd the Insults of Mr. *Whiston*; his so vehement Opposition to it, and his Endeavours to pervert that Account, proceeding wholly from its Inconsistence with his *new Theory*; which is shewn to be altogether fictitious, and without any solid Foundation, or Countenance from Observation.

2. *A Representation of the State of Mankind in the first Ages after the Deluge; with an Historical Discourse wherein the Manners, Customs, Opinions and Traditions, as also the Arts, Utensils, Instruments, and Weapons, of all the most Antient Nations, are carefully compared; in Order to the Discovery of the Origin of Nations, but more particularly of the Americans, Negroes, and Indians.* Tho', in the Compass I am confin'd to, it be not easily practicable to give an Idea of a Work of the Variety and Extent that this is, yet I cannot but take Notice that it makes out very plainly, from Reflexion on their Notions, and Practices, from their chief Customs Religious

gious and Civil, from the Disposition of their Minds, and the Constitution of the Bodies of *Americans*, *Negroes*, and *Indians*, that they, with the rest, came all originally from one and the same Stock: and that the present Difference, as to Stature, Shape, Features, Hair, and Complexion, is owing wholly to the Diversity of Heat, Climes, Soils, and their various Productions, Diet, and the different Methods of Living. As to the *Americans*, in particular, 'tis here shewn that they believ'd in one Supreme God; but, withall, paid some Sort of Worship to the Sun: they offer'd Sacrifices of Animals, and sometimes of Men: they had a Notion of the Immortality of the Soul, which they thought maintain'd by a Transmigration of it from one to another: they retain'd a clear Tradition of the Creation of the World, and of the Universal Deluge: they kept their Records, and preserv'd the Memory of Things, by Hieroglyphic Representations; all which the most antient *Asiatic*, *African*, and *European* Nations, the *Chineses*, the *Ægyptians*, and the rest, likewise did. Thus far  
the



the *Americans* agree exactly with the most early Inhabitants of the Old World. But they knew Nothing of Letters, of Coyn'd-Money, of Iron, of the Plough, or of Horses. Whereas all these Things are of that mighty Service in Life that, had they once known the Use of them, 'tis not to be conceiv'd they could ever possibly have lost it again. So that 'tis evident the *Americans* were departed and gone off before any of these were found out. Now we have certain Accounts, from History, and Chronology, of the Time when Letters first obtain'd, when Money was first coyn'd, when the Use of Iron was discover'd, as also of the Plow and Agriculture, and when Horses, till then running wild, were first taken up, broken, tam'd, and turn'd to the Service of Mankind. This Time therefore being ascertain'd there is no Difficulty in adjusting the Æra of the Departure of the *American Colony*. 3.

*Of the Wisdom of the antient Ægyptians, a Discourse concerning their Arts, their Learning, and their Religion; with occasional Reflections on the State of Learning amongst the Jews, and some other Nations.*

In

In this, besides other Things, the *Mosaic* Institution is vindicated: and the Charge, of Sir *John Marsham*, † and Dr. *Spencer*, \* that some Parts of that Institution were taken from the *Ægyptians*, is refuted.

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## *Postscript.*

**A**S I am putting an End to this Introduction, I have happen'd to light on some of the Letters mentioned *Nat. Hist. Earth illustrated*, p. 112 *infra*. I add them to the *foregoing Papers*, with the Author's Leave; which was the more difficulty obtained, as they were wrote merely for the private Satisfaction of a Friend, without any View of their ever appearing in Publick. Sir *Robert Southwell*, whose Name is at the Head of them, was a Man, as of real Virtue and Honour, so of a great deal of Curiosity, fine Parts, and very solid Accomplishment; and there was, to the last, a strict Friendship betwixt him and the Author. The Letters are as follows.

### LETTER I.

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† Chron. Canon. Sæc. 9.

\* De Legib. Hebræor. Lib. 3.



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LETTER I.

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To the Honourable

Sir *Robt. Southwell*

At KING'S *Weston*.

*Of the Alterations of the Barometer, and the Rise and Fall of the Mercury in it, on the Alterations that happen in the Constitution of the Atmosphere and Change of Weather.*

SIR, *Gresh. Coll. July 4. 1698.*



Choose rather, relying on your accustomed Good-Nature, to return you such an Answer as the Condition of my Affairs will now permitt, than let a Man, I pay the Deference to that I do to you, stay longer for what, when it finally came, might not perhaps  
 much

much better deserve your Staying for. You ask ---- *How it comes to pass that a pure Air should raise the Mercury in the Barometer or Weather-Glass, and a foggy or moist Air shou'd let it sink? Or whether of the two is heavier, Air which is clear and dry, or that which is thick and moist?* You know Sir! very well, and indeed it hath been demonstrated by several late Writers of Hydrostaticks. 1°. That the Mercurial Cylinder is born up in the Tube of the Barometer by the Pressure of the Air upon the external stagnant Mercury. 2°. That this Pressure arises merely from the Weight of the Air, or Atmosphere, that is, the Air, Watery Vapours, and all other extraneous Matter wherewith the Air is charged. 3°. That the Weight of any one particular Body or sort of Matter increases proportionably to its Increase in Bulk or Quantity; *e. gr.* two cubick Inches of pure Gold weigh twice as much as one, so two cubick Inches of Water are double the Weight of one. 4°. That the Weight of Matter of different Sorts, and different specifick Gravities, put or added together, increases



creases in Proportion to the Quantity of each separately consider'd. Thus one cubic Inch of Copper being added to a cubic Inch of Gold, which is about double the specific Gravity of Copper, the Whole will weigh about  $\frac{1}{2}$  more than the Gold apart: and two cubic Inches of Copper being added to one of Gold the Weight of the Aggregate will be about double. And the very Corpuscles which constitute these larger Masses bear the same Relation to one another, as to their Gravity, and to Corpuscles of different Sorts, that the larger Masses themselves do to other Masses, of the same, and of different Sorts. From what hath been laid down, you'll easily resolve the latter Part of your Question, and be satisfy'd *that a Mass of Air that is clear and dry is not so heavy as when thick and moist*, i. e. when charged with Watery Vapours or other Exhalations, it being manifest that the Air must needs be charged with as much Weight more than before, as these Vapours and Exhalations weigh apart, and consequently must press more upon all Bodies, solid and fluid, provided it gravitate with its whole Weight. So that the former, is the much more difficult

difficult Part of your Question. For since it is most certain that, before Rain, the Air is charged with Vapours and other additional Matter: and since consequently it must weigh more, and press more on Bodies, than it could be-fore with its own single Weight: since likewise the Mercury in the Tube is born up by the Weight and Pressure of the Atmosphere upon the external stagnant Mercury, and rises in Pro-portion to that Weight and Pressure, the Question is, why it falls or sinks in the Tube before Rain? Which I think may be fully resolv'd by a right Re-resentation of the Circumstances and State of the Air and Vapours before Rain. It ought to be consider'd 1°. That the Water that falls down in Rain was originaly, and before the Rain happened, raised from the Earth, and born thence up to a considerable Height in the Atmosphere. 2°. That whilst it thus mounts up, it does not press or bear either upon the Air or other Bodies, or gravitate, itself. 3°. That its Motion upward being di-rectly opposite to that Motion where-unto the Air and other Terrestrial Bo-dies are determin'd by their Gravity,

*viz.*



*viz* downward, and towards the Centre of the terrestrial Globe: and the Mass of Air near the Surface of the Earth being very thick, close, or dense, 'tis impossible the Watery and other Vapours shou'd ascend through the Intervalls of the Aereal Corpuscles without hitting and striking upon them; whence it must needs follow that this Counter-Impulse made on the Air by these ascending Vapours must diminish its Pressure or Weight, more or less as the Vapours are more or fewer in Number, and as their Ascent is with a greater or less Impetus. It may not be amiss to illustrate this by some Instance. Suppose a Body descending thro' the Atmosphere, with 500 degrees of Impetus, till, at last, it was met by 20 lesser Bodies that were ascending each with 3 Degrees of Impetus: that as soon as these 20 had hit, and spent their Force upon the said descending Body, they were instantly succeeded by 20 more, which also hit upon it, after these 20 others, and so on continually to the End of its Descent; 'tis plain this Body would, after it was so met and smote incessantly by these ascending Bodies, descend

cend with only 440 deg. of Impetus, there being 60 Degrees to be deducted, from the original 500, by reason of the Counter-Impulse made by the 20 other Bodies each with 3 Degrees. \* Or suppose a Body pressing upon another with the Weight of 50 Ounces: or rather, if you please, suppose such a Body suspended at one End of the Beam of a Balance, and counterpois'd at the other End by 50 Ounces. Then suppose a continual Steam or Efflux of small Corpuscles ascending directly upwards, with an Impetus equal to that made by the Weight of 10 Ounces, and hitting incessantly upon the said Body so suspended; 'tis apparent it wou'd be born up with 10 Degrees of Impetus, and that it might be then counterpois'd with only 40 Ounces. As certain is it that the Vapours ascending before Rain must strike upon the Aery Corpuscles, impede the Force of their Gravity, and lessen their Pressure. What is the Cause of the

Ascent

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\* I do not here take any Notice of the continual Acceleration of the Motion of descending Bodies. That is, indeed, nothing to the present purpose.



Ascent of these Vapours is no Part of your Question; but it is Matter of Fact and indisputable that they do actually ascend, and that is all that I here lay stress upon. Now the Mercurial Cylinder in the Barometer depending entirely on the Air's Pressure, being taller and higher when the Air's Pressure is greater, and shorter and lower when the Pressure is less: and the Air's Pressure being lessened before Rain by the Counter-Impulse of the ascending Vapours that form that Rain, we have a very manifest Reason why the Mercury sinks in the Tube, and the Cylinder becomes shorter before Rain. You see Sir! how the Gravity of the Air, and superadded Vapours, is eluded and impeded. Gravity is a Property that always attends Bodies, and is not, ever, lessened. A Bullet, shot point blank, up into the Atmosphere, is not at all deserted by its natural Gravity, tho' forc'd up by the Explosion with an Impetus superior to that of its Gravity. The Body in the Instance above, suspended at one End of the Beam of the Balance, is really attended with as great a Degree of Gravity, and bears downwards with as

great an Impetus, after the Efflux and Impulses of the ascending Corpuscles, as before, tho' a lesser Number of Ounces serve now to counterpoise it: So likewise when the Air is charg'd with Vapours, the Gravity of the Aggregate, or Atmosphære, is truly augmented, tho' that be eluded, and it do not press or gravitate with the Impetus of its whole natural Weight. The Measures therefore of the Air's Pressure upon the Mercury are not to be taken only from the greater or lesser Quantity of Matter in the Atmosphære, or its greater or lesser Gravity; but regard must likewise be had to the Tendency and the Direction of the Motion of that Matter. 'Tis not a Part of your Request that I lay down the *Canones* of its Motion, nor indeed is that easy to be done; besides that I am now much restrain'd by other Affairs. Only thus much may be added, 'tis not probable that the Atmosphære ever presses with the Impetus of its full weight; there being other Steams and Vapours, besides those Watery ones which form Rain, perpetually sent forth of the Globe, that somewhat repell and break the Force of the Air's Pressure. These may mount as well  
at





ces the Air's Pressure, and consequently the rising and falling of the Mercury in the Barometer. In hot and dry Weather the Mercury is sometimes low; which is an Indication of the Rise of watery Vapours in those Parts, tho' they happen to be born off, and do not fall down there again. At other times it stands high in hot and dry Weather, an Argument there are fewer of those Vapours raised then, as also that the Heat without the Earth contributes little to the raising of them. 'Tis true that that Heat may bear up Part of the Water that resides on the Surface of the Earth; but all, that proceeds forth of the interior Parts of the Globe, which is very much, owes its Rise to another Cause. In Frosty and Cold Weather the Mercury stands frequently high, the Pores of the Surface of the Earth being then usually closer, and the Eruptions fewer. Before Rains the Mercury generally falls, in proportion as the rising Vapours contribute to the Repulsion of the Air's Pressure: and when those Vapours cease to rise, the Mercury ascends in the Tube; but they not always ceasing upon the fall of the Rain, but continuing to flow up for some time,  
and



and perhaps in great Quantity too, the Mercury in such Case is not to be expected to rise presently upon the Fall of the Rain. The Truth is, the Rise and Fall of the Mercury in the Barometer is observ'd to be hardly certain and regular in any sort of Weather : nor can that be thought strange when the Cause of its Rise and Fall is thus various, contingent, and uncertain. 'Tis not more certain in any Respect than in its Fall before Rain; because there generally happens an Eflux of Vapours, before Rain, which affect it. This Cause is constant, and the Effect answers as constantly. But for the Quantity, and the Duration of the Eflux, and whether it all, or part of it only, fall down on the Tract whence it rose, is wholly contingent, and so consequently must be the Motions of the Mercury. Much more might be said, but 'tis not needful to a Person of your Apprehension.

I am, SIR,

Your most Humble Servant

J. WOODWARD.

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## Extract of LETTER II.

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### *The Proposition,*

*relating to the Pressure of the Atmosphere's being diminished, and by that means the Mercury in the Barometer made to fall, by the Ascent of Steams and Vapours out of the Earth and Abyss,*

*briefly stated.*



ALL the Quantity of the Impetus of the Atmosphere's Pressure, caused by its Gravity, 30. Call the Height of the Column of Mercury, raised up into the Tube of the Barometer by that Impetus, likewise 30. Then call the Impulses on the Atmosphere made by the Steam, rais'd or buoy'd out of the Earth, and passing directly up into the Atmosphere, for the Formation



mation of Rain there, 2. I say, whenever, by the Impulses, or Counter-Impetus, of that rising Steam, the Column of the Atmosphære, pressing, gravitating and balancing the Column of Mercury in the Tube of the Barometer, is render'd lighter by 2, the Column of Mercury must then of course become shorter by 2: and then the Height of it can be no greater than 28.

When, by the Steam rising, either in greater Quantity, or with greater Swiftness, or buoy'd up with greater Impetus, the Column of the Atmosphære is render'd lighter by 3, the Column of Mercury must shorten, and fall to 27.

When the Column of the Atmosphære is render'd lighter but by 1, the Column of the Mercury will shorten but to 29.

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LETTER

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## LETTER III.

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*Of the Œconomy of the Great Deep, or Abyss, in the Bowels of the Earth: and the continual Inter-course betwixt this and the Atmosphere.*



Cannot, I confess, but think that 'twould be more agreeable to your Purpose Sir! and I am sure, much easier to me, to lay before you the Observations themselves, and the Collections, which I have made, relating to the Œconomy of the Abyss, and it's Communications with our Atmosphere; but, since you are pleased to command only an Abstract, I here send you One, drawn up in such Manner as my present Circumstances will give leave.

*Proofs of the  
Dispatches  
of a great  
Diversity  
of Princi-*

The Dispatches, of Principles, very various, out of the Abyss, up into the Atmosphere, are almost continual. Of these some are humid, others dry, some cold,



cold, others hot, others of Saline, and mineral Nature. But Sir! as your Inquiry is chiefly relating to Rain, I shall have Regard more particularly to that: and there are both Proofs of its Rise out of the Abyfs, and, for some Time before there be any Appearance of it above in the Atmosphere, Presages of its Access, there, below, at the Bottoms of great Coal-Pits, and deep Mines of Metalls, in all Parts of the World. The first Notice, that the Colliers and Miners have of its Rise, is a Heat, under Ground, something greater than usual. This continuing, the Air there becomes thick, misty, foggy, and finally humid, and damp. In Proportion to the Ascent Increase and Continuance of the Heat and Humidity, the Workmen below foretell the Time of the Fall of the Rain above, its Quantity, and Duration: and those, that have frequently made these Observations, and have Experience, foretell that with great Certainty; than which there needs not a firmer Proof of the Certainty of the Principle. Much the same Phænomena are observed in Grottos and deep subterranean Caverns. Nay even our Vaults,  
by

*ples out of  
the Abyfs.  
1. From  
Phænomena  
observable  
in Mines,  
and Places  
at great  
Depth in  
the Earth.*

*The Translator's Introduction.*

by the Fumes and Stench that the ascending Steams carry up along with them, give sure Prefages of Rain to insue. In some of the deepest Mines, before long and great Rains, Water is seen working forth of the horizontal Fissures of the Strata, first attended with Froath; the Water sometimes flowing in thus in such Quantity as, passing on into them, considerably to raise the Springs, and fill the perpendicular Fissures, to such Degree as to drive the Workmen out. This Phænomenon affords some Light to conduct us in forming a Judgment of the Origin of Springs, and Rivers. But, to proceed, the Thickness of the Air and Fog increasing, in the Mines, or Cole Pits, the Candles, used by the Workmen, under Ground, burn less clear than usual. Nay, the Heat, Rise, and Hurry, from beneath, continuing, and becoming still greater, besides the Humidity, various Sorts of mineral Steams, nitrous, sulphurous, and others, ascend and fly up, sometimes in such Quantity as to take Fire at the Candles, and, after the Manner of Gunpowder, which is composed chiefly of those two Ingredients, make Explosions,



sions, suffocate and kill the Workmen there, and do much Mischief. These have obtained the Name of *Damps*\*. The mineral Steams, ascending to the Surface of the Earth, and being furthered by the Heat there, in Summer, and warm Weather, mount up into the Atmosphære, and form there Lightning and Thunder †. They are sometimes in such Quantity, in our Air, as to be plainly perceived: and a sulphurous Smell frequently attends these Emergencies. It will not be foreign to note that, besides these, other mineral Steams arise, which, passing up to the Surface, become there noxious, injurious to Health, bring on Fevers, and pestilential Distempers ‡; which are ever observed to be the most rife and epidemical, in hot Weather, and the rainy Seasons. So that they, who would apprize themselves of the Causes of the healthy or unhealthy State of the Air, must search for the Origin of them in the Operations of this subterraneous Reservatory.

The

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\* *Conf. Nat. Hist. Earth. Part. IV. Conf.*  
14. † *Ibid.* ‡ *Ibid.*

2. *From  
Phænomena  
observable  
in great  
and high  
Mountains.*

The Strata of Mountains are broken \*, and interrupted, so as to have in them frequent Fissures and Apertures. Then these Strata are elevated †: and put into such Posture as to dispose them to give Passage, not only to Steams, and Humidity, but to Water, sometimes in Quantity, very freely, and directly, from the Abyss; especially where the Strata are so much raised as to come near to a Perpendicular. Thorow these, the Water passes, all along, readily, with the Grain of the Stone: and thorow the Fissures that part the Strata. Nay, here, even the Steams, that rise, by Reason of the greater Cold in those higher Regions, are more suddenly condensed, and arrested: and consequently sooner discernible, than those that arise from the Plains, and Valleys beneath, where the Heat is greater. Any Man, reflecting on this so mechanical a Compages and Structure of the Mountains, will soon see 'tis such that they must in course present us with  
very

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\* *V. Nat. Hist. Earth. Part. II. Conf. 6, 8.*

† *Ibid.*



very early Notices of the Dispatches from the Abyfs : and, in particular, of the Humidity that, assembling and uniteing into Drops, forms Rain. 'Tis for this Reason that we see, ordinarily, on the 'Tops of the higher and larger Mountains, not only ours here, but those of even the most Northern Countryes, quite to *Greenland*; tho' more commonly on the Southren of *America, Africa*, and indeed all Parts of the World, Mists and Fogs; or, as they are commonly called, Clouds, and Caps, for some Time before any Rain is collected and ready to fall. This is so certain, that the Country People, inhabiting within View of these, constantly ground their Prognosticks, with great Assurance, upon them : and, from the Increase and Continuance of these, they make their Judgment of the Quantity and Duration of the Rain to insue. In some, especially the more Southern and hot Countryes, the humid Vapours issue forth of the Mountains so fast, and in such Store, as there immediately to form Rain, and fall down, on the Spot, in Showers. Nor is any Thing more common than, in those

those Countryes, to observe great Rains, and, in some, even Thunder and Lightning, in the Mountains, when all is clear below, and none in the Plains or Valleys. Nay, at some Times, especially in the hotter Seasons, when the Power of the Sun joyns and inforces that of the Subterranean Heat, the Water is roused in such Quantity as to storm the Strata, make new Breaches in them, and force its Way forth, sometimes in such Quantity as to drown and drive away whole Flocks of Cattle feeding in the neighbouring Pastures, overturn Houses, and make Deluges so great as to lay considerable Tracts of Land, and almost whole Countries, under Water. This happens, not seldom, in the larger Mountains of the North of *England*; where these Eruptions have obtain'd the Name of *Out-Bursts*; but much more frequently in the vast Mountains of *Habassinia*, those of the *Andes* of *America*, and other Southern Countryes.

3. From  
Phenome-  
na observa-  
vable in the  
Sea, in great  
Lakes, in  
Springs and  
Wells.

They, who inhabit Places near the Sea, have sure Notices, of every considerable Rain, given them, before hand, by the various Noises that proceed thence, occasion'd by the various Agitations and Commotions of the Sea at the Time.

**These**



These are very different; at some Times such as to imitate Water bubbling up, as boiling: at others, to raise it into a *Swelling*, as the Seamen term it, or Rowling, and Waves, frequently when there is little or no Wind stirring above. Sometimes the Sea Water becomes sensibly more warm, than ordinary, before Rain; by which Means the Porpusses, and other Sea-Fish, are offended and disturbed, to such a Degree as, in Shoals, to toss and fling themselves above the Water, with much Flutter, Noise, and Marks of Discomposure, on the Occasion. In some Places that Warmth is attended by a Sparkling and Light of the Sea-Water, but such as is only visible in the Night. In Loughs, and great Lakes, Rain is likewise presaged by like Noises and Commotions: and by the Water becoming more turbid, muddy, and foul. Of all which Phænomena we have Accounts from those who have made Observations on the great Lakes of *Peru*, of *Habassinia*, of *China*, of *Sweden*, and *Lapland*, of the *Alps* and *Switzerland*, of *Ireland*, and of the North of *England*, where the Natives are wont to ascribe these *Phænomena* to what they call

an *Under-Wind*, or Vapour ascending from the Bottom. Rain is prefaged, in Springs, or Wells, by the Water becoming more or less Warm: by its receiving some adventitious Taste, or being somewhat more thick and turbid: and, in some Springs, especially those which rise in Hills, by an Hissing, Chanting, Thumping, or other Sound: in others, by the Increase and Rise of the Water. This last I take to be the Case of those commonly call'd *Ebbing-Springs*: and in particular of the famous *Tydes-Well*, in the *Peak*, that is said, tho' very wrongly, to ebb and flow with the Sea: as also of some other like Springs, both in this Island, and in foreign Parts, which have so much and so long, in vain, exercised the Conjectures and Speculations of Naturalists and Men curious in such Inquiries. Our Baths, here, at *Bath*, as well as those abroad, become somewhat more hot than usual before any great Rain. Nay even the *Vulcano's*, or Burning-Mountains, *Ætna*, *Vesuvius*, *Hecla*, and the rest, are more noisy, and send forth more Fumes, and Fire, before every extraordinary and lasting Rain. The *Acidula*, or vitriolic



lic Springs, such as those of *Tunbridg*, become ordinarily stronger, and more highly faturated with that Salt, before great Rains; quite contrary to the common Notion, which supposes them thinner and weaker.

In like Manner, before any considerable Rain, most Living Creatures are affected in such Sort as to render them some way sensible of its Approach, and of the Access of something new, to the Surface of the Earth, and to the Atmosphere. Moles work harder than ordinary, throw up more Earth, and sometimes come forth. The Worms do so too. Ants are observ'd to stir about, and bustle more than usualy, for some Time: and then to retire to their Burrows, a while before the Rain falls. Garden and Field-Spiders are seen likewise wandering about, in Quest of Coverture for the Time. All Sorts of Insects, and Flyes, are more stirring and buisy than ordinary. Bees are ever, on this Occasion, in fullest Employ; but betake themselves all to their Hives, if not too far off for them to reach, before the Storm arises. The common Fleish-Flyes are more bold, and greedy. Snails, Frogs, Toads, ap-

4. From  
*Phænomena*  
*observada*  
*ble in Ani-*  
*mals.*

pear disturb'd, disquieted, and uneasy. Fish are sullen, and made qualmish, by the Water, now more turbid than before. Birds, of all Sorts, are in Action. Crows are more earnest after their Prey. As are also Swallows, and other small Birds: and therefore they fall lower, and fly nearer to the Earth, in Search of Insects, and such other Things as they feed upon. So soon as ever the Mountains of the North begin to be cap'd with Fogs, the Moor-Cocks, and other Birds, there, quit them, fly off in Flocks, and betake themselves to the lower Lands, for the Time. Swine discover great Uneasiness. As do likewise Sheep, Cows, and Oxen; appearing more solicitous, and eager in Pasture, than usual. Even Mankind are not exempted from some Sense of a Change in their Bodies, occasion'd by the Change made in the Atmosphere, by means of an adventitious Heat, and Humidity: as also of Mineral Principles, and Salts, perhaps vitriolic, sulphurous, and, in reality, the very same to which I have elsewhere † shewn most of the Diseases,

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† Idea of the Nature of Man, Diseases, and Remedyes. 8vo.



ses, Perturbations, and Disorders of human Nature are owing. And, as the Salts, derived from improper Diet, and perhaps Intemperance, and Excess, are wont, first, to affect the Stomach, and those Parts that suffer in Consort with it, chiefly the Lungs, and Head; but, afterwards, to descend thence gradually into the Blood, where they are diffused over and affect the whole Body; so, on the like Salts, and Mineral Principles, from out the Earth, invading the Atmosphere, Men, of the finer Constitutions, become asthmatic and shortbreathed, have their Heads cloudy, dizzy, and, as they call it, vapoured: and perhaps their Limbs pained; with several other Symptoms. Nay, where the mineral Principles ascend in Quantity greater than ordinary, the Stomach is sometimes sensibly affected: and I know several who become maukish, sick, and actually vomit, before Thunder and Lightning, so constantly that they never fail of such Warnings of those Meteors before their Approach.

The Steams, ascending thus up into the Atmosphere, must, of necessity, break and lessen the Pressure of it: and, by that means, lower and shorten the

5. From  
*Phænomena*  
*observable in Bodies*  
*inanimate; par-*

particularly  
the Baro-  
meter, and  
the Hygro-  
meter.

Mercurial Cylinder of the *Barometer*. † The Humidity, rising, and continually increasing, shews itself in various Ways. In Vaults, Cellars, and Places under Ground, first: and, afterwards, continuing to mount up, in Places that are higher, it casts a Damp and Moisture on Stones, and such other hard polite and specular Bodyes, as, happening to be in its Way, stop, arrest, collect, and so render it discernible. The Humidity, insinuating itself into Bodyes that are fungous and porous, fills their Cells and Pores, distends them, and enlarges the Bodyes so much, that they, by that means, are made to give sensible Evidence of its actual Arrival and Presence: and so serve for *Hygrometers*.

6. From  
the different  
Tenor of  
the Light,  
and various  
Complexion  
of the At-  
mosphere.

The Exhalations of the Abyss, ascending, and intermixing with the Air and Atmosphere, impart a various Manner, Hue, and Colour to it, answerable to the Different Nature of each, and, as they happen to be suspended, in the Atmosphere, in greater  
or

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† Confer. p. 109. & seqq. supra.



or lesser Quantity. When they are in lesser, thin, and near equally diffused in all Parts, the Atmosphere obtains, with some, a Grey Cast, with others, a Sky, or Blue: when in greater, and gross, a white, a yellow, a red, or black.

The Light, cast thorough these Exhalations, Steams, Fogs, and Clouds, and by them variously reflected and refracted, appears with a different Complexion and Tenor, suitable to the different Constitution of the Matter whereof they consist.

The Light of even the very same Day varies much, according as the Vapours in the Atmosphere happen to vary in Nature and Quantity. In Summer,

*The Light of the same Day ordinarily of different Tenor.*

when the Sun's Power is greatest, and its Rayes nearest to direct, here in *England*, the Light of the Dayes, that are clearest, and freest from Clouds, is much varied merely by the various Interposition of the common ascending Steams. During the Cool of the Night, they are usually much lessen'd. So that, in the Morning, in Case the Fogs of the foregoing Evening † are dissipated, the Light, for

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some

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† Confer *Nat. Hist. Earth.* Part IV. Conf. 14. p. 233. 3d. Edit.

some Hours, is bright, vivid, and strong. As the Sun draws nearer to the Meridian, the Light becomes more faint and languid, and is of a different Hue; which rather increases afterwards. The nearer the Sun is to the Meridian, the more direct its Rays, there, are: and the greater its Power upon the Earth; in which Case, more Vapours being continually raised, the Light shews itself somewhat turbid, and thick. In sultry hot Weather, I have frequently observ'd, ascending in the Atmosphere, an extremely fine Matter, agitated, and in a continual Undulation, much after the manner of a very thin ætherial lambent Flame. This, doubtless, is no other than Heat, or the Subterranean Fire, detach'd forth in small Parcels, bearing up along with it Fumes and Steams, which are made the more visible by their Agitations, and their variously reflecting the Light of the Sun. That the Sun's Power, to act upon any Part of the Earth, increases continually as it approaches the Meridian, there, is certain; which assigns a Cause of the raising of these Kinds of Steams chiefly in the Middle of the Day. The Light  
should



should increase in Proportion: and become continually more vivid. That it does not, must be owing to the Interposition of something that thus screens and impedes it. I had a Confirmation of this, *April 22d, 1715,* in the Morning, during the total Eclipse of the Sun. The Light was, before, very bright, clear, and brisk; but, as the Body of the Moon interpos'd, in a little Time, the Light appear'd of the Hue 'tis wont, then, ordinarily, about Noon. As the Moon advanced upon the Sun's Disk, the Light grew more and more faint, and grey, till it appear'd like the ordinary Light, cast obliquely through the Atmosphere, in *September.* At last the Light had a faint blueish Cast. The Air became cooler likewise, in Proportion: and a fine flight Dew fell; occasion'd by the Moon's Interposing, and impeding the Action of the Sun upon the Atmosphere, the Earth, and the Abyfs. 'Tis to that Action that the Rise, of Humidity, up into the Atmosphere, is owing: and; upon this Interruption and Suspense of it, the Humidity now fell back; uniting, thickening, and forming itself into Drops of Dew, as  
it

*Various  
Phænomena that  
attended the  
Eclipse of  
the Sun,  
April 22d.  
1715.*

it fell, and approached the Surface of the Earth. 'Twas probably from this that the Blue, then so much taken Notice of, in the Atmosphere, did arise. Nor indeed can there well be much Doubt but that the ordinary fine thin Azure of the Atmosphere, is owing, if not to humid, to some other Vapours in it. 'Twas also observ'd at *Dunstable*, where there happen'd to be some Clouds, that these became apparently bluer, indeed near black, and thicker, during the Eclipse. At *London*, after the Eclipse was over, the Atmosphere was more dusky, gloomy, and thick, than before. In the Gardens, all round, the finer and more tender Flowers began to close, during the Eclipse, as they are wont after Sun-Sett.

*The Light, of the different Seasons, consider'd. That of Autumn compar'd with that of Winter.*

*Occasionally of the Tencor of the Light du-*

In like Manner the Light, of the different Seasons of the Year, is very different. This happens from the different Power of the Sun, and its different Action on the Earth, the Atmosphere, and the Exhalations there. The Light of *October*, about 40 Dayes after the Autumnal Æquinox, is not commonly so clear † as that

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† Confer, pag. 141. infra.



that of the End of *January*, about 40 <sup>ring</sup>  
Dayes before the Vernal *Æquinox*. <sup>Frost.</sup>  
As to Winter, in the hardest Frost <sup>Of the</sup>  
the Light is clearer than it is in the <sup>Light du-</sup>  
Midle of Summer. It is also brighter, <sup>ring the</sup>  
stronger, more vivid, and intense. <sup>Heat of</sup>  
The Cause, of this Difference, is, in <sup>Summer.</sup>  
Summer the Rays of the Sun are in- <sup>That Heat</sup>  
deed cast more directly through the <sup>lessen'd,</sup>  
Atmosphere, but then, by Reason of <sup>then, by the</sup>  
the greater Heat of the Season, there <sup>great Ascend</sup>  
are Vapours, continually rising, or <sup>of Vapours.</sup>  
stagnating, which intercept and re-  
fract the Rays; whereas, in Frost,  
which happens in Winter, the Rays  
of the Sun are cast obliquely thro'  
the Atmosphere; but, then, the Af-  
cent of the Exhalations from the  
Abyss are check'd, \* and so the Light  
pure, clear, and free from Vapours.  
For if there be the least Appearance  
of Vapour, Fog, or Cloud, 'tis a Sign  
the Frost is declining. So that, in  
hard Frost, 'tis highly probable that  
the Light is the most genuine and pure.  
Our best Metallin-Concaves, and  
Burning-

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\* Confer pag. 150. infra.

Burning-Glasses, collecting the Rays of the Sun, shew that its Heat is full as great, and does as much, if not more Execution, in the Fusion of Metals, and the Dissolution of Bodies the most firm, solid, and hard, ‡ during the hardest Frost, when the subterranean Heat is in great Measure withheld, as in the most excessive and intense Heat of Summer. \* So that the Sun's Heat is really no more interrupted than its Light is, during Frost: and 'tis what I have ever observ'd that its Heat and Light are so exactly commensurate, each to other, that I am not satisfy'd but that they are both the very same. By comparing the extreme Heat of Summer, with this of the Sun in Frost, may be ascertain'd the Power, and Quota of the subterranean Heat: and how much it is commonly superior to that of the Sun, in our Atmosphere. 'Tis indeed evident that, to this subterranean Heat,  
and

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‡ In these Assayes Consideration ought to be had of the Change made, in those Bodies, by Frost.

\* Confer. *Hist. de l'Acad. des Sciences*, 1705. p. 39. 40.



and the various Dispensations of it, all the many Vicissitudes of our Atmosphere are owing.

In Autumn, and in the Beginning of Winter, Fogs are more frequent, thick, and gross, than in the End of Winter, and the Spring. This shews that the Heat of the Earth acts, not only conjunctly with that of the Sun, as in Summer : but separately likewise, and alone ; sending up Humidity and Steams in Autumn,\* and the Beginning of Winter, which form Fogs, and frequently stagnate near the Surface of the Earth, the Heat of the Sun then being not sufficiently powerfull to take them at the Surface of the Earth, to raise, and carry them up, as before in Summer, and the hotter Season. So that, stagnating in the Atmosphere, and in the exterior Strata of the Earth, many of the Pores and Passages become thereby glutted and stopped : and, by that means, the Vapours intercepted ; which is the Reason why Fogs, in the latter Part of the Winter, are ordinarily less frequent : and, when they happen,

*The Light of Autumn obscured by Fogs, and Vapours. These sent up by the Subterranean Heat.*

not

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\* *Conf.* p. 138. *supra.*

*Rain why  
in greater  
Quantity  
in Summer  
than in  
Winter.*

not so thick and gross. 'Tis owing partly to this Glutt of the Pores of the Earth, and partly to the Interception of the Rays of the Sun, by the Obliquity of the Atmosphere, that there is commonly so much less Rain\* in the Winter, and colder, than in the Summer, and hotter Months. This

*The Reci-  
procations,  
betwixt the  
Heat of the  
Sun, and  
that of the  
Abyss, not  
unknown to  
the Anti-  
ents.*

Concurrence of the Power of the Subterranean with the Solar Heat, was taken Notice of very early: and a Writer, of great Rank amongst the Romans, represents the Sun as *incircling* this our Globe, and *dispatching* forth its Rays, which he stiles *Reins of Fire*, so far till it joyns them to the Fire within *the Earth* †.

*The Heat  
of the same  
Season, in-  
constant: of  
several Pla-  
ces in the  
same Lati-*

As, when the Sun is in the same Sign, the Heat of the same Place is different, in several Years, in some greater, in others less; so, tho' the Sun has the same Aspect on all Places in the same Latitude, yet these differ much

\* *Conf. Nat. Hist. Earth. Part III. Sect. 1. Conf. 8.*

† — Sol vagus igneas Habenas  
Immittit propius, jugatq; Terris. — Nævius,  
ap. Macrobian. Sat. l. 18.



much as to the Temperature of the Air, the Heat being very different, and in some of those Places much greater than in others, the Fruits forwarder, and the Productions of the Earth ordinarily larger. On the contrary, in very different Seasons, the Heat of the same Place is frequently nearly alike. I have observed the Thermometer, in *January*, standing at much the same Height that I have sometimes observ'd it at in *May*. In like manner there are Instances of Countreys in different Latitudes, that yet agree pretty nearly in the same Degree of Heat, and Temperature of the Air. So that, 'tis plain, the Temper of the Atmosphere, and Heat at the Surface of the Earth, cannot be owing merely to the Sun. Of these Things I have given several Instances where I treat of *the Complexion of the Negroes*: and shew that the Difference is caused by the irregular and uncertain Dispensations and Effluxes of the Subterranean Heat.

This Sketch, however, mean, concise, and hastily drawn, will, Sir! to a Man of your Capacity, and Penetration, suffice to give an Idea of these Operations: and shew that all Nature concurs

*The Certainty of this Doctrine, of the Causes of these Phenomena, and the so uni-*

*versal Agency, of the Abyss, farther asserted, by bringing of it to still more Tests.*

concurr's to assert and establish the Truth and Certainty of this Doctrine. It has been, else where<sup>\*</sup>, shewn, from Observations, and Facts every where visible in it, that the far greatest Part of the Globe we inhabit is made up and consists of Water; the earthy Part serving only as a Skin, or Shell, to contain that Water. Such a Constitution only, and such a Proportion of the solid Parts of it to the Fluid, could rightly answer the Ends of Providence in the Formation and Well-Being of all its Productions. Had the Shell been thicker, that would not have comported with the incessant and perpetual Intercourse, that is requisite, betwixt the Abyss and Atmosphere, for the Support and Maintenance of those its Productions. The Globe was first formed, and the Parts of it regularly arranged, by the Ministry of Water, and the Principles of the Abyss<sup>‡</sup>. 'Twas, afterwards, at the Deluge, for weighty Reasons, taken  
to

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<sup>\*</sup> *Nat. Hist. Earth. Part. III. and Nat. Hist. Earth illustrated Part. II. Sect. 5.*

<sup>‡</sup> *Nat. Hist. Earth. Part. II. Pag. 109. 3d. Edition.*



to Pieces again, and formed anew, by the same Ministry \*: and, by still the same, all Fossils, mineral and terrestrial Bodies, are formed †. 'Tis to the Ministry of the Humidity, continually rising out of the Abyfs, traversing the Shell of Earth, and mounting up into the Atmosphære, that all Vegetables owe their Formation and Growth ‡. How far Animals, of all Kinds, and Man in particular, live, feed, and subsist upon those, or the superior Kinds of Animals upon the inferior, and these finally upon Vegetables, is obvious to every One, and so well known as to need no Explication here. 'Tis sufficient to have given these Intimations that the Beginnings, and first Operations, of all, are the Result of the OEconomy and Administration of Things in the Abyfs. Of the Magnitude of it, sufficient hath been said; I shall here only subjoyn some Instances of the Extent of its Effects,

k fects,

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‡ *Nat. Hist. Earth.* Part II. Pag. 109. 3d. Edit.

† *Ibid.* Part. IV.

‡ *Vid. Disc. of Vegetation.* *Philos. Transf.* June 1699. And *Nat. Hist. Earth* Part. III. Sect. 1. Cons. 8, and 10.

fects, and of the Principles wherewith it acts, as they occur to me, casting my Eye over my Notes, and the Histories of them that I have collected : and then conclude. Barometers, in Countries the most distant, have, by accurate Observers, been found, especially upon all great extensive and lasting Rains, to keep Time, rising and falling at the same Instant, in each ; *e. gr.* at *Upminster* in *England*, and at *Zurick* in *Switzerland*. Hence we learn that the same Principle affects both : and, in this, we have, of many, one Sample of the Dimensions and Extent of it. In the same manner, before any great Rain, the Phænomena that portend it under-ground, are observed, at the same Time, in Mines, and Cole Pits, how far soever they happen to be from each other. So likewise Mountains, very remote, but of such Height that, from the one, the other may be discerned, appear capp'd with Fogs, in Consort ; the Fog rising, increasing, declining, and vanishing, in one, at the same Time that it does in the other. Of this there are many Instances, and one particularly mentioned by the excellent Author



thor of the *Britannia*\* , of *Skiddaw* in *Cumberland*, joyntly with *Skruffelt*, in *Scotland*. This also is commonly the Case of the *Vulcano's*, or Burning-Mountains, those at the greatest Distance keeping Time, as to their Eruptions, and Discharges of Flames, Fire, Cinders, and other ignited Bodies. Of this there's one Example in the famous Writer of the Life of *M. Pieresk* †. 'Tis of an Eruption of *Vesuvius*, in *Italy*, and *Mount Semus* in *Ethiopia*, at the same Time; from which, tho' not apprised of this so vastly extended Receptacle of the Abyss, he inferrs that there must be some *Subterraneous Communication betwixt Vesuvius, Syria, Arabia, and the Country near the Red-Sea, in which Mount Semus is*. In like manner, the Shock of an Earth-quake has been observed, in several Countryes, at considerable and even the greatest Distance, in each, at the same Moment. These are Instances of Things of the same Kind; I shall next offer some others

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\* *Cambden* in *Cumberland*. p. 822.

† *Gassend*. p. m. 395.

of Things of different Kinds, concurring, and shewing that all are acted by the same Principle. Thus Fogs, on the neighbouring Mountains, attend those Commotions of the Sea that forebode Rain, and Storms. The Baths, here, at *Bathe*, were observed to be hotter, than ever was known, a little before the Earthquake that happened there in 1692. On another Earthquake, that was preceded by an Hurricane, and attended by an unusually great Heat, the Barometer sunk prodigiously, quite down to 25 11'; which was lower than ever was taken Notice of before. Great Heats, sulphurous Smells, Exhalations, and strong and mischievous Damps in Mines, are wont to accompany Earthquakes. The *Vulcano's* are much the most outrageous, and the Waters of the *Thermæ* the most hot and sulphurous, during Earthquakes. To conclude all in a Word, having been more full and particular on this Subject in my *Essay towards a Nat. Hist. of the Earth*, † great Earthquakes

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† Part III. Sect. I. Conf. 12.



quakes are commonly attended with Eruptions of *Vulcano's*, Ebullitions of the *Thermae*, great Discharges of Water out of the Bowels of the Earth, and sometimes of Fire, Emissions of Steams so noxious and pernicious as to kill Cattle, Fowls, and Fish: High-Tides, violent Commotions of the Sea, Inundations, Rain, Wind, Storms very furious, with Thunder and Lightning, all in the same unhappy Scene; than which I think there needs no other Proof that all derive their Origin from one and the same common Source and Promptuary.

Much has been offered, above, in *The Dis-* Relation to the Action, and the sever-<sup>patches, of</sup>al Effects of the subterranean Heat; <sup>the subter-</sup>but 'tis not so easy, to ascertain what <sup>ranean</sup>Heat, to the are the Rules and Laws of its Action, <sup>Atmos-</sup>for Want of Data, and sufficient Hi-<sup>phere, con-</sup>storyes of Fact. 'Tis plain they are <sup>tinent, ar-</sup>not steady, regular, and uniform. <sup>bitrary, and</sup>The Access of Earthquakes, and Erup-<sup>varying.</sup>tions of *Vulcano's*, are not periodical. <sup>Hence the</sup>The Heat at the Bottom of Mines, <sup>Variations</sup>and in the Water of the *Thermae*, <sup>at the Sur-</sup>sensibly varyes: and is not constantly <sup>face of the</sup>to the same Degree at the same Sea- <sup>Earth, and</sup>son. That likewise is the Case of the <sup>in the At-</sup>mosphere.

Heat, and of the Humidity, in the Atmosphære, raised by it. The Earth has ever the same Site, and Position to the Sun, at the same Season. So that the Sun cannot but be constant and regular in its Action: and therefore these Irregularities must be owing to some other Cause; which is apparently the Heat of the Earth, and the Abyfs. As this happens to be restrained, or dispens'd forth, the Atmosphære is pure, and free, or charged with Heat, extraordinary Vapours, Exhalations of all Kinds, and Humidity. Under the greatest Restraint † of it, Frost insues; but, as the Heat of the Abyfs begins to reascend to the Surface, a Thaw commences: and this ever happens, first in the Parts nearest the Earth; which shews that the Principle resides within it. This is most evident when the warm Exhalations, from out the Earth, are great, and consequently the Thaw sudden. It begins, of course, on the Parts, of the Ice, or Snow, nearest the Earth, out of which proceeds the Cause; for I  
 meddle

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† Confer p. 139. supra.



meddle not here with the Melting wrought by the Sun, which is contingent, and only temporary: and the Thaw underneath is frequently considerably advanc'd, and great Quantities of Water are oftentimes sent forth, from the Bottom of the melting Ice or Snow, where they happen to be very thick, and to be lodged upon an Eminence, whence the Water may run on a Descent, some Hours before any Thing like a Liquefaction or Thaw is perceived, above, at the Surface. This the Country People call a *Ground*, or *Under-Thaw*.

Such is the Præcipitation in which I draw this up, that it cannot possibly be without Faults so many and great as Sir! much to need your Pardon and wonted Indulgence. My only Hopes are that You will have greater Regard to the Dignity of the Subject, than to the Manner in which I am constrained to lay it before You. I have the greater Reason for this Apology because what I presume here to offer you, which has scarcely hitherto been touched by any One, is far from

*Of the  
prime  
Spring,  
Mover, and  
Agent, in  
all these  
Operations.*

its due Lustre, tho' it be, in Truth, the Master-Key, in this Work, and serves rightly to open, and let us into the Knowledge of the true Cause of the main Phænomena and Transactions of this our whole sublunary World. But by what Means it is turned, acted, and managed, or what is the prime Mover, and Director of this Heat, and these Exhalations; or what is the Rule and Law by which all is steered and conducted, I will not presume to take upon me to determine. But this I must say, that all the Good or Bad of human Life, the Happiness or Unhappiness of the State of the Region in which we live, move, and have our Being, and of all the Productions of it, apparently depend solely on its Government and Administration: and, whenever that shall be given up, and the *subterranean Fire* once let loose, any One may presently infer, from what has been before layd down, how easily, and by what Means, in that *great and dreadful Day*, † *the Elements shall be*

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† *Malach. iv. 5.*



be brought to *melt with fervent Heat, the Earth also, and the Works that are therein, be burned up, dissolved,\** and the Whole reduced to Confusion, and absolute Destruction.

Under however strict Restraint I have here all along held my Pen, the Subject is so ample, that it has drawn me on too far; so that I shall not longer presume on your Goodness than only while I assure you that

I am, SIR,

Your most obedient

humble Servant

J. WOODWARD.

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LETTER

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\* 2 Pet. iii. 10.

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## LETTER IV.

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*Of the Dissolution and Destruction  
of the Earth, at the Deluge.*

*Why the Shells, and other like ex-  
traneous Bodyes, were not dis-  
solved, as well as the Stones,  
and all native Fossils.*

S I R,

*One grand  
Impediment  
of the Pro-  
gress of  
Knowledge  
in the  
World.*



T must be allowed that your Reflection is very just: and that, of the many usefull Truths which have been advanced in this Age, several have not found so ready Reception, as assuredly they would, with the candid and ingenuous, were they not discouraged and kept from Examining them, and by that Means their Judgment barr'd,



barr'd, by the Interposition and Declamations of some forward Adventurers in the Commonwealth of Learning.

As to the Enterprizes of these Gentlemen with Regard to me, I have this to say for myself, that the Delign of my Studyes hath been ever sincere: and, for the Fruits and Success of them, I willingly submitt that to the Opinion of the World; which has been favourable to me beyond my Merits, and indeed my Hopes. But Nothing has ever encouraged me more than your Approbation: and I have Reason to think this an Over-Balance to all the Opposition that I have found from some, who are far from having shewn a Judgment, a Fidelity, and Exactness like what you do on every Occasion.

With this Incouragement I can easily bear the being wrongfully charged, in Print, and having Objections rais'd against my *Nat. Hist. of the Earth*, by some, as if I there suppose the terrestrial Globe was dissolved by a *Menstruum*: by others, quite contrary, as if I suppos'd it was dissolved by the *Water of the Deluge*; nay, and that this is one of the main Articles of it, and the *Grounds*

*The Error of Imagining the Earth liable to be dissolved by Water, or by any Menstruum.*

*which*

*The Translator's Introduction.*

which I design to build my Theory, as they are pleas'd to call it, upon; † when, in Truth, I am so far from having ever offer'd any Thing like that, or suggest'd that either *Water*, or any *Menstruum*, was the Cause of that *Dissolution*, that I no where, thorow that whole Discourse, go about to assign any Cause at all; \* but reserve the doing that intirely to a future Work. Not but that any One, who shall give due Attention to what I have plainly deliver'd there, will soon find enough to convince and satisfy him that I could never possibly think of either of those two. Indeed, Sir! as you observe, it cannot but be a great Blemish cast upon a Work, to be layd under such Imputations; since Nothing can well be more absurd than to imply there is to be found any where in all Nature a *Menstruum* in such Quantity as to receive into it and dissolve the whole Earth, a Body of 8 Thousand

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† Dr. Nicholl's conf. with a *Theist*. Part II. p. 192. and M. Bernard *Nouv. de la Repub. des Lettres. Mars. 1704.*

\* Vid. *Nat. Hist. Earth*. Part II. p. 120. 121.



land Miles in Diameter: or that all the Solids of the whole terrestrial Globe should be, in a short Time, dissolved, and reduced to their Original constituent Principles, by meer *Water*, that is not capable of dissolving a Flint, which is far from being one of the hardest, in many Hundreds of Years.

But what I perceive you are chiefly solicitous about, is a Difficulty that has prevailed amongst some, whom you think really *impartial*, fair, and free from all sinister Intention. *Fossils and all terrestrial Bodyes, dissolved at the Deluge;* *They cannot, you say, understand* how Marble, and the hardest terrestrial Solids, could be dissolved, while all Animal and Vegetable Bodyes, Bones, Teeth, Shells, Trees, Shrubs, Herbs, and even the tenderest Parts of them, such as Leaves, remained intire, and altogether unhurt. *but neither Vegetable nor Animal Bodyes.* As to the *Impartiality* of these Gentlemen, I will let it pass; but 'tis surely hard for them to make me answerable, because *they cannot understand* why those should be dissolved, and not these. None of those Gentlemen, it seems, go about to deny but that the Fact actually was  
so:

so : and that I have, from the Things themselves, given unquestionable Proof, and even Evidence of Sense, that the terrestrial Bodies were actually dissolved : and that the Vegetable and Animal were not. Now this is all that I took upon me, or am answerable for. So that they have not the least Ground of Objection, or any Reason to think I have not acquitted my self of all that lay upon me. The Parts of Vegetable and Animal Bodies, dig'd up in all Places, and on every Side of the Globe, many of them fair, unaltered, and perfectly well preserved, to this Day, are Witnesses for themselves : and shew how far they were from being dissolved, or destroyed ; while the Fossils carry in them not less manifest Proof that they were all assuredly dissolved, and since formed anew. The Body of the Earth consists mainly of Strata, lying each upon other, and all in such Manner as to shew plainly they are meerly so many Sediments fallen, successively, from Water. Then, they have ordinarily in them extraneous Bodies that are the natural Products of Water, *e. gr.* the Bones Teeth and Shells of Sea-Fishes :  
and



and these are, not only in great Numbers, but incorporated with the Substance of the Stone, and other constituent Matter of the Strata, in such sort as, together, to make up one common Mass. When broken, and parted, the Stone, and other solid Matter, in which these Shells, and other extraneous Bodyes, have been lodged, appears commonly to have taken the Impressions, and even the smallest and finest Lineaments of them, in a Manner so exquisite as to shew the Dissolution was absolute, and the Fossils reduced all to their primary constituent Corpuscles. This is the true Condition of the Strata: and for their Breaches and Fissures, both they, and the Metalls, Spar, and other Bodyes now found concreted in them, must needs have been all formed since the Strata themselves were. So that the primitive Earth, and all the original Fossils, what ever, must have been dissolved: and the present formed since.

Nor indeed is it so difficult, as those Gentlemen may have fancy'd, to shew by what Means, all this happened: and why the Fossils underwent that Fate, and were not preserved, as well

*Of the Texture of the Parts of Vegetable and Animal Bodyes. The*

as

*Cohesion of these owing wholly to the Complication of the Fibres, of which they all are intirely compos'd.*

as the Vegetables and Animals. I long ago intimated that *the Cause of the Cohesion of the Parts of Fossils was quite different from that of Vegetables and Animals*\*. These latter, all our Observations shew, are made up wholly of Fibres: and those Fibres are interwoven each with other, tyed, twisted, and complicated together; by which Means the Cohesion of all the Parts is maintained, and preserved.

*Of the Solidity and Cohesion of the Parts of Fossils. This caused wholly by the Power of Gravity.*

But the Cohesion of the Parts of Fossils is owing to a quite different Cause. I have not now, Sir! that Neglect that I once had of the *Discourse of Gravity*, or that of *Solidity*, since they have been so fortunate as to obtain your Approbation. So far from it, that I could wish there were found some Person, conversant in those Studyes, who had Time and Leisure to fit those two Discourses for View of the Publick; the rather because you are pleased to admitt that the Experiments and Reasonings, in the former, make out that Gravity is the Power  
by

---

\* *Nat. Hist. Earth. Part. II.*



by which all Nature is governed : and, in the latter, that the Solidity of Fossils and ail terrestrial Bodyes is undoubtedly an Effect of Gravity. All the Sorts of these Bodyes are composed of Granules, only applyed, and contiguous, to each other ; but independent, and not any ways connected, or tyed together ; which the Parts of Vegetables and Animals are. This all our Observations, Tryals, and Experiments, concurr to make out : and they are all held together merely by the Compression and Gravitation of the external Ambient, the Air, Æther, and other component Parts of the Atmosphære, wherein they exist. So that Nothing more was needfull, for the total Dissolution of these, than the Suspension of the Cause of their Solidity, I mean Gravity. In that Case they would all immediately fall to Pieces, of themselves, wholly of their own Accord, and without Need of a Menstruum, or any the least exterior Force, and Assistance ; just as the two flat Pieces of Marble, which cohære, when apply'd Surface to Surface, in the so well known Experiment, fall asunder again when put into a Receiver,

ceiver, and only the groffer Air drawn off\*.

*Gravity ceasing, or the Power of it being remitted, there must happen, in Consequence, a Destruction of the Earth, a total Cessation of the Solidity of Fossils, and a Dissolution of them all. But this would no Way affect the Vegetable or Ani-*

But, on such a Suspension of Gravity, the Parts of Vegetables and Animals would not be affected in the least. The Fibres, of which they are composed, would no more untwist, unweave, or untye, on the Suspension of Gravity, than a Cord, a Piece of Cloth, a Gordian or other Knot, in an exhausted Receiver, on drawing out the Air. Nor, when there was in Agitation and Design so great and important a Change in Nature to be made at the Deluge, can it be thought strange,

---

\* For these Marbles are press'd together by only the groffer Parts of the Atmosphære; the rest being far too subtil and fine to be excluded by such an Application. So far indeed that the Planes, of these two flat Marbles, can, by no Art, be made so regular and true, nor is any Marble so free from Pores, and small Caverns, as to take a Polish so exact, or be brought to be contiguous in so many Parts of their apply'd Surfaces, as near to exclude all of even the groffer Parts of the Atmosphære. Whereas the Granules, or primary constituent Corpuscles, of many Fossils, are so regular, that they can, when apply'd rightly each to other, come to be so contiguous as to exclude even the finer; but some Sorts of them, fewer, others, more; those which compose the hardest, *e. gr.* the Diamond, perhaps excluding all, except the luminous, or those which constitute the Light.



strange, at all, that it should be brought about by means of a Change made in the Power, of Gravity, if it be considered that that Power is wholely in the Hand of the supreme Governor of the Universe, and is the very Instrument whereby all Nature is regulated, and managed\*: and that 'twas that great Being who did then bring a Flood of Water upon the Earth to destroy all Flesh, wherein is the Breath of Life, from under Heaven, as also, at the same Time to destroy---the Earth†; and indeed, as the System of Nature was then, and is still supported and established, a Deluge neither could then, nor can now, happen naturally‡. It is not to be thought that the Gravity, of Bodyes, in and about the terraqueous Globe, was then intirely suspended, and withdrawn; for, if it had, they would have been all dispersed, and flung off by the diurnal Rotation of the Earth; in Case there really was then such a Rotation, of

mal Bodyes:  
or, in the least,  
disturb the  
Complication  
of their Fibres.

1 2

which

\* Conf. p. 12. & Seqq. supra.

† Gen. vi. 13, 17.

‡ Nat. Hist. Earth. Part III. Sect. 2. Con-  
sect. 7.

which I am not certain; for the H. Writer, *Gen.* viii, 21, 22, seems to intimate that there was then, for the Time, † a Suspension not only of the diurnal, but of the annual Motion of it, and consequently of *Summer and Winter*, as well as of *Day and Night*. But, if there be supposed such a Rotation, with a Remission or Diminution of the Gravity of Matter only so far that such a Dispersion should be avoided, and prevented, 'twill readily account for every Thing that then fell out, and solve all the Phænomena; \* *e. gr.* a Readyness of the Water of the Abyfs freely to ascend, it being now not heavy as before: ‡ a Disposition of the Parts of Fossils and the terrestrial Solids, to separate, and disunite, † the Gravity and  
and

† *Conf. Nat. Hist. Earth.* Part VI. in fin.

\* Which, to note that by the By, is, not only a proper Test to bring it to, but, its Abideing and Answering this Test, thus punctually, in so many Respects, indeed in all Particulars, is, to wave all the other Proofs, a strong Presumption in its Behalf. So strong, that, in Truth, this, alone, is all that some of the most considerable Theories of the present Age have for their Justification and Support,

‡ *Nat. Hist. Earth.* Part III. Sect. 2. Consect. 2,

† *Ibid.* Part. II. Consect. 2,



and Pressure of the Ambient, that caused their Cohesion, ceasing so far as now not at all to press them together, and only just so much of it remaining, or very little more, than would hinder the Dissipation of the Parts of the Globe: the terrestrial Matter of all Sorts, the Shells, and other like Bodyes, formerly heavier, so that they would then sink, would be now disposed to be easily assumed up and retained in the Water: \* and that Matter, at length, to unite again, concrete, and form Nodules, † not absolutely solid, for that would require a Gravitation and Pressure in the Ambient to effect it, but having their Parts cohering together slightly, and only so far as the then ambient Fluid would dispose them to. But, when the former Gravity totally returned, they would instantly become solid: and subside, ‡ along with the common constituent Matter of the Strata, and with the Shells, Bones, and other ex-

1 3

traneous

---

\* Ibid. Confect. 2.

† Ibid. Part IV. Conf. 2.

‡ *Nat. Hist. Earth.* Part II. Conf. 3.

traneous Bodyes then lodged in them : and, by this Means, the Globe be finished, and formed anew.

*That the Destruction of the Earth was universal: and that all native Fossils what ever were dissolved, and reduced to their primary constituent Principles.* As to the Dissolution of the Earth, to the greatest Depth we ever digg or mine, there are, in it, every where, Proofs, not be contested, and that give ocular Demonstration that all Fossils whatever, the very firmest, Marble, and Stone, Flints, *Pyrite*, and the other Nodules, nay even Diamonds, and the hardest of the precious Stones, underwent all the same common Fate. Indeed, besides all other Arguments, these carry apparently, in their very Make and Constitution, Marks of their having been so dissolved, and concreted anew. Nor is there Reason to doubt that those Parts of the Sphære of Earth, and the Fossils, that lye yet deeper, and even quite down to the Abyss, were all likewise as certainly dissolved. At the Beginning of the Deluge, *all the Fountains of the great Deep were broken up;* \* so that the whole Sphære

---

\* Gen. vii. 11.



Sphære must have been torn, and split, from the Abyfs, quite to the upper Surface of the Earth. At the End of the Deluge, something of like sort must have been done again: and Breaches made, for the Water to return by, back, to the Abyfs. ‡ The Sediments, and Strata, that were at first level, and continuous, † were afterwards broken up, and dislocated, some elevated, and others depressed. ‡ The Agent, or Force whereby this was effected, was seated, under all, within the Sphære of Earth, in the Abyfs. \* So that these two Disruptions were manifestly thorow the whole Thickness of the Sphære of Earth. That the Dissolution was so too, there will be the less Cause to doubt, if it be considered that no Agent can be assigned to affect so great a Part of the Earth, without equally affecting all the rest, I mean the whole Sphære: or Reason given why the Dissolution  
1 4 should

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‡ *Nat. Hist. Earth.* Part. II. Confect. 6.

† *Ibid.* Conf. 5.

‡ *Ibid.* Conf. 6.

\* *Ibid.* Conf. 7.

should stop at any determinate Depth; without going on quite to the Bottom; which, as has been shewn in its Place, ‡ is no very great Way; that Sphere being not of near the Thickness that has been generally thought. Be that as it will, 'tis plain, if all Fossils owe their Solidity to the Action and Pressure of the Ambient, in which they exist: and that Action proceeds wholly from the Gravity of that Ambient, in Case that Gravity was abated, or considerably diminished, for the Time, all Fossils whatever must lose their Solidity, be dissolved, and reduced to their original constituent Particles, as well those that lay deepest, quite down to the Abyfs, as those that happened to be nearer to the Surface of the Earth.

You see Sir! how great a Trouble you have brought upon you, by that generous Partiality you are pleased always to discover towards what I write. If, thorow the Whole, you find any Thing that gives you the least  
Light

---

‡ *Nat. Hist. Earth illustrated.* Part II. Sect. 5.



Light or Satisfaction, I flatter myself  
you'll be so good as to let that atone  
for all the Faults and Defects that  
you'll find in the rest: and believe  
me, always, with great Integrity,

S I R, your most faithfull

and most obedient Servant

J. WOODWARD.



T H E





T H E  
N A T U R A L H I S T O R Y  
O F T H E  
E A R T H,  
*Illustrated, and Inlarged:*  
A S A L S O  
D E F E N D E D,  
And the  
O B J E C T I O N S againſt it,  
Particularly thoſe lately publiſh'd by  
*Dr. Camerarius, answered.*

---

Written originally in *Latin* by JOHN  
WOODWARD, M. D. Profeſſor of  
Phyſick in Greſham College, Fellow of the  
College of Phyſicians, and of the Royal Society:  
And now firſt made *English* by BENJ.  
HOLLOWAY, L. L. B. and Fellow  
of the Royal Society.

---

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Printed and Sold by THO. EDLIN, at the *Prince's*  
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*Strand*. MDCCXXVI.

THE

NATURE OF HISTORY

OF THE

EARLY HISTORY

OF GREAT BRITAIN

AS FAR AS

IS KNOWN

AND

THE REASONS OF THE

DIFFERENCE BETWEEN

THE HISTORY OF GREAT BRITAIN

AND THE HISTORY OF THE  
CONTINENT OF EUROPE  
FROM THE BEGINNING OF  
THE WORLD TO THE PRESENT  
TIME

BY


JOHN HARRISON, ESQ.  
OF THE BARR





The Author's

# P R E F A C E .

 Several Years are now pass'd, since I set forth my Natural History of the Earth, in our own Language, for the Use of English Readers. This the learned Dr. Scheuchzer, Professor of Mathematicks at Zurich, publish'd afterwards to the learned World in Latin, under the Title of Geographia Physica. As there were, in that Work, several Things altogether new, it cannot well be thought strange that some People should entertain Doubts concerning them, and set themselves in Opposition to them; which they

A 2 did,

## The Author's P R E F A C E.

*did, with great Pains and Vehemence; but not with that Force or Weight of Argument to deserve to be severally answer'd by me. Besides, I am of a Temper not disposed to Resentment, nor indeed to Controversies of any Kind. But when the learned Dr. Camerarius's Dissertations came abroad, I presently discerned so great Acuteness, Diligence, and Happiness of Invention in Him, that scarce any Thing had been objected by others that was not there proposed by him, with some Additions of his own entirely new. So that, in returning an Answer to him, I shall likewise refute all the rest.*

*They who shall expect to find, in this Treatise, any Ostentation of Skill in Dispute, or Triumph over my Adversary, will be disappointed. The Cause I defend is supported by Nature itself, and carefull Observations of Things; nor will I any where depart from these in this my Defense.*

*Besides the Arguments which are now brought in Confirmation of my Doctrines formerly published, here are*



## The Author's P R E F A C E.

are offered others not produced before: and such as, I hope, will appear to be of no small Moment, nor in any wise unworthy Consideration. The Subject of which I write certainly demands the strictest Examination: and I should not a little rejoice could I be persuaded I have treated it with an Exactness suitable to its Dignity. But, whatever this my Performance may be, it will find Pardon from Readers of Candour and Humanity, and all such who rightly consider with how great Care and Concern, the Thoughts of those are taken up, who apply themselves to the Practice of Physick with that Fidelity and Diligence it requires, which I ever shall do.









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I

T H E  
N A T U R A L H I S T O R Y  
O F T H E  
E A R T H

*Illustrated, and Inlarged: as also, De-  
fended, particularly against the late  
OBJECTIONS of Dr. Camerarius.*

---

P A R T I.

---

*To the Earl of PEMBROKE.*

*My LORD,*



HE learned Dr. *Camera-*<sup>*The Reason*</sup>  
*rius*, Professor of Physick <sup>*of my pub-*</sup>  
at *Tubingen* \* having at- <sup>*lishing this*</sup>  
tack'd me with so much <sup>*Answer.*</sup>  
Eagerness and Vehemence,

tho', every where, with great Care  
and Art concealed under a Shew of

B                      Complai-

---

\* In *Dissertationibus Taurinensib. Tu-  
bingæ editis.* 8vo. 1712.

Complaisance and good Manners, Your Lordship, and all others of like impartial and ingenuous Disposition, would think me wanting to myself should I neglect to give some Account of my Studies, and the Success of my *Essay towards a Natural History of the Earth*, publish'd some Years agoe; which otherwise there would have been no Occasion for me to have done.

*The Method and Design of my Studies,*

As to my Diligence in these Studies, I may be allow'd to affirm that for many years I have apply'd myself to them with great Constancy. I have carefully search'd the principal Mines of our Island, and the Bowels of the Earth by what ever Means laid open to View; observing the Strata of every Sort of terrestrial Matter, the Manner in which the Minerals there lay, with the Order wherein the several Kinds of Fossils were found: and the Main of what I discover'd from these Observations I set forth in that Book with the utmost Truth and Exactness.

*to trace and set forth the true Laws of Nature.*

Nor did I take those Pains, or write that Book, with any View of supporting some former Hypothesis of my



my own, as that Gentleman suspects, and more than once charges me to have done; but to describe, to others, with what Accuracy I could, the true State of those Things which I had myself observed. And afterwards to advance some Propositions, not such as I might have framed in my Mind before, or that should carry only some Shew of Truth, but that should be certain, as following naturally and plainly from the very Observations themselves; without which, I conceived, the whole Description of those Observations would not be of any real Use.

As soon as I had publish'd that Treatise, impartial Judges, especially they who had apply'd themselves to these Studies, publickly confessed this Matter to be highly worthy of a more attentive Consideration both of themselves and of others: and that many of my Propositions were of the greatest Importance. They, from that Time, represented the Study of Minerals, as most beneficial to Mankind, and regretted its having lain so long neglected. In a Word, that Book found Fortune so favourable, or the Learned

*The Appro-  
bation of  
the Learn-  
ed.*

so well inclined to it, that in a little Time it was carried over the greatest Part of *Europe*, and every where receiv'd with Candour, and not without Approbation.

*Hindrances to my Design in the Natural History of the Earth.*

This was so great an Encouragement to me, that, if my own private Affairs, and that constant Attendance which the Practice of Physick requires, had not otherwise engaged me, and the publick Commotions, occasion'd by the long and cruel War, drawn off the Minds of Men from the more liberal Arts of Peace, I had certainly made a greater Progress in it. What added still more to my Satisfaction was, that from the first publishing that Work, no Man of Candour and Judgment ever made any doubt of my Observations, or ever went about to refute the Propositions drawn from them.

*After the publishing my Book, several learned Men, rejecting their former Opinions, embraced mine.*

Indeed, before the publishing that Work, Naturalists were generally of Opinion, that the Shells, found in Stone, and digged out of the Earth, were not the Produce of the Sea, but meer Stones \* form'd in the Earth, and

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\* See Mr. Ray's 3 *Physico-Theol. Disc.* p. 127.



and of terrestrial Origin. But, I am persuaded, there are now very few, if any, who dispute their being the real Spoils of the Sea, and left behind, by the Deluge, at Land. This is certain, that of those who have made the most accurate Search into these Things, with a View to discover their true Nature, not a few, rejecting their former Opinion, have imbraced mine: and even publickly defended and maintain'd it. Of the many I could name, I shall mention only one, whose Authority is equal to that of many, I mean Dr. *Scheuchzer*, a Person of distinguish'd Particu-  
larly Dr.  
Scheuchzer: Parts and Judgment, consummate Learning, and who is deservedly ranked among the first Naturalists of Europe. He publish'd, in the Year 1695, a Dissertation *De Generatione Conchitarum*, wherein he endeavours to prove that these Bodies ought to be reputed native and genuine Fossils. But, afterwards, upon a carefull Perusal of my Book; he publickly acknowledged \* his Mistake; confessing he had too hastily embraced that Opin-

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nion.

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\* In *Epist. Dedicat. Geogr. Phys.*

nion. Thereupon, as became a sincere Labourer in the Cause of Truth, he gave up his own, and came over to my Sentiments: and the many learned Works, wherein he has from that Time asserted and demonstrated the Truth of this Opinion, besides his other Writings, abundantly shew the great Progress he has made in these Studies.

*and many others;*

In short, the Testimonies of the greatest Men that have wrote on the same Subjects, and their Approbations of my *Natural History of the Earth*, are so many, and considerable, that I should seem too much pleas'd with the Fruits of my own Studies in this Way, if I should particularly recount them all. Neither is there any Need that I should do that, seeing their Works are in every Bodies Hands. Nor had I said any Thing of this Kind, now, nor hereafter, either privately among my Friends, or much less thus in publick, had not the just Defence of myself, and of the Cause, which so many great Men with me have approv'd, required it.

But



But, after all, if what I wrote did *especially* not seem of Weight to the learned *the Writers* Dr. *Camerarius*, unless he thought *of* himself more knowing than all those *Germany,* Gentlemen, every where so deservedly famous for their Knowledge in natural Things, and could not acquiesce in their Judgment, he should not surely have gone about with so much Importunity to oppose his own singly to all theirs. For he acknowledges of his own Accord, that *I have easily won over, to my Side, the greatest of those in Germany who are taken with this Sort of Learning.* \* After which Declaration, he had never set himself with so much Vehemence against an Opinion, received by them, jointly with me, had he not thought himself much more intelligent in these Things, than all of us.

This Testimony of his, *that the who are greatest Men in Germany were ea- most know- sily brought over to my Opinion,* *ing in Fos- sils.* makes more for the Truth of it, and may justly be thought to add the greater Confirmation to it, because there are in *Germany* more Sorts of

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Mine-

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\* *Dissert. Taurin.* p. 268, 269.

Minerals, more frequent and diligent Searches after them, more exact Experiments and Assays of Each: and consequently a more easy and sure Way of attaining the true Knowledge of the State and Nature of those Things, than in any other Part of *Europe* besides. For which Reason, as the *Germans* are most addicted to these Studies, they have been always allowed to have the greatest Skill in them. What Pains they have taken, how shrew'd Judgment they have used in those Studies, and how far the *Germans*, particularly the later Writers, have kept up the Privilege so deservedly conferr'd on their Nation, we have Proof beyond all Exception in the Works, of this Kind, which Dr. *Bayer* \* Professor at *Aldorf*, and Dr. *Spener* † of *Berlin*, as also other learned Men of that Country, have lately set forth. Now, since these appear in Favour of me, establish my Doctrine by their Authority, and confirm it with their Arguments, I have certainly the less Cause

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\* *Descrip. Fossil. Territor. Norimberg.* 4to. 1708. † *Disq; de Crocodilo in Lapide, aliisq; Lithozois Miscell. Berolin.* 1710. p. 99.



Cause of Apprehension from the Attacks of Dr. *Camerarius* alone, however eloquent, and, as I am forward to believe, knowing in other Matters.

What moved him particularly to dissent, not only from me a Stranger, and perhaps known to him merely by Name, but from the most noted Persons of his own Country, and deservedly celebrated, he best knows.

But this I will be bold to say, wherever he has dissented, in that Work, from mine and their Opinion concerning these Things, he has at the same Time departed from Observation and Fact; whereby he has given great Cause to doubt whether he has search'd into Quarryes, Mines, and the other interior Parts of the Earth, with a Diligence needful to support so large a Share of Positiveness.

If a Person of his Eloquence and Politeness, should here expect the same Accomplishments in me, and think himself a little too roughly used, while I call in Question not only his Candour toward myself, but his Skill in the Things he treats of, and his Industry in examining into the Nature

*From these Dr. Camerarius dissents, but without Reason.*

*Address to Dr. Camerarius.*

ture of them, I hope he will Pardon me, when he finds I assert nothing in the following Discourse but what I shall make clearly appear.

Part I. of  
this *Dissertation*;  
wherein is  
consider'd  
his unfair  
Way of  
treating me,  
and his Mis-  
representa-  
tion of  
Things.

I. First, if he has read my Book with due Attention, I have great Cause of Complaint of his Want of Candour, almost every where, toward me. For he often ascribes to me Things I never said, and sometimes such as are apparently contrary to what I had expressly set forth. There are Instances of this almost without Number; but I shall content myself with recounting only a few of them.

I. *Examples of this in his Enquiries relating to the Belemnite.*

I. Where he treats of the Nature of Fossil Shells, contending earnestly that they are not of Marine Production, he mentions the *Belemnite*, and asks me \* *under what Genus of marine Animals I would rank that?* as if I had asserted it to be of some *Genus of marine Animals*. Had I said nothing of the Nature of the *Belemnites*, he might perhaps have fancy'd I took them for Creatures

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\* P. 298. *Conf.* also P. 349.



tures of the Sea. Tho' that would have been a little hard, from my Silence to judge of my Opinion. But when, *with the Consent of all Naturalists*, I had expressly affirm'd, that † *the Belemnites were really Fossils, and of mineral Origin*, I can impute his Suspicion of my Opinion in this Affair, which I have clearly express'd, to nothing but Prejudice, and too much Precipitancy; being unwilling to attribute it to any other Cause in the least unworthy the Character of so great a Man. Hence also it is, that he confounds the ‡ *Ætites*, and *Geodes*, both mere Stones, with Shells, and other Things of marine Extract. *Of the Ætites and Geodes.*

2. He likewise takes great Pains to demonstrate the \* *Cornu Ammonis not to be a Nautilus*: and indeed, for what I have said, he might as well have used other Arguments to prove it no *Murex*, or no *Oyster*; for I never ascribed it more to the Classe of that, than of either of these.

But

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† *Nat. Hist. Earth. passim. Taurin. p. 299.*      ‡ *Dissert. \* p. 296. 297, and 340.*

But yet † the *Ammonite* is really a Shell, of the wreathed or turbinated Kind, produced at Sea, and brought from thence to Land. It has the Marks, and what we call Essential Propertyes, of a true Shell, tho' of a Kind plainly different from all those.

3. The *Ammonite*, rarely light of upon the Shores. I never met with above one Species of them found there; whereas out of the Earth there are dig'd very many. But all the Kinds of Shells, that are to be found on every Shore, have not yet been observ'd and collected with due Care. Besides, there are many which are bred in the inmost and deepest Parts of the Sea, where they have their Abode, and never of themselves come near the Shores, nor are flung out of their native Seats, even by the Violence of Tides or Storms. Of some Kind of these I take the *Ammonite* to be. Most of those Shells which are cast upon the Shores, by Tides, or Storms, are such as were bred not far off, and among the Shal-  
lows

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† See *Nat. Hist. Earth, Prelim. Dissert. in fin.*



lows and Flats. The Disturbances given by Tides, or Tempests, never reach the inner and deeper Recesses of the Ocean. It is therefore less to be wonder'd at, if the Shells produced in those Places, and there residing, are seldom found cast upon the Shores.

The learned Dr. *Camerarius* indeed professes himself † *doubtful of the constant Calmness of the Bottom of the Sea.* This, in so great a Man especially, I cannot but much wonder at, since the Thing is so certain, and so generally known: and the Truth of which he might have had thoroughly confirm'd to him, from Books, as well as from the very Persons, who, when the Surface of the Sea has been most tempestuous, have dived to the Bottom. But since there is perhaps none of these Persons known to us both, to whom I might refer Dr. *Camerarius*, I will recommend him at least to one great Author, out of many, who has wrote of this Matter; one, of whose Fidelity the most suspicious cannot doubt. I mean Mr. *Robert Boyle*, the great, and lasting Honour of his noble Family,

*Lesser Storms do not reach the deeper Parts of the Main, and therefore remove not the Shell-Fish which reside there.*

mily, who is deservedly ranked among the highest Philosophers of our Age, and who has wrote a \* Treatise on this Subject, entitled, *Relations about the Bottom of the Sea*. In the third Section of that Treatise he may find, that the *Water at the Bottom of the deeper Seas, is ever calm, nor in the least disturb'd, even whilst its Surface is most troubled, and tempestuous*. He may also there learn that *Divers take the Water, when the Sea is so very rough that scarcely any Vessels will hazard themselves out of Port*; so that he was under a very great mistake, when he hastily said, † *that Divers never go under Water during great Storms*. But to the Question he puts soon after, ‡ *why Divers do not bring on board, from the Bottom of the Sea, some of those Shells call'd by Naturalists Pelagia*, because they reside only in the Deep of the Main? I return for Answer, in the first Place, what, tho' it be easy and obvious, may deservedly be thought satisfactory, and

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\* *Mr. Boyle's Tracts*; 8vo. Oxon. 1671.  
 † *Dissertat. Taurin.* p. 288. ‡ *Pag.* 288.



and a fit Solution of such a Difficulty; that those Persons, not being Philosophers themselves, nor employed, by such as are, with Design to promote natural Knowledge, but meerly in Hopes of Gain, when they have dived to so great a Depth, with Hazard of their Lives, look for Pearls, and Things of Value; but they neither collect, nor observe others which would be plainly of no Use to them, nor, if they should bring them up, reward their Labour. But, if this Answer should not satisfy the curious *Camerarius*, he ought also to observe, that those Divers look for Pearls not far from the Shores; neither do they go under Water but in such Places as are meer Shallows, if compared with the more remote and deep Parts of the Main, which I speak of. No Disturbance, as may be reasonably believ'd, has ever been given to those inner Recesses of the Ocean, since the universal Deluge; at which Time those Places were totally broken up, and the Shells, inhabiting there, being forced from their antient Dwellings, born to the most distant Places, and not a few left in those their new Seats

at

at the Retreat of the Waters. Those, in my Opinion, are what we now frequently find in the Earth, but very seldom on the Shores, and of the Origin and Nature of which the learned *Camerarius* has raised this Dispute.

*But greater Storms reach those Parts, and bring up Shells that are rare, and never otherwise seen.*

After all, tho' those Shells are never now moved from their native Places, yet there are others often flung upon the Shores by greater Storms, which lesser never reach. The most violent of these Storms, by us called *Hurricanes*, are those which happen about *Barbadoes*, and other Islands of the same Sea, and in the adjacent Parts of *America*. Where those Storms arise, they usually rage more vehemently, than any *European* can easily credit, or conceive to himself, and disturb the Seas to a much greater Depth than usual. After those Storms, Shells lie expos'd on the Shores, in much greater Numbers, than are thrown forth by lesser Storms, and of Kinds quite different from them. Neither is it to be doubted, but as those more violent Tempests cast up Shell-Fish very rarely otherwise seen, being such as inhabit the inner Parts of the Sea, where lesser Storms do not reach, so,  
if



if other yet more violent Tempests should happen, sufficient to disturb the Bottom of the deepest Seas, they would bring up the *Ammonite*, and other Shells, such as, it is plain, were heretofore brought up by the Deluge and never since.

From these Shells, found in such great Numbers, and of such various Kinds, in Places far distant from any Sea, even to the Tops of the highest Mountains, and the Bottoms of the deepest Mines, which nevertheless, as has been noted, are generated only in the Middle of the Ocean, and are never found near the Shores; from these, I say, it is manifest, what great and surprizing Changes were then made: and with what Tumult and Confusion, dreadful beyond all Description and Imagination, all Things were tofs'd and hurl'd about; which they certainly never had, but for some most weighty Cause, such as was that of bringing on the Universal Deluge.

*A Corollary relating to the prodigious Devastation that was made at the Deluge.*

4. Dr. Camerarius judges from Shells, small, and not arriv'd at full Growth, found in the Earth with those that are large, and grown, that both were produced there; but without just Grounds.

4. It frequently happens, that, with the large and full grown Shells of Sea Animals, there are digged up others of the same Species, but smaller, tenderer, and not yet arriv'd to Maturity, or their just and compleat Bulk. From these, especially of the same Magnitude, and Maturity, to which they usually arrive about the End of May, and from such Vegetables as we find in many Places in the Earth arrived to the State they usually attain by the same Season of the Year, from these, I say, I could certainly form a Judgment of the Time of the Year when the Violence of the Deluge coming on put an End to the Growth of both \*. There are also digged up at Land, as well as found at Sea, Shells, full † grown that yet are *thin* and *transparent*: and others also, which, by Length of Time are become tender and friable, as tending towards Decay, and finally to Destruction; but that any are ever found, in the Earth, which even the most quick sighted Person, *by only looking*

on

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\* Nat. Hist. Earth. Part III. and VI.

† Dissert. of Dr. Camerarius. p. 226.



on them, can discern to be still in a Way of growing, tho' Dr. *Camerarius* affirms this, I dare be bold to assert the Contrary. If he has any such Shells by him, from which he thinks he can demonstrate that, I do not ask him to send any of them over to me, which might be troublesome, but I may at least expect he should set forth some of those Signs from which he makes that Inference. For if he can shew any such, I will immediately publickly confess my self mistaken in my Observations, about these Things, and that I have err'd in my Judgment concerning them, I will come over to his Opinion, and most willingly embrace the Truth he shall so demonstrate.

5. The learned *Camerarius* indeed the more willingly admitts \*, that *great Plenty of Shells* may possibly be digged up in *England*, because it is an *Island* every where † surrounded by the *Sea*, from whence he supposes those Bodies to have been carried thither through *some subterraneous*

5. *Shells,*  
digged up  
in other  
Countries,  
in as great  
Plenty as in  
England.

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ous

\* Page 282.

† Page 347.

ous Passages, by Inundations, and violent Changes, which he fancies it has undergone; of which I shall say something hereafter; but he denies\*, that any Judgment can be made of the State of other Countries, from Arguments fetched from that Island. He else where says †, that in the Midland Parts, especially of larger Countries, a like Quantity of them is not to be found. But how unadvisedly these Things are asserted, tho', by a Person very intelligent in other Things, all the most Antient, as well as the Modern Writers unanimously testify; the unquestionable Accounts which I my self have procured from the most inland Parts of, *Asia, Africa, and America*, as well as *Europe*, clearly shew: and lastly the Things themselves, the Bones, Teeth, and Shells, of Marine Animals, of which, together with many other Things, I have by me great Numbers, collected there, and brought thence hither, give abundant Proof.

But

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\* Ibid. † Page 282, 290, 347.



But why do I endeavour to con-  
firm, by the Testimonies of others,  
what he confesses to have observed  
and found Himself? For he says, in  
another Place \*, *there are whole*  
*Mountains in Germany, which ap-*  
*pear to be nothing but Shells:* and  
that particularly about † *Echterding,*  
great Numbers, and variety of them,  
are found. And soon after he men-  
tions ‡ *whole Mountains, all where-*  
*of consist of Stones figur'd or cast in*  
*Shells, and which are, as it were,*  
*formed and compil'd of them.* These  
are his own Assertions of the Plenty of  
Shells, and of Stones moulded in them,  
found *in other Countries;* a Plenty of  
both no way inferiour to what are any  
where to be found in this our *own*  
*Island.* These Things are indeed  
so contradictory one to another, and  
his own Representations of Fact so  
totally inconsistent with this his Opi-  
nion and Doctrine, that how they can  
be easily reconciled I am not able to  
see; he must look to that himself.  
But tho' Shells abound so much in  
C 3 those

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\* Page 293. † 297, 298. ‡ 338.

those Parts, that whole Mountains seem to be made up of them, yet he could find no Remains or Traces of them about \* *Tubingen*. But what follows from thence? Does he believe, he, or any one else, has so carefully searched these Parts too, as to be satisfy'd there are not still some that may lye concealed there, and be, some Time or other, at last discovered? Or what if, by Length of Time, and having lain in a Soil containing Salts, detrimental, and gradually destructive to the Texture of such Bodies, they are long since perished? Or finally what if None at all were ever lodged in those Parts? For I have not any where said, nor can it indeed be thought, that they were left in all Parts of the Earth, especially since in some they are so accumulated, and heaped up as to compile whole Mountains. A little lower, as becomes a Man so ingenuous, he confesses, *there offered themselves to his View Myriads of small Shells, lodged very deep in the Earth; in those very Places*  
*about*

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\* Page 283.



about *Tubingen*, but, as he believes, not of *Marine Origin*. And he wonders, nor indeed without Reason, that such Numbers of them should be found at so great a Depth in the *Earth*, since they must have been, some Time or other, carried out of their Native Seats, and by some means or other lodged there. So that, altho' those Shells were not really of *Marine Origin*, of which yet there is not the least Reason to doubt, because the *River* and *Terrestrial Kinds* are very light, and seldom or never found at so great a Depth in the *Earth*, yet they prove at least, that the *Earth*, so far, has been violently disturb'd, and suffered great Changes. But he \* enquired of those who break and draw up Myriads of Stones out of *Quarryes*, and they were all alike ignorant of such figured Bodies, except one, who declared, he had twice or thrice found a small Shell in the Stone, the Shape of which he did not remember. But if one or two such Shells were observed by a heed-

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\* Page 284.

less Digger, it is to be believ'd, many more might be discovered by those who look more diligently after them. For neither may we depend, more on the Diligence or Curiosity of these Diggers whom he rightly calls \* *rude Labourers*, than of those † *Divers*; both of which usually have their Mind, and Eyes, most intent upon that which they are in Search of, and, even tho' admonished, are blind to the Rest. If any one therefore would be surely inform'd of the Truth of Things of this Nature, he should, while others digg, examine the Places, and carefully survey, with his own Eyes, what they digg up. *But when perhaps others may discover these Things, at least about the Neighbourhood of Tubingen, by greater Diligence than ordinary, they are abruptly called away from thence in the midst of the Search ‡.* Which indeed I then begun to suspect, when I saw he denied that he found any Shells there of Marine Origin; nor do I indeed doubt but, if at any Time he

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\* Page 276.

† Conf. pag. 14. *supra*.

‡ Page 284.



he would search the same Places again, and only use greater Diligence and Patience without so sudden an *Interruption*, he may find great Plenty of them. But let us proceed to what next follows. *In all our Journey, over so many Mountains, in Switzerland, and Valois and the Alps, and Chains of Hills, we met with nothing at any Time figured in that Manner, tho' we looked over innumerable Stones, on the highest Ridges of the Alps, particularly of great Bernardus.* This he tells us *p. 284*, and not much after, *viz. p. 297*, he attests that Shells of many Kinds, Univalves, and Bivalves, are to be seen in Abundance on the Mountain *Randus* in *Switzerland*, and in Places every where round about it. Now to deny, in that Part of his Dissertation, that any Shells were to be found in those Places; but to acknowledge in this Part of it that many and various Kinds were found there, made equally for his purpose. This great Man might \* indeed have properly inform'd

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\* Page 284.

form'd his Readers, upon this Occasion, that he *had not yet seen* the learned Dr. *Scheuchzer's Book on that Subject*, if that Book had been publish'd in some remote and more obscure Part of Europe. But since that Book had been abroad nine Years and more, before Dr. *Camerarius* had wrote on the same Subject, and deservedly gained its Author so great a Reputation, that he then first obtained, among the Learned, the Title of the *Helvetian Pliny*, the learned *Camerarius* might certainly, I do not say he ought to have *seen it*. If indeed *he had seen it*, I do not in the least doubt but, that if he had not immediately changed his Opinion, he would not have defended it so strenuously, after he had considered the great Number and Variety of Marine Bodies found in *the Mountains of Switzerland*, and other Places, and delineated and described *in that Specimen of Dr. Scheuchzer's Lithographia Helvetica*, published at *Zurich* in the Year 1702.



6. I said that at the Time of the Deluge, while Shells, sustain'd and upheld in the Water, floated, together with Sand, and other the constituent Matter of Stone, Flint, Spar, and all other Minerals, reduced to their primary Particles, the dissolved Matter of these, entering the Shells, filled them up, so that they gave their own Form, or Figure, to the Matter so received into them, and were as *Matrices*, and *Moulds* to it\*: that of these Shells, whether so fill'd or empty, sinking together with the Matter of Stone, Clay, Chalk, and all the rest that this terrestrial Globe is compos'd of, are made those Strata, of which this our Earth consists: that the Strata of Mountains, afterwards, being laid open by the Force of Rains, Torrents, and Accidents which often happen in all Parts, were broke up, and the Shells, contained in them, which lay uppermost, with some which lay deeper, were thrown out, and left expos'd at the Surface:

6. *Of the Origin and Formation, of the Conchitæ, and other like Bodies.*

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\* *Nat. Hist. Earth. Part II. and IV.*

Surface: that at length those Shells, so laid open, thrown out, and exposed, † were worn away, or broke, but the Matter enclosed in these Shells, whether Stone, Flint, Spar, or any other, of a Constitution firm and solid, did still retain, and represent the *concave*, ‡ or *interior Form* of those Shells, in which it was moulded. *This*, from an accurate and often repeated Examination, and diligent Consideration of these Things, *I asserted to be the true Origin of the CONCHITÆ, COCHLITÆ, ECHINITÆ, and other like Bodies* \*. But here this very learned Man professes *himself unable to comprehend these Matrices, these Moulds.* † *For these figured Stones bear, he says, the outward Form of the Shells; not the inward, which they plainly ought, if they were formed in the Hollow of them.* Now these *Matrices and Moulds*, which he could not yet comprehend, I believe he easily may hereafter, if he will only look into these Matters, a little more carefully. For my own Part I have

*Dr. Camerarius's mistake in this Affair.*

† *Nat. Hist. Earth. Part. V.* ‡ *Ibid.*

\* *Ibid.* † *Camerar. Dissert. p. 338.*



have Nature my Guide in this whole Affair; and since I have offer'd Nothing, at any Time, but from the Things themselves, and have rely'd wholly on Observations of the same made with the utmost Accuracy, I now appeal to them and to Nature; and, as of all other Naturalists, so especially to the Observation of the learned *Camerarius* himself on these Things, but made with more Care than hitherto. If indeed he had used such Care and Diligence before, he would certainly have had no Cause to enter into a Controversy on this Subject. For among Thousands and Myriads, of those Bodies, which are found in their Places, I dare take upon me to say he would not find one Stone, or Flint, which *bears* the Convex or *outward Figure of the Shell*. If he shall find any such hereafter, I will then admitt the Force of this Objection, and yield up my Opinion to it.

One Thing indeed there happens *Occasionally* in some Places, which is not here to *of the Cavi-* be pass'd over: When Water, con- *ties in Stone* taining in it Vitriol, or other like *form'd af-* Salts, pervades any Strata, it dissolves *ter the Mo-* *del of Shells:* the

the Shells lodged in such Strata by little and little, carries their dissolved Particles away with it, and leaves the Spaces, before filled and possessed by those Shells, empty. Examples of this are to be found in almost all Parts of the Earth. To say Nothing of other Places, there is here, in *Portland*, an huge Stratum of the hardest Stone, in which may be observed an infinite Number of such Cavities, or vacant Spaces, representing to View both the Shape, and Size, of Turbinated Shells, and Bivalves. Into these Cavities if there be poured melted Lead, or any other Metall, it will always take the most exact Figure of these Shells. So where it happens, that the Water, passing through, carries with it, besides such Salts, Particles of Spar, or other Minerals, it frequently lodges them in those Cavities, and there leaves them till at last it fills them up. Wherever this happens, it always follows, as of Necessity it must, that the Matter of Spar or other Minerals so formed, exhibits and represents the very Sizes, and perfect Figures, interior, and exterior, of the Shells

*and of  
Spar, &c.  
formed in  
the Shape  
of Shells,  
&c.*



Shells whose Places it had filled. Nor are there seldom found *Conchitæ*, and other Stony and flinty Bodies of that Sort, at length cast out of the Strata, incrusted with the Substance of such Spar, and other Minerals, supplying the Place of the Shell that is worn away, and destroyed. If Dr. *Camerarius* means these Incrustations, as I think he does not, I was not treating of them; nor indeed do these make out what he would demonstrate, but rather shew the Contrary. For if these Incrustations are broken off, the Surface of the Stony Matter, contained within, exhibits the *interior* Figure of the Shell, in which it was first moulded, as exactly as those other Stones, which remain still covered with the Shells; which ever bear the Impression of the *interior* Surface of the Shells, after the Shells themselves are decayed or consumed.

7. But I come now to that part of the Book, where Dr. *Camerarius* treats of the Order wherein these Bodies are found lodged in the Earth. He is not forward to admitt any Thing that I have offered on this Subject.

*7. Dr. Camerarius's Objections, as to the Site of Shells in the Earth, refuted.*

ject. For to what I had writ he returns,---- \* *These Things indeed carry a great Shew of Proof as to what relates to Crabs and Lobsters,---but demonstrate Nothing with Respect to the BUCCINA, and CONCHÆ VENERIS; since these are found so very numerous on the Shores, and have not the small specifick Gravity of Crabs, and therefore were not lodged in the upper Strata, so that they ought to have been found in the lower.* I am realy very much concerned when I cannot make this learned and ingenious Gentleman's Observations, of Things, which require no great Study, but only common Sense, and a meer View of them, comport with my own, which were not made without due Diligence and Consideration. I have made Tryals of many Crabs, as exactly as possibly I could; and found some of them answer to Water, in Specifick Gravity, as  $1 \frac{3}{4}$ , to 1, and others as 2 to 1. But I have observed many of the *Buccina* that have not the Proportion  
of



of 2 to 1, and but few that exceed that Proportion. For the *Concha Veneris exigua alba striata*, this has the Proportion of  $1 \frac{1}{2}$ . These therefore coming so near the specifick Gravity of Crabs, we cannot expect to find these more commonly than Crabs. But lastly he says, *the BUCCINA, and CONCHÆ VENERIS, occur in very great Numbers on the Shores.* There are indeed some few of the *Buccina*, and but only one Species of the *Concha Veneris*, which is that which I mention'd above, to be found on the Shores of our Island: and only a very small Number on any of all the Shores of *Europe*.

Nor indeed is he less doubtfull in his Opinion concerning the Order of Metals, and Minerals, and their Disposition in the Earth. \* For he thinks the *Moleculæ*, or *minutest* Particles, of Metals and Minerals, too heavy to have been supported in the Water, or mingled with the Matter of the *Strata* of Stone, so that they should have been precipitated down, so as to constitute

*Of the Situation of Metals, and Minerals, in the Earth.*

D tute

\* P. 307. 309. 325.

tute the lowest Stratum of all, and to reach the very *Centre of the Earth*. But the Things themselves, and the daily Experience of Chymists, afford Arguments sufficient against this Opinion of his. For who knows not, that Gold and Silver, which are not the lightest Sorts of these, are sustained in *Aqua regia*, and *Aqua fortis*, so as not to sink to the Bottom? This is a sufficient Answer to Dr. *Camerarius*. Nor indeed is it here to be enquired, how so great an Abundance, as well of separate Particles, as of Nodules, or Lumps of Metallic or Mineral Matter, became repositied in the *Strata*, among Sand, and other lighter Matter. This is a Subject foreign to the present Inquiry, as I had intimated to my Readers, *Nat. Hist. Earth*. Part. 4: and therefore Dr. *Camerarius* should not have wholly neglected that Admonition of mine.

*Of the Site,  
and Order,  
of the Stony  
and terre-  
strial Stra-  
ta.*

He moreover denies, \* *that Order, Disposition, and Distinction of the Strata, with the extraneous Bodies contain-*

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\* P. 291.



contained therein, according to their specifick Gravity, to be commonly observable. But on what Argument does he chiefly rely when he does this? From what Example of the Things themselves does he endeavour to demonstrate the contrary? Why truly from what *Mountfaucon* has supply'd him with from *Ramazini*. But, when he objected this to me, he should have seriously consider'd with himself, what those learned Men thought of the Strata about *Modena*, † who believe those Strata were not from the Deluge, but were formed at various Times by the Mud of Rivers. Whether this be true, or false, I do not here enquire; but if *Dr. Camerarius* takes it for Truth, and supposes that those Strata have been the Work of later Times, and thrown up by the Rivers, then they are not those which we are here treating of, and consequently make Nothing to his Purpose. And therefore he should make Use of other Arguments, fetched from other Places. Nor indeed are

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there

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† P. 294.

there such other Places wanting, where he imagins he finds Matter for Arguments of the same Kind, and which are not refuted by the Judgment of any One, nor easily to be refuted; for Example, \* *The Quarry of Biberax, and other Quarrys, and the Pits that are dig'd thereabouts, contradict my Opinion, which present sometimes to View Strata of Earth, sometimes of Sand, sometimes of Clay, and sometimes of Stone.* In Case I believe and acknowledge these to be so, depending upon his Fidelity and Diligence, which indeed I easily do, because they are often found so elsewhere, yet Nothing can be gathered from thence to destroy my Opinion, and overthrow the Doctrine I have advanced relating to those Things. He indeed says, † *but the very View of the Strata shews, they were not formed, and laid one over another, by such an orderly Subsidence, according to their specific Gravity, because then the Strata of*  
*Earth,*

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\* P. 291.

† P. 310.



*Earth, Clay, Sand, Stone, Chalk, Marble, &c. could not be so unequally intermix'd; the lighter Stratum being often found under the heavier.* But this he seems to assert only upon Conjecture, and Observation of the various Constitution of the Strata; because he does not say that he has made any accurate Experiment of this, nor that he has made Tryal of the Specific Gravity of any Stratum, and found the Matter of the under Strata to be lighter than that of the upper. But, if he had done so, and found Things in that Manner, yet he could by no Means thereby have made out what he thinks demonstrated without any Examination at all either of himself, or any One else. For that unequal Order of the Strata does not in the least affect my Doctrine of the Subsidence of the dissolved Matter of the Earth. For that Doctrine is supported by the Evidence of Bodies brought from the Sea into those Strata, and now found in the same all over the Earth, a Proof the most certain that could be required. I say those Bodies, bred in the Waters, which are now found in the Strata, lodg'd among

*The Origin of the Strata asserted from the Shells and other extraneous Bodies contained in the Strata. Their constituent Matter once dissolved, and sustained in the Waters.*

Earth, Chalk, Sand, Stone, and all other Matter, as well that which is now more loose, as that which is more solid, of which those Strata consist: and the Order and Condition in which those Bodies are found, plainly shew that Matter to have been once \* all in a State of Solution, all sustained in the Waters, and at last, subsiding in those Waters, formed those Strata. It is not here material to enquire how that Dissolution was effected; it ought to suffice, that the Thing is certain, that there are every where extant Proofs of it so manifest that if any One, I will not say instructed in even the first Rudiments of Natural Philosophy, but who has only common Sense, and the Use of his Eyes, will but go into the next Quarry, he cannot but immediately acknowledge the Matter to be actually so, which those who sit contriving Hypotheses in their Studies, deny to be possible. From such a Contemplation of Things, and Observation of the Strata in the Earth, it was

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\* See *Nat. Hist. Earth*, Prælim. Dissert. and Part 2.



was, that the † most antient Philosophers believed, and taught, *the Earth to be Nothing else but the Sediment and Dreggs of Water.*

Now these Things being proved according to Reason, and demonstrated even to the Eyes, I desire to know of the most ingenious *Cammerarius*, what he thinks was the Cause, why those Marine Bodies, together with Sand, and other Matter, dissolved, and floating in the Water, should sink, and be formed into such Strata? For my Part I think their Gravity was the Cause. And if that Matter, and those Bodies, owe their Subsidence to Gravity, it is necessary that those Strata themselves should obey the Laws of Gravity, and be dispos'd and formed according to the same Laws. If he would overthrow my Doctrine on this Subject here he ought to begin: this its Foundation should be undermined. For thus I wrote when I treated of this Matter,

*That Matter being brought to subside by its own Gravity, the Strata were composed of it. The Laws and Order of that Subsidence.*

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and

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† Τὴν μὲν γῆν ὑπόστασιν εἶναι καὶ τεύχεα τῆ ὕδατος. *Metrodorus apud Plutarch. de Placit. Philos. Lib. 3. c. 9.*

and never argued otherwise any where else ; \* *This Subsidence happened generally, and as near as possibly could be expected in so great a Confusion, according to the Laws of Gravity.* For in such a Confusion of Matter dissolved, it could not be imagined that the Subsidence should be every where alike, or the Strata, thereby composed, always placed in the same certain Order. They therefore who look for that, look for what I never promised to shew them. But when they read my Writings without due Attention, they thence frame Laws of Nature, as if conceived according to my Opinion, and devise to themselves a Sort of Fabrick of the Earth exactly according to those their Laws ; and if any of them, entering upon that Fabrick, find those Laws not justly observed, they immediately pronounce mine wrong and mistaken. But to return to the Matter in Hand ; this is most certain, the Subsidence could not be every where uniform, and the same. Nay it was

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\* *Nat. Hist. Earth.* Part 2. Consect 3.



was necessary, it should vary, in every Place, according as the Quantity of Matter sustained, answered to the Quantity of Water that sustained it: as the Water itself was more troubled, or more calm: as each Body sustained was greater or less: as there were more, or fewer, of any Kind, in the same Place: and finally, as the Place, where each Body fluctuated before it began to sink, was farther from, or nearer to, the Bottom, and as the Course of its Descent was longer or shorter. For it could not otherwise happen but that a Particle of Matter, however light in itself, floating within some few Feet of the Bottom, when Things began to settle, must reach the Bottom much sooner, and so lye deeper in the Earth, than another, tho' much heavier, which floating perhaps a thousand, or more Paces above, began to sink at the same Time. \* It is therefore

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\* *This Argument is more accurately treated of in that Chapter of my greater Work, Part of which the ingenious and learned Dr. J. Harris has inserted in his Book, entitled, Remarks on some late Papers relating to the Deluge, and to the Natural History of the Earth. London published, in the Year 1697, 8vo.*

therefore necessary, tho' we suppose this whole Affair to have been transacted exactly according to the Laws of Gravity, that a great Part of that Mass shou'd sink promiscuously, and confusedly, and be laid without any certain Method: that the Constitution of the Strata should be various, and uncertain: and that therefore lighter Bodies should be often found lodged under heavier. \* 'Tis most evident that only that Matter, and those Bodies, which, when Things began to settle, were higher, and fluctuated nearer to the Surface of the Mass, and had consequently a longer Descent to make, † could be disposed into any certain Method and Order. It was also necessary that these should sink last; and so constitute the upper Parts of the Globe, and those nearest to its Surface. Hence the Reason is plain why the Strata nearer the Surface of the Earth, and the Marine and other Bodies found therein, lye in better Order than those placed

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\* Conf. Part 2. Sect. 5. *infra*.

† Ibid.



placed at a great Distance lower. But this more uniform Site of the upper Strata, and the Disposition of the Bodies therein, I would have understood only of those Places where the upper Strata, after the Subsidence of the Matter, and Consolidation of the Earth, were not removed, and born away. For I shall elsewhere shew, by many remarkable Instances, that they were in several Places so removed, and born away, by the Force of the Waters returning from off the Earth, at the Conclusion of the Deluge. The Matter so forced away was thrown else where, and there laid without any certain Method, or Order. And truly this seems to be the State of that Tract of Land about *Modena*, \* where Things lye as the Current of the Water, so returning, disposed them. In like Manner great Quantity of Gravel, Sand, and other Matter lyes promiscuously, in some Places, at the Surface of the Earth, nay even to very great Depths, as well in *England*, as in all other Countries.

*The Strata,*  
*since the*  
*Time they*  
*were form-*  
*ed, have*  
*suffered*  
*some Chan-*  
*ges;*  
*i. the upper*  
*ones by the*  
*Return of*  
*the Waters*  
*after the*  
*Deluge:*

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\* See P. 35. *Supra.*

Countrys. But for the Strata themselves from which that Matter was then taken away, and so by that Means were uncovered, and now appear bare, and on the very Surface, which before lay under all that Matter, these Strata, I say, commonly present to View Things laid perplexedly and confusedly together, and that for the Reasons above assigned.

2. *the lower Strata, by the Removal of Metallic and Mineral Matter.*

Besides which, from the unequal Subsidence of the dissolved Matter, there must of Necessity be an Inequality also of the Strata; the Strata themselves, since the Time they were first formed, and compacted, have apparently not remain'd in the same State, but undergone considerable Changes. To say nothing of the other Matter of them, I will only recite here what I have set forth in my *Nat. Hist. of the Earth*. Part IV. Consect. II. *There have and do still happen Transitions and Removes of the Metallic and Mineral Matter, from one Part of the same Stratum to another: and from the lower Strata to those which lye above them. From which Transitions of that Matter,*  
and



and Changes of it's Places, the Gravity also of the Strata themselves must necessarily have been changed too. For that heavier Matter, being extracted and removed, leaves its own Strata lighter: and adds to the other, into which it has shifted, the Gravity taken from the former. So that from the Gravity of the Strata as they now are, a certain and exact Estimate of their original Gravity, cannot always and every where be made; especially in Countrys which most abound in Metalls. For, in others, the Strata retain their primitive and original State, if not entire, yet much less changed.

This, as in other Parts of our own *Yet in many* Country, *Britain*, may be observed *Places Fos-* in those Parts particularly of the Coun-*sils are* ties of *Glocester*, *Oxford*, and *Nor-* *found dis-* *thampton*, where Metalls and Mine-*pes'd, with* rals less abound: where the Strata *a wonder-* of Stone, and every other Matter, are *full Exact-* found disposed according to their re-*ness, accord-* spective Gravity, so that they seem to *ing to the* have retained their primitive Consti-*Laws of* tution to this very Day. Some Ex-*Gravity.* amples of this are now lately set forth *Examples* in the learned Mr. *Morton's Nat.* *Hist. of Northamptonshire*, a Work *of this.* of

of many Years Labour, no way inferior to any of the Kind, and which will give abundant Proof, to all who are Judges of these Studies, of the Author's unwearied Diligence and uncommon Knowledge in Natural Things. It is also farther to be observed, that those Counties, being very remote from the Sea, did not suffer so much Damage by the Return of the Waters at the End of the Deluge, and in many Places fewer of their upper Strata were born away. There are indeed many other Things which might be offered here relating to the Subsidence of the terrestrial Matter, and the Formation, and Disposition, of the Strata, which, had I not already exceeded the intended Bounds of this Treatise, I might produce here. But I shall quit this Subject after I have only put the learned *Camerarius* in Mind of one or two very remarkable Instances of lighter extraneous Bodies, found among lighter Terrestrial Matter, and of heavier lodged among heavier; which indeed seems to be of great Moment towards putting an End to this Controversy, and  
which



which I have formerly mention'd in my *Nat. Hist. of the Earth. Prelim. Dissert. versus fin.* In several Countyes of *England*, e. gr. *Kent, Surrey, Essex, Hartfordshire, Berks,* and *Oxon*, there occur almost every where many and vast Strata of Chalk. To these, which are sufficient of themselves, I could add other Places, not only in our Island, but in foreign Countreyes also, where Chalk much abounds, in all which great Numbers of Shells, and other marine Bodies, very different indeed from one another, both of the Turbinated Kinds, as also of Bivalves, and Echini, are found; yet all these are ever of the lighter Kinds of Shells, and such as come nearest the Specifick Gravity of Chalk. But in Strata of Stone, a Matter much heavier than Chalk, only the heavier Shells are found; and that too in not less Numbers or Variety. If any one seriously considers this, which could neither fall out by Chance, nor any other Means than what I have assign'd, I can hardly think it possible, but he may of himself from hence resolve all his Doubts as to this Matter. Another Argument,

ment, for this, may be taken from the Crustaceous Kinds of Marine Animals. It could not be otherwise, but that Crabs, Lobsters, and other Animals of the Crustaceous Kind, must be cast out of the Sea, with those of the Testaceous. But, tho' the former are ordinarily the bigger, and, were they now extant, would be more easily found, yet I have almost everywhere met with Thousands of the Testaceous, without having been hitherto able to find, with the utmost Diligence, above five or six Remains of the Crustaceous, or to procure them from any other Part of the Earth. Nor indeed does this seem strange to me; nay I should rather wonder if it happened otherwise. For those Crustaceous Kinds, being lighter than Chalk, and almost every other Sort of terrestrial Matter, and so subsiding last of all, must lye upon the Surface of the Earth, exposed to the perpetual Injuries, of the Weather, Rain, and other Casualties, till being totally decayed, and rotten, they left behind no Signs of their ever having been there. Nor indeed is this any Thing other than what I wrote before,  
in



in my *Nat. Hist. Earth, Prelim. Dissert. in fine*, and *Part 2. Consect.*

3. which Passages and some others, if the learned *Camerarius* had more carefully attended to, I cannot see that he would have had any Grounds to have raised a Controversy on this Subject.

8. In Opposition to my Opinion of the Origin of the Strata, the learned *Camerarius* supposes Stone to grow; of which if he can give any Proof from the Thing it self, he shall no longer find me tenacious of my Opinion, or defending my Doctrine, but I will immediately give up both to the Truth which he shall so demonstrate. Therefore he should exert himself, to find some Argument in Confirmation of his Opinion. Let him turn over his Common-place-book to see if he has any Examples of this Growth, which he speaks of, observed by himself, or any other. Let him search all his own Country, *Germany*, if he thinks he can find any Proof of this. But if he is disappointed in all these, let him make Enquiry of the same in any other Part of the Earth. Yes truly he has a most certain Proof from the

E Things

8. *Of the Growth, and consolidating of Stone.*

Things themselves, every where to be found, both at Home, and Abroad, and obvious to any one. For when I assert that *there is no Instance of Strata of Stone growing gradually more and more hard,---so as, by Degrees, finally to attain a complete solidity, Dr. Camerarius \* thinks that Examples occur very frequently, not only in Germany, but in other Places, of Stone of a softer Nature while in its Quarry, and which must therefore be wrought as soon as drawn out, because otherwise it would be wonderfully hardened by lying some Time abroad, exposed to the Weather. Examples of this Matter are indeed very frequent; but does he fancy this will prove, that Stone, in its Strata under Ground, grows gradually more and more hard, and by little and little attains a complete Solidity? He had surely something else in his Mind when he wrote this. For if Stone, drawn out of its Quarry, and exposed to the Air a long Time, does actually become hard, can he think it thence follows*

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\* P. 315.



follows that they do the same while they lye in their native Seats down in the Quarrys, expos'd to no such external Causes to harden them? This indeed I could not have in the least expected, nor have believed to have been so easily received by so great a Man, and one so acute at censuring the Writings of others. Did I ever deny that Stone, when drawn out of the Strata, becomes harder? Who was ever ignorant of this? I had actually made mention of the same Thing before \*, not as a Matter first discovered by my self, but to give the Reasons of that Hardening, which perhaps the Generality of Readers had not observed, and which also seems to have been the Case of this learned Gentleman when he wrote against me. For in my *Nat. Hist. of the Earth, Part 3d, and 4th,* treating of the great Plenty of Water in the Earth, and the Power it has to insinuate it self, I said scarce any Stone, nor indeed any Marble, is so close, that the Water does not at least

*Stone, in the Earth, saturated by Moisture there and soft, being at length expos'd to the Air, and dryed, becomes harder.*

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so

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\* *Nat. Hist. Earth. Part 3. Sect. 1. Consect. 8.*

so far penetrate, and pervade it, as to insinuate it self into its Pores, and even moisten it throughout. So that all Kinds of Stone, while in the Strata, must of Necessity be less solid, and hard, than after they have been long digged out, and dryed by the Air, and Sun.

*The Argument, concerning the Vegetation of Stone, taken, from Dr. Tournefort's Observations, considered.*

But this Argument, fetched, as he fancies, from the very Nature of Things, he endeavours to confirm by the Testimony of the learned, and deservedly famous Dr. *Tournefort*. Out of his Observations Dr. *Cameraarius* produces what follows, *In the Cave which is called Antiparos, Dr. Tournefort saw a new Sort of a Garden, with Variety of Plants, of Marble\* still growing, ranging into Beds, and Species, and which, from all the Circumstances of their Formation, could not but have grown after the Manner of Vegetables.* p. 315, 316. What shall I answer to this Remark of an Eye Witness? I readily acknowledge him to be a most skillful Botanist, as he has applied

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\* Of Stone, Pierre. *M. Tournefort's Mem. de l'Acad. des Sciences.* 1702. p. 221.



plied himself to those Studies, much to his own Honour and the publick Advantage; but he has acted somewhat unadvisedly, and extended too far the Bounds of those Studies, when, in an Account of Vegetables, their Nature, and Properties \*, he adopted Stones into the same Family. Among the many Calamities of the long and tedious War, may be justly reckoned the Hinderance to all mutual Commerce of Literature, when but few French Books, as well as other Commodities, could be brought over to us, or few of ours sent over to them, and those only privately. Whence it is no Wonder if my Book was not carried thither, or at least never came to the Hands of the learned Dr. *Tournefort*, which I readily believe. For had he seen that Book, he had found what he treats of, accounted for by me. For he might have there learned, that it was not the *Stone* itself that was in a Way of Growth in the Garden, but *Spar* affixing to the Stone, in that most beautiful Order.

E 3

\* That

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\* *Mem. de l'Acad.* 1708. p. 151.

That the Thing really was so appears from Dr. *Tournefort's* own *Description*\* of it. And he himself might have immediately discovered this, at first Sight, had he been more used to make Observations under Ground. For there *white* Spars are commonly found cast and fixed upon the Strata of *grey* and other coloured Stone; as appears in almost every Cavity, and Fissure, where Water pervades, and sparry Matter, or that of which Spar consists, abound. And I not only have shewn, that Spars *grow* exactly after this Manner, but have set forth in the 4th Part of that Book, the Reason of their Formation, and the Order of their Growth. When therefore the celebrated *Camerarius* thus confounds Bodies, in their Nature and Original very different from one another, and takes the Growth of Spars in the Fissures of the Strata,  
for

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\* Une espece de Broderie, haute d'environ deux, ou trois Lignes.---La Matiere en est *blanchatre*, quoique la Pierre d'ou elle sort soit *grisatre*: & je regard comme une espece de Calus. M. *Tournefort*, Memoires de l'Acad. des Sciences. 1702. p. 221.



for the Growth of Stones and Marble which constitute the Body of the Strata, he is so far from producing any Thing, as he imagines he does †, against *my System, and the Account I give of the Origin of all Stones*, that he represents my Doctrine very ill, if not invidiously, and discovers his own Unacquaintedness with these Subjects. If by Chance his happy Genius, and great Elocution, should draw some to be of his Opinion, yet he will not gain many of the more intelligent Readers, at least by the Strength of these Arguments.

9. *What shall I say, says Dr. Ca-* 9. *Of the*  
*merarius, of the Growth of Metals,* *Growth of*  
*of their particular Way of ripening,* *Metals.*  
*their Regeneration, and Generation*  
*anew in Glebes long exhausted, and*  
*likewise of the Increase of pure and*  
*solid Metall \*? What, learned Sir,*  
 you would now, or hereafter, say of these Things, I know not, nor am able to guess. But this I will say, when you shall demonstrate any other Opinion, *of the Generation and*  
 E 4 *Growth*

*Growth of Metals*, contrary to mine on the same Argument, I will forthwith embrace it. But, in the meanwhile, I would ask of you, where I have ever said, *that Water can dissolve all Metals*, contrary to all Chymical Experiments †? For unless my Memory and Eyes very much deceive me, I have said no more on the Subject than that the Water takes up the Particles of Metall, which lay before loose, and separate, in the Interstices, and Pores, of the Strata of Stone, and thence carries them into the perpendicular Fissures of the Strata\*.

10. Of the Origin of Crystall, and of Gems.

10. With the like Candour it is that Dr. *Camerarius* † ascribes to my Doctrine, *so numerous a Crystallization, and Formation of so many Gems*, in the Waters, at the Time of the Deluge. Whereas, tho' I well knew that some Crystallizations did then happen, yet, as they were but few, I passed them over in Silence. Nor indeed did I then so much as mention any one Crystallized Body, except

† P. 327.

‡ P. 326.

\* *Nat. Hist. Earth. Part IV.*



except the *Selenites*, and *Echinated Crystalline Ball*. But, on the contrary, I declared, as expressly as I could, that the far greatest Part of *Crystallizations*, and figured *Gemms*, has been produced since the Deluge, by Means of Water, in the Fissures of the Strata. *Nat. Hist. Earth.*

Part IV. Consect. 6, 7, 8.

11. Another invention of the same Ingenious Gentleman is *that Menstruum of Water, for Sulphurs, Oils, and Bitumen*, which, of his Liberality Dr. *Camerarius* is pleas'd to ascribe to me. p. 328.

12. But where did I ever say, *the Waters are press'd out of the Abyss by the Weight of the incumbent Strata, and so, contrary to the Laws of their own Gravity, rise up to their Springs* \*? I actually assign a Cause, of this Ascent, very different from that, but agreeable to Nature and right Reason. *Nat. Hist. of the Earth.* Part III.

11. *Water no fit Menstruum of Sulphur, Oil, or Bitumen.*

12. *The Ascent of Water to Springs, not owing to the Pressure of the Strata.*

13. The

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\* Page 318.

13. *What Supply the Springs receive from Rains.*

13. The learned *Camerarius*, as discerning and quick-sighted as he is, does \* not see how the Rains can be wholly excluded from mixing with the Water of Springs, and Rivers. Nor really do I see why he wrote this. For tho' I have denied, that they owe their Rise wholly to Rains, yet I have no where excluded these. On the contrary I have, in express Words, declared that the Water of Rains is wont to fall into and mix with that of Springs, and Rivers. *Nat. Hist. of the Earth.* Part 3. Sect. 1. Consect. 4.

14. *Of Earth-quakes.*

14. Moreover, when he insinuates †, that I deny that there ever were TOWNS swallowed up by Earth-quakes, MOUNTAINS broken, ROCKS sunk, and new LAKES formed, he does not seem to have read what I wrote of these, *Nat. Hist. of the Earth.* Part III. S. 1. Consect. 12. viz. that the Earthquake is sometimes so extremely violent, as to undermine and ruin the Foundations of the Strata, so that the whole Tract

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\* P. 320. † P. 303, 339.



*Traçt* sinks down to rights into the *Abyss* underneath,---the *Water* thereof immediately riseing up and forming a *LAKE* in the *Place* where the said *Traçt* before was. Several considerable *Traçts* of *Land*, and some with *Cities*, and *TOWNS* standing upon them, as also whole *MOUNTAINS*, many of them vastly large and of a very great *Height*, have been thus totally swallowed up. Nor was there the least *Reason* for him to imagine, from what I have any where written, that all *Earthquakes* would be universal, if the *Waters* of the *Abyss* were so vari-*fyed*, and gave the *Earth* such *Concussions* \*. For I have shewed, that it might, and commonly does, happen, that by the *Effort* which causes these *Concussions*, some one *Traçt* of *Land* only is affected, yet should that *Effort* extend it self further, and act with greater *Force*, there might be, and actually have been, some *Shocks*, which at least a great many *Parts* of the *Earth*, if not the whole *Globe*, have felt †.

15. Nor

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\* P. 322. † See *Nat. Hist. Earth.* Part III.

15. Of the Olive Tree from which the Dove cropped the Leaf she brought to Noah.

Of Trees, and other Plants, frequently digged out of the Earth.

15. Nor does he use me with more Candour, where he says \*, I imagin'd the Olive Tree from which the Dove cropped the Leaf that she brought to Noah, to have been that Time *swimming in the Waters*. For I wrote nothing like that; but the direct contrary. See *Nat. Hist. Earth. Part VI.* In the Strata of Stone, even to the greatest Depths, are found Leaves, and other Parts, not only of the common and known Plants, but of others that are very strange, and of Kinds whereof there are none at this Day growing in those Countries where these are found so lodg'd in the Strata underneath. In the very same Manner, in most, if not in all, Parts of the Earth, Shrubs and Trees are digged up, some very large, and many of Species not now found growing in those Places. Nay there are found buried Trees, in great Numbers, and some of huge bulk, in Islands where the Soil is either so barren, or the Air so bleak and sharp, or else the Winds there so blustering and tempestuous, as to suffer none now to grow

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\* Page 344.



grow there; nor can we learn either from History, or from the Accounts of the most antient Inhabitants, that any ever did grow there. So univer-  
 fal a Devastation could never have been effected, without a Cause equally extensive: and in Truth there are so great a Variety of Circumstances and Phænomena, which plainly shew the universal Deluge to have been that Cause, that there can I think be nothing offer'd in Contradiction or in Objection to the Proof they give. Now tis very remarkable, that these Trees are found with their Roots still adhering to them. For this plainly shews there was a Dissolution and Failure of the Ground, where they formerly stood and grew. Of this there was also a long Tradition among the most antient Nations \*.

*Bacchus is by the Naturalists taken for the Fruit of the Vine. He is feigned to have been born † a second Time*

*That Havock, of Vegetables, was caused by the Dissolution of the Earth, at the Deluge.*

*The Tradition of the Antients, concerning that Dissolution and Havock.*

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\* Φυσιολογῆτες-- ἡ ἀπο τῆ ἀμπέλου καρπὸν Διόνυσον ὀνομαζούσης. Diodor. Sic. L. 3. p. 195. † Διὸς δ' αὐτῆ τῆν γένεσιν ἐκ Διὸς ὡρα διδόσθαι, διὰ τὸ δεκεῖν μὲν τῶν ἄλλων ἐν τῷ κτῆ τῆ Δευκαλίωνα κατὰ κλυσμῶ φθαρήναι καὶ τέλος τῆς καρπῶς. καὶ μὲν τὴν επομβρίαν πάλιν ἀναρῦνθαι. Ibid. p. 196.

Some Passages of Holy Writ compar'd and explain'd.

*Time of Jupiter, because in Deucalion's Flood, (which they usually confound with Noah's) the Vine is supposed to have perished with other Trees, and afterwards to have sprung up a-new. But we have a much fuller Description both of the Earth's dissolving, and the falling of the Trees, in Seneca, where he treats of his Deluge, viz \*. their Roots being let loose, every Shrub, in particular the Vine, fell down, and every Plant lost its Support in the Ground, which was become soft and fluid.---- The Buildings fall and are overpower'd, and the Waters being admitted into the Earth quite to the very deepest and lowest parts of it, their Foundations sink and fail, and the whole Earth becomes a Bog. In vain are Things tottering assisted by props, for every Foundation is in*  
a

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\* Nat. Quæst. Lib. 3. C. 27. Solutis quippe Radicibus, Arbuta procumbunt & vitis, atque omne virgultum non tenetur solo, quod molle fluidumque est.---Labant & madent Tecta, & in imum usque receptis Aquis Fundamenta defidunt, ac tota Humus stagnat; frustra titubantium fulcra tentantur, Omne enim Fundamentum in lubrico figitur, & lutosa Humo nihil stabile est.



*a sliding State, and nothing can stand firm in Ground so quaggy. And afterwards, speaking of the Earth †, he affirms it to have been changed, dissolv'd and reduc'd to a Fluid:--- that it was necessary its Parts shou'd perish, and be all perfectly destroy'd, that they might be all again formed a new, simple and pure. There had obtain'd an Opinion, amongst many of the Antients, that the very Earth was corrupted, and was therefore destroy'd, purified, and formed a new, at the Deluge. This is what the Philosopher here points at. Perhaps there may some Time or other be published the Passages of those antient Writers to this Effect, more accurately collected out of their Writings, and illustrated with Remarks. But thus Seneca goes on to describe the Dissolution of the Earth ‡, It therefore begins to putrify, and the*  
*Particles*

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† Terram esse mutabilem & solvi in Humorem.---Partes ejus interire debuerint, abolireve funditus totæ, ut de integro totæ rudes innoxiaque generantur. ‡ ---Incipiet ergo putrescere, dehinc laxata ire in Humorem, & assidua Tabe defluere.--- Seneca. Nat. Quest. L. 3. c. 27, 29.

Particles of it, being loosened, to turn into a Fluid, and by a continued Solution to be absolutely liquated. To which Opinion of this Philosopher *Lycophron* very much agrees,

\* *When Jove, in Tempests raging,  
storm'd the Earth,  
He dash'd the Whole into minutest  
Atoms.-----*

Where the Scholiast, *Is. Tzetzes*, expounds ἡμάθυνε by ἄμμον ἐπόινσε κατέκλυσε: and that very properly, since all Stone was reduced into Sand, and the *hardest* Bodies in the Earth into *soft* and *tender*. So that, at the Deluge, in such State of Things,

† *The World was unmade or taken to Peices again, as ‡ Nonnus* in his *Dionysiaca* well observes. We have also some Footsteps of the Earth being

\* 'Οτ' ἡμάθυνε πᾶσαν ὀμβρήσας χθόνα, Ζηνὸς καχλάζων νασμὸς. —

† ——— Κόσμος ἀκόσμος ἐγένετο. ———

‡ Lib. 6.



being so dissolv'd, and melted as it were, in *Manilius* §.

*Th' Earth quivers now, before tho' firmly bound,*

*And from their Feet withdraws the treacherous Ground.*

*The melted Globe swims in itself: the Main*

*Spews up a Sea, and sucks it in again.*

*Nor can the great Abyss itself contain.*

*All Nature thus was in Confusion hurl'd,  
And the Deep gorg'd itself with all the World.*

*Deucalion only then remain'd behind,*

*The Solitary Heir of all Mankind.*

The Knowledge and Tradition that the Gentiles had of these Things came first from the *East*. The *Hebrews* of old had frequent Commerce with

F first

§ Concutitur Tellus validis Compagibus hærens,

Subducitque solum Pedibus; natat Orbis in ipso;

Et vomit Oceanus Pontum, sitiensque reforbet,

Nec sese ipse capit. Sic quondam merferat Urbes,

Humani Generis quum solus constitit Hæres

Deucalion.— *Manil. Astr. Lib. 4.*—

the *Phenicians*, and *Ægyptians*, and both these with the *Græcians*. And thence was the Fountain and Origin of many of those Notions, and Customs, which afterwards obtained among the *Greeks* and *Romans*. That the Destruction of the whole Earth was threatened, before the Deluge: and that that Destruction was effected during the Deluge, we have the Authority of *Moses*, *Gen. vi. Vulg. Lat. † I will destroy them, with the Earth.* So the § *LXX Version, And behold, I will destroy them, and the Earth. Gen. ix. ‡ 11. Nor shall there hereafter be a Deluge to destroy the Earth.* So the *Hebrew*, as well as the *Samaritan*, *Chaldee*, and other Interpreters. The \* *Vulgar Latin Translator*

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† Ego disperdam eos cum Terra. Vulg. Lat. Gen. the 6th. 13.

§ Καὶ ἴδὼς ἐγὼ καὶ ἀποθέρσω αὐτοὺς, καὶ τὴν γῆν. LXX.

‡ Neque erit deinceps Diluvium ad disperdendum Terram.

\* Neque erit deinceps Diluvium dissipans omnem Terram. Vulg. Lat. Rob. Steph. f. Par. 1546.



flator hath it, *Nor shall there hereafter be a Flood dissolving the WHOLE EARTH.* The † LXX, and there shall be no more a Deluge to dissolve the WHOLE EARTH. *Dissipare*, the Word used here by the Vulgar Interpreter, signifies not only *disjicere* to scatter, but *liquare*, and *dissolvere*, to melt, and *dissolve*. Thus Seneca, † *the Showers wash away the Snow in the Spring; and the first Heat melts [dissipat] what remains behind.* And Cicero, § *Epicurus is against the Notion of Bodies Concreting, least it shou'd be inferr'd that, on the Contrary, there might be a Perishing and Dissolution [Dissipatio] of them.* To which the Word *καταρθείσαι*, used by the LXX, well answers, signifying to melt, corrupt, putrefy; from *Φθέω*, or rather from *φθείρ*, whence also *Φθειρίασις*. So that that

F 2

Destru-

† Καὶ ἐκ τῆς ἕσας κατακλυτμὸς ὕδατος καταρθεῖραι ΠΑΣΑΝ τὴν γῆν.

† Quippe vernis Temporibus Imbres nivem diluunt: Reliquias ejus primus Calor dissipat. *Nat. Quæst. Lib. 4. C. 2.*

§ Epicurus Corporum Concretionem fugit, ne Interitus & Dissipatio consequatur. *De Nat. Deor. Lib. 1.*

Destruction of the Earth was effected by melting and dissolving it, and all Fossils. To this the Royal Psalmist \* agrees, *He uttered his Voice, the Earth melted.* For which Reason Philo-Judæus thought the whole World, at the Deluge, was turned into the Nature of Water. †

So the Pseudo-Sibyll,

*Water is all, and all Things are destroy'd by Water.* §

And the Author of the Book *De Dea Syria*,

\* *All Things are become Water.*

Among the sacred Writers also there's great Agreement, as in other Matters, so likewise in this. *Habak. iii. 6.*

† *He stood and measured the Earth; he beheld, and drove asunder the Nations; and the everlasting Mountains were broken to Pieces, [or scattered,*

\* Dedit in Voce sua; liquefacta est Terra. Psalm xlvi. 6.

† Νομίσαι τὰ μέρη τῆ παντὸς εἰς μίαν φύσιν  
‡ ὕδατος ἀνασοιχάμενα. De Abrahamo. p. 355.

§ ὕδωρ ἔσαι ἀπαντα, καὶ ὕδασι πάντα ἀπολείψαι.

\* Πάντα ὕδωρ ἐγένοντο.

† Stetit & mensus est Terram: Vidit & exsilire fecit Gentes: & contriti sunt Montes Perpetuitatis, incurvaverunt se Colles Sæculi. *Habak. 3. 6.*





ters passed by: the Abyss uttered his Voice. In this Place the Destruction of the Mountains is particularly treated of: and hence it is plain the primitive Mountains were [contriti] beaten to Pieces, or, as the Commentators rightly explain it, liquati, comminuti, dissipati, melted, broken to Pieces, dissolved. Nor is this any other than what I was lead, by Observations of Nature, to set forth, *Nat. Hist. Earth*, Part 2. Thus likewise *Amos ix. 5. 6.* The Lord God of Hosts is he that toucheth the Land, [or the Earth,] and it shall MELT, and all that dwell therein shall mourn. IT shall rise up WHOLEY like a FLOOD, and shall be drowned as by the Flood of Ægypt. The Vulg. Lat. ‡ The Lord God of Hosts is he who touches the Earth, and it shall MELT, and all who dwell therein shall mourn: and ALL the Earth shall rise up like a River, and

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‡ Dominus Deus Exercituum qui tangit Terram, & tabescet: & lugebunt Omnes habitantes in ea: & ascendet sicut Rivus omnis, & defluet sicut Fluvius Ægypti.



and flow about like the Flood of Ægypt. This Passage does not treat of any new or future Deluge, as some imagine. For both the Prophet and the People were assured by an Oracle, \* of all others the most infallible, that no such shou'd ever happen more, to the End of the World. The dreadful Devastation made by that antient Deluge was in every Man's Mouth, and impress'd on every Mind. Nor was there any more easy and sure Method to strike the People with Horror and Dismay than by mention of that Deluge, and Repetition of the surprizing Phænomena of it. For this Reason the *Jewish* Writers the oftener made Use of this Method. As did *Amos* also; and indeed *the dissolution of the whole Earth* could not be more fully or happily express'd by any Series of Words, than those which this Prophet has made choice of, nor could the promiscuous *Raising* of the Earth so dissolved, and the *sustaining* it in the *Water* be more clearly set forth; of which also, tracing closely the

F 4

Foot-

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\* *Gen.* ix. 8. & seq.

Footsteps of Nature, and supported by Observations made in the Bowels of the Earth, I treated *Nat. Hist. Earth.* Part 2d. Consect. 2d. Of this likewise the Compiler of the *Sibylline Oracles*,

*The Mountains and the Earth shall swim.---* †

As above,

----- *He shall break up*

*The Earth's Recesses, and dissolve her Walls.---* †

Thus *Isaiab* xxiv. 18, 19, *The Windows from on High are open, and the Foundations of the Earth do shake, the Earth is utterly broken down, the EARTH is clean DISSOLVED, the Earth is moved exceedingly. The Chaldee has \* it, The Earth is dissolved by a Dissolution: the LXX, with Confusion shall the Earth be confounded. So Job xii. 15. ¶ God sendeth out the Waters, and they*

† Πλεύσει γῆ, πλεύσουσιν ὄρη. Orac. Sibyll. Gallæi. Lib. I. p. 133.

† Κευθμῶνάς τε γαίης σκεδάσει, καὶ τείχεα λύσει. Ibid p. 122.

\* Dissolutione dissolvetur Terra. Chald.

‡ LXX. Ταραχῆ ταραχῆσεται ἡ γῆ.

§ Deus emittit Aquas, & subvertunt Terram. *Job.* 12. 15.



they overturn the Earth. The lxx,  
 †\* He sent forth the Waters, which,  
 overturning (the Earth,) destroy'd  
 it. And this is that [Απώλεια]  
 Destruction of the Earth of which  
 St. Peter speaks, ¶ By the Word  
 of God the Heavens were of old,  
 and the Earth standing out of the  
 Water, and in the Water. Where-  
 by the World that then was, being  
 overflowed with Water, perished.  
 But the Heavens, and the Earth,  
 which now are, &c. In which Ac-  
 count indeed he gives a short, but  
 true Representation of the Constitu-  
 tion of the Terraqueous Globe, or  
 of the Orb of Earth, with the Abyſs  
 ſhut up in it, and the Ocean with-  
 out. How exactly agreeable to Na-  
 ture itſelf this is drawn, may be ſeen  
 in my *Nat. Hiſt. of the Earth*,  
 Part 3d. The Apoſtle aſſerts that  
 primitive Earth to have been *deſtroy'd*:  
 as, after him, the Author of the Book  
*de*

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†\* LXX. ὕδωρ — ἐπαφῆ ἀπώλεσεν αὐτήν  
 (γῆν) κατασρέψας.

¶ Οὐρανὸι ἦσαν ἐκπαλαι καὶ γῆ, καὶ ὕδατος  
 καὶ δι' ὕδατος συνεσῶσα τὰ τῶ Θεοῦ λόγῳ. δι' ὧν  
 ὁ τότε κόσμος ὑδατι κατακλυθεὶς ἀπώλετο. Οἱ δὲ  
 νῦν ἔρανοι, καὶ ἡ γῆ, &c.

*de Egregoris*, \* which is wrongly ascribed to *Enoch*, *The Whole Earth is destroyed*. To conclude, he makes a plain and manifest Difference betwixt the Antediluvian Earth, and that which we now inhabit, betwixt *The World that then was, and the Heavens and the Earth which now are.* † As *Philo* likewise fitly and wisely observes, *a new Earth* ‡ sprang from the Primitive, which was dissolved at the Deluge: and *St. Chrysostom* †\* asserts, that there was an *Abolishing* or *Destruction*, as of Men and Animals, so *likewise* of *the Earth itself*, and that the same was afterwards \*§ *restored* and *framed anew*. Many of the Modern *Jews* likewise, as well as the Antient, maintain directly the same Doctrine. For tho' they did not

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\* Ap. Grab. in Spicileg. Patrum. p. 351.

‡ ἡ γῆ ἀπολλυῖ ΠΑΣΑ.

† ὁ τότε κόσμος, — οἱ ὃν νοῦ ἔρανοὶ, καὶ ἡ γῆ.  
§ Νέας [τῆ γῆς] ἀναφανείσης. De Vita Mo-  
fis, Lib. 2. p. 663.

†\* Καὶ αὐτῆς τῆ γῆς τὸ ἀφανισμόν. Homil. 22.  
in Gen. v. Op. Tom. 2. p. 262.

\*§ Ἀνασοιχέωσιν. Ibid. p. 266.



not know how far the Dissolution went, yet they affirm that there really was a Dissolution. *The Hebrews say three Palms of the Surface of the Earth were dissolved, and turned into Water; and therefore it is said, Gen. vi, 13, And I will destroy them, with the Earth.* † To this is agreeable *the Hebrews calling the Deluge מַבּוּל, which according to R. S. is derived from בָּלַל, to confound; because all earthly Things were confounded by it. But Kimhi derives it from the Root גָּבַל, \* which signifies to flow about, and rot to pieces. The Rabbins also assert, ‡ that all the Trees on the Earth were rooted up by the Waters of the Deluge. The* *The Condi- tion and Site of the Trees, particularly of the Olive, after the Return of the Waters of the De- luge.*

† Trees therefore being thus deserted, by the Earth's being dissolved, and they being all fallen down, § many of the bigger Sorts of them, having large and spreading Heads, lay, up- on the Departure of the Flood, with their Branches stretched up to a great Height

† Lyran. in Gen. vi. 13.

\* Munster in Gen. vi. 17.

‡ Id. in Gen. vii. 18. and viii.

§ Nat. Hist. Earth. Part. 6.

Height in the Water, and, after that was withdrawn, in the Air. And thus probably lay the Olive Tree, § from which the Dove pluck'd the Leaf, she brought to Noah, Gen. viii. 11. But Dr. *Camerarius* earnestly contends, † *that even the Olive Leaf alone, which the Dove returning brought to Noah, sufficiently proves that the Earth remained intire, and the Tree continued fixed by its Roots to the Earth, under the Waters of the Deluge.* The Reason he gives is this, *for, says he, \* if the Tree had been floating about, a Leaf of it had been no Proof, to Noah, that the Earth was become dry.* Nor truly did Noah infer any such Thing from thence; he only conjectured that the Waters were so far ‡ *abated* and diminished, that the Trees began to appear. And that he might with as much Reason have concluded from thence, if the Tree lay along upon the

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§ *Nat. Hist. Earth.* Ibid.

† *Dissert. Epist.* p. 344.

\* Ibid.

‡ Gen. viii. 8. 11.



the Ground, as if it had stood upright. † *For the Olive Tree is sometimes very tall, and large, (as Dr. Stapel rightly observes,) with Boughs spreading forth to a great Extent.*

And therefore those Boughs, which happened to extend upwards, while the Tree lay along, might appear as far above the Water, as any others could if the Tree had been then standing. So that the *Dove* might pluck a Leaf from one of these, as long before the Waters were abated, as it could, if the Tree had then stood upright, and rootèd in the Ground.

*Moses* himself gives no express Account of the Condition and Site of the Olive Tree. But if his \* *De-* The Mosaic  
Account of  
this Affair  
consider'd.  
*struction* of the Earth implies its *Dissolution*, which indeed I think I have proved, § it is certain that Tree cou'd not be standing at that Time. As for *Noah*, it is evident, from the History itself, that he knew nothing of what was done, at that Time, out of the Ark. If he knew not that  
the

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† J. Raij. *Histor. Plant.* Vol. 2. p. 1541.

\* Gen. vi. 13. ix. 11.

§ *Nat. Hist. Earth.* Part 2d.

the Waters were abated, 'till he sent out a *Dove* to discover that, much less cou'd he know that the Earth was dissolved, and all the Trees driven about as Chance directed. So that had *Noah* believed the Olive Tree to have been *standing*, which yet does not appear, that had really made Nothing to the present Purpose; nor could that Mistake of his have been brought as an Argument against me.

*The Olive Trees were rooted up about Mount Ararat at the Deluge; for none are found growing in that Country now.*

I cannot leave this Argument without observing one Thing, which I think very material. Tho' we learn from *Olearius*, *Tavernier*, *Chardin*, and others, that Olive Trees are found growing in great Numbers in *Persia*, and other Places far remote, yet *none* now grow in all that Country where the Ark rested; \* whence it happens, that *many have very much wondered, whence the Dove took the Leaf she brought to Noah.* But that Difficulty will

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\* Il n'y a point d'Oliviers; ce qui fait, que plusieurs s'étonnent ou la Colombe peut prendre la Rameau qu'elle apporte à Noë. Les Voyages & Observ. du Sieur de la Boulaye 4to. p. 85.



will immediately vanish, and the Truth of the Thing appear without any Room for Doubt, if the Affair be rightly considered and represented. For probably these Trees might abound in that Country before the Deluge; and yet be all then rooted up, and buried deep in the Earth, or laid along upon its Surface. Nor should any one wonder if the Olives of *Ararat* had the same Fate with our † *English* Pines, which we so commonly find buried in our Fens and Marshes, when yet none are found now growing here, unless planted, and raised by Art. And indeed, in this Case, 'tis plain, the Olive Tree, from which the *Dove* cropped the Leaf, could not be in a standing Posture, but lying along. And very likely 'twas owing more to Chance than Choice, that the *Dove* took an Olive Leaf; for any other had served as well to shew the Waters were abated. But probably the Olives there lay in greatest Numbers, and that Leaf offered itself first.

And

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† See Dissert. 3. Sect. 3. *Infra.*

And if it imported but little what Leaf was brought, there was no Necessity, that the *Dove* should take her Flight into *Persia*, or some other remote Country, to find out this. Besides a Leaf brought from any other Region had not shewed the Thing looked for. For the Earth was not plain, but some Parts of it lay higher than others: and therefore a Leaf brought from a very remote Country had indeed signified that the Waters, if any still remain'd in those Parts, were little, and of no considerable Depth; but not at all, in the Parts where the Ark rested, and that Leaf was not gathered.

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T H E  
N A T U R A L H I S T O R Y  
O F T H E  
E A R T H

*Illustrated, and Inlarged: as also, De-  
fended, particularly against the late  
OBJECTIONS of Dr. Camerarius.*

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P A R T II.

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II:  HE Instances alledged in the former Part of this Discourse, to which many more might be added, sufficiently shew, with what Care the learned *Camerarius* had read my Writings, and what Regard he had to Truth, when he undertook to refute what I had therein set forth. Nothing more seems now to remain on my Part, but to shew, with all possible Brevity, in some few Examples, what the Ex-

*II. The 2d. Part of this Dissertation, wherein are considered Dr. Camerarius's Mistakes, and careles Way of passing Judgment of these Things.*

G tent

tent of his Skill and Knowledge in these Things, is.

1. *He joins and confounds Things that are in their Nature very different.*

1. For when he offers, as he does, Natural Things confusedly, and presents in the same Order and Class such as have not the least Relation to one another, but are most different in their Nature, they who do not better know this Gentleman, might be apt to suspect this to have been the Effect of his Ignorance in this Affair, or done with Design, and some indirect Purpose to keep others in the Dark, as to the Merits of the Controversy begun by him. If any desire Proofs hereof, such may be found, as in many other Places, particularly in Page 298, and 299; where he promiscuously brings in, together, Shells, Bodyes formed in Shells, Stones, and native Fossils, none of which have any Agreement in Nature with the other, or are Things of the same Class.

*He gives unfit Names to Things.*

To this confused Way of rangeing Things, may be added, those uncouth Names, he makes use of, devised, and imposed by fancyful Men; such as *Ombria*, *Brontia*, *Gryphites*, *Hysterolithos*, *Bucardites*, *Balanoides*,



*noides*, and others; which Names communicate no real Ideas in themselves, nor in the least assist towards understanding the Constitution, or Properties of the Things to which they are applied. 'Tis certainly the Business of a Naturalist, by fit and descriptive Names, to clear up Things not well known; but by no Means to render them more obscure, by a Cloud of Names, which neither any Way explain the Nature of the Things in Question, or any others, nor indeed convey any right Notion of them to the Reader :

*Not with dark Smoak to smother  
up what's bright,  
But out of Smoak to send clear  
Rays of Light \*.*

2. But to spend no more Time a-  
bout his Way of methodizing, and of  
naming Things, let us come to the  
Things themselves. Dr. Camerarius  
asks † *with what Colour can it be  
supposed, that Shells, sinking down  
together, and forming the same Stra-  
tum by Reason of their being of the*  
2. Dr. Ca-  
merarius's  
*Inconsisten-  
cy as to the  
Shells keep-  
ing them-  
selves whole,  
while moved  
and tossed  
by the  
same Waves, a-  
mongst*

G 2

\* Non Fumum ex Fulgore, sed ex Fumo  
dare Lucem. Horat.

† P. 309, 310. Conf. 296, 297.

same specifick Gravity, should not be then broke to pieces; for that must of Necessity have happened from their being dashed each against other, as they subsided, in the confused Com-motions of the Waves. The Stones, meerly by their Weight, must have broke the Shells which were there amongst them, and beat them all to *Bitts*. He thinks it utterly impos-sible for them not to have been so broke: and therefore makes this Ob-jection more than once. But it sure-ly is a sufficient Answer to this so often repeated Objection, that so vast a Number of Shells are still found en-tire, and not at all broken, even in the firmest and hardest Stone. Nor does he himself deny that this is actual-ly so. *Shall I assert*, says he, *that no real Marine Bodyes are found there?* \* *Far be it from me after so many Observations of that learned Gentleman, and, he might truly have added, of every other Man, in all Parts of the Earth.* He presently after this makes Answer to a Question of

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\* Page 546.



of his own, *By what Means came these Shells into the Earth, the Strata, and those Parts*\*? Many of them, says he, if not all, were cast there by the *Deluge*, through the *Fissures of the Earth*, while it was gaping, and lodged in the *Strata* while they were yet soft and fluid. Now what Part am I to act here, when he is at such Variance with Himself, should I interpose as a Reconciler? He grants that the Shells are really found in the *Strata*: and points out the very Means of their Conveyance thither; *viz.* they were lodged there by the *Deluge*, while the *Strata* were yet soft and fluid. And yet he avers he is entirely ignorant, with what Appearance of Truth it can be supposed *that the Shells sinking together, and forming the same Stratum, should not be then broke to Pieces, and destroyed, by the Dashing and Agitation of the Stones.* Let us therefore proceed to something else.

G 3

3. What

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\* Page 346.

3. Of the  
Glossopetrae, their  
Nature,  
and Origin.

3. What they commonly call the *Glossopetrae*, of which I my self have several digged up here in *England*, as well as others brought from the Island of *Malta*, and various other Countries, are apparently Teeth of Sharks, and such like Fishes. Nor, indeed, according to any Judgment to be formed from the Words of Dr. *Camerarius* himself, can I make the least Doubt, but that those he mentions, digged up about *Montpelier*, are the Teeth of Marine Animals also, tho' he is at so great Uncertainty about them. For, what Reason does he produce for his Doubts about these †? Only because in Distillation they did not yield *Volatile Salt, Spirit, and Oil*, in the Quantity he expected; tho' they did afford an *Urinous Phlegma*, which alone might have served as a clear Indication of a *Volatile Animal Salt* ‡. But, tho' from these Tokens they did not with any Certainty appear to him to be the Teeth of Animals, yet, since even such a *Phlegma* is not to be extracted from any Mineral

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† P. 272. ‡ P. 172.



ral Body, it is thence highly probable that these rather had their Origin from any Part of Nature than from the Earth. And indeed whoever makes Searches of this Kind, without observing the various Circumstances of the Things, and comparing them well together, will obtain little Light or Advantage from them. There is no one but knows how easily and how soon the Volatile Particles, of almost every Body, fly off of their own Accord, and are exhaled. Nor certainly can any one expect so great a Plenty, of these, from those Teeth which have lain buryed above 4000 Years in the Earth, as from others of the same Kinds just taken fresh out of the Mouths of the Animals. If Dr. *Camerarius* should doubt of this, let him try, if he can, to extract a like Quantity of Salts from human Bones and Skulls which have been long buryed, as from those of Bodies but newly dead.

But to that Argument Dr. *Camerarius* adds another, which is, that *the Glossopetrae do not* (as *Fabius Columna* The Opinion of Fabius Columna, con-

G 4

lumna

cerning  
these Bo-  
dies, assert-  
ed, and his  
Reputation  
vindicated.

lunna had, he says, *falsely pretend-*  
*ed*) turn into a Cinder, but into a  
*Calx*. For those *Glossopetræ* which  
*F. Columna* had procured from *Mal-*  
*ta*, did, he tells us \*, *when put*  
*into the Fire, burn to a Cinder,*  
[Carbo] *before they went into a Calx,*  
*or Ashes,* as the Bones, Teeth, Horns,  
and other like Substances of Animals,  
are wont to do: and for that Reason  
he judged them to be of the same  
Substance, and not of the Nature of  
Stones, which do not turn first into a  
*Cinder*, but into a *Calx*. *Dr. Camera-*  
*rius* charges *F. Columna* † *with*  
*Falsehood* for asserting that the *Glos-*  
*sopetræ* turn into a Cinder. But  
how came he to any certain Know-  
ledge of that? Did he learn it from  
Tryals made on the *Glossopetræ* of  
*Montpelier*, and finding that they  
immediately turned into a *Calx*? If  
he take upon him to affirm this, I will  
give him Credit. Yet there are some  
other Things which he ought also to  
have

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\* *F. Col. De Glossop. Dissert. sub fin. Lib. de Purpura, p. 31, † Fab. Col. ibid.*



have been well assured of, and carefully to have considered, before he had called in Question, not the Judgment, but the Fidelity, of *F. Columna*. Not to mention others, he ought certainly to have known, if the *Glossopetrae* are found lodged in very different Places, and in different Sorts of Matter, whether they would not, in Tract of Time, be so affected by that Diversity of Places, and of Matter, as to turn, when committed to the Fire, some of them into a *Cinder*, and others presently into a *Calx*. He ought further to have observed, that the same Body, put into the same Fire, burning slower, or remaining there a shorter Time, will turn into a *Cinder*: but, if in a stronger Fire, or continued longer, into a *Calx*. Which is obvious of it self: and indeed *Columna* has given some Hints of it. But to say something here of the Character of *F. Columna*, he was a Person of a noble Family, and Himself a Man of extraordinary Ingenuity. He was also eminent for his great Learning: and for his Pursuit of the Study of Natural Things with more Diligence, Accuracy, and Success,

cess, than almost any one of those Times; as the Writings he has left behind him, by which he has deserved greatly of Posterity, abundantly testify. His Contemporaries looked upon him as a very diligent Searcher after Truth, and as a Man of the greatest Fidelity; which Reputation he still retains, now at the Distance of almost a Century from the Time of his Death. When the celebrated Dr. *Camerarius* therefore reproaches a Person of that illustrious Character, with Falsehood, as to an Experiment that he made, and yet really produces no Proof of such a Charge, he surely acts in a Manner unbecoming an ingenious and learned Man, and such as can be very little agreeable to those who are really such. Nor has he treated this Gentleman only, who is of those early Times, with so much Liberty, in his *Dissertations*, but several more modern Writers likewise, and some who are yet living, and of the greatest Repute for Learning and Judgment: and that, at least as appears to me, and perhaps to all others of candid Disposition, not because what they have set forth is any Ways repug-



repugnant to Truth, but meerly because their Opinions do not square with his own.

4. What I have written concerning the Dissolution of the Earth, and of all Fossils, the learned *Camerarius* is very averse to admit. *Tho' it be allowed,* says he, *that real Marine Bodies are found in the Bowels of the Earth,---yet it does not follow from thence, that the Earth was dissolved at the Deluge \**. Such a Dissolution he pronounces † *supposed,* without any Proof: and treats it as supported by no Shew of Truth. But before he had inveighed, with so much Vehemence, against this Proposition, he ought to have shewn, how, without such a Dissolution, the Shells of *Conchæ, Cochleæ, Echini,* and other Marine Animals, came to be exactly filled with Stone, Flint, Spar, and other Mineral and Metallic Matter, as they are at this Day found to be: how the Surfaces of Stones, Flints, Spars, and other Mineral and Metallic Bodies, every where digged up,

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\* P. 287. † P. 326.

up, came to have the very Forms, and even the finest Lineaments of these Shells, impressed upon them: and, finally, how it happened that so great a Plenty, and Variety, of Marine Bodies, were immersed in the Strata of Stone, and almost every other Kind of Terrestrial Matter, and so intimately and thorowly incorporated with that Stone, and Matter, as, together, to constitute one common Mass; and this in Places the most remote from any Sea, and to the greatest Depths in the Earth that Men ever dig; he ought, I say, to have explained by what Means all these Things could be effected, without a Dissolution of the Earth, and of Fossils, before he had, upon his single Opinion, and Authority, condemned what I had advanced, wherein is given an Account how all this was brought about, and by a Method the most plain, easy, simple, and such as is exactly conformable to the Procedure of Nature it self.

Dr. Came-



Dr. *Camerarius* neither believes himself, nor thinks any Body else easily will, that softer Matter remain-  
 ed entire, while the most solid was dissolved, at the Deluge. For who-  
 ever, says he, \* *shall compare the most solid Marble, and hardest Stone, with the tender Shells of Fish, will not be easily perswaded that these could remain entire, and not be dissolved by that Agent that reduced all Marble into Powder.* But this perhaps will appear less wonderfull to any one who has observed, which may be easily done in many Places, or been informed from the Observations of others, that the exterior Parts of Marble, and of the hardest Stone, lying a long while exposed to the Weather, or the sharp and salt Vapours of the Sea, are, by Degrees, worn, eaten, and consumed away, while the Shells, contained in them, not only continue to exist, but often remain a long Time after entire, or but little hurt by the same Weather, Salts, and Vapour. Which Fact had  
 this

*Terrestrial, and Mineral, but not Animal, or Vegetable Bodies, dissolved at the Deluge.*

this Gentleman, so very knowing in all other Respects, been rightly appriz'd of, and duely considered it, I'm apt to think he would not have insisted on this Argument. But, as to the true Cause of the Dissolution, made at the Deluge, it cannot be sufficiently shewn within the Compass of either that *Essay*, or of such a Tract as this. My Design in both is to shew, that the Earth it self, and all Fossils whatever were really dissolved; but that Shells, and other Animal, and Vegetable Bodyes were not; and indeed that the Thing actually was so, I think I have, from Observations, sufficiently made out, and proved. But to add somewhat further to what I have, above, brought in Answer to this Objection of the learned *Camerarius*, he ought also to consider that the Texture, and Constitution of the former of those Bodyes, is very different from that of the latter. For the Parts of Animals, and of Vegetables, are fibrous, and their Fibres connected, complicated, and variously interwoven each with other; but the Parts of Fossils, even the hardest, are only contiguous, and held together



ther by no common Tye. Whoever rightly reflects upon this Difference of these Bodyes, he will not think it so difficult perhaps to find the Reason why all the Fossils were immediately dissolved, while the others were not in the least hurt, but remained entire and in their Original Condition. If therefore the celebrated *Camerarius* should, at any Time, resume this Argument, which, in real Friendship, I would advise him not to do, let him dream no more of a *Menstruum* sufficient to dissolve the whole Globe of Earth. There are others indeed who, like him, have before done the same, without being able to touch any Point of what I have delivered; but only betrayed their own Ignorance, both of the Powers of Nature, and the Operations of a *Menstruum*. He objects also to my Doctrine, that *the Dissolution of the Globe would have been the Destruction of the first Creation* \*. This I readily grant him, it being no other than what Nature shews, and *Moses* teaches: and what indeed I my self have

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\* P. 344.

have endeavoured to make out, *viz.* that the Deluge was brought on, and the Dissolution of the Globe effected, by the Divine Appointment, in Order to *destroy the first Creation.* *Nat. Hist. of the Earth.* Part II. 'Twas therefore his proper Business to have examined, and try'd to have refuted what I had there set forth, and not thus to have taken and dressed it up in Form of an Objection against what I had deliver'd.

5. *Of the Abyss, or that great subterraneous Reservoir of Water.*

5. The learned *Camerarius* confesses † that he very much desires to see Arguments to prove the Abyss, or Central Sphere of Water. But I think it needless to produce any new Arguments here, nor those in particular with which, if God gives me Life and Leisure, I am ready to render the Truth of this Matter more evident; since what I have proposed in my Book has made it sufficiently clear, and indeed put it out of Doubt. Nor can I make any Question but those Arguments would have given Satisfaction to this learned Writer, had

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† P. 318.



had he sufficiently attended to them. Which since he seems not to have done, I will here propose two of them anew; one of which is to shew the Quantity of Water that overflowed the Earth at the Time of the Deluge, and the other to shew the Place where the Water is now reserved.

Of the first of these we may form *Of the* a Judgment from a Survey of the *Quantity* Strata, and generally of whatever else *of this Wa-* is found in the Earth, being, as 'tis *ter.* easy to observe in very many Places, all repositied in a regular Order and Method, and indeed according to the respective Gravity of each. † For to effect this, 'tis most evident and certain that an immense Quantity of Water must needs be required. Such a Disposition of Things, as we now almost every where see, could, by no Means, have been brought about unless the Fluid, in which all was transacted, had been very thin: unless the dissolved terrestrial Particles had been considerably distant each from other: and lastly, unless their Descent was very great, or the Place,

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† See page 41, Et Seqq. supra.

from which they first began to subside, very remote from that where they all at length settled in their Order. \* For Nothing of that Regularity in the Settlement of the terrestrial Matter could have happened, if those Waters had not vastly exceeded that Matter in Quantity. But, if we suppose this, the Explication of this Phenomenon will be easy. For, as the Velocity of Bodies subsiding in Water is different, according to the different Gravity of those Bodies, it was necessary that, of those which were of the same Magnitude and Figure, and began to subside together, and from the same Height, the heavier should sink fastest, and so be placed at the Bottom of all. Yet, tho' those Bodies differed so much from each other in Gravity, it could not otherwise happen but that the Heavier, in their Descent, sometimes falling and hitting upon the lighter, should be, by that Means, much impeded, and retarded in their Motion; while the Lighter were

*Of the Moments of heavy Bodies descending in a Fluid.*

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\* For this was absolutely necessary, that the heavier Bodies, from so great a Space of Descent, might have Time to get before the lighter, and leave them at some Distance behind. For, without that, they had not been placed deeper and below them.



were accelerated and pushed on by such Impulses of the Heavier.\* But, after the Heavier had reached their Journey's End, or the Bottom of the Water, the Lighter might proceed to subside in their Order, unless, when it so happened, that, by so great a Quantity of terrestrial Matter, subsiding between the Heavier and the Lighter, as to fill the intermediate Space betwixt them, both settled at the same Time. In Case no such Impediment intervened, two such Bodyes would be repositied at no great Distance beneath one another; † tho' if the Lighter of them was so impeded, it would be layd at a greater Distance above the Heavier. But if there happened to be two Bodyes, not very different in Gravity, it was necessary that the Heavier of those should sink thro' a great Space of Fluid, before it could leave the other, which was

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\* From these their Collisions it was unavoidable but there should be some Confusion and Disorder in the Sediment they together constituted.

† So that, Heavier and Lighter Bodyes may some Times be found near one another, and lodged in the very same Stratum, tho' their Subsidence was exactly according to the Laws of Gravity, and tho' those Bodyes, so different in Gravity, sunk through a very great Space of the Fluid.

but a little Lighter, at any considerable Distance behind it. And yet, of those Bodies, that are almost equal in Gravity, we frequently see the Heavier lodged in the Strata far beneath the Lighter; whence 'tis most evident that these two Sorts of Bodies must needs have sunk through an immense Mass of Fluid. If we consider all these Things, with due Attention, 'twill thence abundantly appear that so great a Work could not have been transacted, without the whole Stores of the Abyfs, or such an Orb of Waters as I represented.\* Which of itself sufficiently shews that such an Abyfs really existed.

*Of the two-fold Increase of the Waters assigned by Moses. Occasionally, of the Mosaic Origin of the Earth. Also of the Chaos of the Antients.*

After that the *Deluge* had prevailed for the first forty Days, and the Waters were increased greatly, so that all the high Hills under the whole Heaven were covered; and the Waters were fifteen Cubits above the Mountains, † which Inundation was brought on, that Men, and all terrestrial Animals, might perish in it,

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\* *Nat. Hist. Earth. Part 3. Sect. 1. Consect 1.*

† *Gen. vii. 17, 19, 20.*



it, the Waters prevailed anew, and, very likely, for a much greater Number of Days. *An hundred and fifty Days* \* are mentioned in the Whole. In the first forty of these, the Waters were brought out of the Abyfs, which, together with the Rains that fell, covered the Mountains. But in the following Days the primitive Earth was dissolved: the Waters which then remained in the Abyfs were poured out: the dissolved Matter of the Earth was taken up into and sustained in the Waters, and afterwards precipitated again downwards, disposed, and formed into a new terrestrial Globe. But, hitherto, the Condition of this new Globe, was the same of the old one when first created; § *it was without Form*, ‡ that is, not yet reduced to such *Form* as might render it habitable, and fitted for such Ends as it was made to answer. The Surface of it was *plain*, even, and *spherical*; *not broken*, so as to have any Hills, Valleys, Caverns, or Fissures; † all which were

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\* *Gen. vii. 24.*    § *Gen. i. 1.*    ‡ *Gen. i. 2.*  
 † *Nat. Hist. Earth. Part 2. Consect. 5.*

absolutely necessary for the Production, and Sufenance of Animals, Vegetables, and Minerals. It was also, like the primitive, *void*, \* while all the Waters, that were to be suddenly sent back into the Abyfs, which was then *void*, or empty, and to be remanded again into the Bowels of the Earth, remained yet, without, upon the Surface of it: and till this Sphere of Earth, which was like a Crust, or Shell, was broken, † Hills raised, Valleys sunk, and Fiffures made, whereby the Waters were to return down again into the Abyfs. Afterwards the Waters, withdrawing at the Divine Command, *were gathered together unto one Place*; ‡ *viz.* into the Abyfs, within the Earth, § and, which is as a Kind of Appendage to it, the *Sea*, † as before in the original Earth; *and the dry Land appeared.* [†] And the Earth at length attained a *Form* compleat, fitted for Habitation, and to answer the Uses of it. Of this whole Affair I may  
some

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\* Gen. i. 2. † Nat. Hist. Earth. Part 2. Confect 6. 8. ‡ Gen. i. 9. § Nat. Hist. Earth. Part 2 and 3. † Gen. i. 10. [†] Gen. i. 9.



some Time treat more at large; but, till then, what I have already wrote sufficiently shews the Sense of the sacred Writer, where he says, *the Earth was without Form, and void.* \* From these Words of *Moses* the Heathens devised their *Chaos*; and are herein followed by most Modern Philosophers. But neither the *Jewish*, nor *Christian* theological Writers, seem to have rightly understood this Passage; they being not thoroughly informed of the true Fabrick and Constitution of the terrestrial Globe: nor did they sufficiently attend to the *Mosaic* Description of it, couched indeed in few, but the most proper and express Words, that could ever possibly have been pitched upon. To conclude, in some Time of the latter Part of this Space of 150 Days, the Waters were abated, and withdrawn from off the Earth, so far, that their Surface was sunk to about the same Degree, to which it had arose in the first forty Days of the Flood, and the Ark touched upon

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Mount

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\* *Gen.* i. 2.

Mount *Ararat*; \* where, at length, it rested.

*Of the Place where those Waters are, at this Day, stored up. And something further touching Earthquakes.*

The other Argument, whereby I proved that such a Mass of Water did really exist, and shewed the Place where it is now reserved, is drawn from Consideration of some Phænomena of Earthquakes. For that these are caused by the Force of Waters within the Earth I think I have proved by Arguments sufficiently firm and convincing. Now since there are, on Record, Earthquakes, and indeed not a few, by which the Globe, for many hundred Miles together, has been shaken, at the very same Moment of Time, it thence follows, that the Waters, which caused those Concussions, were not only equal in Extent to that Space of the Globe which was so shook, but one fluid Body continued, and not divided into Parts, or distinguished into Regions, so that particular Portions thereof should be confined each to its proper Cavern. *Nay, there want*

*not*

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\* Gen. viii. 4.



not Instances of such an universal Concussion of the whole Globe, as must needs imply an Agitation of the whole Abyss. † For an Effect of so vast an Extent could never have proceeded but from a Cause equally extensive; such as might affect the whole Earth at once; which cannot be done without such an Orb of Water, as I have described. We have had Accounts from Writers of the most unquestioned Fidelity, and even from Eye-Witnesses, that there have been Earthquakes, in our own Times, so that it can hardly be thought that the learned *Camerarius* could be ignorant of them, wherein the Motion, given to the Earth at the several Shocks, perfectly resembled that of the Waves of the Sea raised by a strong Wind. Whoever shall rightly attend to this Phænomenon in particular, he must, not only acknowledge that the Earth contains in it an Abyss of Water, and is moved by the same: but must also readily agree with me that this  
terre-

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† *Nat. Hist. Earth.* Part 3. Sect. 1. Con-  
sect 12. in fine.

terrestrial Part of the Globe is Nothing but a thin Shell, which includes in it, closely on every Side, an immense Mass of Waters, and whenever those Waters happen to be put into any extraordinary Motion, the Earth is by them moved and agitated just in the same Manner as the inclosed Waters are moved and agitated. As of the primitive Earth, in which no One can doubt but that there was an Abyss, so the Use and Design of this second Earth likewise was to serve for an Habitation to Men, to send forth Vegetables, and all those other Things, which might serve for the Nourishment, for the Defense and Convenience of Men, and Animals created for their Use. To answer which Purpose there was no Need of a thicker Crust of Earth; one more thin, such as the present is, would best answer the End proposed, the Water making up the far greatest Part of the Globe. Nay, a thicker one would have perpetually obstructed the Passage of Vapours, † and intercepted all that Communication,

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† Confer. p. 109, 110, infra.



munication, betwixt the Abyfs and the Atmosphere, which is fo neceffary for the Prefervation of human Life, and of all Things which grow out of the Earth. \*

To this Description and Account of the terraqueous Globe, taken purely from Observation and Views of Nature, that of the illuftrious Arabian Philofophor *Job*, as well as that of *Mofes*, *David*, and others of the Hebrew Nation, is exactly conformable. Of which two Accounts

*The exact Agreement that there is, betwixt Nature, and Holy-Writ, concerning the Abyfs, and the Structure of the terraqueous Globe.*

*He who well knows either, will know both. †*

Both of them fet forth an Abyfs, a Mafs of Waters very vaft ; on which this our Globe, or Cruf of Earth, is founded, expanded, and lyes built all round it. ‡ Both alfo fhew that this Abyfs communicates with the Ocean, fupplies, and gives Rife as well to Vapours, Rains, Springs, and Rivers, as to the various Phanomena, and Affections, of

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\* Confer. p. 109, 110. infra.

† Qui utramvis recte norit, ambas noverit. *Terent.*

‡ *Nat. Hist. Earth.* Part 2, 3.

of the terrestrial Globe, and of our Atmosphere. § Thus likewise we find, both from Nature, and from Holy Writ, that this immense Abyfs of Water, at the Time of the Deluge, was brought from out its Place, and poured forth upon the Surface of the Earth: and that afterwards the terrestrial Crust itself, being first liquated and dissolved, was taken up into and sustained in that mighty Mass of Water: and that finally all that Matter, so dissolved, afterwards subsiding, was composed and formed anew into a terrestrial Globe, after the Model of that which was made in the *Beginning*, at the Creation, and built and fixed upon a *Void*, a Place capable of such an Abyfs, and fitted finally to receive it: and that this terrestrial Sphere being at length burst, and broken up, the Waters returning back again down into that hitherto *void* Place, left the Surface *dry Land*, commodious, fit, and rightly disposed for the sending forth of all  
 natural

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§ Ibid. Part 3, 4. Conf. p. 109, 110. infra.



natural Productions: ‡ and that all these Things were not brought about mechanically, by any Tendency of their own, or the meer Powers of Nature, but were now transacted, the whole Fabrick formed, and finished anew, by the same Hand, and Divine Counsel, by which 'twas created in the *Begining*. \* But I hope to have hereafter Occasion to treat of these, and some other like Things, more at large.

Nor was this so mighty a Mass of *The Rise of* Water created, and laid up there *Meteors,* meerely for the Sake of swelling out *and of all-* the Globe, and bringing it to its just *most all the* and necessary Dimensions; no, there *Changes,* are other Uses of this huge subter- *Phænomena, and Af-* raneous Work-house of Nature, that *fections of* are not only exceeding proper, but *the Atmo-* absolutely necessary for the Producti- *sphere, from* on and Conservation of all natural *the great* Things whatever. For in this Abyfs *Abyfs.* of Water are seated the Origins, and Initia, or first Beginings of all that  
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‡ *Nat. Hist. Earth.* Part 2, 3.

\* *Ibid.*

is afterwards tranſacted, and brought to Perfection, in the Earth itſelf among Mines and Minerals, as alſo on the Surface, of it, and in this Region of the Atmosphere in which Vegetables grow, and whereon Man, and Animals live and have Being. That the ſame Seasons, in different Years, are ſo various, in ſome more cold, or wet, leſs fertile, or healthfull : in other Years, quite contrary, more hot, dry, fruitfull, or more healthy ; all theſe Variations, I ſay, are owing to the Operations of Nature, in that great ſubterraneous Promptuary of Water. As to Earthquakes, Vulcanos, Damps in Mines, the Origin of Springs, Rivers, and Rains, of Thunder, and Lightning, I ſay, I have offered my Sentiments, with the Obſervations whereon they are grounded, elſewhere ; † intending, as I ſhall ſee Men's Minds ſettled, and turning to theſe Studyes, if God ſhall give me Leiſure, to methodiſe what I have wrote, and to treat of the ſame Subjects more at large, together

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† *Nat. Hiſt. Earth.* Part 3, 4.



ther with some others of like Sort, *e. gr.* Meteors, Frost, Winds, Tempests, and Storms. Mean Time I shall only intimate here, in general, that from numerous Observations made by Persons of great Sense, and Fidelity, in every Part of the World, I am satisfiyed that all these take their *Rise* from the *Abyss*: and that, whenever they are disposed to issue out thence, they constantly send forth before them some sure *Signs* of their Approach, very plain and discernible to all who attend and observe them, in the Sea, in great Lakes, in Springs, in deep Wells, in the Bowells of the Earth, in Caverns, and in Mines, before ever they begin to act, or shew themselves on the Surface of the Earth, and in the Atmosphere.

I shall now make only this one single Remark further, when Exhalations, Vapours, and watry Particles, ascend in any extraordinary Quantity, from out the Abyss, into the Atmosphere, till they are there collected and so condensed as to form Drops and Rain, these Exhalations thus taking a Course and Motion, and exerting a Force, in a Direction quite  
 contrary

*The Cause  
of the Phæ-  
nomena of  
the Baro-  
meter.*

contrary to that of the gravitating Atmosphere, they thereby so much diminish and break the Force and Pressure of the Atmosphere as sensibly to lessen and render it more languid; which is the true Cause of the Descent of the Quick-silver in the Barometer, as often as those Circumstances happen. Nor, since 'tis now agreed on all Hands, that the Ascent and sustaining of the Mercury in the Barometer, is owing to the Pressure of the gravitating Atmosphere, can it be wondered that, when the Pressure is, by the Causes here recounted, so much lessened, that the Mercury should thereupon descend. This is the real and constant Reason of that Phænomenon, as I have shewn in some Letters which I wrote several Years ago, and which perhaps may some Time appear in Publick.

Instances of  
certain  
Parts of the  
Earth's  
Surface be-  
ing under-  
mined by  
Earth-  
quakes, and  
falling  
down into  
the Abyss  
beneath.

What this learned Gentleman urges, p. 318, *that the Abyss would afford but a weak Support to the terrestrial Strata*, makes Nothing against me; I readily allow the same Thing. For altho' the Earth, being a Sphere or Spheroid, and consequently every Segment of it an Arch, which of all Kinds of Structure is the



the strongest, yet, since it is but thin, and subjected to the Force of such an Agent as is within itself, it may happen to give Way to that Force. Which is no more than I have delivered in very plain Words.---*The Earthquake is 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 sailing, the whole Tract, as soon as ever the Shock is over, sinks down to Rights into the Abyss underneath, and is swallowed up by it; the Water thereof immediatly rising up, and forming a Lake in the Place where the said Tract before was.* †

6. To what Purpose the learned *Camerarius* wrote that which I am next going to take Notice of, I cannot see, nor indeed avoid being surprized at it; since it really makes Nothing against what I have offered, neither is it indeed agreeable to Truth.

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6. *Of the Salts that supply the Mineral Waters.*

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† *Nat. Hist. Earth.* Part 3. Sect. 1. Con-  
sect. 12.

His Words are these, *If the Water of the Abyss had pervaded the Strata continually from the Time of the Deluge, it must long ago have exhausted and drawn all the Salts out of them. Nor had there any now remained, to have given that Taste which we find in Mineral Waters.* \* But have I ever proposed any Thing that could be refuted by this Argument, supposing it was true in itself? I have advanced Nothing any where relating to the Quantity of Salt which the Water, passing through the Strata, brings thence along with it, nor to the Time wherein that Salt shall be totally exhausted. And therefore this is a Subject that I leave to be treated of by any who shall hereafter write of these Things. Yet I cannot but take this Opportunity to observe one Thing, which is, that that Water, whether it rises from the Abyss, or, if *Dr. Camerarius* will have it so, from any other Place, has actually pervaded the Strata ever since the Deluge, and brought thence forth along with

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\* *Dissertat.* p. 328.



with it Salts, and still continues to bring them, without having yet, or being perhaps ever likely to drain them all forth. For they so easily liquate, mix with the Water, and flow out along with it, and so great Abundance is there of them in the Strata, that there is no Reason to fear that these Salts, some of which are of the greatest Use to human Life, and the Conveniences of it, should ever wholly fail. Whoever shall observe how great Quantity, especially of Vitriolick or acid Sals, there's almost every where found in the Earth, will not have the least Occasion to apprehend there should not be a sufficient Supply of those Salts, to saturate the Mineral Springs with all, thro' all future Ages.

7. When Dr. *Camerarius* says, *It is evident from History, that so many high Mountains have been formed, and cast up by Earthquakes,* \* he speaks of what I confess myself intirely ignorant, having never yet seen those *Historyes*; so that I should

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esteem

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\* p. 303.

esteem it as a very great Favour, if he could help me to the Sight of some of them. Certainly, when I had openly asserted, *that there is not any authentic Instance, in all History, of so much as one single Mountain that was heaved up by an Earthquake,* \* he ought not to have asserted the Contrary without producing at least *one Example* in Favour and Support of it. Till therefore he shews he can do that, while he is turning over his Authors, and producing their Testimonies, I may be allowed to give my Judgment from Nature itself, and the State of Things in the Earth. It is needless to say any Thing here of the *Monte di Cinere*, in the Kingdom of *Naples*, the Matter of which I have shewed was not raised by an Earthquake, but thrown up by a *Vulcano* that then broke out there. † From the Times that Men first began to write for the Service of Posterity, there have not been wanting Persons to committ to writing, whatever

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\* *Nat. Hist. Earth. Part 2. Sub fin.*

† *Ibid.*



ever Works either of Art or Nature, they thought worthy the Notice of after Ages. Now, as they recorded many other Things, not alwayes because they appeared to be of great Moment, but as they happened rarely, it is scarcely credible that they should omitt those more remarkable Events, which could not happen without even the Astonishment of all who saw them; such as *the raising up so many vast Mountains* must certainly have been. The Rise of that *Heap of Cinders* is taken Notice of by most of the Writers of that Time, and by some since; but not a Man, at least that I know of, has ever committed to Memory the raising so much as any one single Mountain. Till therefore the learned *Camerarius*, or some other, shall shew, from the Historians he talks of, not yet known to the learned World, that the *Alps*, the *Apennines*, Mount *Taurus*, *Atlas*, or others, or at least some one Mountain, was formed and took its Rise from an Earthquake, or any other like Force in Nature, I must still, relying on the Arguments I have alledged in Defence of my own Opinion, believe

those, and the other Mountains, were formed all together, at the Time that I have elsewhere assigned. † For if, of the numberless Mountains that there are in most Countryes and Parts of the Globe, some of them very high, and of great Extent, he cannot prove the Rise of any one in his Way, 'twill surely be what they call a good negative Argument of the Truth of my Opinion in this Affair. For if the Mountains, now so frequent and obvious, every where, were cast up, one after another, in different Ages, the Inhabitants of every Country had been always in Danger, or at least under perpetual Fear; nor would all the Historyes of those Times have been wholly silent in a Thing so surprizing, so well worth Notice and being recorded,

8. *The Origin of Islands. Particularly of that Heap of*

8. I have asserted that, as *Mountains*, so all *Islands had their Origin from the Deluge.* ‡ But the celebrated *Dr. Camerarius* fancyes that Nature has supplied him with a late Instance,

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† *Nat. Hist. Earth. Part 2.*

‡ p. 347, 348.



Instance abundantly capable of over-<sup>Rubble</sup>throwing my Doctrine. Says he, <sup>raised in the</sup>  
*That new Island, in the Bay of San- <sup>Bay of San-</sup>  
*torini, is enough of itself most terribly* <sup>torini, called</sup>  
*to shake the whole Woodwardian Sy-* <sup>by some an</sup>  
*stem.* \* That is, if this formidable <sup>Island.</sup>  
 Engine be managed by the most gal-  
 lant and brave *Camerarius*. Let us  
 therefore go on, to try his Strength.  
*It is, says he, an Island formed by*  
*a slow Emerfion out of the Waters,*  
*put together by many Earthquakes,*  
*Noifes, and Flames, becoming at last*  
*so large, and so much raised above*  
*the Waters, and as it was joyned to*  
*Rocks that rose together with it,*  
*and to those of the Neighbourhood.* †  
 A huge and formidable Engine in-  
 deed! but so far is it from shakeing,  
 or giving any such Blow to the *Wood-*  
*wardian System*, that it cannot, by  
 any Means, be so much as levelled  
 at it. But to leave off talking, in  
 Figures, in the Way of the most elo-  
 quent *Camerarius*; that Island, when  
 I wrote my *Natural History of the*  
*Earth*, was not in Being. So that*

I 4

certainly

\* p. 347, 348.

† Ibid.

certainly it could not be expected that I should predict its Rise to follow in some short Time. I then made mention of a Heap of Rubble like this, I mean the *Monte di Cinere*; only that was not cast up in the Sea. For is not this Island just like that Mountain, the Matter, and the Cause of the Rise of which I then fully explained? Are they not both of the same Kind, both thrown forth by the same Force of *Vulcanos*? For thus I had represented the Matter, and the Cause of that Hill, *That it is Nothing but a Heap of Stones, Cinders, and Ashes, spued out of the Bowels of the Earth, by the Eruption of a Vulcano, in the Year 1538*; † nor indeed did I ever go about to deny, that there were already, or might be hereafter, others thrown up in the same Manner. Neither did I deny that *Vulcanos* may as well rage with such Violence under the Sea, as in like Manner to break up its Bottom, and throw forth so great a Quantity of Matter as to  
 pile

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† *Nat. Hist. Earth. Part 2. sub. fin.*



pile such a Heap of Rubble up to and above the Surface of it; for it is reasonable to believe that, wherever the Eruption of a Vulcano happens, whether at Sea or Land, its Force and Effects will be the same. If therefore the ingenious Dr. *Camerarius* is pleased to give the Name of *Mountains* to Heaps of Rubble, cast out of the Earth by such Means, he may, with all my Heart, call those which are cast up at Sea, *Islands*. But whatever he shall fancy, or take upon him to write, of these Things, I intreat him not to imagine that I was speaking of such Kinds of confused Heaps of meer Rubble, when I referred the Origin of all Mountains and Islands to the Time of the Deluge. For all those which I call'd Mountains and Islands have the Matter, of which they consist, laid in a Method, certain, regular, and like that of the rest of the Globe: and are every where distinguished into Strata, lying commonly in an orderly Manner each upon other. Whereas both the *Monte di Cinere*, and that Moles of *Santorini*, are Nothing but rude indigested Piles of Fragments

ments of Stones, of Dross, Cinders, and Rubbish. The Vulcano therefore that flung out that Bomb at *Santorini*, is so far from *shaking my* WHOLE SYSTEM, that it cannot so much as touch this one single Proposition, relating to the Origin of Islands; which, I hope, will be readily admitted by every impartial Reader, especially a Person of so great Sagacity, so well versed in the Study of Nature, and so candid a Judge of the Works and Performances of Writers of all Kinds as your Lordship † is universally allowed to be. But if this Part of my *System* remains still firm and unhurt by *so many Earthquakes, so many Bellowings, and Flames*, which Way will this expert Ingeneer ply his Machine to shake and overturn all the rest of the Parts of it? Let him try, if he thinks fit, whether he can, by Arguments taken from this Phænomenon, refute what I have wrote of Vulcanos, of Earthquakes, of the Season

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† The E. of *Pembroke*, to whom this Treatise is addressed.



Season of the Year in which I have proved the Deluge happened, as also what I have wrote of Amber, and of the Situation of Paradise, with very many other Things. For what I have proposed concerning every one of these, he cannot deny to be *Parts* of that my *System*. If that be what he here contends for, I can indeed willingly grant him, that the Arguments, he has drawn from this Phæ-nomenon, as much affect any of my other Propositions, as they do this of the Origin of Islands; which they are so far from having weakened, that they rather have established and confirmed it. In a Word that whole *System* appears, not only to myself, but to not a few others of the most accurate Searchers into Nature, so well and effectually supported by Observations, that I cannot think any one that shall apply himself to these Searches, with like Accuracy and Diligence, will ever go about to dispute any Part of it. For all others, they may go on, and please themselves with their own Opinions.

When

*The Conclusion of this second Part. With what Disposition of mind I set my self to read Dr. Camerarius his Dissertations.*

When first Dr. *Camerarius* his *Dissertationes Physico-Medicæ* came to my Hands, I thought my self particularly concerned to take Notice of so much of them as related to my Writings; to the End that, if I found any Part of my Doctrine confirmed by the Judgment, and improved by the Wit, of so great a Man, I might have less Apprehension from the Censure of others: or that, if he had candidly and friendly corrected any Mistakes, or pointed them out to me, I might have returned him Thanks for so obliging an Office, done me publickly, in a Manner as publick: or finally, that, if he had, as is the Custom, not only with vulgar Readers, but with the Generality of Animadverters, seemed, which yet I could not have suspected in such a Man, to have read my Writings, purely to pick an Occasion of Censure, and, relying on the Reputation he had acquired, and his own sprightly Genius, to condemn those Things, which, only because they were new, he would not assent to, and yet could not prove them erroneous, I might take the Occasion to vindicate and ascertain the Truth



Truth of them. When, contrary *With what*  
to my Expectation, I found I had fal- *View, and*  
len into the Hands of such an Ani- *in what*  
madverter, tho' I had many other *Method, I*  
Things which might advantagiously *have an-*  
have been offered here, I determined *swered*  
to produce only such Arguments as *them.*  
might defend what was called in Que-  
stion, and at the same Time discover  
the hasty Judgment of this Critick  
upon me. Some Things indeed there  
are brought by him into Dispute which  
I have designedly passed over, but  
they are only such as any Person, I  
thought, besides himself, the least con-  
versant in these Studyes, would not  
raise any Difficulty about. Yet feve-  
ral of those I have touched upon are  
such as shew how negligently the Au-  
thor hath run over my Book, how lit-  
tle conversant he has been in these  
Studyes, and how far he was from  
being sufficiently apprized of the State  
of the Earth, and the Nature of Fos-  
sils, the Subject he took upon him to  
treat of. Had I sought after Instan-  
ces of this Sort, I should have found  
Plenty enough of them every where.  
But what I have done in that Way is  
only sparingly, and that too by Con-  
straint.

straint. I have only defended myself, and the *Truth* of what I had laid down relating to the Earth, and all Fossils, especially Metalls; which I conceived would neither be unacceptable to Gentlemen who are curious, nor disadvantageous to the Estates of those who had Mines in them.

*Hinderances to the Search of Truth.* Now that I am speaking of Truth, I can not well forbear making some few Remarks on this Subject. While

some allow themselves so much Liberty, and others are so easy to be misled, and carryed away, by the Conceits of every One that sets up for an Author, the Condition of Truth must needs be very precarious, and unsettled. And, as with the *Romans* of old, so is it at this Day with us,

*We have imposed on us the Show instead of the Substance of Truth\*.* It is frequently so wrapt up in Clouds, and the thickest Darknes, that but few there are who know the Way to approach, or distinguish it; that 'tis  
not

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\* Decipimur Specie Reeti.---

*Hor. de Arte Poet.*



not to be wondered at that there's in Science so little that is established and certain. If, as there are many, there be those who make Observations of Things with the greatest Diligence, and afterwards publish them with not less Care and Fidelity, there will straightways start forth others, who, buoyed up wholly with Opinion of their own Genius, tho' really destitute of all true Knowledge of Things, will yet be ever making such a Shew of their Skill, such Confusion in the Things they take upon them to treat of, in a Word, rendering them so dark, so perplexed and intricate, that but few Readers are capable of determining whom to follow, or what to depend on. By which Means it is that such Undertakers are so far from contributing to the publick Good, as they would be thought, that they defeat, and do it the greatest Injury imaginable. Some also there are who make it their Business to decry the Works of others, without attempting to furnish forth any Thing that is rational, or solid, of their own. These are the *Goths* and *Vandals* of the Common Wealth of Learning; they

they acting the very same Part in this, that those barbarous Nations did in the polite *Roman* World.

*The Scope and Design of all my Writings.*

As to my self, the Truth has been ever what I solely aimed at: and in the composing that whole Work, which this Gentleman thus sets himself against, I steered my Course intirely by Observation of Fact, and of the Things I treat of; nor have I therein proposed any Thing, that does not rightly square therewith. Nay,

*The Doctrines, by me formerly delivered, confirmed by all Observations made since.*

ever since the first publishing that Book, I have taken Care to have the same Observations carryed on, with still as much Diligence as ever, all the World over; from which I have received not only many, but those the most substantial Confirmations of what I then offer'd: nor, in all this Time, has the whole Field of Nature presented so much as one single Thing that has given me the least Cause to doubt of the Truth of any one of those my Propositions. 'Twas the Remark of a great Man among the Antients, that *Time strikes out all Notions that are not well grounded, but establishes those which are*



are founded upon Nature\*. No Man living can be more conscious to himself of his Weakness than I truly am of mine; but that Work will remain a lasting Testimony and Monument how far that Defect has been supplied by my Diligence, and Faithfulness.

There have not been wanting those, who have not spared any Pains, nor left any Stone unturned, to find out Mistakes, if they could, or any Thing that might deserve Censure, in my Writings; but

*The vain Attempts, of my Adversaries, in Opposition to them.*

all, hitherto, wholly in Vain. Every Attempt, to invalidate, has confirmed them the more. For still the more candid, and those who were better Judges, have openly professed, they never found any Thing alledged that, when brought to the Test, could deserve the Name of an Objection.

Nevertheless, if any One hereafter, upon diligent Perusal, and well weighing what I have wrote, shall seriously think he has discovered in it any Errors, he can do Nothing more

*My Readiness to listen to the Admonitions of those who are candid:*

K

agree-

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\* *Opinionum Commenta delet Dies: Naturæ Judicia confirmat. Cic. de Nat. Deor. L. 2.*

*and to dis-  
regard those  
who cavil,  
and are  
contentious.*

agreeable to me, than in a friendly and candid Manner to admonish me of them. For by this Means he will really pursue the same End with me, who never proposed any Thing other than to make all my Studyes and Endeavours subservient to the Cause of Truth. But if any one, out of a Spirit of Contradiction, or Hopes of raising a Reputation, by publishing some Notions and Opinions contrary to mine, without any Regard to Truth, shall hereafter take upon him to attack my Writings, he will have no Reason to expect that I should neglect my own Affairs, and my other Studyes, to give him an Answer; tho' I am now doing it to a Gentleman, in whom I should rejoyce to have found a Candour, and Skill in the Subject he has undertaken to treat of, equal to the Politeness, Wit, and Happiness of Invention that he every where shews himself so much Master of.

THE



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T H E  
N A T U R A L H I S T O R Y  
O F T H E  
E A R T H

*Illustrated, and Inlarged: as also, De-  
fended, particularly against the late  
OBJECTIONS of Dr. Camerarius.*

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P A R T I I I .

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III.  O much of what was III. *The*  
 requisite for my own *third Part*  
 just Vindication, being *of this Dis-*  
 thus delivered in the *sertation,*  
 two former Parts, I now pass on to *wherein are*  
 dispatch what yet remains further to *examined*  
 be spoken to. Now, if this learned *Dr. Came-*  
 Gentleman would be thought to have *rarius his*  
 dealt fairly by me, and at the same *Conjectures,*  
 Time to have given Proofs to others *set up, by*  
 of his own Abilityes, after having refuted *him, in Op-*  
 what he thought in me Errors, he *position to*  
 ought *what I have*  
 advanced.

ought to have set up his own Opinions, against mine; but those only such as are attended with Evidence very convincing, and much more probable than mine. This indeed is no more than what he well knew, and confessed, his Readers might justly expect from him. For thus he addresses \* the Noble Person, to whom he writes. *Methinks I hear You object, that I have indeed rendered those Things dubious, but have not pointed out any other Way whereby those figured Fossils could be produced, and brought into the Bowels of the Earth. But that is not my Business: nor am I duely qualified for it. Expect not therefore, says he, any Thing more of me than only some Conjectures, and those perhaps such as carry no Shew of Truth, and are supported by no solid Reasoning. But surely, if any Thing was, this was his Business: and what was apparently expected from him. Now really, whatever shew of Modesty this may carry in it, these Expressions compli-*

ment

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\* P. 344.



ment the great Parts of the Author to the highest Degree that well can be; since they shew he expects that bare *Conjectures* of his, nay tho' looked upon by himself as slight ones, should pass current as sufficient Answers to the strongest Arguments of others. To think that in these Words of his he gives his real Judgment of his own Performance, must surely be surprizing, and indeed hardly credible. For how can it well be thought that a Man so ingenious, and discreet, should go about to offer what carries *no shew of Truth*, in Lieu of, not what really is so in it self, but what he only surmises, he has *rendered dubious*? to offer, as his *Conjectures*, what he confesses *are supported by no solid Reasoning*? Or how could he ever believe such would pass upon his Friend, who he represents to be as eminent for his Judgment as his Quality? But, after all, let us consider these *Conjectures*: and they are such as follow,

i. The Sea-shells, now digged up in all Parts, were not re-posed in the Earth at the Time of the first Separation of the Waters from the dry Land, nor before the Deluge.

i. Some shells, says Dr. Camera-rius, were perhaps lodged there, in the Earth, before the Deluge, at the first separation of the Waters from the dry Land, \* i. e. at the Creation. Now certainly this Conjecture of the learned Author will never appear very probable to any One, who hath observed what Plenty, and how great Variety, of these Bodies, are found in the Earth; especially if he has seen the whole Skeletons of Whales, the Teeth and Bones of Sharks, and of other Fishes, as also Sea-shells exceeding all Number and measure. Among others, of that Kind which *Fab. Columna* † calls *Concha Anomia*, I my self have taken Notice of many Millions in that one County of *Glocester*; not to mention those which I have observed in other Countryes, and those I have received Samples of from almost all Parts of the World. That such an Abundance of Shell-Fishes, of the same Kind, should have been created, all at once, at the very Beginning

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\* p. 346.

† De Purpura. C. 12.



Beginning of Things, can hardly seem credible to any thinking Man: and still less credible is it that, without any Cause, they should immediately be extirpated, and destroyed. Dr. *Camerarius*, very ingenious, as he certainly is, has not been able to find out, at least has assigned no Reason for the Destruction of them. Whereas, what Exceptions soever he may be pleased to make to it, that *Destruction of the first Creation*, \* which I supposed, † I have proved was brought on with a Design worthy of the Divine Wisdom. Besides, there are almost every where found, ‡ in the Earth, Shells, of the very same Kind, some small, others large: some young, others old: some immature, others full grown: and, in a Word, small Ones affixed to the larger, or those which are young to the Old Ones, just in the same Manner as they commonly are found at Sea, for their better Security against the

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Shocks

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\* Dr. *Camer.* Dissert. p. 344.

† *Nat. Hist. Earth.* Part 2.

‡ *Ibid.*

Shocks and Injuries of the Tides and Storms. These certainly give plain Proof that they were not all created together; but generated successively, and at different Times. To this may be added, that the very Order ‡ in which these Bodies are often found disposed: and those Indications, which so many Shells and Plants carry with them, of the Season of the Year in which the Deluge began, \* sufficiently prove this *Conjecture* of Dr. *Camerarius* to be without any Grounds. I shall say nothing here concerning the Bones of Quadrupeds, or about Vegetables, and in particular the great Trees which are commonly found lodged in the Strata, none of which could ever be the Production of the Waters. But, if I should, after all, ask by what Authority this learned Gentleman affirms that, when the Earth was first created, it was covered with Water, and that afterwards the Waters were *separated from the dry Land*? He must immediately

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‡ p. 45. to 49. supra.

\* Part I. §. 4. supra.



mediatly answer, that of *Moses*, Gen. i. But then *Moses* tells him likewise that those Bodyes, which are now found lodged to the greatest Depths in the Earth, were none of them created till after this *Separation of the Waters was made*. For the Waters withdrew on the third Day of the Creation \*; but Fishes, and the other Inhabitants of the Waters, were not made till the fifth, † which was two Days after. When therefore a Person, who would seem to write with so much Caution as Dr. *Camerarius*, says, that these Bodyes were left at Land, upon the Retreat of the Waters, when they were not created, and had not so much as Being till two Days after that Retreat, he says a Thing which surpasses not only mine, but the Apprehension of every Man of common Sense. Now, tho' he cannot shew us how this could possibly be, I will not straitways pronounce *the whole Camerarian System*, ‡ of which I have seen but a small  
Part,

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\* Gen. i. 9, 13.

† Gen. i. 20, 23.

‡ Differt. 19. p. 348. Confer. Part 2. § 8. supra.

Part, quite overthrown, yet I cannot well forbear thinking at least this Proposition of it, to be most *terribly Shaken*.

2. Those Shells were not originally lodged in the Fissures, but intermingled, and incorporated with the Matter of the Strata, while this was soft, loose, and in a State of Dissolution.

2. But let us proceed to the second *Conjecture* of the famous *Camerarius*, and see if that be more substantial. *Many of these Marine Bodyes*, says he, \* *were hurried by the Deluge into the Earth, through its Chasms and Fissures*. For my Part, I allow that, not only many, but *all of them* were brought to Land by the Deluge. *Dr. Camerarius* invented those Fissures, the better to introduce the Shells into the Bowels, and interiour Parts of the Earth, and to elude the Doctrine of the Dissolution of the Strata. But, if they were then thrown into Fissures, they would be found in Fissures now. Whereas, I never found so much as one of those Bodyes any where in the Fissures, nor have I read or heard, of any Man that ever did. They are always found, either loose on the Surface of the Earth, or incorporated

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\* p. 346.



corporated with the very Substance of Stone, and even the most solid Strata. If therefore he appeals to Nature in this Affair, she certainly gives her Suffrage for me. But, if he argues that those Fissures, and Chasms, have been since filled up in Tract of Time; neither has that any the least Appearance of Truth in it: and Nature her self Shews the direct contrary. For, was the Thing so, the Shells, and those other Bodyes, would be now found in the perpendicular and other Fissures, and not in the Strata themselves, nor in that adventitious Matter with which the Fissures are supposed to be filled. But the Fact is quite otherwise; they are found lodged promiscuously, and without any such Distinction, indifferently in all Parts of the Earth. To which may be added, that, if there were formerly any such Fissures, and filled up since, some Traces of them at least would still appear. That, the Variety of the Matter, and of the Constitution and Hardness of it, in the same Stratum, would readily and manifestly discover; which yet we no where find it does. Another very strong  
Argument

Argument likewise, to me, that these Marine Bodyes were not originally thrown into, and lodged in Fissures of the Earth, is, that there are such Multitudes of them, met with, even in the most midland Countryes, every where all about for many Miles together, particularly here in *England*, throughout almost the whole Countyes of *Glocester*, *Oxford*, *Northampton*, *Somerset*, and *Wilts*; in the Fields, and on the Hills. Or, where they have been lodged so deep that they cannot be now turned up by the Plough, and cast out upon the Surface of the Earth, there they are found by those that have Occasion to dig down deeper, in the Bowels of the Earth. If these, and all other Parts of the Globe, in which such Bodyes are now found, were once Fissures, and Chasms, filled with no solid Matter, those Fissures must have been surely of a prodigious and even incredible Extent. Finally, tho' these Shells, every where found, in the Strata, and never in the Fissures, sufficiently shew how little Dr. *Camerarius* was acquainted with this Affair, on which he ventured  
thus



thus to pass his Judgment, I will presume to add one Thing further which must render his Oversight still more evident. In Mining, and Opening Quarries, at the Fissures of the Strata of Stone, it is common to find shells so broke in two, and divided with the Stone, that one Part of the same shells shall remain on this side of the Fissure, and the other Part on the other side of that Fissure. Which, tho' there were no other Argument of the same Thing, plainly proves those Shells to have been lodged in the solid Strata, while they were continuous, and before those Fissures were made: and also that both those Shells, and the Strata, were broke, and divided, at the same Time, and by the same Means.

3. The third *Conjecture* of Dr. *Camerarius*, is that *these Shells were brought out of the Sea by particular Inundations* \* Now I should think that, before he had published this *Conjecture*, he should have looked for

3. *Those Shells were not brought out to Land by particular Inundations.*

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\* P. 346.

for some Support for it in History: and if he had found any Accounts of such Inundations, as they would have been new, so they would have been very acceptable to the Republick of Letters, if he had published them. Or he should at least have produced from thence some Instances of *Inundations*, which have reached quite to the midst of the greatest Continents: which have laid his own Country, *Germany*, for two or three hundred Miles under Water; for, even there, at so great a Distance from any Sea, are those Marine Bodies found: he should have given us Examples of such *Inundations* which have conveyed Shells, peculiar to the *American*, and other the remotest Seas, into the very Midland Parts of *England*, where we, at this Day, commonly dig them up: nay such as have brought Animals, that are Natives of the Land, or Rivers, into Countries where it is not probable there were ever any of the same Kind before, and certainly are not now the Natural Product of those Countries; such as Crocodiles, the Skeletons of which  
are



are found under Ground in *Germany* ;\*  
Elephants in *England*, where their  
Bones and Teeth are digged up in va-  
rious Places ; and that Kind of *Ame-  
rican* Deer, we call the *Moose-Deer* ;  
in *Ireland*, the Skeletons, and Horns,  
of which, of incredibly large Size,  
are often digged up there : finally,  
which have fetched up by the Roots,  
and thrown down Trees, such as  
those large Pines, and Firs, which  
are found, in so great Numbers,  
buried in almost all Parts of *Eng-  
land*, where no such, not only in  
the Memory of Man, but in the  
Records of any History, have been  
known to grow ; it is certain, *Cæ-  
sar* † testifies none were here in his  
Time. Dr. *Camerarius* should like-  
wise have bethought himself of a  
Way by which these Marine Bo-  
dies, brought from Sea, might, by  
the Violence of those *Inundations*, be so  
intermixed, and incorporated with  
the very Substance of the Strata of  
Marble, and all Sorts of Stone, in  
such Manner that, when these come  
to be now broke up, the Shells should  
for

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\* Miscell. Berolin. 1710. pag. 103.

† Com. de Bello. Gall. L. 5.

be found lodged in all Parts of those Strata: he should have thought of a Way by which some of these Shells could have been cast down to the Depth of several Hundreds of Feet in the Earth, while others were carryed up to the Tops of the highest Mountains, *e. gr.* of the *Alps* in *Europe*, and of other the loftyest *Asiatic*, *Chinese*, and *American* Mountains. When the learned Author framed this his *Conjecture*, he seems to have had *England* particularly in View, *An Island encompassed on all Sides with the Sea* \*. But he certainly ought to have considered that this our Island has Mountains, tho' not equal to those just mentioned, very large, and high; of which I scarce know any, which have not Shells lodged in them to the very Tops. If therefore he can imagine those Shells were carryed to the Tops of those Mountains by any particular *Inundation*, what Condition does he think, *France*, and all *Europe*, nay and the whole *Globe*, were in, at that Time when the highest Hills in *Britain* were covered by the Waters

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\* Page 290, 347.



Waters of that *Inundation*? For Water cannot be piled up in Heaps, but must flow about, till the Surface of it is on all Sides equidistant from the Centre of the Earth: and consequently all Parts of the Globe must be then laid as deep under Water as *England*. All these Things being seriously weighed, by any Man, I can scarcely believe he will easily come into this *Conjecture* of the ingenious *Camerarius*: or ever imagine that these Marine Bodyes could be brought from Sea, and lodged in all Parts of the Earth, by any other Means than the *Noetic* or Universal Deluge.

4. His fourth *Conjecture* is what follows. Hence, says he, it is that so many Marine Bodyes are found in England. That Island, being environed by the Sea, admits, by subterraneous Passages, the Waters of it into its Bowels deeper and further than you would imagine\*. But before he had suggested that those Marine Bodyes were brought, through any Passages, Subterranean into the Bowels of the Earth,

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or

\* Pag. 347.

or its interior Parts, and such as are very remote from the Sea, he should have put it beyond all Doubt that there are such *subterraneous Passages* from the Sea. Certain it is such are yet discovered. Whereas if there really were such, they would be easily found out, so spacious † as they must be, to receive such vast Bodies into them, and to give Way for them to pass into the very Middle of this Island. Not to mention others, many Shells of the *Ammonite* Kind, two Foot over, are digged up in *Portland*, and some broader in *Glocestershire* and *Somersetshire*. Besides the Skeletons and Bones of Whales, and other the largest Fishes, are digged up here. But for what Purpose can we think those Fishes should swim up these Passages, if there were any such? And to Places so far distant from the Sea? For Nature has not assigned them any agreeable Way of Living or Habitation under the Earth. But should we suppose so great Numbers, some of them of so vast a Bulk,

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† Conf. p. 140. *supra*.



Bulk, to have been hurried and thrown up hither, that could never have been effected without a Force far greater than is easy for us to conceive or imagine. And why do not we see as great Numbers of them in our Times forced up by the same Violence? Some †, who defend this Opinion, think the Waters are carryed through those Passages from the Sea, to supply the Springs and Rivers; but without any Proof from Nature, or Shew of Reason. For was it so, the Spring and River Waters would be salt, like those of the Sea. 'Tis plain, were those Passages so spacious, as to receive such great Bodyes, as some of those which we often find in the Earth, they could not separate the Salt from the Waters by Percolation, nor by any other Means hinder its attending of them. In short, the Water could not rise, through such Passages, above the Altitude of the Surface of the Sea. Whereas those Shells, and other Bodyes, are found quite up to the very

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Tops

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† See T. Laurence Mercur. Central. 12mo. Lond. 1664.

Tops of the highest Mountains, some Miles higher than the Sea, if not in *England*, at least in other Countries. But, lastly, there's an Argument equivalent to almost all the rest, which is that these Marine Bodies are never found, either in Fissures, or subterraneous Passages; but lodged in the very Strata of Marble, Clay, and of Stone, and every other even the most close dense and solid Matter. Are therefore those Passages, through which the Springs and Rivers are supplied with Water, usually damm'd, and fill'd up with terrestrial Matter, and Marine Bodies? If so, whence have we at this Day remaining any Springs or Rivers? Or do those Passages, and subterraneous Channels, frequently change their Course, from one Part of the Earth to another? We certainly no where see or observe any Thing of this Kind. Springs, and the Heads of Rivers are at this Day in the very same Places that they antiently were. Nor indeed does there any where appear, in Nature, any Power that is ordinarily capable of effecting such Changes in the Earth. If there were ever any such Changes made, those  
Marine



Marine Bodyes would be now found, lying in a certain Method, and Track, answering the former Course of those Channels filled up since; which, as I have sufficiently shewed before, is no where to be seen.

5. Thus far I have had under Consideration what Confirmation from Nature, and the Things themselves, and what appearance of Truth, the four first *Conjectures* of Dr. *Camera-rius* carry along with them. But what shall I say to his fifth *Conjecture*? He thinks it no absurdity to suppose God to have made some Analogy and Resemblance betwixt Marine and terrestrial Bodyes, by creating various Kinds of Stones representing the Forms of Sea-Shells\*. By the same Rule also Hazle Nuts, such as grow on Trees upon the Earth, Pine Apples, nay even Oaks, and other Trees, and Vegetable Bodyes, which are found buried to a very great Depth in the Earth, were all there created by God. This is indeed an easy Way of solving all those Difficulties;

5. *Those Shells were not created, by God, in the Bowels of the Earth; but bred at Sea.*

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\*. Pag. 348.

cultyes, but founded on no Support of Nature, or Attestation of Holy Writ. After all, supposing God did create these Bodyes entire, did he likewise create Pieces and Fragments of them in the Earth? For 'tis common to dig up Fragments of Shells: and, in some Places, only the upper Shells of Bivalves, in others, only the lower Shells: nay Bivalves, turbinated, and indeed Shells of all other Kinds, without having in them the Animal or Fish belonging to these Kinds. But perhaps we may set this Conjecture of *Dr. Camerarius* in a better Light, if we imagine *Aristæ* or Beards of Corn created without the Ear, the Bark of Cedars without the Wood, the Hides of Oxen without the Flesh and Bones, the Skins of Men without their Bodyes, and Hands or Legs without the rest of the Limbs, or other Parts. For in the same Manner the Fossil-Shells and other Things we treat of, are often found in the Earth; *e. gr.* all Sorts of Shells without the Fish in them, some one Bone without the rest of the Skeleton, or a single Tooth without the Jaw. But to pass over these Things, and what I have  
 pro-



produced to the same Purpose in the *prelim. Dissert. to my Nat. Hist. of the Earth*, there are many other Things which much weaken this *Conjecture*: and which the *Camerarian Hypothesis*, that allows only the Figure and Similitude of Marine Bodies to those Fossils, cannot account for. 1st. The Shells, which are digged up in Places, and found lodged in Matter, fit to preserve them, and which therefore are firm, found, and have less felt the Injuries of Time, yeild still a true Marine Salt, such as recent Shells taken out of the Sea, or cast on the Shores, are wont to yeild. This is certainly worthy the Consideration of the learned Author: and tis what I had long ago put him, and my other Readers, in Mind of, *Nat. Hist. Earth, prelim. Dissert.*

2. There are also found in the Earth the Teeth of Fishes ground down, and worn away, in the very same Manner as the Teeth of those Kinds of Fishes, taken at Sea, usually are, by chewing their Food. 3. The Shell-Fish called the *Purpura*, has a Tongue of a considerable Length, terminating in a hard boney sharp

L 4                      Point,

Point, with which, as with an Augre, he bores Holes thro' the Shells of other Shell-Fish, and feeds on the Substance of them drawn forth thro' those Holes. This has been observed of the *Purpura* by the antient Naturalists, particularly *Aristotle*, and *Pliny*. Thus *Aristotle* writes concerning it, *such is the Strength of this Member, the Tongue, in the Purpura, that he is able therewith to pierce thorow the Shells of Shell-Fish, particularly those of the turbinated Kind, with the Meat whereof he is wonderfully delighted* \*. What *Pliny* † says, is, *the Tongue of the Purpura is about a Finger's Length, with which he feeds himself, by boring thorow the Shells of other Shell-Fish; so hard is the Point of it.* Now there are commonly found in the Earth, among others,

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\* Ταῖς γὰρ πορφυραῖς τοσαύτην ἔχει δύναμιν τῆτο τὸ μόριον, ὥστε καὶ τῶν Κογχυλίων διαστυπῶσι το ὄσρακον, ὅιον πῶν σφόμβων, οἷς δελεάζουσιν αὐτάς.  
Aristot. de Partib. Animal. Lib. 2.

C. 17. versus finem.

† Lingua Purpuræ Longitudine digitali, qua pascitur perforando reliqua Conchyliia; tanta Duritia Aculeo est. *Hist. Nat. Lib. 9. C. 36.*



thers, Shells bored thorow in the Manner above described; whence it is certain that those Shells had once living Fishes in them, and that those Fishes formerly lived in some Place, where also there were *Purpuræ* to feed on them: and that Place could be no other than the Sea. 4. It is common to dig up the Shells of Oysters, *Conchæ*, *Pectines*, and other Bivalves, which retain plain Marks of Tendons, and other Signs which undoubtedly shew that they had once actualy the living Creatures in them. 5. Lastly, the *Echinitæ*, *Conchitæ*, *Cochlitæ*, and other Bodyes of that Kind, consisting of Stone, Flint, Spar, and other Mineral Matter, which every Way match the Size, and exhibit the perfect Resemblance of the interior Part of those Shells, from which they have derived their Names, could never have been so formed, moulded and shaped, had not those Shells been quite empty. But there are other Bodyes also, of which I have Samples by me, formed likewise of Stone, Flint, and Spar, which represent only Pieces, or some particular Parts of the *Echinitæ*, *Conchitæ*,  
*tæ*,

*ta*, and *Cochlita*. These, any One, at first Sight, may plainly discern were formed in the Shells, while they had yet their Fishes actualy in them: and therefore could receive only so much of the Stoney Flinty or Sparry Matter, as would fill up the Parts which were empty or vacant, and not possessed or taken up by the Fish. Thence it is, that those Stoney Flinty and Sparry Bodyes bear only the Resemblance of that Vacancy, as having been moulded in it. Now these Bodyes plainly shew those Shells to have had Fishes formerly in them: and at the same Time point forth to us the true Origin of them; *viz.* that they were not produced in the Places where they are now found, but were at some Time brought all from the Sea.

*The gross Mistake of those who imagine, not only Shells, but several artificial Things dig'd up, were form'd in the*

But let us consider this *Conjecture* of Dr. *Camerarius* a little more attentively, to see if it may not be applyed to other Uses, and made to explain some Things, which have afforded hitherto Matter of Dispute to the Learned. Indeed I cannot think that Dr. *Camerarius* will take it ill, if I endeavour to improve, in-  
large,



large, and render more usefull, what *Earth, by*  
he had the Ingenuity, and good For *Nature*  
tune first to find out. It is common *playing and*  
in many Places to dig up Coins having *sporting un-*  
inscribed on them the Names of *der Ground.*  
*Alex-*  
*ander the Great, Julius Cæsar, Cu-*  
*nobeline,* and other Emperors and  
Kings. Should any fancy that these  
were stamped by some Mint-Master  
many Hundred Years ago, and after-  
wards lost, or hid and burved in the  
Earth, and have lain there for so long  
a Time, he truly would seem to rea-  
son much after the common Rate, and  
just as those do who believe the  
Shells, found in the Earth, were ori-  
ginally produced at Sea. 'Tis much  
the shorter and easyer Way of de-  
ciding so disputable a Point, if, as the  
Matter of the Coins must, so like-  
wise the Forms of them, be ascribed  
to the Workmanship of God. And  
he who thus happily first removed  
this cruel Stumbling-Block, out of the  
Way of the Students of Antiquity,  
can never be thought less deserving  
our Praises and Rewards than he who  
shall happily find out

*Where*

*Where there grow Flow'rs inscrib'd  
with Names of Kings \**

Nay further, if it so fall out that those employed in digging, should, as they frequently do, find, under Ground, Things carrying with them the Appearance and Shape of Pots, and Earthen Vessels, tho' those Things have been hitherto taken for antient *Roman Urns, Pateræ, or Simpula*, yet it would be intolerable, that we, and all Posterity should run still on in the same Mistake. For in good Truth it is to the full as likely that these Pots, and other Things, were formed by Nature in the Earth, as those Shells. But least I should seem to propose this rashly, or to arrogate to my self the Honour of this *Conjecture*, so much of a Piece with that of Dr. *Camera-rius*, there are some Writers of Natural History, and indeed principaly those, that will needs have it that the Shells, found in the Earth, were produced there, who advance the same Opinion concerning these Utensils.

Whether

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\* Quibus in Terris inscripti Nomina Regum  
Nascantur Flores.-----



Whether or no, if Dr. *Camerarius* gives Sanction to this Opinion of those Writers, People may not go hereafter to search for Earthen Ware, as now they do for Ores of Metalls, in the Bowels of the Earth, and so finding them there under Ground ready made to their Hands, have no need to buy, or have Recourse to the Potters, they may not be all undone by the Shift, I cannot tell; let them look to that. But, certain it is, that *Bob. Balbinus*, with great Elegancy, calls these Vessels *Fossil Pots* \*. *Conrad Gesner* terms them *Native Pots* †. And Dr. *Jo. Dan. Major* treats of them as of *Fossil Urns* ‡. *Balbinus* gravely and wisely argues that Clay---- readily, and of its own Accord, disposes it self into the Shape of Pots, Nature her self directing what she would have here done †. Finally another like

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\* Ollas Fossiles. Miscell. Hist. Regni Bohem. L. I. C. 49.

† Ollæ Nativæ. De Fig. Lapid. p. 87.

‡ Urnis Fossilibus. Dissert. Epist. de Cancris & Serp. petrif. p. 43.

† Existimat Argillam--- ad figuram Ollarum sponte sese ac libenter componere, Natura ipsa quod fieri velit docente. Loco supracitato.

like sagacious Writer, treating of Pots digged up near *Spremburg* in the lower *Lusatia*, is of Opinion, *That the Possibility of such Pots being formed by Nature is not to be disputed\**. This Way indeed of arguing and making Inferences, having already got Authors of so stanch Judgment, and Patrons so mighty, if it should at last prevail as to the Formation of Shells, Bones, Teeth, and other like Bodyes in the Earth, it would make the whole Matter so easily intelligible, that no Doubt or Dispute can ever possibly be raised about it hereafter. But yet I cannot forbear telling them that there is one Thing I would advise the Authors that shall take upon them this Task, to write, not in Prose, but in Verse, nor were it amiss that it should be set also to some suitably merry Tune; since *that Nature*, to which, they ascribe such Works, can be only fictitious, and *Poetical*: and that *God*,  
which

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\* Credit naturæ in ejusmodi fabricandis Ollulis Possibilitatem non esse detrahendam. D. Ebr. Hagendon Miscell. Cur. Ann. 3. Obs.



which *Camerarius* brings in here meerly imaginary, and *Mechanical*\*. But 'twere to have been wished that this so considerate a Writer had taken here the Advice of one of the best Judges of Poetry that ever lived,

----*Ne'er introduce a God,  
But for a Cause right worthy of a  
God* †.

With so much Reverence did he, in those Days, think those his Gods, tho' really no better than fictitious, ought to be treated. But they who suppose the One only true God, the great Author of Nature, to be thus employed, in making Toyes, and Things of no Use, may be deservedly thought either not rightly to know God, or not to pay him due Reverence. So that a Man of great Wit and Learning, Dr. *Hier. Cardan*, with good Reason, sharply reprimands that rash Way of Conjecturing; *We sorry idle Fellozws*, says he, *talk of God as of one*

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\* Θεός ἀπὸ μηχανῆς.

† Nec Deus interfit nisi dignus Vindice  
Nodus

Inciderit.----- De Arte Poet.

one of us †. Of the same Sort also is that other *Conjecture* of the famous *Camerarius*, where he says, *he had rather suppose the beneficent Creator would have shewed Men the Use of Letters, than believe he would have let them lived for sixteen and more Ages without the Knowledge of them, or that Picture should be more antient than simple Writing* \*. 'Tis impossible surely but that, from the Time this lucky *Conjecture* was first advanced, *Polidore Vergil*, *Geo. Paschius*, and others who have wrote of the Inventors of Things and Arts, must lose the Esteem they have hitherto obtained, and be now finally wholly despised. Nor can it be well wondered at if the late Author of *Muscipula*, who, in his facetious Manner, attributes the Invention of the Mouse-Trap to his happy *Welch* Hero, he reckoned fit Company for such *Poetical* Writers.

But

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† Nos Nebulones loquimur de Deo tanquam de uno e nobis.

\* Pag. 304.



But Dr. *Camerarius*, not to seem altogether destitute of an Argument, takes in one, and that only, from Analogy. As, says he, God have Species of Vegetables in the Sea, perfectly analogous and like others at Land, in that great Variety of Coralls, Corallines, Sponges, Alga's, Fucus's, &c. what hinders but that there may be such a Vegetation and Growth of Stones in the Earth, as there is commonly at Sea, and as is especially observable in Coralls, that are of Stoney Nature \*. Most certainly nothing hindered but that God might have done so; tho' that he actually has done so, does not thence by any Means follow so far as I can perceive. But if it were so that God had made Bodies at Sea analogous to others at Land, it does not thence follow, that he must likewise, on the other Hand, have needs created Bodies at Land resembling those at Sea, or that there should be any Vegetation of Stones, in the Earth, representing Marine Bodies. But not

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to

\* Pag. 349.

to insist upon this, let the learned *Camerarius*, if he can, produce such Bodies growing *in the Sea*, either *Coralls, Corallines, Spunges*, or any other, which are *analogous to Terrestrial Bodies*, either in their outward Form, or inward Texture. For, in Truth, neither I, nor any Body else, ever saw any Samples of such Things. But when he, from his better furnished Cabinet, and Store, shall be able to produce any, I will readily come into, and embrace this his *Conjecture* concerning them.

*The Conclusion to the right honourable the Earl of Pembroke.*

These, my Lord, are the Objections which the learned Dr. *Camerarius* has been pleased to offer against what I have set forth, in the *Nat. Hist. of the Earth*. Of what Force and Weight they are, whether he had really any just Cause for writing at all, and whether what I have here replied may be admitted as a full Answer to him, I willingly leave to be determined by any impartial and intelligent Person, but, above all, your Lordship, to whose distinguished and uncommon Judgment, as in all others, so likewise in these Studies



dyes and Subjects, I pay a very great Deference; wishing, most sincerely, that, as you have hitherto done, you may long continue to live, with Health, and Prosperity, a Benefit, and Blessing to this our Age, our Nation, and this great Metropolis.

*Gresham College*  
xi Dec. 1713.

F I N I S.



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## ERRATA,

Occasion'd by the Editor's being at  
a Distance from the Press.

**P**Age 1. line *ult.* after *Art* add (,) P. 5. l. 14.  
read—*but whose Authority.* P. 12. instead of  
*Prelun*, in the Reference at the Bottom, r. *Pralim.*  
P. 17. l. 8. r. *From these strange Shells.* P. 31. l. 17.  
instead of *interior Figure*, r. *inward Form.* *ibid.* l. 26.  
instead of *the Book*, r. *his Book.* P. 61. the last Mar-  
ginal Title should stand higher against l. 19. P. 73.  
in the Reference, l. penult. r. *Οι κ' ὕψυ.* P. 74. in  
the Reference, the Accents are wanting over  
*ἀπόλλυται*—*τότε*.—*γῆς.* P. 145. l. penult. r.  
*subterranean Passages.* P. 156. in the Reference  
after *Flores* add *Virg. Eclog. 3.*

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