



COMPARATIVE ESTIMATE

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OF THE

MINERAL AND MOSAICAL

GEOLOGIES.

Bristol Education Society

“ Singulare remedium antidotumque exhibet PHILOSOPHIA contra infidelitatem et errores. Nam Salvator noster inquit, ‘ *Erratis nescientes SCRIPTURAS et POTENTIAM DEI.*’ Ubi *duos libros*, ne in errores incidamus, proponit nobis evolvendos: primo, VOLUMEN SCRIPTURARUM, quæ voluntatem Dei, dein, VOLUMEN CREATURARUM, quæ potentiam revelant.”

BACON, DE AUGMENT. SCIENT. lib. i. tom. iv. p. 40.

By GRANVILLE PENN, Esq.

LONDON :

PRINTED FOR OGLE, DUNCAN, AND CO.

AND SOLD BY PARKER, OXFORD; DEIGHTON, CAMBRIDGE; BELL AND BRADFUTE, EDINBURGH; AND M. OGLE, GLASGOW.

1822.

COMPARATIVE ESTIMATE

OF THE

MINERAL AND MOSAICAL

GEOLOGIES.

By Sir RICHARD DODD.

“ Sir Richard Dodds's translation exhibits a comparative estimate of the mineral and mosaicical geologies of the British and French islands. It is a valuable and interesting work, and will be found useful to all who are engaged in the study of the geology of these islands. The author has not only translated the original, but has also given a full and accurate account of the geology of the British and French islands, and has compared the two geologies, and shown the differences between them. The work is well written, and is a valuable addition to the literature of geology. It is published by the author, at the price of 10s. 6d. per volume. London, 1830.”

By RICHARD DODD, Esq.

LONDON:

PRINTED FOR GEE, DUNCAN, AND CO.
AND SOLD BY PARKER, BOND; BELL, COURTNEY; BELL AND BELL, PATERNOSTER; AND H. COLL, CLIFTON.

LONDON:

PRINTED BY J. MOYES, GREVILLE STREET.

BS657

P45 iv

1822

PREFACE.

I AM sensible that the first use which I ought to make of this preface, is to apologize for troubling the world again, so soon after submitting to its judgment my observations on *The Primary Argument of the Iliad*. The best apology which I can offer, is the assurance, that neither of these tracts has been newly or hastily taken into hand; but, that they have lain by me for many years, and have been occasionally revised, extended, or curtailed, according as later materials have fallen in my way.

When Varro published his treatise upon *Agriculture*, he alleged; “*annus octogessimus admonet me, ut sarcinas colligam antequam proficiscar de vita.*” No one

of common sense, will wait in the expectation of such a monitor. Short of the term of the vivacious Varro, every reflecting person will be sensible of a period, in which it is prudent to begin *sarcinas colligere*. This motive has induced me, to allow treatises, upon subjects so widely different, to follow each other so soon; and I request, that the same may be favourably received as a general apology, should the present tract not be the last thus adventurously put forward.

With respect to the *argument* of the present work, it is my wish, not to anticipate it in a preface; but, to leave it to unfold itself to the reader in the perusal. I shall, therefore, only briefly and summarily state; that the *First* and *Second Parts* consider, severally, the doctrines of the *Mineral* and the *Mosaical Geologies*, concerning the *MODE of the first formations of this terrestrial globe*; and, that

the *Third Part* compares the doctrines of both *Geologies*, relative to the *MODE* of the revolutions which this globe has undergone. The *results* of these investigations, will be found combined in the *Conclusion*, with which the treatise is terminated.

I have endeavoured, by keeping the argument simple and compressed, to avoid all superfluous dilatation and digression; in which endeavour, I hope I shall be found to have succeeded. It was originally designed, and it has been solely prepared, with a view to such earnest and sincere inquirers, as may be anxious to relieve their minds from perplexity, or to disengage them from error, concerning the important subjects of which it treats; and to *advance*, in the prosecution of the *truth* respecting them, as far as its *principles*, actively pursued, are capable of conducting them. Such *advance*, is frustrated by the practice which, in similar discussions, has too frequently

prevailed; of maintaining a constant skirmish with cavillers and sophists, whose policy it is to challenge a perpetual warfare on the road, in order that it might not be travelled to the end. By yielding to that stratagem, we contribute to the attainment of one great end of infidelity. Whereas, if we will only resolutely set forward, and pursue our progress under the safeguard of *a sound and powerful principle*, we may set all adversaries at defiance; and, by pressing on to the utmost extent to which that principle will lead us, we shall at length arrive at the term, from which it was the design of the adversary to preclude us. It is a weak system of tactics, which, in an enterprise of great moment, would stop to engage with every hovering band that attempts to harass the march; while, at the same time, there exists *a consciousness of force*, sufficient to accomplish the enterprise in spite of all opposition.

To those among the opponents who

cherish a general regard for truth, and many such there are, the manifestation of the *Sacred Truth* which we shall have gained in their despite, will operate with advantage; and they themselves will thus become benefited by the resolution, with which their arms shall have been slighted, and their opposition disregarded. With respect to all other opponents; as we cannot entertain the hope of serving them by our success, so neither shall we suffer ourselves to be interrupted by their opposition: — *obturatâ aure transibimus.*

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tion:—obtainat ante Transmissum.

A

COMPARATIVE ESTIMATE

OF THE

MINERAL AND MOSAICAL

GEOLOGIES.

CHAPTER I.

PART I.

CHAP. I.

THE characters which unfold themselves to our view, in examining the substances of this globe, point out to us some period, or periods, in which the order of its structure sustained violent agitation and alteration. In every part of the earth we encounter unequivocal evidence of disruption, subsidence, and subversion of its hardest and most solid materials; and we discover remains, equally unequivocal, of organic matter, both animal and vegetable, involved and deeply imbedded in other of its materials, which are soft, or which must have been so at the time when those foreign substances were imbedded within them. Monuments, so wonderful and so important, have

B

PART I. naturally stimulated the curiosity of man to
 —
 CHAP. I. inquire, and to endeavour to ascertain, *how* and
 when those amazing effects were wrought in the
 substance of our globe.

An extended investigation of the same characters has led to a further observation: that those foreign organic substances are not found indiscriminately in *all* the materials of which our earth consists; that they are found only in *one* order of them, while in *another* order they are *never found at all*. This remarkable fact, well established, has given occasion to a division of the materials of the earth into *two* general classes, distinguished chiefly by the *presence* and the *absence* of organic fragments; and, since it has been observed, that the materials in which those fragments occur, bear, in general, the appearance of *sediment* deposited in water; whereas, those in which they never occur wear a *crystalline* appearance; their respective *formations* have been reasonably ascribed to different immediate causes. And because those which appear to be *sedimentary* are observed to be deposited *upon* those which appear to be *crystalline*, the latter, which sustain the former, are with equal reason assumed to be of a more ancient date: and from hence all the mineral matter of this globe has been distributed scientifically into two principal

divisions, entitled *primary* and *secondary*; the *first* of which comprises the *crystalline* matter, containing no organic fragments, of which kind are *granite rocks*; and the *second* comprehends the *sedimentary* matter, in which alone those fragments are contained — such are, *calcareous* or *argillaceous earths containing sea-shells*.

PART I.

CHAP. I.

An *intermediate* or *transition* class has of late years been introduced, with much accuracy, between the two; comprising mineral masses formed of the conglutinated fragments of different *primary* rocks, but rarely enclosing any organic fragments — such is that species of *rocks* which is called *pudding-stone*.

In this general distribution of terrestrial matter, the *primary class*, exhibits to us the mineral matter of the globe in its primitive formation and texture, *previous to the existence of organized beings*: the *intermediate class*, exhibits the same matter in a state of extensive fracture and disorder, in consequence of some violent force exercised upon it; and the *secondary class*, indicates the universal subjection of mineral matter to the dissolvent quality and mechanical action of water, *subsequently to the existence of organized beings*. From which general diversities, the intelligence is naturally led to apprehend corresponding and succeeding periods in the remoteness of time. 1. The

PART I. period, of the *beginning* of this terrestrial system, when it received its *first mineral formation*.

CHAP. I.

2. The period, of a *violent disruption* and dispersion of part of the mineral substances composing that *first formation*; and, 3. A period, of the *general destruction* of animal and vegetable life; and of the occupation of our present earth by the waters of the sea. These several characters, unequivocally marked, and of late years observed with peculiar ardour and application, have excited the ambition of science to investigate, and to endeavour to detect, *the mode* by which, and *the times* in which, those several classes of matter received their respective sensible formations.

The particular science which undertakes to lay open to us these profound *historical secrets* of time and nature, has received the denomination of GEOLOGY; a science, whose pretensions are of the most exalted and comprehensive kind; since it extends its view to the *commencement of time*, and embraces within its scope the *origin and revolutions* of all terrestrial matter, *mineral, vegetable, and animal*. To attain to the *certainty of fact*, in these important particulars, is to arrive at an universal principle of *truth*, diffusing light and distinctness over every object of human contemplation; to be seduced into error respecting them, is to be-

come involved in an universal cloud, spreading obscurity and confusion over every object. It is evidently, therefore, of the very highest concernment, that, in seeking for that certainty of *fact*, we should make choice of *the guide* competent to conduct us to it with the *most perfect security*.

PART I.

CHAP. I.

Unfortunately it happens, that two *guides* present themselves to us, at the outset of this pursuit, to importune and claim our confidence, which *two guides* are directly contradictory to each other; so contradictory, indeed, that whichever of them be *true*, the other must of necessity be absolutely and fundamentally *false*: these are, *the Mineral and the Mosaical Geologies*. The *latter* of these, is of very great antiquity; and rests its credit, for the truth of the historical facts which it relates, upon a *record* pretending to *divine revelation*; and acknowledged as such, by the uninterrupted assent of some of the best and wisest of mankind, for *upwards of three thousand years*. The *former*, is of very recent origin; and can hardly be said to have existed, in a state approaching to maturity, for much more than *half a century*. This guide does not, indeed, pretend to oppose any *record* to that of the other; but it aspires to establish a series of *historical facts*, by induction from *chemical principles newly discovered*, which

PART I. it affirms, disclose *evidence of truth* superior to
 CHAP. I. any that is presented in the *professedly historical*
 document, and which must, therefore, qualify
 the *credit* which that document is *entitled to*
 receive.

To extricate themselves from the labour and embarrassment of *choosing* between two such different and adverse parties, some inquirers have attempted to employ them both; and with that view have endeavoured, by various schemes of *accommodation*, to effect a reconciliation between them. But, the result has always been, that which must ever attend measures of undue compromise and concession, — *perpetual inconsistency in the progress*, and *ultimate failure in the issue*. There can be no *real reconciliation* between *positive contradictories*, no compromise between *truth* and *falsehood*; and therefore, since the generality of inquirers have exclusively followed one or other of these two guides, it is manifest, that one division of them must have been drawn into an error of the most extensive and injurious operation: for, as Cicero long since pronounced, “*labi, errare, nescire, decipi, et malum et turpe ducimus;*” and there are few subjects on which the force of this maxim falls more heavily than on this.

In this dilemma, there is only one course

which wisdom will counsel, or reason sanction; and that is, to bring the pretensions of the two opponents fairly to an issue, by applying them both to some *common and agreed test*, by the decision of which we may be able to ascertain the validity of each, — and thus, at length, determine conclusively, which of them is *true*, and which is *false*.

PART I.

CHAP. I.

And the task is not so difficult as it might at first sight appear, from the voluminous mass of geological disquisition, the intricacy of the subjects which it embraces, and the hard words with which it has entrenched itself. We have no necessity to embroil ourselves with all the multitudinous details of that disquisition: we need only to extract the *root*, or *fundamental principle*, on which the bodies of the two geologies severally rest; to apply each to that common test; and afterwards to abide by the one whose superior validity shall be established by the authority of that criterion.

To extract the root or fundamental principle of the new geology, is become a very easy operation, in consequence of the systematic order which it has at last acquired. It has now assumed a form of complete symmetry; and presents itself to our view in the unity of a well-compacted structure, with root,

PART I. trunk, and branches. We have, therefore, only
 CHAP. I. to direct our attention to *the root*, without
 pursuing the process of the trunk, or the rami-
 fications of the branches: such as is the quality
 of *the root*, such also will necessarily be that
 of the process and ramifications which derive
 their substance and vitality from it.

Although many skilful and eminent writers
 have contributed their assiduous labours to the
 edification of this science, yet it perhaps owes
 its fairest and most finished form to a recent
 French geologist, who, in the execution of
 his elaborate work, has displayed equal ability
 and integrity of mind. For, although he has
 applied the powers of a superior genius to
 advance the progress of his science; and al-
 though he has given to those powers all the
 impulse of an enthusiastic ardour, inspired
 by the grandeur of his subject, yet he has,
 at the same time, affixed to his treatise this
 honourable and upright profession: “ My sole
 “ object is to propagate *the truth*; and I should
 “ see with satisfaction any work which should
 “ establish it, even if it should overturn any
 “ of the assertions which I have believed,
 “ or which I still believe, to be true. It was
 “ not a desire to maintain or to gain converts
 “ to a system, that induced me to take up
 “ my pen. I positively adopt none; and if,

“ in treating of mineral masses and strata,
 “ I appear to follow an hypothesis with respect
 “ to *the mode of their formations*, it is, because
 “ such a method of proceeding appeared to
 “ me simple, and well adapted for representing
 “ facts, and connecting them together: much
 “ in the manner of those philosophers, who,
 “ though they are not convinced of the exist-
 “ ence of a magnetic fluid, yet *suppose it*, in
 “ order that they may be the better able to
 “ describe what takes place in the different
 “ phænomena of magnetism¹.”

And, that this profession was as sincere as it is positive, this respectable writer affords many proofs; and especially when, though attached to the Neptunian geology of Werner, he yet relinquishes its doctrine with respect to the cause of the basaltic formations of Saxony, in these terms:—“ The facts which I
 “ had just witnessed spoke too plainly; the
 “ *truth* was too manifestly exposed before my
 “ eyes; I must either have absolutely resisted
 “ the testimony of my *sight*, not to *perceive*
 “ it, or that of my *conscience*, not to *declare it*.”

To such a dissertator we can, with confidence, address an argument which equally seeks

¹ D'AUBUISSON, *Traité de Géognosie*, tom. i. Disc. Prel. p. 17. ² *ib.* tom. ii. p. 603.

PART I.

CHAP. I.

for truth; nor shall we think it necessary to apologize for the earnestness with which we may deem it requisite to conduct it. The disciple of Werner, who holds his mind in that state of subordination to *truth*, that he is at all times ready to pass from the Neptunian to the Plutonian scheme of geology, if the latter can only exhibit proof that the balance of reason weighs on its side, must be equally ready to surrender the mineral geology altogether to the Mosaical, provided that the latter should be found, after a trial of their respective authorities by some *common conventional standard*, to be that which can best sustain the test of the criterion.

Now, it is not difficult to find such a *criterion*, because mineral geology itself proposes one for the trial of *its own* validity, and the Mosaical geology consents to submit itself, unconditionally, to the same: so that the whole operation will be reduced to the simple process of applying, successively, to the *same* standard, the *root or fundamental principle* of the *two* geologies, with respect to the *modes of the primary and secondary formations* of the mineral substances composing this globe.

The test to which mineral geology appeals, is *the reformed philosophy of BACON and NEWTON*. Our object will therefore be, to ascertain whether the *mineral* or the *Mosaical* geology

can best endure the trial of that test. And, since the former, which challenges the trial, is of very recent origin, whereas the latter is of very great antiquity, it will be in propriety and order, that we should bring first to the test the quality of the new pretender. Let us therefore inquire — *What is Mineral Geology?*

PART I.

CHAP. I.

recent denomination, Geology, is no other than mineralogy, of the science of minerals; determining the mode of the first formation of the mineral substances composing this earth, and the mode of the changes which those substances appear to have subsequently undergone. That this is a true definition or description of this geology, is attested, both by the statements of its teachers, and by their reports of the history of its origin.

The principal object which geology has in view, says the able writer from whom I have just quoted, is

1. The knowledge of the mineral masses, or rather of the different groups or systems of mineral masses, whose assemblage composes the solid portion of the terrestrial globe. It considers the mineralogical composition, structure, and extent of each of these systems. It treats of their reciprocal

PART I.

CHAP. I.

PART I.

CHAP. II.

CHAPTER II.

PART I. MINERAL GEOLOGY, as it is properly characterized by Cuvier¹, or, according to a more recent denomination, **GEOGNOSE**, is no other than *mineralogy*, or the *science of minerals*; determining the *mode* of the *first formations* of the mineral substances composing this earth, and the *mode* of the *changes* which those substances appear to have subsequently undergone.

That this is a true definition or description of this geology, is attested, both by the statements of its teachers, and by their reports of the history of its origin.

“ The principal object which geognosy has
“ in view, (says the able writer from whom
“ I have just quoted²), is,

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“ poses the solid portion of this terrestrial
“ globe. It considers the mineralogical com-
“ position, structure, and extent of each of
“ these systems. It treats of their reciprocal

¹ CUVIER, *Theory of the Earth*, sect. 22, p. 67. ² Tom. i. p. 1.

“ dispositions, of the circumstances of their
 “ *superposition* one to the other, and of the
 “ different relations subsisting between them :

PART I.

CHAP. II.

“ Secondly; *Of every thing which relates to*
 “ THE MODE *of their* FIRST FORMATION : And,
 “ Thirdly; *To* THE CHANGES *which they*
 “ *have undergone.*”

In this exposition, the first article describes *simple mineralogy*; the two other articles describe the same science converting itself into *mineral geology*.

If we consult the historical accounts of the origin of this science, as they are delivered by its professors, we shall find that they exactly answer to the preceding description. They relate, that the *experience* which had been acquired in a long course of *mineralogical practice*, the numerous observations which had been successively made by a series of able and acute *mineralogists*, and the light diffused over *mineralogy* by the improvement and reformation of *chemistry*, engendered an ambition in succeeding *mineralogists* to advance beyond the mere investigation of the *actual properties* of minerals; their description and classification; and to endeavour to detect, by means of *physical principles*, the *mode* by which they were *first formed*, and by which they were afterwards *altered* in their circumstances. And it is this

PART I. new and extraneous exercise of *mineralogy* that
 CHAP. II. properly constitutes the new science, which
 is called *mineral geology*, and which exercises
 such exalted functions at the present day.

Thus, both the description of this geology and its history, as delivered by its most distinguished and zealous conductors, confirm the position; that it is no other than *simple mineralogy*, or the *science of minerals*, pretending to determine the *truth*, in two remote and extensively important *facts* pertaining to the *history of this globe*.

The first thought which a consideration of these pretensions awakens in a reflecting and reasoning mind, is this question:— Can mineralogy be competent to determine, by means of *physical* principles alone, the *matter of fact* in those points? For, the proper sphere of mineralogy is confined to the characters and qualities, that is, to the *actual sensible phenomena* of mineral matter; and can *actual sensible phenomena* alone supply the means of determining, with the evidence which sound philosophy and sound reason demand, the certainty of the two *past facts* in question?

To this doubt it thus replies: that it is *competent* to determine these two points of fact, and with the evidence which reason and philosophy demand; that “ *the happy revolution*

“effected by BACON and NEWTON in the studies
 “of the natural sciences, was not experienced in the
 “science of geology until very late¹ ;” but that, by
 employing the method of induction from “obser-
 vation and sound principles of physics, by the
 rules of an exact logic²,” introduced by that
 happy revolution, and adhering to the rules
 taught and practised by those great teachers,
 it is able to reason from the sensible phænomena
 of mineral matter, to the mode of its first forma-
 tion and of its subsequent changes: and that man,
 who has weighed the planets, and measured
 their distances, may presume to trace the
 operations by which the surface of the globe
 was arranged³.”

PART I.

CHAP. II.

This is the test by which mineral geology
 desires that its own validity should be tried.
 Let us, therefore, apply our close attention,
 while it professes to instruct us upon these
 two heads by the rules of “an exact logic, and
 sound physical principles;” and let us first

¹ “L’heureuse révolution, que BACON et NEWTON avaient
 opérée dans l’étude des sciences naturelles, ne se fit ressentir
 que bien tard dans celles de la géologie.”—D’AUBUISSON.
 Disc. Prel. p. 3.

² “L’observation, les principes d’une saine physique, et les
 règles d’une exacte logique.”—Ib. p. 36.

³ *Comparative View of the Huttonian and Neptunian Systems
 of Geology*, p. 2, 3.

PART I. hear it upon the *first* head, viz. the *MODE of the first mineral formations of the earth*; comparing
 CHAP. II.

it with the standard of BACON and NEWTON. The issue of the *first* comparison, will probably determine the degree of authority which it is entitled to command, with respect to the *second* head, viz. the *MODE of changes, or revolutions.*

CHAPTER III.

PART I.

CHAP. III.

“ FORMATIONS, (in mineral geology,) are the
 “ different assemblages of particular rocks, or
 “ soils, in which one and the same species
 “ eminently prevails. — These are the *true*
 “ *unities* in the mineral constitution of the
 “ globe; the determination of which is the
 “ great object of geognosy¹. — *First formations*,
 “ are those mineral formations *which preceded*
 “ *the existence of organized beings*².”

2. “ In considering the globe in its entire-
 “ ness, and in fixing our attention upon its
 “ figure, we shall find, that it is exactly such
 “ as a *fluid mass*, endowed with *similar motion*,
 “ would have *assumed*; and we shall be imme-
 “ diately *aware of its primitive fluidity*³.”

3. “ That the surface of the globe *has been*
 “ *in a fluid state*, is established by very ample
 “ evidence — which extend to the whole sur-
 “ face of the earth, and *indubitably prove its*
 “ *former fluidity*⁴.”

4. “ There is a great class of rocks which

¹ D'AUBUISSON, tom. i. p. 322, 3. ² *Ib.* tom. ii. p. 3.

³ *Ib. Introd.* p. 3.

⁴ *Compar. View of Hutt. and Nept. Geol.* p. 4, 5.

PART I. " lies under every other, but never over any
 CHAP. III. " of them; it is, therefore, the *oldest*, and,
 " as far as we know, the *first formed*. It is
 " denominated the *primitive class*. The rocks
 " belonging to this class have a *crystalline*
 " appearance, intimating, that they have been
 " precipitated from a state of chemical solution¹."

5. " Crystallization, is the arrangement of
 " the particles of a body in a regular deter-
 " minate form; and it necessarily implies a *pre-*
 " vious state of fluidity, which would allow these
 " particles to arrange themselves in positions
 " necessary to produce these forms²."

6. " As we advance towards the lofty sum-
 " mits of mountains, we arrive at strata, whose
 " crystallization shows that they have been formed
 " in a fluid³."

7. " The superficial parts of the earth, at
 " least to a certain depth, must have been
 " originally in a *soft or fluid* state. This fact
 " is *inferred* from the *shape* it at present exhi-
 " bits; which, as *astronomers* tell us, is that of a
 " *spheroid compressed at the poles*. This shape it
 " evidently could not assume, unless to a certain
 " depth its superficial parts were in a soft and

¹ JAMESON'S *Mineralogy*, vol. iii. p. 67.

² *Comp. View of Hutt. &c.* p. 4.

³ CUVIER, *Theory of the Earth*, § 7.

“ liquid state.—The liquidity *thus proved to*
 “ *exist* in the more superficial parts of the globe,
 “ comprehending those that are now most
 “ solid, *must* have proceeded, either from
 “ *igneous fusion, or solution in water*¹.”

8. “ The different masses and strata, which
 “ compose the mineral shell of the terrestrial
 “ globe, *have been fluid*: the fact is not con-
 “ tested, it is *incontestable*².” — “The *spheroidal*
 “ figure of the earth is a *proof of its original*
 “ *fluidity*: this important conclusion was *never*
 “ *disputed*; the only question has been, whether
 “ the fluidity was the effect of *fire or water*³.”

9. “ It is beyond *all doubt*; 1. that the
 “ mineral masses which compose the crust
 “ of the globe *have been fluid*. 2. It is not
 “ less certain, that the fluidity of *secondary*
 “ formations was *aqueous*; and that they were
 “ formed in the bosom of the seas by a course
 “ of sediments, which successively deposited
 “ themselves one upon the other. 3. That the
 “ insensible and *incontestable transition of the*
 “ *secondary to the primitive formations*, indicate
 “ an *analogous mode of formation in all*⁴.—Some

¹ KIRWAN'S *Geol, Essays*, p. 7.

² D'AUBUISSON, i. 379, 380.

³ JAMESON, iii. c. 5. p. 10.

⁴ D'AUBUISSON, i. p. 388.

PART I.

CHAP. III.



“ very distinguished natural philosophers have
 “ lately contested this mode of formation, (viz.
 “ the *Neptunian*, or by the *action of water*); and
 “ have endeavoured to substitute for it another,
 “ (viz. the *Plutonian*, or by the *action of fire*);
 “ but these anomalous theories appear to be
 “ *mere oscillations*, which the progress of our
 “ geological knowledge experiences in its po-
 “ sitive progress towards *truth*¹.”

10. “ The first essential step which has
 “ been made in this course of pursuit, has
 “ been the general conclusion deduced from
 “ the assemblage of *facts*, after a long course
 “ of observations; that *all* the substances which
 “ compose our mineral strata, *must* have ori-
 “ ginated from *chemical* combinations in an
 “ *aqueous liquid*².—There was at first, upon
 “ our globe, neither *menstruum* nor *solvend*; a
 “ *confused assemblage of elements*—*un assemblage*
 “ *confus d’éléments*—*formed itself* in a liquid, of
 “ which *water* was the basis; and it is from
 “ this first mixture that *all substances whatever*,
 “ which engage our observation or experi-
 “ ence, successively *formed themselves*³.—
 “ All enlightened geologists now agree, that

¹ D’AUBUISSON, t. i. p. 389.

² DE LUC, *Lettres Géologiques*, p. 111, 112. ³ *Ib.* p. 120.

“ all the substances which compose our strata,
 “ *must have been*, at one time, contained in the
 “ same liquid; from which they were succes-
 “ sively separated by a *chemical process*¹.

11. “ The *primitive* soils, whatever was the
 “ mode of their formation and consolidation;
 “ were *not* formed or consolidated at *the same*
 “ *instant*: there was *necessarily a succession of*
 “ *time*².” — “ Let us carry ourselves, *in idea*, to
 “ the *first moments of the formation* of that part
 “ of the globe which is known to us; that is,
 “ of the thin rind or crust which covers our
 “ planet. — At that epoch, the part of the globe
 “ which was then actually existing, *was* like
 “ a kernel surrounded by the *elementary prin-*
 “ *ciples* of the minerals, of which its rind
 “ or crust is now composed. We can *repre-*
 “ *sent to ourselves* these principles, as suspended
 “ in a *vast dissolution*, whatever else might have
 “ been its nature³. — This CHAOTIC OCEAN⁴ —
 “ or, ‘*original CHAOTIC FLUID*⁵,’ — very *different*
 “ from our present seas, contained the *elements*
 “ of the *primitive earths*. In obeying the laws
 “ of the *affinity of composition*, they coalesced,
 “ and *grouped themselves* together in different

¹ DE LUC, *Ib.* p. 384.² D'AUBUISSON, t. ii. p. 4.³ D'AUBUISSON, tom. i. 270. ⁴ *Ib.* 355.⁵ KIRWAN, p. 11.

PART I.

CHAP. III.



“ manners; and they thus produced the in-
 “ tegral molecules of the different minerals.
 “ This was the *first*, or *chemical structure*.

12. “ Causes *which are unknown to us*,
 “ having occasioned the precipitation of these
 “ molecules, they successively *deposited them-*
 “ *selves*, uniting by the *laws of the affinity of*
 “ *aggregation*; and they formed our *minerals*.
 “ From this *second* or proper *mineralogical*
 “ *structure*, are derived the different particu-
 “ larities which minerals present to us in their
 “ texture and fracture.

13. “ *At length*, the minerals formed, by
 “ their assemblage, the masses or rocks, and
 “ the strata or soils, the aggregate of which
 “ constitutes the solid crust of the globe. The
 “ disposition of the minerals in their masses,
 “ of the masses in their strata, of the strata
 “ in the formations which subdivide them, and
 “ lastly, of the formations, with relation to
 “ each other, constitute the *geognostic struc-*
 “ *ture*¹.

14. “ The *first formations* were produced
 “ by a *general cause*. We can represent them
 “ *to ourselves*, as precipitations from an uni-
 “ versal dissolution, that is to say, from
 “ a dissolution which covered the whole

¹ D'AUBUISSON, i. 271.

“ terrestrial globe. But, although the disso-
 “ lution *was general*, it will not follow that
 “ every precipitate was such, and that each
 “ formed originally a stratum which enveloped
 “ the whole globe. While the dissolution de-
 “ posited one substance, or one rock, in one
 “ place, it is very possible that it produced
 “ no precipitate of the same species in another;
 “ either because the constituent principles of
 “ the rock were not in sufficient quantities
 “ in that part of the dissolution, or because
 “ the causes of the precipitation did not there
 “ exercise their action, or lastly, because other
 “ causes obstructed them. In this place, they
 “ deposited *granite*; and a little further,
 “ *micaceous schist*, because the elements of
 “ *mica* were, *perhaps*, in a greater quantity in
 “ that part of the dissolution which covered
 “ the latter place¹.

15. “ When the observer enters into the
 “ details of the *formation* of minerals, he sees
 “ *nothing but precipitations, crystallizations, and*
 “ *dissolutions*. The *powers* which produced the
 “ minerals, and which collected and united
 “ their elements, were *the powers of affinity*.
 “ He will not be able to appreciate correctly
 “ their effects, without a profound knowledge
 “ of *general chemistry*. But he will stand in

¹ D'AUEVISSON, i. p. 326, 7.

PART I. “ need of great reserve and discrimination,

CHAP. III.

“ when he would conclude, from what takes
 “ place in our laboratories, to that which takes
 “ place in *nature*. *Nature* acts upon immense
 “ masses; *she* has *time at her disposal*, it is
 “ nothing to *her*; and these *two* circumstances
 “ will often be sufficient to render entirely
 “ dissimilar the effects of the same agent, and
 “ the products of the same cause. — *Time*,
 “ which has such narrow limits for us, has
 “ *none at all for Nature*; for *her*, it is as inde-
 “ finite as *space*: both of these exceed even
 “ the conception of our imagination¹. — It is
 “ further to be observed, that we cannot
 “ flatter ourselves with *being able to know all*
 “ *the means which Nature employs in her forma-*
 “ *tions*; and we are not to conclude that an
 “ effect is impossible to *her*, because we have
 “ not been able to produce it in our labora-
 “ tories; for instance, we are not to conclude
 “ that a given substance is undecomposable,
 “ merely because we have not been able to
 “ decompose it².

16. “ It will be sufficient to recollect; that
 “ *the science of physics* makes known to us the
 “ *laws which appear to govern matter*, and that,
 “ by continually keeping before our eyes the

¹ D'AUBUISSON, tom. i. p. 241, 2.

² Id. *Disc. Prél.* p. 30.

PART I.

CHAP. III.

“ *phænomena of Nature, and the causes which*
 “ *produce them, it renders us competent to ap-*
 “ *prehend and form a just notion of the rela-*
 “ *tions which may subsist between the effects*
 “ *we see and the causes to which we are led to*
 “ *attribute them; to be sensible, how necessary*
 “ *this science is to those who apply their*
 “ *thoughts to the revolutions of the terrestrial*
 “ *globe, and who endeavour to account for the*
 “ *changes which its surface experiences, or has*
 “ *experienced*¹.”

17. “ It is principally, I repeat it, the pro-
 “ *gress of chemistry, that has conducted us to*
 “ *this general conclusion, from whence at length*
 “ *has resulted a solid basis for geology*².—*General*
 “ *chemistry, ought here to be our only guide, as*
 “ *to principles; and it is but very lately, that it*
 “ *has supplied us with true lights with respect*
 “ *to these*³.”

Thus, the *mineral geology* concludes, from the
crystalline phænomena of this earth, that it was,
 originally, “ a *confused mass of elemental prin-*
 “ *ciples, suspended in a vast dissolution, a chaotic*
 “ *ocean, or original chaotic fluid;*” which, after
 an unassignable series of ages, “ *settled them-*
 “ *selves*” at last into the order, and corre-
 spondence of parts, which it now possesses,

¹ *Id. Disc. Prél. p. 30.*

² DE LUC, *Lett. Géol. p. 112.*

³ *Ib. p. iii.*

PART I. by a gradual process of "precipitation and
 —
 CHAP. III. "crystallization," according to certain "laws
 "of matter," which it denominates "the laws
 "of affinity of composition and aggregation;" and
 that they thus formed successively, though
 remotely in time, 1. a *chemical*, 2. a *mineral*,
 and lastly, a *geognostic*, which is its *present*,
 structure; and that it was during this long
 process, and before it attained to its present
 solidity, that the earth acquired its peculiar
 figure by the operation of the *physical laws*
 which cause it to revolve upon its axis. This
 is that *root*, or *fundamental principle*, of the
mineral geology; which we were to extract,
 and to try by *the test* of the reformed philo-
 sophy of Bacon and Newton.

If these conclusions are the genuine fruits
 of that reformed philosophy, we shall of course
 find them to be in exact and entire concord
 with the conclusions of Bacon and Newton
 upon the same subject; since the mineral geology
 professes to deduce them, by the method of
induction, "from observation, sound principles
 "of physics, and by the rule of an exact logic,"
 introduced by that philosophy.

Bacon and Newton certainly taught, both
 by doctrine and example, the method of philo-
 sophizing by *analysis* and *induction*; and it was
 that method, skilfully and rigidly observed by

them, that produced and constituted that “happy revolution in the studies of the natural sciences,” which mineral geology so justly eulogizes. But, was there not a *caveat*, which Newton annexed to his process of *induction*? “The method of *analysis*,” said he, “consists in making experiments and observations, and in drawing general conclusions from them by *induction*; and in admitting no objections against the conclusions, *but such* as are taken from experiments, or other certain truths¹.” There were, then, some *certain truths*, which had always authority, in Newton’s philosophy, to govern and regulate the process of induction; and even to oppose objections to general conclusions, if these betrayed any *defect in the analysis* from which they were deduced: for the analysis must be *complete*, before the induction can be *conclusive*. If, therefore, any *certain truths* were disregarded, and if the induction still persisted in going forward in despite of them, it necessarily departed from philosophy and truth exactly in the same *ratio*; and only wandered, further and further, into the wilderness of fiction and error.

And what are the *certain truths*, which, in consequence of a manifest evidence of original

¹ *Optics*, L. iii.

PART I.
 —
 CHAP. III.

defect in the analysis, have been crying out by the mouth of Newton, during the last ten pages, to the eager and unheeding progress of the mineral geology—*Siste, viator!*—*Halt!* They are these: “It seems probable to *me*, (said “the wise, sober, and circumspect Newton,) “that GOD, *in the beginning*, formed *matter*, in “solid, massy, hard, impenetrable, moveable “particles, of *such sizes and figures*, and with “such *other properties*, and in *such proportions* “to space, as most conduced to the end for which “HE formed them.—All material things seem “to have been composed of the hard and solid “particles above mentioned, *variously associated* “in the FIRST CREATION by the counsels of an “INTELLIGENT AGENT. For it became HIM “who created them to *set them in order*; and “if HE did so, it is *unphilosophical* to seek “for any other origin of this world, or to “pretend that it might rise out of a CHAOS “by the mere laws of Nature; though, being “once formed, it may continue by those laws “for many ages¹.”

This is the *test*, to which we were to bring and apply the *root* of the mineral geology. Now, it must be evident to every understanding, that the mundane system which supposed the earth to be at rest on the back of a

¹ *Optics*, L. iii. *in fin.*

tortoise, is not more fundamentally in opposition to the *planetary system* of Newton, than the conclusions of the mineral geology, which we have just read, concerning *the mode of first formations*, are in opposition to the conclusions of Newton upon the same subject ; which conclusions constitute the *basis* of his philosophy.

The “ *confused assemblage of elements, or chaotic ocean,*”

instabilis tellus, innabilis unda,

from which the mineral geology derives the figure, symmetry, beauty, and accommodation, which we “ observe and experience” in this earthly system, is no other than the “ *CHAOS,*” which Newton has expressly and pointedly rejected and reprobated. The operation, which he entitles “ *the setting in order,*” is the very same which the *mineral geology* describes as “ *the forming successively a chemical, a mineral, and a geognostic structure.*” That operation, Newton ascribed to the *immediate intelligence and power of God*; the *mineral geology*, attributes it to *general chemistry*, and to certain laws of *affinity*, acting through a long succession of ages ;

Donicum ad extremum crescendi perfica finem
Omnia perduxit rerum *Natura creatrix* ¹.

¹ LUCRETIVS, ii. 1115.

PART I.

CHAP. III.

Till all things, to their end of growing brought,
Creative Nature in perfection wrought.

Newton emphatically, and as it were by a prophetic judgment, pronounced this conclusion of the *mineral* geology to be “*unphilosophical* ;” and therefore, essentially contrary to that which alone he acknowledged to be philosophical, according to the principles of his own philosophy.

This judgment, indeed, chiefly affects the *Neptunian* system ; but he has not altogether forgotten the *Plutonian*, which perpetually replaces a *perishing system* of the globe with a *new one*, by “the mere laws of nature :” “The growth of *new systems out of old ones*,” says he, “without the mediation of a DIVINE POWER, seems to me apparently *absurd* ¹.”

¹ *Third Letter to Dr. Bentley.*

CHAPTER IV.

It will be instructive and important, to trace with some minuteness the opposition of doctrine, between the philosophies of Newton and of the mineral geology, respecting a *chaotic state of this globe*; and to observe, how deeply the foundation of that opposition is laid.

When Newton had remarked, that the planets presented to the view figures of *obtuse spheroids*, and not of *perfect spheres*; when he had reflected upon the nature of that peculiar figure, and had contemplated those orbs as subjected, in their revolutions, to the *adverse* actions of *gravity* and *centrifugal force*; his penetrating mind at length discovered, that *the rule of harmony and equilibrium* between those two contending powers was only to be found in *the figure of an obtuse spheroid*. To make this fact plain to the understanding of others, he imagined this *hypothetical illustration*. — “*If*,” said he, “the earth were formed of an uniformly yielding substance, and if it were to become deprived

PART I.
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CHAP. IV.

PART I. “ of its *motion*,” — *si terra constaret* — ex uni-
 CHAP. IV. “ formi materia, motuque omni *privaretur*¹ ;”
 the law of gravity acting equally, and without
 resistance, from all points of its surface *towards*
its centre, would cause that yielding substance
 to settle into the figure of a *perfect sphere*.
 But, *if it were* then to receive a *transverse im-*
pulse, which should cause it to revolve upon
 its axis, the new transverse force would coun-
 teract the former force of gravity, by urging
 the particles composing the yielding substance,
from their centre, towards their circumference ;
 and would thus produce an *alteration* in the
 figure of that sphere. For, the new force would
 tend to *elevate* the surface, and would have
 most power at the *equator*, and least at the
 poles ; whereas the opposite force of gravity
 would tend to depress the surface, and would
 have most power at the *poles*, and least at the
 equator. The result of this inequality of gravita-
 tion must necessarily be, that the original *sphere*,
 becoming elevated at the equator, but not at the
 poles, and the elevating power gradually dimi-
 nishing from the equator to the poles, its figure
 would be eventually changed into that of an
obtuse spheroid.

¹ *Princip. Math.* L. iii. *prop.* 19. *prob.* 3.

It being thus shown, that such would be the necessary result of the compound power of gravity and centrifugal force; it followed, that those two forces, acting at the same time in the earth *supposed to be formed of an homogeneous and uniformly yielding substance*, would work themselves into *harmony and equilibrium* by producing that figure; which they would thenceforward maintain. Whereas, if we suppose the case of a *true sphere*, which should consist of a *solid and resisting substance*; the two forces must act in perpetual and violent *discord and conflict*, and with a constant tendency to *disunite and rend* the texture of the fabric. Now, Newton, maintained, “that GOD at the beginning formed all material things, (and therefore this earth which is one of them,) of such *figures*, and *properties*, as most conduced to the end for which HE formed them;” and, having thus demonstrated, that the property of an *obtuse spheroid* was that *which most conduced to the end for which God formed the earth*, he left it to the capacity of every one to draw the obvious inference, in conformity to his known principles,—viz. *that it is highly probable, that God has formed the earth with the same figure, which it is manifest HE has given to the other planets; and for which, an ADEQUATE REASON is thus rendered plain to the intelligence.* And he confirmed this argument of *probability*, by super-

PART I.

CHAP. IV.

adding the *experimental proof*; that unless the earth was actually flatter at the poles than at the equator, the waters of the ocean, constantly rising towards the equator, must long since have deluged and overwhelmed the equatorial regions, and have deserted the polar; whereas, the waters are now retained in equilibrium over all its surface. Such was the whole nature, design, and extent, of Newton's proposition and demonstration. And so his accurate expounder drew his inference: "What we have said of a *fluid earth*, must hold of the earth *as it is*; for, if it had not this figure in its solid parts, but a spherical figure, the ocean would overflow all the equatorial regions, and leave the polar regions elevated many miles above the level of the sea; whereas we find, that one is no more elevated above the level of the ocean than the other¹." It did not enter into his head, any more than it did into Newton's, to draw from this demonstration the *geological conclusion*, that the *earth had been REALLY fluid*.

But, the illustration inspired the mineral geology with peculiar satisfaction. Without making any reference to the *principles and conclusions* of Newton's philosophy, or to the *object*, for

¹ MACLAURIN, *Account of Sir Isaac Newton's Phil.* p. 364.

which alone he designed the illustration, it seized upon his plastic sphere; and transformed his *philosophical demonstration* into a *geological proposition*. That supposed sphere, bore too convenient and desirable a resemblance to the “*chaotic fluid*,” or “*confused mixture of elements*,” not to be eagerly identified with it by the mineral geology; which could thus argue the *original fluidity* of the earth, and its *consequent obtuseness*; and refer to the “*Principia Mathematica*,” for a *Chaos*.

“The spherical figure of the earth, (it said) had for a long time suggested the idea, that its mass *had been fluid*, at least to a certain depth. *Newton, proceeding from this idea,—Newton, partant de cette idée*—joined to the rotatory motion of the globe, found that its diameter at the poles, must be to its diameter at the equator, as 229 to 230. Now we find in the *Philosophical Transactions*, of the Royal Society of London, for the year 1791, a memoir by M. D’Albi, in which, discussing the sum of the results of the measure of a degree of the meridian in different latitudes, he finds that *this determination of Newton* is confirmed by experiment, as far as this latter method of determination could extend. We thus, *therefore*,

PART I.

CHAP. IV.

PART I.
 —
 CHAP. IV.

“ know, that our globe *really was once liquid*,
 “ at least to a certain depth; and that when
 “ it acquired its solidity in the portion essen-
 “ tial to its form, it had the same sensible
 “ velocity of rotation, which it has now.”¹
 And again: “ The earth *was covered* with a
 “ *liquid containing the substances of our mineral*
 “ *strata*. It was *then*, that by a movement of
 “ rotation, continued sensibly thenceforward
 “ in the same degree, *the earth received the*
 “ *spheroidal figure*, which it has been found to
 “ possess by the observers of this age, *and*
 “ *which Newton had proved by its motion.*”² The
 “ *Neptunian system*,” it says, “ only considers
 “ the earth to have had a spheroidal shape,
 “ *when it was in a fluid form.*”³ And it con-
 cludes: “ Since the earth has that spheroidal
 “ form, which its motion of rotation *ought* to
 “ produce in a liquid mass, *it follows necessarily*,
 “ *that it must have been fluid*.”⁴

Thus reasoned the mineral geology, to fortify itself with the support of Newton's illustrious name. But, Newton did not set out from *any such idea*, as that the earth “ *had been really fluid.*” The mineralogist's *real fluidity*

¹ DE LUC, *Lett. Géol.* p. 81.

² Id.

³ JAMESON'S *Mineral.* V. iii. p. 10. *Note.* ⁴ DE LUC, *Ib.* p. 107.

of the earth, and Newton's supposed equally yielding substance, have nothing whatever in common; neither identity of origin, nor congeniality of nature. And, indeed, the geologist last quoted, in a brighter period of his lucubrations refrained from deciding; "whether the obtuse figure of our globe was owing to its having been once fluid, or, whether it immediately received that figure at the creation, as being the most convenient¹." Although, even at that moment of hesitation, he was far from the philosophy of Newton, who had already concluded the latter; yet his judgment might still have fallen into coincidence with that philosophy. But he at length concluded on the side of the mineral geology, against Newton, maintaining, that our globe "really was once a fluid;" constituting a chaotic liquid, out of which the whole mechanism of its wonderful structure "rose by the mere laws of nature."

Had Newton conceived, that his illustration was liable to such gross and unscientific abuse; and that it would have been thus perverted to prop a doctrine, from which he was abhorrent, which he emphatically disclaimed, and which he pronounced to be "unphilosophical;" we may be assured, that he would not have instanced

¹ *Lettres sur l'Hist. de la Terre*, tom. ii. p. 154.

PART I.

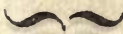
CHAP. IV.

of *this earth* particularly, but of *any ball* consisting of moist, homogeneous, and yielding matter, such as *softened clay*; which would have equally supplied the illustration which he intended. But his exalted mind, being conversant with the planetary orbs, drew his example from them: incautiously, and too confidently, as it would now appear. His sole design, was to render intelligible, and sensible, the *compound effect* of two known forces. That he did not suppose that the earth had ever *really been fluid*, and that it had *settled itself by laws of matter* into its present figure; is proved, both by the *object*, and *hypothetical form*, of his proposition, and by his express ascription of its "*properties*," as of those of *all first formations*, to the intelligent counsels and creative act of God, immediately. His own words were sufficient to have preserved his proposition from the perversion which it has experienced; for he states it in different modes, by which his intention is cleared from all ambiguity. He does not only argue, "*if the earth were fluid*," &c.; but he also argues, "*if all circular diurnal motion were taken from the planets*," &c.; "*if all matter were fluid*," &c. That these were only different

¹ *Princ. Math.* L. iii. *prop.* 18. *theorem* 16.

hypothetical propositions, employed to illustrate the same principles, is thus manifest to every capacity.

PART I.
—
CHAP. IV.



And, when we can demonstrate to our intelligence, by means of the illustration, that the figure of an *obtuse spheroid* is that which alone can produce *harmony* between two *adverse*, but *requisite* forces acting in the *same* globe; why are we not rather to assume, with him, that such a figure was *given to it* at its origin *with a view to that harmony*, provided we acknowledge, with him, an *intelligent agent*; than to conclude, with the mineral geology, that it was left to *produce itself*, as the *ultimate issue of a long, rude, and violent conflict between the two forces?*

Such, however, are the opposite conclusions of the two philosophies; the one, concluding from the figure of the earth to an intelligent act of *God*; the other, to the action of a *chemical menstruum*. “The *several planets* are “spheroidal like the earth, *therefore it has been* “*fluid*’.” I fear, that this argument would not be held *secundum artem*, in the schools. “Let the earth, (it argues) be *supposed fluid* to “a certain depth; *then*, the statical figure “which it would assume, in consequence of ro- “tation on its axis, would be that of a spheroid

¹ GREENOUGH'S *Geology*, p. 172.

PART I.
 —
 CHAP. IV.

“ flattened at the poles. Such, or nearly such, being the figure which it has assumed, we have good reason to believe from this circumstance, that the earth has been more or less fluid to a certain depth¹.” No doubt, if we were sure that the earth did assume that figure, we should have the best reason to conclude of its primitive fluidity; but here also the logic needs revisal; for the previous question is, whether it did assume that figure, or whether it received it from an intelligent cause, and with a view to a particular end; in which latter case, we cannot possibly conclude to its primitive fluidity. The latter, is the conclusion of Newton; the former, is that of the mineral geology, which it calls, “ the great fact—le grand fait,” from which results “ the proposition, fundamental to mineral geology; viz. that the epocha, when all the operations whose monuments are before our eyes began upon the earth, is characterized by an immediate chemical circumstance, namely, the original fluidity of the globe².”

Thus, both from crystalline character, and from the obtuseness of spherical figure, the mineral geology concludes to Chaos; whereas, from both of these, Newton concluded to God.

But, what is least to be tolerated in this

¹ GREENOUGH'S *Geology*, p. 91.

² DE LUC. *Lettres Géol.* p. 81.

error, is that, after thus misapprehending and perverting Newton's illustration, it proceeds to find *him* guilty of error in it. "Newton," it says, "*supposed* that the mass of the globe *was* homogeneous in density, and that *its figure, in flattening itself, became an ellipsoid.*—Maclaurin demonstrated the legitimacy of the second of *Newton's two suppositions*, the *ellipticity* of its form; with respect to the other, that of its *homogeneity*, Clairault showed that it was *inadmissible*, by proving "that it *is* denser in its interior than at its surface¹." But, did Newton require it to be *admitted as a fact?*" Clairault might have saved his pains, as far as they related to the refutation of Newton. Newton indeed *supposed*, that is, *proposed*, the case of the earth's homogeneity, as a *philosophical hypothesis*, in order to a particular demonstration; but, where did Clairault discover that he *supposed* it, that is, *assumed* it, as a *geological fact?* After rectifying Newton's *error*, however, by the more accurate rule of Clairault, the mineral geology thus proceeds to draw out the *consequence* of Newton's *supposition*.

"We have seen, that the flatness of the earth is such as is indicated by the laws

¹ D'AUBUISSON, i. 17.

PART I.

CHAP. IV.

“ of hydrostatics; that is, that the earth has
 “ exactly the same figure which it should have,
 “ if it had been originally fluid. By what
 “ *singular Chance*, if it had always been solid,
 “ *could* it have so extraordinary a form, which
 “ is a necessary consequence of the properties
 “ of fluids, and which seems to pertain to them
 “ exclusively? The *fact* is, it has *moulded itself*
 “ into this *singular form*: and, in order to
 “ have been able to do so, its molecules *must*,
 “ *in all necessity*, have been originally inde-
 “ pendent of each other, that is, *they must have*
 “ *formed a fluid mass*¹.”

This example, therefore, added to the preceding one, demonstrates how widely the mineral geology stands apart from the philosophy of Newton. We have no need to proceed further to show, that it has failed under its own test; and, therefore, that its conclusions with respect to *the MODE of first formations* are fundamentally erroneous by that rule; the proof of its discordance with *the test*, being technical conviction of its error. So far, therefore, is “ the
 “ happy revolution effected by Newton in the
 “ studies of the natural sciences,” from having been experienced “ *late* in the science of
 “ *mineral geology*,” that it is evident that it has

¹ D'AUBUISSON, i. 23.

PART I.

—
CHAP. IV.

not been experienced in it *at all*. It may have been experienced in some of its *subordinate* arguments; but subordinate arguments are subordinate considerations. In philosophy and science, we are supposed to speak, first, of *first principles*; and, certainly, there is no savour of the philosophy of Newton in this first, *fundamental principle*, or *root*, of the mineral geology.

But it will be highly important that we should proceed further with this subject, and that we should investigate the *cause* of this extraordinary discordance; in order that we may ascertain, precisely, how it has come to pass, that the mineral geology, while it professed, and while it really intended, to follow the method of *analysis* and *induction* taught by Newton, should nevertheless have concluded in direct contradiction to him.

It will, perhaps, say, that it draws its conclusions from a series of facts and observations which were wholly unknown to the age of Newton; that if Newton had lived to witness the vast progress that *physical science* has made in mineralogy and chemistry since his time, he would have changed *in toto*, or, at least, would have very materially modified, his conclusion. But, I reply; that it could only urge that plea, by continuing under the same misapprehension of Newton's principles, which has

PART I, already caused it to conclude in contradiction
 CHAP. IV. to him. Those principles, with relation to the
 great question with which we are engaged, are
 not alterable by any possible contingency in
 the progress of the *physical* sciences. They
 are derived from a far higher science, a science
 which must ever govern and control the na-
 tural sciences. His "*rules of philosophizing,*"
 though prefixed, and immediately applied by
 himself to the mathematical science, are not,
 therefore, exclusively *mathematical*; they are
general rules, deduced from that *universal science*
 which Bacon denominates, "*prima philo-*
sophia;" viz. the science of *universal logic*, that
 is, of *universal and immutable reason*¹.

¹ *Regulæ philosophandi*:—Reg. 1. "More causes of natural
 " things ought not to be admitted, than are true, and suffi-
 " cient for explaining their phænomena.

Reg. 2. "Therefore, to natural things of the same kind,
 " the same causes ought to be assigned, as far as it is pos-
 " sible.

Reg. 3. "Qualities of bodies which cannot be increased
 " or lost, and which pertain to all bodies which we can
 " subject to our experiment, are to be accounted qualities of
 " all bodies universally.

Reg. 4. "In experimental philosophy, propositions, drawn
 " from phænomena by induction, are to be accounted as
 " *true*, either strictly, or nearly approaching to it, until other
 " phænomena occur, by which they may be rendered either
 " more accurate, or open to exceptions."

Mineralogy, however valuable and excellent in its own proper sphere, is, in itself, merely a *physical* science; the science of *mineral characters and mineral qualities*; and if it reasons wrong within its sphere, it can never transmute its false reasoning into true reasoning, by virtue of any *physical* resources of its own: whereas, Newton's philosophy, being essentially *logical*, that is, *rational*, possessed always a rectifying and conservative principle within itself. In Newton, intuitive *logic* was dominant; and *mathematics* were the steps by which his *logic* ascended to the elevation to which it attained; in the mineral geology, *physical impressions* are dominant, and logic is only an artificial instrument which it seeks to employ for arranging those impressions. How many eminent mathematicians had seen apples fall to the ground, before the intuitive *logic* of Newton apprehended the phænomenon? How different that logic was from the logic of the mineral geology, we have seen by the difference of their conclusions.

PART I.

CHAP. IV.

CHAPTER V.

PART I. IT will be easy to point out, according to the preceding distinction, the *cause* of the signal contradiction thus subsisting between Newton and the mineral geology. It is simply this; that, in attempting to reason of the *MODE of first formations*, by Newton's method of *analysis* and *induction*, the mineral geology has not carried the process of *analysis* far enough back; whereas, Newton carried it as far back as it could extend. Let us hear Newton himself.

CHAP. V.

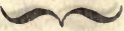
“By this way of *analysis*,” said he, “we may proceed from compounds to ingredients, and from motions to the forces producing them; and, in general, from effects to their causes, and from particular causes to more general ones, *till the argument end in the MOST GENERAL*. This is the method of *analysis*. And the *synthesis* consists in assuming the causes, discovered and established, as *principles*, and by them explaining the phænomena proceeding from them, and proving the explanations¹.”

To set this doctrine in all its light, I shall

¹ *Optics*, lib. iii. *in fin.*

subjoin the commentary of his exact reporter upon this passage. PART I.

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CHAP. IV.



“ In order to proceed with perfect security,
 “ and to put an end for ever to disputes, he
 “ proposed that, in our inquiries into nature,
 “ the methods of *analysis* and *synthesis* should
 “ be both employed in a proper order; that we
 “ should begin with the *phænomena* or *effects*,
 “ and from them investigate the powers or
 “ causes that operate in nature; that from
 “ *particular* causes we should proceed to the
 “ *more general ones*, till the argument end in
 “ the *most general*: this is the method of *ana-*
 “ *lysis*. Being once possessed of these causes,
 “ that we should then *descend*, is a contrary
 “ order; and from them, as established prin-
 “ ciples, explain all phænomena that are their
 “ consequences, and prove our explanations:
 “ and this is *synthesis*. It is evident, that as
 “ in mathematics, so in natural philosophy,
 “ the investigation of difficult things by the
 “ method of *analysis* ought ever to precede the
 “ method of composition, or the *synthesis*. For,
 “ in any other way, *we can never be sure that we*
 “ *assume the principles which really obtain in*
 “ *nature; and that our system, after we have*
 “ *composed it with great labour, is not mere dream*
 “ *and illusion*¹.”

¹ MACLAURIN, *Account of Sir I. Newton's Phil.* p. 9.

PART I.

CHAP. V.

Now, the analysis of the mineral geology does not extend beyond *mineral matter*; whereas that of Newton went back to *all matter*, of which *mineral matter* is only *a part*. It must be evident, that it is in the highest degree unphilosophical to institute an argument on *the MODE of the first formation of mineral matter*, otherwise than by investigating *the MODE of the first formation of all matter in the general*, and then descending to that of *mineral matter, in the particular*: because, by so doing, we necessarily leave behind us the *general principle* of the mode of the first formation of *all matter*; and, by assuming a partial principle for a general one, and continually employing it as a general one, we must proceed in error through all our inductions, and the result must be, an error in our ultimate conclusion. This has been the case with the mineral geology; for, the principle of *truth* lay precisely in *that part* of the subject in which the analysis of Newton reached beyond that of the other; which principle being, therefore, not comprehended in the other, it proceeded without its light and guidance; and *hence* the opposition of principles and conclusions between the two.

The more general is the analysis, the more general also will be the induction; and “the argument by induction (says Newton) may be looked upon as so much the *stronger*,

“ by how much the induction is *more general*.” PART I.

—
CHAP. V.

The converse of this maxim must be equally true: that the argument by induction may be looked upon as so much the *weaker*, by how much the induction is *less general*. But the induction of mineral geology is *less general* than that of Newton; and, therefore, it is *weaker* in the same degree. In the method of analysis and induction, the extent of the induction must depend upon the extent of the analysis: we cannot conclude securely, further than we have analyzed; we can descend no further by synthesis than we have ascended by analysis; if the latter has been limited to chemical and mechanical causes, we shall conclude to the same; and if these comprise not the most general cause, the most general cause will not be included in the induction. But, the *mode of first formation*, necessarily supposes *the most general cause*.

By confining the analysis to mineral matter, detached from universal matter, and working entirely within that circumscribed sphere, the view of mineral geology was narrowed to the peculiar characters which distinguished it as *a class of matter*, namely, appearances or similitudes of chemical action; and attempting, by principles collected in that partial sphere of contemplation, “to explain its phænomena,” and

PART I. to conclude of *the mode* of its first formation,
 and forgetting, that it was only a part of a
 whole, the mode of whose first formation was
 the mode of the first formation of *all* its parts ;
 it ascribed the mineral structure of this globe
 altogether to *chemical action* ; as promptly, and
 with as little hesitation, as it would ascribe to
 chemical action, a measure of Glauber's salts,
 or sugar-candy, in the shop of a chemist, or a
 confectioner : thus falling into the class of,
 what Bacon entitles, "*impediments of knowledge,*
 "*in slipping off particular sciences from the root*
 "*and stock of universal knowledge*¹." "I see,
 "sometimes, (says he) the profoundest sort of
 "wits, in handling some particular argument,
 "will now and then draw *a bucket* of water out
 "of *this well* for their present use ; but the
 "*spring-head* thereof seemeth to me not to
 "have been visited²."

Whereas, Newton's contemplation extended
 and expanded itself to embrace *all matter*, in-
 discriminately and collectively. Without suf-
 fering his view to be arrested or distracted by
 its particular discriminations, he applied him-
 self to the consideration of matter in its totality,
 in order to find the *ultimate law*, which is com-

¹ *Interp. of Nature*, v. i. p. 380.

² *Ibid.* p. 53.

mon to the universal system. In this survey his mind searched for *the mode of its first formation*, and for an *adequate cause of its existence*; and, sensible that the cause could not exist in the effect, and recognizing the skill and wisdom by which the whole was formed and ordered, he concluded; that the first formation of all matter, and, therefore, the first formation of all the several parts or subordinate systems of matter, was the work of an intelligent agent; “*set in order in the beginning*, with respect to “*size, figure, proportions, and properties*,” by “*the counsels of his own intelligence*.” He saw all the separate systems of matter converge and unite in one common centre of wisdom and power, from which no *one* could bear to be separated more than another, and from which alone emanated *the reason* for the perfect existence of each; and he ascribed to that common centre of causation, in one and the same proposition, both the *existence* and *perfection* of the vast planetary system of matter, of which our *mineral earth* is a member, and the *existence* and *perfection* of every minutest system of matter attached to this member of the planetary system. “*Such a wonderful uniformity in the planetary system*, (said he) must be the effect “*of choice*; and *so must* the uniformity in the “*bodies of animals*; these, and their instincts,

PART I.

CHAP. V.

“ can be the effect of nothing else than the
 “ *wisdom and skill of a powerful ever-living*
 “ *agent*¹.” Thus, Newton accounted at once,
 and by the same principle, for *all first forma-*
tions whatever, while mineral geology can only
 propose a principle for the first formations of
mineral matter; a principle, utterly inapplicable
 to any other system of terrestrial matter, and
 therefore proving the extent of its analysis.
 And thus, his philosophy easily accomplished,
 what mineral geology claims as its province,
 but which it has never even attempted to
 accomplish, viz. “ *to connect with their causes*
 “ *the phænomena*, presented in our globe by
 “ *the three kingdoms of terrestrial matter*².”

But Newton prevented the equivocation
 (shall I say? or the prevarication) which at-
 tends the geognostic phrase, “ *mode of first*
 “ *formation*,” by employing the simple, dis-
 tinct, and unequivocal word, *creation*. In doing
 which, his exalted reason conformed to the

¹ *Optics*, L. iii.

² “ *La Géologie est principalement distincte de l'Histoire*
 “ *Naturelle, en ce que celle-ci se borne à la description et*
 “ *classification des phénomènes que présente notre globe,*
 “ *dans les trois règnes; au lieu que la première doit lier ces*
 “ *phénomènes avec leur causes.*”—DE LUC, *Lett. Géol.* p. 3.
 We should rather have expected, that such a writer would
 have said, “ *avec leur cause.*”

plain dictates of common sense. For common sense, duly instructed and rightly exercised, plainly perceives that *all first formations* must be *creations*; otherwise, there would be formations before first formations. For, *creations* are unquestionably *formations*; and, if they are not *first formations*, they must be *prior to first formations*; which would be a contradiction in terms. The *existence, arrangement, sizes, figures, and properties* of all these, Newton ascribed to the *immediate act of God Himself*; and he adjudged it to be *unphilosophical*, to ascribe them to any *mediate or secondary cause*, such as *laws of nature operating in a Chaos*. De Luc abstained, with a very curious reservation, from employing the word *creation*, in *physical inquiries*: “I shall not say *created*, (said he) “because in *physics* I ought not to “employ *expressions which are not thoroughly “understood between men*”¹. Not understood! By whom? By those who do not choose to understand it; by those, who, like Falstaff, “are troubled with the disease of not listening, “the malady of not marking.” Such were his contemporay atheists and materialists of the

¹ “Je ne dirai pas qu’elles ont été *créées* ainsi, parce-
“qu’en *physique* je ne dois pas employer *des expressions sur*
“*lesquelles on ne s’entend pas*.” — *Lett. sur l’Hist. de la Terre*,
tom. ii. p. 211.

PART I. middle of the last century. But was he, there-
 CHAP. V. fore, to compliment those perverters equally of
 morals and physics, by excluding from *physical science* all mention of *creation*? Was he aware, that in excluding the *word*, he at the same time excluded the *idea* associated with that word; and, together with the idea, the *principle* involved in the idea? the exclusion of which is the very parent-cause of all materialism, and of all atheism? Newton was well aware of this; and, therefore, though assuredly he knew the laws of *physical inquiry* at least as well as the best *mineral geognist*, he did not exclude the word, but *entertained* it; and proclaimed it, as sufficiently intelligible to every *unsophisticated understanding*, and as the *sine quâ non* of *truth*, in treating of *material first formations*. His logic found, that *God* is the first *physical principle* in *physics*, as He is the first *moral principle* in *morals*; and, that there is no arguing *truly* in *either* branch of philosophy, without the application of that *first, common, and universal principle*. — “*De DEO ex phænomenis disserere ad philosophiam Naturalem pertinet.* — “*It pertains to Natural philosophy,*” said he, “*to reason from phænomena to GOD.*”

Had the mineral geology, therefore, carried its analysis as far back as Newton, it would have concluded to that *first physical principle* for *first*

formations; and, if it had done so, its general induction would have been the same as Newton's; but, by stopping its analysis short of the term to which Newton extended his, its induction became "the less general, and therefore the less strong by how much it was the less general;" and thus it necessarily fell into contradiction to him, as we have seen.

PART I.

CHAP. V.

PART I.

CHAP. VI.

CHAPTER VI.

PART I. BUT, there must have been *some cause*, which
 —
 CHAP. VI. determined mineral geology thus to check its
 analytical progress, at the term of *mineral mat-*
ter; and to return at once from that point, to
 the exercise of its synthetical operation.

That cause, was *the fascination of physical impressions*, or what it denominates, *phenomena*. For, being habitually conversant with mineral substances, and passionately attracted by the admirable characters and varieties which they revealed; the *appearance* of these acquired so powerful an authority in its imagination as to confine it within their sphere, and to render every other object in nature secondary, and comparatively unregarded; and being unequally instructed in other branches of knowledge, and therefore partial to that particular branch with which it felt itself most familiar, it was led to regard that one branch, which in fact extends itself over the entire mineral surface of our planet, as alone sufficient to supply all the principles requisite for resolving the problem which it proposed to itself. *Mineral phænomena*, were therefore assumed by *mineral*

geology as all-sufficient for determining the great question, of *the mode* of the *first formation* of *mineral substances*; and, in this common principle, of *the omnipotence of phænomena*, both the *Neptunian* and the *Plutonian* or *Vulcanian* systems entirely coincide.

Yet there were other orders, or classes, of matter pertaining to this earth, whose *first formations* presented subjects for inquiry of equal importance; and which could not be separated from the former, in the question of *the mode* of first formations, without a dereliction of the first principles of the philosophy of *Bacon* and *Newton*, and, indeed, the first principles of *common sense*: these were the classes, of *animal* and *vegetable* matter. *Newton's rules of philosophizing* require, that we should refer to the same common cause all existences, which share the same common properties; and the *three kingdoms of matter*, equally share the same general properties of matter. But, besides sharing the same general properties of matter, they demonstrate a *community of system*; each existing with relation to the others, and having the reason of its own existence in that relation. Thus the solid body of the earth exists with relation to the vegetation, which it is to fructify; and to the animals which it is to support. The two latter exist with relation to the earth,

PART I.

CHAP. VI.

PART I.
CHAP. VI.

without which they could neither be nourished nor supported. They are thus, in fact, corresponding and constituent *parts* or members of *one whole*; the *first formations* of each of which, must therefore be referred to the same *cause*, and to the same *mode*. Not to recognise this principle, would be, to be something more than purblind in philosophy; and indeed we have seen, that mineral geology lays claim to the province, of “connecting with their causes” the phænomena presented by our globe in “*the three kingdoms*,” although it has hitherto confined its exercise to *one only*. What it has thus omitted to perform, we shall now endeavour to supply.

By the *universal analysis* of matter, we arrive at the *common cause* of all the *three orders* of terrestrial matter, and of their several systems, and we perceive the *equal* relation of each to that cause; so that by discerning the relation of *any one* of them, we at the same time discern that of the *other two*. Now, their respective characters, or *phænomena*, in *first formations*, must be subject to the same common law; and the authority of the *phænomena* for determining *the mode* of their first formations, must be *the same* in all. The highest principle of *probability* in this question to which the mind of Newton could attain by induction, was, as

we have seen, “ that *all* material things were “ in the beginning created, and set in order “ by God, in their fittest sizes, figures, proportions, and properties;” from the vast planetary system, including this mineral globe, to the most diminutive insect which exercises its instinctive sagacity upon it. Common sense discerns, that *creation* alone could give *origin of existence* to that which before did not exist; it discerns, that there can be no intermediate stage or degree between *non-existence* and *existence*, and therefore, no graduality in the passing from the one state to the other. To the *mode of creation*, we cannot therefore ascribe that mode of *succession* to which we give the name of *time*. The action of *creation* was therefore effected *without the mediation of time*, and consequently, in that mode which we express when we exclude all notion of the mediation of time; namely, *immediately, instantaneously, or suddenly*. Let us now endeavour to ascertain exactly, *what is the authority of sensible phenomena for determining the mode of the first formations of each of the three kingdoms of matter*, by trying that authority, in each of them, successively.

As we trace back *all terrestrial matter* to a term of *first, or creative formation*, so we trace back each of its three orders, or kingdoms, to

PART I. the same term; for, *all terrestrial matter*, signifies only *the aggregate of those three kingdoms*.

CHAP. VI.

In the same manner, we trace back each of the *individuals* composing each order; for, the *order* is only the aggregate of the *individuals* which compose it. We thus likewise trace back the generations of *men* to a primitive, ungenerated *parent* or *parents*; and we perceive, that there must have been a *first formed, created man*, as certainly as there has since been a succession of *generated men*. Now, whatever be the standard of age in correspondence to which we may suppose that first man to have been *created*, it must correspond to some period of the human life *subsequent to the birth*. It is of little consequence to the argument, what that age may be; but it is most consistent with the notion of an Intelligent Agent, and therefore most philosophical, to suppose, that He created that first man with the perfection of mind and body, “which most conduced to the end for “which He formed him.” That man received *a frame*, to be sustained by the laws of *nutrition*, which commenced with his existence; which frame was similar to those that were to be engendered from his own. He possessed, therefore, a *bodily structure* similar to ours, and consisting of *similar parts*. Of these, let us contemplate those *solid parts*, which support the

soft and flexible, namely the *bones*; and let us first ask, “*what is bone*, in its nature and com-
“ position?”

To this question Anatomy replies: “the use
“ of the *bones* is to give shape and *firmness* to
“ the body; to be leavers for the muscles to
“ act upon, &c.:—their fibres, when *first formed*,
“ are *very soft*, until, by the addition of a
“ matter which is separated by the blood into
“ them, they grow *by degrees* to the hardness
“ of a cartilage, and *then*, perfect bone. But
“ this change is neither made in a *very short*
“ *time*, nor begun in all parts of the bone *at once*.
“ By the continual addition of the ossifying
“ matter, the bones increase till the hardness
“ resists a further extension; and that hard-
“ ness increasing while they are growing, the
“ increase of their growth becomes slower
“ and slower, till they cease to grow at all¹.”

This is indeed the nature and composition of *bone*, according to the law established *after creation* by the creating agent, for the formation and gradual growth of the animal system, and which we call one of the laws of animal matter; but we are now concerned exclusively with the *first, created, ungenerated* man, and with *his bone*; from the period of whose *first form-*

¹ CHESLDEN'S *Osteographia*, Introd.

PART I.

CHAP. VI.

ation only, those laws were to begin to operate. It is evident, that in this man *none of those processes took place*; but he was *created*, by the will and immediate power of God, in the same form, and with the same structure, which, *after him*, was to be produced only by the operation of those laws. *His bone*, therefore, was *not* formed “*by degrees*,” but “*in a very short time*,” namely, “*at once*;” *not* by “*a continual addition of ossifying matter*,” but with the full measure of that matter; *not* “*with soft fibres, and growing by degrees to the hardness of a cartilage, and then of bone*,” for this process must commence in a *maternal womb*, from whence he did not proceed. In him, therefore, the act of the Creator produced *at once*, by the *mode of creation*, that form, structure, and composition of *bone*, which in all other men is produced by the gradual process of *ossification*, which has been described.

From hence we obtain this first principle, with respect to the *first formations of animal matter*; “*that in those first formations the Creating Agent anticipated, by an immediate act, effects which were thenceforward to be produced only by a gradual process, of which He then established the laws.*”

If a bone of that *first, created man* now remained, and were mingled with other bones

pertaining to a *generated race*; and if it were to be submitted to the inspection and examination of an anatomist, what opinion and judgment would its *sensible phenomena* suggest, respecting *the mode* of its *first formation*, and what would be his conclusion? If he were unapprised of its true origin, his mind would see *nothing* in its *sensible phenomena* but the laws of *ossification*; just as the mineral geology “*sees nothing* in the *details* of the formation “*of minerals, but precipitations, crystallizations, and dissolutions*”¹. He would therefore naturally pronounce of this bone, as of all the other bones; that its “*fibres were originally soft*,” until, in the shelter of the maternal womb, it acquired “*the hardness of a cartilage, and then of bone*,” that this effect “*was not produced at once, or in a very short time*,” but, by “*degrees*,” that, after birth, it increased in hardness “*by the continual addition of ossifying matter, until it ceased to grow at all*.”

Physically true, as this reasoning would appear, it would nevertheless be *morally and really false*. Why would it be false? Because it concluded, from *mere sensible phenomena*, to the *certainty of a fact* which could not be established

¹ See above, p. 23.

PART I. by the evidence of sensible phænomena *alone* ;
 CHAP. VI. namely, *the mode of the first formation, of the substance of created bone.*

From hence we obtain a *second* principle, with respect to such first formations by creation : “ That their sensible phænomena *alone* “ cannot determine *the mode* of their formation, “ since the *real mode* was in *direct contradiction* “ to the *sensible indications of those phænomena.*” What has been here said of the *solid* parts of the animal structure, is equally applicable to *all its parts*, and to *every member* of the *animal kingdom*, at its *first creation*.

Let us proceed from animal to *vegetable matter* ; and let us consider the *first created tree*, under which the created man first reposed, and from which he gathered his first fruit. That tree must have had a *stem* or *trunk*, through which the juices were conveyed from the root to the fruit, and by which it was able to sustain the branches upon which the fruit grew. Let us consider the structure of the *wood* which composed that stem or trunk ; and let us ask, *what is wood*, in its nature and composition ?

To this question, Natural History replies : “ If we entirely remove the bark, we perceive “ the *wood* ; which is a *solid body*, giving *support* “ and *strength* to the tree. On which account

“some naturalists have regarded it, as being
 “with respect to *trees*, what *bones* are in the
 “bodies of *animals*. The ligneous, or woody
 “folds, are *at first soft and herbaceous*, before
 “they acquire the *solidity of wood*. They do
 “*not suddenly* pass from the state of softness
 “which they first have, to the hardness of
 “perfect wood; they only acquire that hard-
 “ness, of which they are capable, *after many*
 “*years*. In a young tree, all those woody
 “folds (I mean those sensibly apparent folds
 “which *indicate the growth* of each year,) are
 “of unequal firmness, hardness, and density;
 “those of the centre being the hardest, and
 “those of the circumference the most tender.
 “*The hardness of these folds is, therefore, only*
 “*effected by degrees*¹:—and since *Nature* does
 “nothing but by *a progressive course*, it is not
 “surprising that *wood* acquires its hardness
 “*only by little and little*².”

This is, indeed, the nature and composition
 of *wood*, according to the law established, *after*
creation, by the creating agent, for the formation
 and gradual growth of the vegetable structure;
 and which we call one of the laws of vegetable
 matter. But, we are now concerned exclu-

¹ DUHAMEL, *La Physique des Arbres*, tom. i. c. 3, p. 30.

² *Ibid.* p. 45.

PART I.

—
CHAP. VI.

sively with the *first, created, unpropagated* tree, and with *its* wood; from the period of whose *first formation* only, those laws were to begin to operate. In the wood of this tree, it is evident that *none of those gradual processes took place*; but it was *created*, by the will and immediate power of God, in the same form, and of the same structure, which, *after it*, was to be produced only by the operation of those laws. *Its wood*, therefore, was not formed “*by degrees*,” but “*suddenly* ;” its solidity was not acquired “*by a progressive course—by little and little—after many years* ;” not by a gradual hardening from a state of softness and herbaceousness; for that has its origin in a growth from *seed*, from whence this tree did not proceed. In *this wood*, therefore, the act of the Creator produced *at once*, by the *mode of creation*, that form, structure, and composition, which in all succeeding trees is produced by the gradual process of *lignification*, which has been described.

Here, then, we find the same first principle in the first formations of created *vegetable* matter, which we found in the first formations of created *animal* matter; a principle, *common to both*; viz. “*That in those first formations the Creating Agent anticipated, by an immediate act, effects which were thenceforth to be produced only*

“ by a gradual process, of which he then established the laws.”

If a portion of this *created tree* now remained, and if a section of its wood were to be mingled with other sections of *propagated trees*, and submitted to the inspection and examination of a naturalist; what opinion and judgment would its *sensible phænomena* suggest to him, respecting *the mode of its first formation*; and what would be his conclusion? If he were unapprized of its true origin, his mind would see *nothing* in its *sensible phænomena*, but the laws of *lignification*; just as the mineral geologist “ sees *nothing* in the details of the formations of primitive rock, but *precipitations, crystallizations, and dissolutions.*” He would, therefore, naturally pronounce of it as of all the other sections of wood: that its “*fibres,*” when they first issued from the seed, “*were soft and herbaceous;*” that they “*did not suddenly pass to the hardness of perfect wood,*” but, “*after many years;*” that the hardness of their folds, “*which indicate the growth of each year,*” was therefore effected only “*by degrees;*” and that, “*since Nature does nothing but by a progressive course, it is not surprising that its substance acquired its hardness only by little and little.*”

Physically true, as the naturalist would here

PART I.

CHAP. VI.

PART I.
 —
 CHAP. VI.

appear to reason; yet his reasoning, like that of the anatomist, would be *morally and really false*. And why would it be false? For the same reason; because he concluded, from *mere sensible phænomena*, to the *certainty of a fact* which could not be established by the evidence of sensible phænomena *alone*; namely, *the mode of the first formation of the substance of created wood*.

We thus find a *second principle*, common to the first formations both of *animal and vegetable matter*; viz. “That their *sensible phænomena alone* cannot determine *the mode* of their formations; inasmuch as the *real mode* was in *direct contradiction to the sensible indications of those phænomena*.” What has here been said of the *solid parts* of the vegetable structure, is applicable equally to *all its parts*, and to *every member* of the *vegetable kingdom*, at its *first creation*.

If, therefore, the natures of *created bone* and *created wood* had suffered them to subsist, and to be preserved until the present day; we plainly perceive, how easy it would have been to demonstrate to the science of *physics*, its absolute incompetence to determine any thing at all, by *phænomena alone*, concerning the *mode of the first formations* of the first individuals composing either the *animal or vegetable kingdoms of matter*.

CHAPTER VII.

THERE only now remains to be considered, the *third*, or *mineral* kingdom of this terrestrial system; and it appears probable, to reason and philosophy, by *prima facie* evidence, that the principle determining the mode of first formations, in *two parts* of this *threefold* division of matter, must have equal authority in this *third part*. And indeed, after the closest investigation of the subject, we can discover no ground whatever for supposing, that this *third part* is exempted from the authority of that *common principle*; or that *physics* are a whit more competent to dogmatize concerning the *mode of first formations*, from the evidence of *phænomena alone*, in the *mineral* kingdom, than they have been found to be in the *animal* or *vegetable*; or, to affirm, from the *indications* of the former, that the mode of its *first formations* was *more gradual* and *tardy* than those of the *other two*.

Let us try this point, by proceeding with our comparison; and let us consider the first created *rock*, as we have considered the first created

PART I.
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CHAP. VII.

PART I. *bone and wood*; and let us ask, *what is rock*, in its nature and composition?

CHAP. VII.

To this question, Mineralogy replies: "By
 " the word *rock*, we mean every *mineral mass*
 " of such bulk as to be regarded an *essential*
 " *part* of the structure of the globe¹. We un-
 " derstand by the word *mineral*, a natural body,
 " inorganic, solid, *homogeneous*, that is, com-
 " posed of integrant molecules of the same
 " substance²:—We may, perhaps, pronounce
 " that a mass is *essential*, when its displace-
 " ment would occasion the *downfall* of other
 " masses which are placed upon it³. Such are,
 " ' those lofty and ancient mountains, *the first*
 " *and most solid bones*, as it were, of this globe,'
 " *les premiers, les plus solides ossemens*—which
 " have merited the name of *primitive*, because,
 " scorning all support and all foreign mixture,
 " they repose always upon bases similar to
 " themselves, and comprise within their sub-
 " stance no matter but of the same nature⁴.—
 " These are the *primordial mountains*; which
 " traverse our continents in various directions,
 " rising above the clouds, separating the basins
 " of rivers one from another; serving, by means

¹ D'AUBUISSON, i. p. 272.

² Ibid. 271.

³ Ibid. 272.

⁴ SAUSSURE, *Voyages des Alpes, Disc. Prél.* p. 6, 7.

“ of their eternal snows, as reservoirs for feeding the springs, and forming in some measure the *skeleton*, or, as it were, the *rough framework* of the earth¹.” These primitive masses “ are stamped with the character of a formation altogether crystalline, as if they were really the product of a tranquil precipitation².”

Had the *mineral geology* contented itself with this simple *mineralogical* statement, we should have thus argued, concerning the *crystalline phenomena* of the first mineral formations; conformably to the principles which we have recognized. As the *bone* of the first man, and the *wood* of the first tree, whose solidity was essential for “ giving shape, firmness, and support” to their respective systems, were not, and could not have been formed by the gradual processes of *ossification*, and *lignification*, of which they nevertheless must have exhibited the sensible phenomena, or apparent indications; so, reason directs us to conclude, that *primitive rock*, whose *solidity* was equally essential for giving shape, firmness, and support to the mineral system of this globe, was not, and could not have been formed by the gradual process of

¹ CUVIER, § 7. p. 39. ² D'AUBUISSON, ii. p. 5.

PART I. *precipitation and crystallization*, notwithstanding
 — any *sensible phænomena*, apparently indicative of
 CHAP. VII. those processes, which it may exhibit; but that
 in the *mineral* kingdom, as in the *animal* and
vegetable kingdoms, the creating agent *anticipates*
 in his formations, by an immediate act, *effects*,
 whose *sensible phænomena* could not determine
 the mode of their formation; because *the real mode*
 was in *direct contradiction* to the *apparent indications*
 of the *phænomena*.

The *correspondence and correlation* of the *three subjects*, is pointed out by physical science itself, in the passages which have just been quoted; for, *natural history* notes the analogy of the *wood*, in the *vegetable structure*, and *mineralogy* notes that of *primordial rock*, in the *mineral structure*, with the *bone* in the *animal structure*. *Solidity and consistency*, therefore, are the *common properties* of all the *three*. To produce that *solidity and consistency*, which were as necessary for the surface which was to sustain, as for the bodies which were to be sustained by it, was equally the *end* of the formation of *each*; and, therefore, according to Newton's *second rule*, we are bound by reason to assign the *same identical cause* for the *solidity and consistency* of *each*. And it will then necessarily follow; that *primitive immediate crystallization*, can furnish no data

for computing *time*, more than *primitive immediate ossification*, or *primitive immediate lignification*.

PART I.
CHAP. VII.

It matters not to this argument, whether the mineral geology adopts the *Neptunian* or the *Plutonian* system; whether it *sees* in the *phænomena* of minerals, the characters of aqueous solution, or of igneous fusion; because, the argument is directed, universally, to the question—of the authority of *phænomena*, in *first formations*, for determining the *mode* of their production; and it is, therefore, in no manner affected by the particular differences subsisting between those two conflicting hypotheses: whether the *phænomena seem* to indicate the *mode of water*, or the *mode of fire*, they cannot be indicative of the *real mode*.

But, the mineral geology has not contented itself with that simple mineralogical statement; nor drawn the conclusion which we have drawn, in conformity with the principles, and in observance of the rules, of Newton's philosophy. It affirms, that the *characters* by which geology is written in the book of nature, in which it is to be studied, are *minerals*!; and it *sees nothing* in that book of nature but "precipitations, crystallizations, and dissolutions;"

D'AUBUISSON, *Disc. Prél.* p. 29.

PART I. and therefore, because it *sees nothing else*, it concludes without hesitation, from *crystalline phenomena* to *actual crystallization*. Thus, by attempting the impossibility of deducing an *universal principle*, viz. *the mode of first formations*, from the analysis of *a single individual*, viz. *mineral matter*, separate from co-ordinate *animal and vegetable matter*; and concluding from that defective analysis, to the *general law of first formations*; it set out with inadequate light, and it is no wonder that it ended in absolute darkness; for such is its *elemental chaos*, and its *chemical precipitation of this globe*: a doctrine, so nearly resembling the exploded *atomic philosophy* of the Epicurean school, that it requires a very close and laborious inspection to discover a single feature, by which they may be distinguished from each other.

The *sensible phenomena*, which suggest *crystallization* to the Wernerian, or *vitrification* to the Huttonian, in examining a fragment of *primitive rock*, are exactly of the same authority, but not of a particle more, with that which would have suggested *ossification* and *lignification* to the anatomist and naturalist, who should unknowingly have inspected or analyzed *created bone*, or *created wood*; and the same error would have befallen all the three, should each have concluded, from what they *saw*, that the substances

which they were severally engaged in examining, had been formed by the several *modes* of *crystallization*, *ossification*, and *lignification*: the mineralogist can no more discover the *mode* of the formation of *primitive rock* by the laws of *general chemistry*, be they the laws of *fire*, or the laws of *water*, than the anatomist can discover the *mode* of the formation of *created bone*, by the laws of *generation* and *accretion*.

But there is this notable difference between the three cases; that the *animal* and *vegetable* structures were formed to continue only for *short durations* of time; they were to reproduce their species, and to perish; and to be continued only by the *succession of generation*. The first formations of these, have therefore long since been resolved into their ultimate elements, and are now totally irrecoverable by us. Whereas, the first formed *mineral* masses of this earth, constituting the “*skeleton*, or *rough frame-work*” of this globe, were not made to reproduce their kind, nor to perish within the experience of the human race; they *still subsist*, with the nature and structure which they *received* at their *first formation*, or *creation*. When we discover no evidence whatever of *re-composition* of *divided parts*, but a simple homogeneous mineral substance, incapable of production by any known secondary cause, then we see a true *first formation*. Such

PART I. are the *granite masses* which we survey; which
 CHAP. VII. were coeval with *created man*.

Hence it is evident, that we are to reason of the first formation of *primitive rock*, as we should reason of a *hortus siccus*, composed of *created plants* from the garden of Eden; with which those primitive rocks were contemporary, although they have so long outlasted them. If we *knew*, that those dried plants were formed before the laws of vegetable generation and growth could have commenced, we should take no account of the apparent indications of generation and growth in their *phenomena*; nor suffer ourselves to be deluded by them, in respect to *the mode* of their formation. In the same manner we ought to dispose our judgments, with respect to the *first mineral formations*; which were unquestionably formed by the *same mode*, because anterior to the first flowers that grew upon the earth.

When, therefore, we handle a piece of granite from the Alps, the Andes, or the Himmaleh mountains, and think we discern in it the characters of aqueous, or igneous, action; if we would be sure to reason unphilosophically and falsely, we shall instantly conclude, from the first promptings of our *senses*, that the *mode* of its first formation was by aqueous solution, or by igneous fusion; we shall say, “ this substance *looks as if it was formed* by the

“ agency of water, or fire; we see nothing in
 “ it but the characters of water, or of fire;
 “ therefore, it was formed by the agency of
 “ water, or of fire.” And thus it is, that the
 mineral geology actually does reason; though
 professing to govern its reasoning, “ by the
 “ principles of *sound physics*, and the rules of
 “ *an exact logic*.” Nothing can be more un-
 philosophical, and *popular*, than such *prima*
facie conclusions.

But, if we would reason philosophically,
 and conformably to the principles and method
 of Newton, we shall take our premises much
 higher; and shall reason thus: This substance
 is a portion of terrestrial matter, and of that order
 of terrestrial matter which constituted the *first*
mineral formations of this globe: it was therefore
 not produced by any secondary cause, but it was
 “ *created, and set in its order*, by the Creator,
 “ with the *properties* which most conduced to the
 “ *ends* for which He formed it;” which properties
 were, *solidity* and *stability*. It was designed to
 sustain the loose materials of the *globe*, as the *bones*
 were designed to sustain the soft and flexible
 parts of the *body*. His first formations were made
 in *correspondence* with the laws which He was
 then *about to establish*, and in *anticipation of effects*
and appearances which were thenceforward to be
 produced only by the operations of those laws;

PART I.
 CHAP. VII.

PART I.
 CHAP. VII.

and since there are no decays and reproductions of granite mountains, as there are of animal and vegetable structures, and therefore no known laws for their successive or occasional formation, it is reasonable and philosophical to regard this piece of granite as a part of a *first formation*, the *mode* of which was *Divine Creation*; and which has therefore always subsisted the same, since the *act of Creation* brought it into being.

“ But (exclaims the mineral geology,) can any
 “ one uphold the doctrine of *universal forma-*
 “ *tion*? Let him who answers in the affirmative
 “ reflect on *the consequence* which that doctrine
 “ involves. He must admit, that when the
 “ particles of *quartz, feldspath, and mica*, which
 “ had before *arranged themselves* so as to form
 “ granite, *changed* their mode of arrangement,
 “ so as to form *gneiss*, that change was con-
 “ veyed *with the rapidity of an electric shock*,
 “ from one end of the world to the other:—
 “ that the *currents* of the different hemispheres
 “ had so *equable* a motion, that the particles
 “ borne along by *these currents* were so *equally*
 “ *assorted*, that *within the tropics and without*,
 “ the same dispositions *began and ceased at the*
 “ *same moment*:—that similar pebbles were
 “ detached from their native rocks, at the poles
 “ and at the equator, by equal forces acting
 “ under the same circumstances, and were

“ deposited by *the same means*, and at *the same*
 “ *time*. All these he must admit, or reject in
 “ *toto* the doctrine of *universal formation*¹.”

PART I.

CHAP. VII.

We have no objection whatever to the alternative here offered us; only we must rectify some confusions in the statement. For, in admitting *universal formation*, we are so far from admitting what is here assumed, viz.:—that the particles of *quartz*, *feldspath*, or *mica*, previously *arranged themselves*, or subsequently *changed the mode of their arrangement*, that we absolutely deny that any particles of matter, of any description whatever, *arranged themselves* at all, prior to *universal formation*; because we affirm, that universal primitive formation gave to all particles of matter, both their *being* and their *arrangement*. And we cannot be embarrassed by “*the rapidity*” of the operation “*from one end of the world to the other, like an electric shock*;” because we suppose it in the *mode of first formation*; which was *Divine Creation*. We cannot be perplexed, that the particles were “*equally assorted, both within the tropics and without, at the same moment*,” because we conclude with Newton, “*that all the particles of matter were variously associated*

¹ GREENOUGH'S *Geol.* p. 225.

PART I. "at the FIRST CREATION by the counsels of an
 CHAP. VII. "Intelligent Agent;" and, for the same reason,
 we find no difficulty in supposing this operation
 to have taken effect "at the poles and at the
 "equator, by the same means, and at the same
 "time," because it is the very conclusion of
 Newton's philosophy, and of unsophisticated
 reason; which teach, *Universal Primitive Form-*
ation, by the Creative Act.

"What, then! (it will perhaps further ex-
 "claim,) has God introduced *appearances* into
 "His works, to *mislead* and to *deceive* His moral
 "and intellectual creatures? Has He affixed
 "phenomena, which should seduce them into
 "error?"—Μη γένοιτο, *God forbid!* Great was the
 authority which warned; μη κρινετε κατ' οψιν, αλλα
 την δικαιαν κρισιν κρινετε—"judge not according to
 "appearance (only), but judge a right judgment."
 And although this precept was certainly not ad-
 dressed to the mineral geology, yet it is of uni-
 versal force, in every subject which may engage
 the reason. Those *phenomena* cannot mislead,
 deceive, or seduce any one, who faithfully and
 diligently exercises his moral and intellectual
 faculties by the rule which God has supplied for
 their governance; but only those, who neglect to
 exercise them by that rule. For, those very
 faculties, while they direct us to infer *universal*
first formation by the immediate act of God, caution

us not to be misled by the *phænomena* which that *act* must occasion. They warn us, that all *first formations* of the *material* works of God must have received a *specific form* of their substance, and, therefore, must have exhibited to the *visual* sense *specific characters*, even at the moment when they were first called from non-existence into being. Whether it were the first formed *bird*, or the first formed *shrub* on which that bird rested, or the first formed *rock* on which that shrub grew, each must have instantly exhibited *sensible phænomena*; the first, of *ossification*; the second, of *lignification*; and the third, of *crystallization*. Yet, the *phænomena* would not have been truly indicative of *actual* ossification and *actual* lignification in the two first cases; and therefore, they would not have been indicative of *actual* crystallization in the last; that is, of those subjects having passed through any of these *gradual processes*. There is no possibility of escaping from the self-evident certainty of this principle; which extends equally to all the *three* kingdoms of terrestrial matter. And the uniformity, regularity, and simplicity of all the works of God, direct us to believe; that the *texture*, and consequent *phænomena*, of first formations in all those three kingdoms, would have manifested a direct correspondence with the laws which He was then

PART I.
—
CHAP. VII.

PART I. providing for His new system. It would have
 done so in the first *bone*, it would have done
 so in the first *wood*; therefore, it would have
 done so in the first *rock*. The bone, and the
 wood, have passed away; but the rock still
 remains, and we contemplate it at the present
 hour, in the east and in the west, in the north
 and in the south. If *crystalline* composition is
 the property, which, by the laws appointed at
 the creation, constitutes the greatest *hardness*
 and *solidity* in *mineral* substances, we shall
 expect, that the primitive *mineral* masses will
 be “*stamped with a character altogether crys-*
 “*talline*¹,” just as we conclude, by parity of
 reason, that the *bones* of the first animals must
 have been *stamped with a character altogether*
calcareous.

Those persons, therefore, who rightly use the
 faculty of reason, will be in no danger of being
deceived by primitive phænomena; but will ascribe
 them, by rational induction, to the *immediate*
design and act of God. To others, indeed, they
 may become a judicial snare; to “*take the wise*
 “*in their own craftiness; and to make foolish the*
 “*wisdom of science, falsely so called.*”

De Luc, in his “*Letters on the Earth*,” ob-
 served: “Neither natural history, nor physical

¹ See above, p. 71.

“ science, lead us to believe, that our globe has existed from all eternity; whenever, therefore, it acquired its *first existence*, the *matter* of which it was composed must, in all necessity, have been of *some nature*, and under *some first integrant form*¹.” His mind was, for a moment, sensible of this great truth; and he was then nearer to “*a solid basis for geology*²,” than he ever was afterwards. But, it was only for a moment; for, from that period his philosophy retrograded, while he imagined that it was advancing. He wanted either the ability, or the resolution, to trace back all the links of the chain, which connected the *actual phænomena* of mineral matter with that great *remote principle*. He vacillated; he could not stand the intermediate sarcasms of the celebrated *physical* philosophers who were his contemporaries, and some of them his distinguished fellow countrymen; and, resorting to his fatal system of compromise and concession, he sought to conciliate the good fellowship of *physical* science, by surrendering that high and solid principle to the *chemical geology* of Saussure. “In my letters on the *History of the Earth*,” says he, “I acknowledged, that I saw nothing as yet that could lead me to *conceive the formation*

¹ Tom. ii. p. 211.

² See above, p. 25.

PART I.
 —
 CHAP. VII.

“ of *primordial substances*, the masses of which
 “ were *unintelligible to me*. Since the publica-
 “ tion of that work, that of the observations
 “ and remarks of M. de Saussure, *has become*
 “ for me a compass by which to steer.—From that
 “ time the observations of mineralogists, together
 “ with my own, have placed beyond all doubt
 “ this *great geological fact*; that all the *visible*
 “ mass of our continents, except volcanic sub-
 “ stances, *formed itself* in successive beds, or
 “ strata, of different kinds, beginning with
 “ *granite*.—It is impossible to deny this, after
 “ reading the “*Voyages des Alpes*,” of M. de
 “ Saussure; in which that great observer has
 “ so accumulated the proofs of *this truth*, that
 “ no one can doubt it, and retain any right to
 “ the title of *geologist*!” that is, of *mineral geolo-*
 gist. Thus, the importunity of *sensible phænomena*
 fascinated his judgment; and drew away his
 view from the great *truth*, of which he had
 caught a glimpse. He went back from the
 path of Newton, and plunged into the chaos of
chemical first formations; and he thereby reduced
 himself to the necessity of seeking, by a daring
 and inerudite tampering with texts of Scripture,
 that visionary and arbitrary chronology for the
effects of Creation, which he had before strenu-

¹ *Lettres Géol.* p. 73, 74. Note.

ously refused to other geologists, who had demanded the same for the *effects of the Deluge*.

I am well aware, of the power of *phænomena* on the mind; and, of the difficulty which the mineral geology experiences, in resisting their importunity with respect to the *mode of the first mineral formations*. But then, I am equally aware, of the difficulty which a countryman experiences in renouncing his persuasion, that *the sun rises* from the earth in the morning, and *sets* at night, either in the ocean or behind the hills. The *difficulty* is of the *same kind* in both cases; and proceeds from the *same cause*, viz. the contradiction of the *real fact*, and the *apparent indications of the sensible phænomena*. But these contradictions, of *fact* and *phænomena*, appear to reveal a *law*, designed to stimulate the exercise of our *rational and moral faculties*, and to abstract them from the dominion of *sense*.

PART I.

CHAP. VII.

PART I.

CHAP. VII.

CHAPTER VIII.

PART I.
 —
 CHAP. VIII.

THE entertainment of a *chaotic philosophy*, however modified, within the lights of *reformed philosophy* and *revelation*, is a *monstrum* in the history of the human mind; because, there exists no reason whatever, *à priori*, for supposing, that an *Intelligent Agent* gave *imperfect existence* to any of His *first formations*; and because we have found ample proof, *à posteriori*, that in *two parts* out of *three* of this *tripartite system* of matter, the first formations must have been produced in their full perfection—*perfect bone*, and *perfect wood*. We are therefore directed, by every sound principle of analogical reasoning, to infer; that in the *third part*, where the first formations were as essential to the structure of *the globe*, as in the two former to the structures of their respective systems, the first formations were likewise produced in their full perfection—*perfect rock*; and we have seen, that the indications of *sensible phænomena* can have no authority whatever in this question. To conclude then to a *chaos*, for that *third part* of matter, in the *present state of our knowledge*, is far more monstrous than the conclusion to an *universal chaos*, in the *heathen world*.

The pretended analogies by which it is attempted to be maintained, are too fallacious to affect the judgment of any one who is at all at the pains to think for himself, and who does not permit the thread of his thoughts to be intersected. “ In the *present order of nature*, “ (says the mineral geology,) we observe that “ *animals and vegetables* advance by a comparatively *slow* progression to maturity; such “ *appears* also to have been the *order of nature* “ in the progression of *our planet* to a tranquil “ state¹.” The false reasoning of this argument needs scarcely to be pointed out: it first takes ground upon a *pre-assumption*, that our planet *actually experienced a progression* from a disordered to a tranquil state, (which is the point refused;) and then it attempts to confirm that pre-assumption by comparisons, which can yield no analogy whatever; namely, 1. of the *present order of nature*, with *another supposed antecedent state of things* which it equally calls the *order of nature*; and, 2. of the *secondary formations of generated animal and vegetable structures*, under that *present order*, with the *first formation of the mineral*, in that *antecedent state*: between which things it is manifest that there can exist

¹ BAKEWELL, *Elements of Geology*, p. 429.

PART I. no relation of analogy whatever. The “*present*”
 CHAP. VIII. “*order of nature*,” is a phrase without mean-
 ing, if it is not intended to express *the order established by God at the creation*; as Bacon interprets it. But this excludes any *pre-existing order of nature*, which are words absolutely without any meaning at all; not only in religion and philosophy, but, in common sense, which perceives, that *nature* is here a slovenly word, borrowed from heathen ignorance, and only serving for the obscuration of truth. To reason *right*, the analogy should have been stated, between the *first formations of all the three kingdoms of matter*; between the *first man*, the *first tree*, and the *first rock*, before the present order of nature commenced its operation; and the *time* requisite for the first formation of the two first of these being found, would give the time requisite for the first formation of the third. But, what inference can be drawn concerning it, from “*the comparative slow progression to maturity*” of generated animals, or propagated trees, in the *present order of nature*? The supposition of a *primitive chaotic fluid*, or *confused mixture of elements* produced by the Creator, is the supposition of an *imperfect creation*; but, the tender condition of nascent animals, or vegetables, under the *present laws of generation*, is no imperfect

creation, but a beautiful part and sequence of that first formation, in which the first animals, and first vegetables, were *created perfect*. If the mineral geology could show it to be probable, that the *first man*, and the *first tree*, subsisted at first an “*imperfect substance, which day by day was fashioned, when as yet there was none of them,*” then indeed it might infer with consistency, “the comparatively slow progression of our planet, from a state of *chaos*, to a state of maturity;” but that it never can do; and therefore, it can never draw that inference from the laws *now* operating in *generated beings*, without renouncing all pretensions to the faculty of conducting a logical argument. There is a *reason* for the slow progression of *generation*; but there is *no reason* for slow progression in *first formations*.

Again, it would argue by analogy; and it asks, “*Why are there mountains on the globe?*” which question it immediately answers, exultingly, with this other question: “*Why are there pyramids in Egypt?*” as if it should say, “*Are you answered now?*” And it adds; that “the course which the *antiquary* pursues in his researches concerning *pyramids*, marks out that of the *geologist*, with respect to *mountains*, and their bases, our *continents*¹.” It

¹ DE LUC, *Lettres Géologiques*, p. 5.

PART I. then shows, that in each there must be *materials*
 and *operation*; but it forgets, that in the pyramid,
 CHAP. VIII. the *materials* must precede the *operation*; whereas,
 in mountains, the *operation* must precede the
materials. In the pyramid, there must be ma-
 terials before the artificers can act; in the moun-
 tain, the Artificer must act, before there can be
 materials. In the one case we are led to inquire,
 from whence did the artificers *procure* the ma-
 terials? but, in the other, how did the Artificer
produce the materials? that is, what was the *mode*
 of their *first formation*? What *true analogy*, then,
 can there be between the two cases, if closely ex-
 amined? But, from not examining them closely,
 and limiting its view to a vague resemblance,
 between the *strata of soils* in mountains, and
 the *layers of masonry* in pyramids, it contents
 itself with that resemblance; and it con-
 cludes, “we should indeed be very far behind
 “hand in geology, if we were not able to dis-
 “cover, from whence the materials proceeded of
 “which those *strata* were formed¹.” And from
 whence does it at length *discover* that they
 ultimately did proceed? From a *chemical chaos*,
 or “confused assemblage of elements, of which
 “water was the basis; and it is from this *first*
 “mixture, that *all substances whatever*, which
 “engage our observation or experience, *formed*

¹ DE LUC, *Lett. Géol.* p. 7.

“*themselves*¹.” And this “*discovery*” is to be imposed upon us, as a result of “*the happy revolution, effected by Bacon and Newton in the studies of the natural sciences!*”

PART I.

CHAP. VIII.

But, says the mineral geology, “every proposition in the physical sciences, which does not result simply and immediately from the observation of a *manifest fact*, can only be an *induction* drawn, by *analogy*, from facts which are known; this is an incontestable principle of all sound logic².” There can be no doubt of the truth of this maxim; but the *validity of the induction* must depend, entirely and absolutely, upon the *soundness of the analogy*. Every degree of unsoundness in the *analogy*, will impart its defect to the *induction*; and as the preceding analogies proposed, between the *mode of the first formation of the earth and that of secondary formations*, are utterly and palpably *unsound*, so must the *induction* deduced from them be utterly *unsound* also.

The mineral geology does not seem to be aware, how baseless a fabric it constructs, in founding its doctrine of *first mineral formation on secondary causes*. “The first basis of geology founded on *facts*,” says de Luc, “is certainly an exact knowledge of the mineral strata,

¹ See above, page 20. ² D'AVUISSON, Tom. ii. 603.

PART I.
 —
 CHAP. VIII.

“ which compose the mass of our continents
 “ subject to our observation; for, these strata,
 “ *the formation of which has entirely ceased,*
 “ must have been *the effect of primordial causes,*
 “ *which no longer subsist.*” To the same
 purpose D’Aubuisson, but with greater con-
 sideration: “ *The nature of this cause, and the*
 “ *manner in which it acted, are most likely re-*
 “ *moved for ever from our knowledge: no effect of*
 “ *the same kind is ever now produced:—all the*
 “ circumstances of the division of the mineral
 “ masses into beds and strata, both in their
 “ primitive and actual states, are *very far from*
 “ *being known to us;* and, in concluding this
 “ subject, we are constrained to say, that to
 “ determine respecting stratification, its cir-
 “ cumstances, and its laws, *still remains a pro-*
 “ *blem to be resolved, and is perhaps the most*
 “ *important one in geognosy.*” Thus also Cuvier:
 “ We remain in *utter ignorance* respecting the
 “ *causes, which have given rise to the variety*
 “ in the mineral substances of which *strata*
 “ are composed. We are *ignorant even of the*
 “ *agents* which may have held some of these
 “ substances in a state of solution; and it
 “ is *still disputed* respecting several of them,
 “ whether they have owed their origin to the
 “ *agency of water, or of fire*¹.”

¹ See above, page 60. § 23, p. 70.

That every *effect* must have a *cause*, is a truth which all the evil ingenuity of Hume could not invalidate; for he confirmed it while he laboured to impugn it, by proving, that he was striving to render his own sophistry the *cause*, of the *effect* of scepticism in others. But it does not necessarily follow, because every effect must have a *cause*, that every sensible physical effect must have a *secondary physical cause*; on the contrary, we know that there must have been, and there still must be, many sensible physical effects, which can only be ascribed to a *first physical cause*; and we have found, that the *first physical cause* is the *Creator*.

Now, in order to establish the legitimate relation of cause and effect, subordinately to the first cause, it is indispensably necessary, either that the cause should have been known in the course of *actual operation*, or the effect in course of *actual production*; in either of which cases, we may securely pronounce of the relation of cause and effect. To these alone Newton assigned the denomination of *phænomena*; and he affirmed, that “whatever cannot be deduced from “*phænomena*, is to be called *hypothesis*; and that “*hypotheses*, whether metaphysical, *physical*, of “occult qualities, or mechanical, are not to be



PART I.
—
CHAP. VIII.

“ admitted in experimental philosophy¹.” But, if neither of these have ever been known, how fundamentally hypothetical must be the relation alleged! And who ever knew a granite rock, in course of *production*, or a *menstruum* exhibiting a *cause* capable of producing it? Mineral geology says, that it *infers it*, because the crystalline substance of rock must have had a *cause*. So must the calcareous substance of bone, and the fibrous substance of wood, have had a *cause*; but, if it was *first-formed, created bone*, or *first-formed, created wood*, it most assuredly had not a *secondary* physical cause, whatever were the *appearances*, which the mineral geology call *phenomena*; and, if it is *first-formed, created rock*, it had not a *secondary* physical cause, whatever are its appearances. Yet, we know that there are now *secondary* causes which produce bone and wood; but we know of no *secondary* cause that produces granite. And the reason appears to be obvious: for, the *animal creation* was to subsist, *by succession to the first-formed individuals*; and therefore, laws for securing that succession, by the multiplication of individuals, were necessary: but, the *mineral creation* was to subsist, *permanently in its first-formed individuals*; there-

¹ Pr. Math. Schol. General.

fore, no laws for their multiplication were necessary. And from this consideration alone, accrues a very powerful moral evidence; that the *first mineral formations*, which are still permanent, were formed by no other *mode* than that which formed the *first animals*, which have been succeeded by generation.

When, therefore, the mineral geology ascribes the *first formation* of rocks to the mode of crystallization in an universal *aqueous* fluid, it assumes an effect which was never known in course of production, and explains it by an assumed cause, which was never known in course of operation. And what is this in *philosophy*, but assuming an *occult cause*; and in reason, but assuming a *fiction* instead of a *fact*, for the *basis of a science*? For the *water-geologist*, who maintains the crystallization of granite by *water*, is obliged at the same time to acknowledge the fact of crystallization by *fire*, in some instances; and since we have never witnessed the crystallization of granite at all, either by water or by fire, the system that would determine the mode of its formation to *water*, *absolutely*, can have no *real* foundation.

The *water-geologist*, indeed, ascribes all formations, primary and secondary, to *water*, while the *fire-geologist* ascribes them all to *fire*; which resembles “*the glorious uncertainty*,” irreverently ascribed to the law; and has given

PART I. cause to an eminent chemical philosopher to
 CHAP. VIII. observe: "geologists arrive at conclusions *dia-*
 " *metrically opposite*; upon which a clever
 " writer remarks, 'that among all the wonders
 " geology presents to our view, the *confidence*
 " *of the theorists* is the most unaccountable¹."

But, there is still room for *fancy* to play between *the two*; for, why might not those formations be ascribed to both agents, *in succession*? Why might not the primary formations have been caused by fire, and the secondary by water? Why, after a mineral globe had been formed by *igneous fusion*, might not a revolution have been effected by an *aqueous fluid*? for we are certain of the existence, and of the power, of both those agents in the globe. Why then are we to contend for the one, or for the other, exclusively? and why might they not have operated in *alternation*? Here is still a ground-plot left, to attempt the raising a new system. The argument is so entirely and essentially hypothetical on both sides, that this last supposition may be just as defensible as either of the other two. The Neptunian has established the fact against Hutton, that *secondary* formations are of *aqueous* production; by showing, that the perfect pre-

¹ BRANDE, *Manual of Chemistry*, v. iii. p. 230.

PART I.
 CHAP. VIII.

servation of sea-shells in inland soils could not have taken place, if the revolution which transported them thither had been effected by *fire*; for the shells, being calcareous, must have been dissolved, and mingled with the general mass¹. But, he would infer *from thence*, that *primary* formations must likewise have been of *aqueous* production²; which is more than his premises can yield. He has refuted Hutton, indeed, in the one argument, but he has left him as strong as ever in the other: and yet, not a whit stronger than himself; for, the force of their arguments is so nearly poised and balanced, that they neutralize each other. The result is, that there will remain for ever a ground for hypothetical contest between the two; and, therefore, as there exists no accessory weight of *truth* to determine the scale *definitively* on either side, the just conclusion is, that *both* are equally erroneous with respect to *fact*; consequently, that “*the crystalline character stamped upon the primitive mineral masses,*” was not stamped by either of the *secondary* causes assigned; but, that it was impressed by the *first, Creating Cause*, who anticipated the effects of each, in giving

¹ D'AUBUISSON, tom. i. p. 381.

² Ibid. p. 388.

PART I. to those masses “*the properties which most con-*
 CHAP. VIII. “*duced to the end for which He formed them.*”


A principal and obvious “*end*” of those “*prop-*
 “*erties,*” as we have seen, was the *solidity* and
durability resulting from the grain and texture
 of their composition; so that the granite sum-
 mits, traversed by Hannibal 2000 years ago,
 are identically the same which we now witness;
 and we are sure that they stood identically the
 same, twice 2000 years before him. Whatever
 may be the destructive and wasting power of
 the atmospheric agents upon some bodies, it
 is null with respect to these, and therefore
 idle to take account of it in geology; and it
 is only resorted to, to aid a limping system.
 We discern a manifest “*end,*” likewise, in their
 “*sizes,*” and their “*figures;*” for, to the alti-
 tude of the *former,* is owing the accumulation of
 supplies for the rivers which are to irrigate the
 globe; and, to the prolongations and incli-
 nations of the *latter,* are owing the conduct
 and direction of the rivers which actually
 irrigate it. And how is it possible to contem-
 plate the unchangeable arrangement, by which
 all these perfect means conduce to their several
 perfect ends, without “*rendering immediately*
 “*to God, the things which are God's!*”

CHAPTER IX.

It is revolting to *reason*, and therefore to *true philosophy*, to observe how strenuously physical science labours to exclude the *Creator* from the *details* of His own creation; straining every nerve of ingenuity, to ascribe them *all* to *secondary causes*. Can it be aware that, in so doing, it is moving in the very direction which leads, and which ever has led, to *materialism*, practical, if not theoretical; and, therefore, in the very opposite direction to that in which Bacon and Newton, of whom it makes its boast, always moved? And that, in every degree in which it despoils *the Creator*, in order to furnish the fiction which it extols under the unmeaning term of *Nature*, it in the same degree disclaims the philosophy of Bacon and Newton, and sanctions the doctrine of *Epicurean atheism*? for, the atheism of Epicurus was not a denial of *Deity*, but a denial of the action and interference of *Deity*.

How different was the proceeding of Newton! who declared, "When I wrote my treatise about our system, *I had an eye upon such principles as might work with considering men for the*

PART I.

 CHAP. IX.
 

PART I.
 CHAP. IX.

“*belief of a Deity*¹,” that is, an *intelligent, interfering, and operating Deity*. Hence it was, that he taught: “*Hæc omnia, simili consilio constructa, suberunt UNIVS dominio:—Hic omnia regit, non ut Anima Mundi, sed ut universorum Dominus. Et propter dominium suum, Dominus Deus Παντοκράτωρ dici solet. Nam Deus est vox relativa, et ad servos refertur; et deitas ac dominatio Dei, non in corpus proprium, uti sentiunt quibus Deus est anima mundi, sed in servos*².—*All these things, constructed by the same Wisdom, are subject to the dominion of ONE alone. HE, rules them all; not as a soul of the world, but as the Lord and Master of the universe; and, on account of His own proper dominion, He is called, the Lord God Almighty. For God, is a relative term; and relates to servants, or ministers; and the godship and domination of God is, not over His own frame, as those supposed who considered Him only as the soul of the world; but, over His servants or ministers.*”

But, does the mineral geology exhibit any demonstration, that it “*has an eye upon any such principles,*” in the management of its science?

¹ *First Letter to Bentley.*

² *Princip. Math. L. iii. Schol. General.*

It is vain to say, that it *presupposes* a first, Intelligent Cause; and therefore, that it has no need to *propound* it. It is indispensably necessary to propound it, like Newton; and not only to propound it, but to proclaim it, like him; and not only to proclaim it once, and then to have done with it, but to recur to it repeatedly and constantly, like him, *as a first principle* never to be lost sight of; that, in so intricate and dangerous a labyrinth, the mind may *hold fast* by it, as a clue never to be relinquished; lest, if it should once lose that clue, it should stray further and further from the only secure road, into the gloomy entanglements of error, and should become ultimately lost in all the horrors of moral darkness. He who teaches a *science*, is understood to ground it upon the *first principle* which he propounds; and when that first principle is *nature* and *chemistry*, when that nature is personified, and when creative acts are ascribed to it; such doctrine is fundamentally unscientific and unphilosophical, if brought to the test of Bacon and Newton; and essentially profane and impious, if brought to the test of Revelation. It is manifest, that the mineral geology, *considered as a science*, can do as well *without God*, (though in a question concerning the *Origin of the Earth*,)

PART I.

CHAP. IX.



PART I.

CHAP. IX.

as Lucretius did; and that, like him, it would relieve God from all personal trouble in producing the wonderful arrangements of this globe. Like Lucretius, it says in effect :

Quæ bene cognita si teneas : *Natura* videtur
Liberâ continuo Dominis privata superbis
Ipsa sua per se sponte omnia Diis agere experts¹ :

If then you'll understand, you'll plainly see
How the vast mass of matter, *Nature* free
From th' proud care of th' meddling Deity,
Doth work by *Her* own private strength, and move
Without the trouble of the powers above.—CREECH.

but, “*The Creator of the ends of the earth faint-eth not!*” It may cry out at the assertion; but it will not be at calumny, but at the *discovery of a truth of which it was unaware*. All that it requires, *scientifically*, is the *presence of unordered matter*, with freedom to submit it to *Nature* and *Her* *chemical process*. It signifies little, to every *overt end which it propounds*, whether it finds that confused matter existing from eternity, or whether it obtains it in the form of a *spheroid of elemental mud*, produced by no very intelligent power. Like Lucretius, it again says, in effect ;

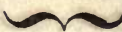
¹ II. 1066.

² Isaiah, xl. 28.

—————quom materies est multa parata,
 Quom locus est præsto, nec res nec causa moratur
 Ulla, geri debent nimirum, et confèri res¹.

With matter ample, space, and causal force,
 Formation follows as a thing of course.

PART I.
 —
 CHAP. IX.



There is no doubt, that by submitting its mud² to its process, it might make for itself a very ingenious mineral earth in the laboratory of its imagination; but then, it could never succeed in clothing that earth with vegetation, nor in peopling it with inhabitants, with all its ingenuity and all its chemistry. And therefore, since that is the case, it may assure itself; that until it shall assign a MODE of first formation, which can not only crystallize a mineral earth, but moreover attach to it, when crystallized, an investiture of vegetable and animal life, it has not apprehended the true mode of the first formation of this mineral globe.

Deduct from the intelligence of a First Cause, and we sap our rational belief of a First Cause in the same proportion. It is in vain to say, that the wisdom which we extol in the laws of

¹ LUCRETIVS, ii. 1068.

² This mud, is a very venerable geological antique; it is no other than the $\mu\omega\tau$, mot, of the old Phœnician cosmogony: "Mor, limum nonnulli, alii aquosæ mixtionis putredinem esse volunt. Hinc factum est seminium omnis creaturæ, et omnium rerum creatio."—BRUCKERI Hist. Phil. T. i. p. 240.

PART I.

—
CHAP. IX.

Nature, we ascribe ultimately to the *Author of Nature*; for, His intelligence is questioned, in proportion as *secondary* causes are supposed to execute functions which reason sees to pertain exclusively to a *First Cause*. To assume arbitrarily, *à priori*, that God created the matter of this globe *in the most imperfect state to which the gross imagination of man can contrive to reduce it*, which it effectually does, by reducing the creative *Fiat* to the mere production of a *spheroid of elementary mud*; and then to pretend, that His intelligence and wisdom are to be collected from certain laws, by which He enabled that *mud* to work itself into *perfection*, after innumerable ages; would tend to lessen our sense, either of the divine *wisdom* or *power*, did not the supposition recoil with tremendous reaction upon the supposers, and convict them of the grossest irrationality. The supposition is totally *arbitrary*; and not only arbitrary, but *viciously* arbitrary; because it is totally *unnecessary*, and therefore betrays a *vice of choice*. For, the laws of matter could not *work perfection* in the mass which the Creator is thus supposed to have formed *imperfect*, unless by a power imparted by *Himself*, who established the laws. And, if He could thus produce perfection *mediately*, through their operation, He could produce it *immediately*,

without their operation. Why, then, wantonly and viciously, *choose* the supposition of their mediation? It is entirely a decision of *choice* and *preference*, that is, of the *will*; for, the *reason* is no party in it, neither urging, suggesting, nor in any way aiding or abetting the decision, but, on the contrary, positively denying and condemning it. The *vast length of time*, which this sinistrous choice is necessarily obliged to call in for its own defence, could only be requisite to the Creator for *overcoming difficulties* obstructing the perfecting process; it therefore *chooses to suppose*, that He *created obstructions* in matter, to resist and retard the perfecting of the work which He designed; while, at the same time, He might have perfected it without any resistance at all, by His own Creative Act.

Or, does the *mineral geology* form its notion of the Creator by so abject a standard, as to imagine, that His infinite intelligence created for Himself an *interest*, or an *amusement of curiosity*, in watching the precipitation and crystallization of the elements of His muddy spheroid during a flux of ages, because *itself* watches for several hours, with patient and solemn sagacity, the progress of crystallization in *its own phial*; and that the difference of

PART I.

CHAP. IX.

PART I. the two cases consists in the differences of
 CHAP. IX. *quantity and time?* In fact, it reasons *from itself to the Creator*. But, *why* does it wait all those hours for its crystals? Because it cannot have them any sooner, and is therefore *obliged* to wait for them; because it is constrained by laws *which it cannot control*, and to which it must therefore fain submit: if it could accelerate the process, it would not wait those hours. If it was equally in its power, to obtain the crystals by a process causing several hours' delay, or by one that would yield them to it at once, which would it deem the *most intelligent* selection for *itself* to make? If it would not choose the former, *why* is it, arbitrarily and without any suggestion from reason, to ascribe such *choice* to the Intelligent Creator? It will no doubt reply, by the argument; that there is no such thing as *time*, no *delay* or *acceleration*, with respect to God. But it establishes no right to this subterfuge; for the *previous question* is refused it. Yet, grant it the right; and the argument will be found most shallow and superficial. No doubt, there is neither delay nor acceleration with relation to *God Himself*; but, with respect to *His creation*, there is always that relation of *time*, which He has demonstrated to be *the rule* of

His counsels with respect to *this earth*; and it argues a great infirmity of reasoning, not to perceive the incongruity and inconsistency of ascribing *innumerable ages* to the precipitation of a *brute globe*, the great *moral interests* of which were to pass away with such comparative rapidity.

But, those *laws*, which the mineral geology supposes to have required so many ages for precipitating and crystallizing the primordial rocks and primitive substances of this earth, did not control the Creator; since they must have been of His own enactment. To suppose then, *à priori*, and without the slightest motive prompted by *reason*, that His wisdom willed at the same time both the *formation* of a perfect work, and a series of resistances to *obstruct* and *delay* that perfect work, argues a gross defect of intelligence *somewhere*; either in the *Creator* or in the *supposer*; and I leave it to this science to determine the *alternative*. “*Nature*,” it says, “has *time* at *her* disposal, it is nothing to *her*; to *her*, it is as indefinite as *space*.” it would better have said, that the mineral geologist has time at the disposal of *his* extravagant and undisciplined fancy, and that it is nothing to *him*. But, since physical science has of late been compelled, by the progress of physical research, to acknowledge; that

PART I.

CHAP. IX.



PART I.

CHAP. IX.

all the great and multitudinous events which fill up the histories of the nations occupying the present surface of our globe, have fallen within a compass of time not exceeding that which has elapsed since the Mosaical epocha of the *Deluge*; it might have acquired a sense of the absurdity of supposing, that innumerable ages were employed in laying the *pavement* of a theatre, on which so brief a *drama* was to be acted. Sound philosophy contemptuously rejects such an auxiliary as *time*, in concluding of the *MODE of first formations*. It is not needed for the service of *truth*; but, merely to lend a helping hand to *physical* adventure, when it has rambled beyond the light of truth. If *time is nothing to God*,—and this is the only rational meaning that can be bestowed upon the proposition, “*time is nothing to Nature*!”—it is evident, that *He has no need of it*; and it is much more philosophical in that case to suppose, that *He did not employ it in FIRST FORMATIONS*, than to suppose, that *He employed it profusely and prodigally, when He did not need it*.

It is a singular fatality, and a fact pregnant with instructive virtue, that the *mineral geology*, while it lays claim to a rank in the school of Newton, should nevertheless have lapsed into

¹ See above, p. 24.

PART I.

CHAP. IX.

the very error against which he warned it; viz. "the derivation of this admirably ordered globe from *the elements of a chaos*, by the "mere laws of Nature;" and that it should thus have concluded, by attracting to itself the very stigma of "*unphilosophical*," which Newton posted up as the *term* of his warning. This, however, has necessarily resulted from the causes which have been exposed; namely, its delusion with respect to *primitive phænomena*, and its consequent defective and unskilful employment of the method of *analysis* and *induction*, in laying the basis of its science. By not rendering the analysis universal and complete, in imitation of Newton, it failed to ascend to the *common cause of the first formations of all material things*, and to combine them all in *equal relation to that cause*; and it thereby excluded from its philosophy every *moral principle*, limiting its speculations to *physical principles only*.

It is exactly by this *exclusion*, that it demonstrates itself altogether alien from Newton. It concludes, from *physical principles only*; Newton, from *physical principles* always subjected to *moral*: and, from the differences of these methods has necessarily resulted, *the opposition of their respective conclusions*. In the intuitive logic of Newton's mind, *morals* and

PART I. *physics* were indissolubly articulated together,
 CHAP. IX. and *terminated jointly* in *God*. Newton held

the connexion of *natural* and *moral* philosophy to be so intimate, that the latter must necessarily be extended by the sound extension of the former; so that if the latter be not proportionately extended, all extension in the former is unsound and vicious. "If," said he, "*natural* philosophy, in all its parts, by pursuing this method (*analysis* and *induction*), shall at length be perfected, the bounds of *moral* philosophy will be also enlarged. For, so far as we can know by *natural* philosophy what is the FIRST CAUSE, what power HE has over us, and what benefits we receive from HIM, so far our *duty* towards HIM, as well as that towards one another, will appear to us by the *light of Nature*¹."

And it would be so advanced by *geology* also, were it perfected according to Newton's philosophy; concluding from *universal analysis* to a *First common and intelligent Cause*, "creating, and setting in the order most conducive to the ends for which He formed them," every *first formation* of His universe. *Physics* and *morals* are to the corporate sum of human

¹ *Optics*, l. iii. *in fin.*

knowledge, what the *vascular* and *nervous* systems are to the animal body. Where the animal frame is perfect, those systems inseparably and equally accompany each other, in all their processes and ramifications. The vascular system supplies substance and bulk; the nervous, sense and conscious life. We know, that the vascular system may supply *bulk* beyond the extent of the nervous branches, or, after they have perished; but, all those parts are without sense and feeling. And so, in the body of human knowledge, are all those elongations of physical science, which grow beyond the growth of the moral knowledge with which they ought always to preserve a parallel; either by not attempting to exceed the moral measure, or by being careful to cause the moral branch to grow in equal proportion with the physical. Otherwise, they show only as the *monstrous*, or the *paralyzed*, members of the system to which they pertain.

But, what growth or advancement can *moral* philosophy acquire from *mineral* geology; proceeding, from *imperfect and defective analysis*, to a conclusion of *Nature*, personified, and invested with the attributes of *deity*? Such a conclusion shuts out the *First Cause*, the *First Physical and Moral Principle*, from the mental view; and substitutes in its place a

PART I.

CHAP. IX.

PART I.

CHAP. IX.

counterfeit power, to receive all the homage of the mind. The *existence* of that First Cause may, perhaps, be adverted to; but He is then consigned to repose and inaction; and the *physical philosopher*, having discharged the preliminary formality, deems himself at liberty to proceed without Him; and to speculate, in full freedom, on the laws of *matter* or of *nature*. If this is Newton's philosophy, it is *Newton's philosophy palsy-struck*.—Τοῦτο οὐκ ἐποίησεν¹, “*this did not*,” NEWTON!

Philo remarked, “*that there were those who were more engaged in admiring THE WORLD ITSELF, than the MAKER OF THE WORLD; and who falsely attributed to Him, an INACTION in it*:—τινες τον κοσμον μαλλον η τον Κοσμοποιον θαυμαζοντες—του Θεου πολλην απραξίαν ουκ ευαγως κατεψευσαντο:” and he cautioned them, “*not to reverence it IMMODERATELY*”—μη πλεον του μετριου αποσεμνυναι², lest it should draw aside their contemplation from that which should principally engage it; namely, its *First Cause* and *Omnipotent Creator*. It is offensive, to observe how commonly this is the case in the *natural sciences* even at the present day; although we are existing in a *focus*, in which are combined and centred all the *united lights* of reformed

¹ John, viii. 40.² PHILO, T. i. p. 2.

philosophy and of revelation. Such determined averseness to admit *God*, as the *first physical principle*, in the pale of sciences wholly conversant in *His own works*, can only be paralleled by the conduct of our first parents immediately after the *Fall*; when “*they heard the voice of God, and hid themselves from His presence among the trees of the garden.*” Equally unhallowed is the demonstration which the natural sciences make, when they abandon Newton, proclaiming *God* as the *immediate and sole cause*, not only of the *existence*, but of the *order*, of all *first formations*, and the *first principle*, *moral and physical*, in universal science; and when they palm upon us *Nature*, as His proxy or substitute. An heathen philosopher could discover, that *Nature* can be no other than *God*.—“A man says, *Nature gives me these things*: (exclaimed Seneca). Do you not understand, that when you say this, you are only *changing the name of God*? For, what else is *Nature*, but *God*, and *the divine reason*!”—“I have often wondered, (said the excellent Boyle, above a century ago,) that in so inquisitive an age as this, among those learned that have, with much freedom, as

¹ SENECA *de Benef.* iv. c. 7.

PART I. “ well as acuteness, written of the *works of*
 CHAP. IX. “ *Nature* (as they call them), and some of
 “ them, of *the principles* too, I have not met
 “ with any that has made it his business to
 “ write of *Nature herself*. This will perhaps,
 “ hereafter, be thought such an omission, as
 “ if one should particularly treat of the barrel,
 “ wheels, string, balance, index, and other
 “ parts of *a watch*, without examining the
 “ nature of THE SPRING, *that sets all these a-*
 “ *moving*¹.” We have not much improved,
 since Boyle wrote this admonitory stricture;
 for we have seen, that the *mineral geology* speaks
 of *Nature*, in terms that would have provoked
 the natural theology of Seneca. An eminent
 mineral geologist asks; “ Why should not
 “ natural history one day have its *Newton*²?”
 —There is no reason why it should not: but,
 this we may venture to affirm, peremptorily;
 that it will never have that Newton, unless,
 following in the steps of his illustrious proto-
 type, he shall so conduct his science, as to
 conclude, from the most general analysis, to the
 wisdom and power of an Intelligent Agent, as

¹ *Free Inquiry into the Received Notion of Nature. Pref.*

² CUVIER, *Theory of the Earth*, § 1. p. 27.

the *immediate cause* both of the *being* and *perfect arrangement* of all *first formations*; and unless his *natural philosophy* shall proceed by a course, which shall at the same time equally advance the progress of *moral philosophy*.

PART I.

CHAP. IX.

PART I.

CHAP. X.

CHAPTER X.

PART I. WE have now determined the question, concerning the authority of *sensible phænomena*, for deciding *the mode of first formations* in the *mineral kingdom* of matter, by applying the same question to the *animal* and *vegetable kingdoms*; and *sound philosophy* clearly perceives, that their authority is precisely the same in all the three; and that the *mineral geology* can advance no one plea in objection, which might not have been equally advanced, and with equal futility, by *anatomy* and *natural history*. It therefore concludes of the "*skeleton, or frame-work of this globe,*" the "*magnæ ossa parentis,*" as of the *skeleton of created man*: That it was not produced by any *secondary cause*, but by the *immediate act* of the *First, Intelligent, Omnipotent Cause*; and that it is *unphilosophical*, to seek any other origin for its *form* and *composition*, or to pretend, that these might have arisen out of a *chaos, chaotic ocean,* or *confused assemblage of elements*, by the *mere laws of Nature*. And thus, the whole order of *first mineral formations, or simple primitive rocks and earths*, together with *all their strata* and *all their varieties*, are withdrawn from the specula-

tions of the *mineral* geology, respecting the *mode* of their production; so that it may only exercise those speculations, *philosophically*, upon that remaining order of minerals, which, by bearing incontestable evidence of *alteration*, either by *decomposition*, *recomposition*, or *mechanical action*, prove themselves to be distinct in circumstance from the former.

To what cause, then, it will exclaim, are we to ascribe the regular successive *strata* in the *first* mineral formations, previous to the disturbance of which they bear the evidence? I ask, in reply: To what cause are we to ascribe the regular successive *laminæ* in the shell of the *first* tortoise; or the regular successive *folds* in the wood of the *first* tree; or the regular successive *compartments* in the pulp of the *first* orange? The *final cause*, in each, was the *end* to which it was to serve; the *efficient cause*, was the *intelligent power* which sought those ends; to whom, all created magnitudes are equal.

To what cause, it will again exclaim, are we to ascribe the characteristic diversities of *granite*, *porphyry*, *serpentine*, &c.? I again reply, by asking: To *what cause* are we to ascribe the diversity, of the *ivory* of the *first* elephant, and the *horn* of the *first* elk; of the *wool* of the *first* sheep, and the *fur* of the *first* ermine? Those

PART I.

CHAP. X.

were *first formations*, then, as the *granite*, the *porphyry*, and the *serpentine*, continue to be *first formations*, now. To what cause are we to ascribe the diversity, of *spots* in the *first formed panther*, of *stripes* in the *first formed tiger*, and of a *plain hide* in the *first formed lion*? To what are we to ascribe the differing textures, of *bone*, *cartilage*, and *muscle*, in the *created animal*? We may as well ascribe all these to differences of *secretion* and *accretion*, which never took place, as the diversity of *primitive rocks* to differences of *precipitation* and *crystallization*, which never took place. Of *true first formations*, the cause of the *being* and of the *diversity* must be the same. Are not use, beauty, and variety, manifest ends in this creation? and, if they are so in the *vegetable* and *animal* kingdoms, why are they not to be the same in the *mineral*? And, as the Creator at first planted the earth with every tree, not only “good for food,” but also “*pleasant to the sight*”—that is, *the sight of man*; as He adorned it with the gaiety of flowers, and enlivened it, not only with melody of sounds, but likewise with variety and splendour of colours; so He provided its interior with mineral substances both of use and beauty, to be afterwards drawn forth to light by the activity and industry of man; imbedding within it His treasures of ores and gems, and causing to

arise from its surface the useful and beautiful varieties which are found among His primitive mineral formations. The philosophy of Bacon and Newton, will never consent to derive these from an *elemental chaos*.

PART I.

CHAP. X.

I know, that the *mineral* geology wishes to establish a *distinction* between the *mineral*, and the other *two kingdoms*; and that it claims a sort of scientific property in the *former*, to which it does not lay equal pretension in the latter; but, as the distinction it intends is *unreal*, so its claim can never be *realized*. “*Man*,” it says, “who has *weighed the planets*, “and *measured their distances*, may presume “to trace the operations by which the surface “of the globe has been arranged¹.” What true analogy can be found between the two cases, or what possible consequence can flow from the one to the other? What just comparison can be made, between the *measurement of present objects of sense*, and the *recovery of past facts of history*? Because we can apply rules of arithmetic or mathematics to present objects, we are not *therefore* capacitated to recal past events. In the former case, we carry the evidence of the truth *along with us*; in the latter,

¹ See above, p. 15.

PART I. we must seek it *elsewhere*, for we can never find it in the subject matter of our study.

CHAP. X.

What, then, is to become of that vast portion of the *mineral kingdom*, of which we would thus despoil the *Mineral Geology*? It is to be restored to, and to be committed to the charge of, *simple and genuine Mineralogy*; that sound and valuable science, to which pertains the cognizance of the *mineral* natures of the globe, as that of the *animal* natures pertains to *zoology*, and that of the *vegetable* to *botany*. The zoologist does not speculate on the *mode of the formation* of the *first* animal individuals by *secondary causes*, nor the botanist on that of the *first* vegetable: they severally confine their attention to the characters and properties of the individuals themselves; which bound their vast and admirable sciences. In the same manner, the characters and properties of the *mineral* individuals, bound the science of *mineralogy*; but yet leave it an equally wide and luxuriant field, for the exercise of its intelligence. When it would attempt to refer to *secondary chemical causes*, for the *MODE of the first formations* of those individuals, it then mistakes its sphere, and becomes *Mineral Geology*: a science, which is so far from conducting us in the same course with Newton, that it leads us quite the contrary way. Newton's course leads *upwards*, to

an open and unimpeded issue; at the *exit* of which we perceive the dawns of a light, that assures us we are near the sources of *divine truth*.

That of the mineral geology, on the contrary, conducts us *downwards*, to an obscurity; in which we are presently stopped by a *bivium*, leading, on the one hand, to a *chaos of aqueous solution*, and, on the other, to a *chaos of igneous fusion*. Here we might long hesitate, which path to pursue; and little would it matter, which of the two we take at last, if we are determined to proceed in that direction; for, as both are equally remote from the *exit to truth*, whichever is most pleasing to the palate of the fancy, will yield the greater gratification; and all that can be obtained from either, is the gratification of the *fancy*. The Neptunian and Plutonian geologies may here securely contend, in ceaseless equality, for the truth of their respective systems; for, both being equally erroneous in principle, neither can ever become vanquished by the other.

But, can we seriously contemplate this interminable contest, to dogmatize concerning the *first* formations of this globe by *secondary* agencies, without hearing the Voice which spoke
 “ *out of the whirlwind, and said: Who is this that*
 “ DARKENETH COUNSEL BY WORDS WITHOUT
 “ KNOWLEDGE? *Gird up Thy loins like a man;*

PART I. “ for I will demand of Thee, and answer Thou ME.
 —
 CHAP. X. “ Where wast Thou, when I laid the foundations of
 the earth? Declare, if Thou hast understand-
 ing.—Whereupon are the foundations thereof
 fastened? or, who laid the corner-stone thereof?—
 Knowest Thou it, because Thou wast then born?
 or, because the number of Thy days is great¹?”

Whereas, if we will take the contrary direc-
 tion, and travel with Newton; we shall make
 the nearest approximation, which the light of
 unaided reason can make, to the truth of the
 MODE of first formations, in all the THREE king-
 doms of terrestrial matter.

¹ Job, xxxviii. 1.

PART II.

CHAPTER I.

IT has been sufficiently shown; that the *root*, or *chaotic principle*, of the Mineral Geology, cannot endure the *test* of the reformed philosophy of Newton, to which it appealed. It will hardly expect, that we should enter into an argument to *prove* that Newton is right; before we infer, from that failure, that its own conclusions are erroneous. Since it has admitted the authority of his philosophy, it must abide by its decision; and the reader will have seen enough, in the progress of this discussion, to convince him of the just title which that authority possesses to decide the question at issue; viz. *the MODE*, by which *all first formations* of this globe were *really* produced. He will be sensible, that the highest probability to which the energies of unassisted reason can attain in this question, is only to be found in that philosophy; and therefore, that it cannot exist in the opposite philo-

PART II.

—
CHAP. I.

PART II. sophy, which it contradicts, refutes, and repro-
 CHAP. I. bates. The conclusions of the mineral geology
 upon *this point* are, therefore, in direct opposition
 to the *highest probability*; and therefore, to say
 the least, they must be in the *highest degree*
improbable.

Valuable, however, as the *highest probability* is,
 where the *certainty of truth* cannot be attained;
 yet, when the mind has once attained to that emi-
 nence of secondary evidence, it experiences an
 eager yearning to advance still higher, in conse-
 quence of the innate *appetite for truth*, which
 characterizes the intellect of man. Let us then
 inquire, whether this final gratification is abso-
 lutely withheld from us; or, whether we may
 not be able to add, to the sentiment of the *highest*
probability, the consummation of *positive cer-*
tainty.

That this can only be supplied by *competent*
and positive history, and that *physical induction*
 is utterly inadequate to impart it, is a truth
 felt, and indirectly avowed, by the mineral
 geology itself. “ Before we proceed to deter-
 “ mine *causes*, (says the ingenuous M. D’Au-
 “ buisson,) let us endeavour to make ourselves
 “ acquainted with their *effects*. All the cir-
 “ cumstances of the division of mineral masses
 “ into beds and strata, as well as the presence
 “ of these, both in their *primitive* and *actual*

“ state, are yet *far from being known to us*;
 “ and we are constrained to say, in closing
 “ the subject, that the determination of stratifi-
 “ cation, its circumstances, and laws, remain
 “ still *a problem to be solved*; and it is per-
 “ haps the most important of geognosy.—We
 “ should have nothing more now to do, than
 “ to compose an *history of the revolutions which*
 “ *have taken place in the terrestrial globe during*
 “ *the formation of its mineral crust*; but that
 “ *those revolutions are of an order which has*
 “ *nothing analogous to the effects which we see*
 “ *Nature produce. The thread of induction is cut*
 “ *off, it can no longer conduct us: to attempt to*
 “ *advance without its aid, would be voluntarily to*
 “ *lose ourselves in pure hypothesis.*—Neverthe-
 “ less, *to fill up the void*, as far as we are
 “ permitted, and to show what observation
 “ *seems to indicate as most probable, and most*
 “ *simple*, I shall summarily expose the manner
 “ in which Werner represents the changes
 “ which progressively *took place* in the forma-
 “ tion of the mineral strata¹.” He then lays
 down the *principle*, constituting the *root* of this
 geology, which we have just tried by the
 criterion of Newton; viz. “ that the earth was
 “ heretofore covered by a vast *chaotic ocean*,

PART II.

CHAP. I.

PART II. “ very different from our actual seas, and
 —
 CHAP. I. “ containing the *elements of the primitive*
 “ *earth*¹.”

The prudence and judgment of this estimable geologist are not so conspicuous in the conclusion of this passage, as his ingenuousness is in the former part. He first acknowledges, that a *void* exists in the *physical* means of recording an *history of the revolutions of the globe*, occasioned by the *thread of induction being cut off*; and, that to attempt to advance without its guidance, is to plunge ourselves into *pure hypothesis*; and yet he immediately proceeds to supply that void with *pure hypothesis*, as if the *presence of fiction* is always a more desirable thing than the *absence of truth*: a principle, which has been the fruitful source of the most dangerous errors. But, how comes there to be *any void*? The truth is, that the mineral geology has *created the void* at which it repines, by *rejecting the history* which had filled it. And it is the place of the *history* so rejected, that it fills up with the *hypothesis* which we have confuted by the authority of NEWTON; whose “*thread of induction*” has *not been “cut off;”* but, on the contrary, has conducted us to the measure of the *highest*

¹ M. D'AUBUISSON, tom. i. 355.

probability, and therefore, to the verge of that **PART II.**
certainty which can only be supplied by *com-*
petent and positive history. **CHAP. I.**

It is amusing to observe the confidence, with which the mineral geology offers to *contrive an history* that shall supply that *void*; as if we were left totally without one. “*The ancient history of the globe,*” it justly remarks, “is one of the most curious subjects that can engage the attention of enlightened men; and if they take any interest in examining, in the infancy of our species, the almost obliterated traces of so many nations that have become extinct, they will doubtless take a similar interest in collecting, amidst *the darkness which covers the infancy of the globe,* the traces of those *revolutions which took place anterior to the history of all nations.* We admire the power by which the human mind has measured the motions of globes, which *nature* seemed to have concealed for ever from our view. Genius and science have burst the limits of *space*; and a few observations, explained by just reasoning, have unveiled the mechanism of the universe. Would it not also be *glorious* for man to burst the limits of *time*, and, by a few observations, to ascertain the *history of the*

PART II. “ world, and the series of events which preceded
 — “ the birth of the human race¹?”
 CHAP. I.

It is needless to inquire, what degree of glory would attend the success of the effort; because we are perfectly certain, that the effort never could be successful. Imagination might be satisfied, and enthusiasm gratified, by the schemes of apparent concinnity which those efforts might produce; but, stern *reason*, which only looks to *truth* and *evidence*, sees beforehand, that *physical induction* can never produce a true history of the series of events which preceded the birth of the human race. The *certainty of history*, must be derived from a source very different in its nature from *physical speculation*.

It is wisely observed by Mr. Kirwan; that
 “ *past geological facts* being of an *historical*
 “ nature, all attempts to deduce a complete
 “ knowledge of them merely from their still
 “ subsisting consequences, to the exclusion of
 “ unexceptionable *testimony*, must be deemed
 “ as absurd, as that of deducing the history of
 “ Ancient Rome solely from the medals or
 “ other monuments of antiquity it still exhibits,

¹ CUVIER, § 1. p. 27.

“ or the scattered ruins of its empire, to the
 “ exclusion of a Livy, a Sallust, or a Ta-
 “ citus¹.”

PART II.

—
CHAP. I.

To add the consummation of *certainty* to the highest probability, respecting the *first formation* and the *revolutions* of this globe, is the peculiar pretension of the *Mosaical Geology*; and we are now to try the *root*, or *fundamental principle*, of this geology, by the same *test*, by which we have already tried that of the *Mineral Geology*.

It is evident to reason, that certainty concerning a *past fact*, such as is the *mode* by which all material existences were *really first formed*, must be *historical certainty*: the subject, therefore, is no longer a subject for *philosophical induction*, but for *historical testimony*; and, like all other subjects for *evidence*, demands a *voucher*, competent to establish its truth. Now, the *voucher* that could establish the *fact*, respecting the true *mode* of *first formations*, must have been a *witness* of that mode; but the only *witness* of the *mode* of *first formations*, or *creations*, was the *Creator Himself*.

But, how may we presume to hope, that we can obtain the *positive testimony* of that awful *Actor*, and sole *Witness*, of the opera-

¹ KIRWAN, p. 5.

PART II.

CHAP. I.

tion of *Creation*? from whom alone we can derive the consummation, of *positive certainty*.

As Newton has conducted us to the eminence of the highest probability, and therefore to the verge of certainty; so BACON, to whom the mineral geology equally appeals, shall be our guide, to lead us on to that sacred testimony in which alone the evidence of *certainty* can subsist; for, the *foundation-stone* which he laid for that system of science which produced “*the happy revolution effected by himself, and afterwards by NEWTON, in the studies of the natural sciences,*” was no other than this:

“ Let us FIRST seek for the *dignity of science* in its Archetype, or Exemplar, that is, in the *attributes and acts of GOD*; so far as they are *revealed to man*, and may be discreetly investigated by him. In which inquiry, we are not to speak of *doctrine*, since all doctrine is *acquired knowledge*; but no knowledge in God is acquired, but *original*. We must therefore seek another name; that of ‘ WISDOM,’ by which name the sacred Scriptures denominate it.”

Bacon particularly adverts to that article of those sacred Scriptures, in which “ WISDOM” is sublimely personified; as having been present with, and attendant on the Creator, at the *first formation* of His creation.

“ The Lord by WISDOM hath *founded the*
 “ *earth*, by INTELLIGENCE hath He established
 “ the heavens.—Doth not WISDOM cry, and
 “ INTELLIGENCE put forth her voice, saying :
 “ The Lord possessed Me in the beginning
 “ of His way, before His works of old. I
 “ was set up from everlasting, from the be-
 “ ginning, *before ever* THE EARTH *was*. When
 “ there was no depths I was brought forth ;
 “ when there were no fountains abounding
 “ with water. Before the *mountains* were
 “ settled, before the *hills*, was I brought
 “ forth : while as yet He *had not made* THE
 “ EARTH, neither the *plains*, nor the *heights*
 “ of the *dust of the world*. When He prepared
 “ the heavens, I was there ; when He set a
 “ *compass* upon the *face of the depth* : when
 “ He established the clouds above : when He
 “ strengthened the fountains of the deep :
 “ when He *gave to the sea His decree*, that
 “ the waters should not pass His command-
 “ ment : when He *appointed the foundations*
 “ of THE EARTH. Then I was by Him as one
 “ brought up with Him ; and I was daily His
 “ delight, rejoicing always before Him ; re-
 “ joicing also in the habitable part of His
 “ earth, My delights were with the sons of
 “ men. Now therefore hearken unto Me, O
 “ ye children : for, blessed are they that keep

PART II.

—
CHAP. I.

PART II. “ My ways. Hear My instruction, and be
 “ wise, and refuse it not¹!”

CHAP. I.

It is this “ WISDOM,” vouchsafed to man as a positive and competent *voucher* of the *fact* of the *first formation* of *this earth*, that Bacon here propounds; and upon the authority of whose testimony, he thus proceeds :

“ Thus, then, *the FACT stands*: In the works
 “ of the *Creation*, we behold a *twofold* emanation of the divine virtue; of which the one
 “ relates to its *power*, the other to its *wisdom*.
 “ The former, is especially observed, in the
 “ *creating* the material mass; the latter, in
 “ the *disposing the beauty of its form*. This
 “ being established, it is to be remarked, that
 “ there is nothing in the ‘ *History of the Creation*,’ to invalidate the *fact*, that the mass
 “ and substance of heaven and earth was
 “ *created—confusa²—confusedly* or *undistinguishably*, in ONE MOMENT of *time*; but that SIX
 “ DAYS were assigned for *disposing and adjusting*
 “ *it*: in so signal a manner did God distinguish,
 “ between the works of His *Power*, and of His
 “ *Wisdom*. We may further observe; that in
 “ the *creation of matter*, it is not related, ‘ *God*
 “ *said, Let the heaven and the earth be,*’ as it is

¹ Prov. iii. 19; viii. 1, 22—33. ² See after, p. 150.

“ related of His other works which ensued ; PART II.
 “ but, simply and actually, ‘ *God created the* —
 “ *heaven and the earth:*’ so that the *matter* CHAP. I.
 “ itself seems to have been, as it were, a *work*
 “ *of hand*; but the introduction of its form,
 “ bears the style of a *law* or a *decree*¹.”

Bacon here appeals to a “ *Revealed History of the Creation;*” the authority of which, his judgment entirely acknowledged, and the statements of which, he employed for the foundation of his new philosophy: a *document*, which we should therefore have expected to obtain equal authority with all those who endeavour to gain confidence to their own doctrines, by making profession of conforming to his. This “ *Revealed History,*” is no other than that which was imparted to man by GOD, the only possible *voucher* for the *fact of creation*, through the ministry of MOSES; the authority of which record is acknowledged, with equal homage of the reason, by Newton, and which supplies the last degree of evidence that remained, to perfect that of the highest probability, deduced by Newton from a general analysis of the universe.

This sacred and inestimable record, which was revealed to mankind above 3000 years

¹ BACON *de Augment. Scient.* lib. i. p. 37, vol. iv.

PART II.

—
CHAP. I.

ago, unfolds a detailed recital of the *sensible mode* by which God “*formed, and set in order*” the entire system of this terrestrial globe; and likewise, the history of a *great universal revolution* which He caused it to sustain, by the operation of *water*, 1656 years after He had created it. This history comprises, therefore, a revelation, 1. of the MODE of *first formation*, of every member of this earthly system; and 2. of the MODE, by which God afterwards effected an *universal alteration* in the substance and circumstances of its structure.

A record of such amazing authority ought, in common reason, if it be authentic, to direct, and altogether to govern the intelligence, in all researches concerning *first formations* and *revolutions* of the earth; for, in proportion as we should depart from such a guide, we must necessarily depart from the *only rule* which is able to establish *certainty* upon those subjects. This record, comprises *the Mosaical Geology*. We shall therefore proceed to investigate the great and important facts disclosed in this sacred geological history; comparing them with the same *test* with which we before compared the *Mineral Geology*, and keeping constantly in view, both the *general conclusion* of Newton, respecting the *mode of first formations*, and the *corollaries*, which we have been led to

deduce from that conclusion. But, in pursuing that comparison, let us be careful to adhere firmly to the principles which they disclose; observing rigidly the admonition of Newton, which enjoins, “*to admit no objections against them, but such as are taken from certain truths*” plainly and unequivocally competent to disprove them.

PART II.

CHAP. I.

The conclusion of Newton was this :

I. That GOD, in the beginning, formed *all material things*, of such *sizes and figures*, and with such *other properties*, and in such *proportion to space*, as most conduced to the end for which He formed them; and that He variously associated them, and set them in order, in His FIRST CREATION, by the counsels of His own Intelligence; antecedently to the commencement of all *secondary causes*, or laws, which, though they might *continue the first formations*, could not possibly have any share in *producing* them.

The corollaries which resulted from that conclusion, were these :

1. That, in the *first formations* of all material things, God *anticipated*, by an immediate and incomprehensible act of His power, *sensible effects*, which were thenceforward to be produced only by *gradual processes*, of which He then established the laws.

2. That the *sensible phænomena alone* of the

PART II. *first formations* of material things, whether
 —
 CHAP. I. *animal, vegetable, or mineral, could not there-*
 fore determine any thing at all concerning *the*
mode of their formation; because, the *mode* by
 which they were *actually first formed*, must
 have been *in direct contradiction to the apparent*
indications of those phænomena.

“ *That the things which are seen, were not*
 “ *made of things which do appear*”—μη εκ ΦΑΙΝΟ-
 ΜΕΝΩΝ τα βλεπομενα γεγονεναι: but, “ *that they*
 “ *were formed by the Word of GOD—of HIM, who*
 “ *calleth those things which are not as though*
 “ *they were*”—κατηρτισθαι ρηματι Θεου¹—του καλουντος
 τα μη οντα ως οντα²: is therefore not only the first
 principle of *faith*, but the first principle of *philos-*
sophy; of that reformed philosophy which was
 effected by BACON and NEWTON. And thus, in
 this *first great principle*, both *true philosophy*,
 and *religious faith*, are found *identified*.

¹ Heb. xi. 3.

² Rom. iv. 17.

CHAPTER II.

IN entering upon a minute examination of the *text* of this Sacred Record, in order to obtain a true and precise apprehension of its contents, it is indispensably necessary, first of all, that we should inform ourselves, correctly, of its *general nature*, and *true character*; by exercising the most scrupulous caution and circumspection, and by diligently employing those means of interpretation, which the resources of sound learning, and sound criticism, are alone able to supply.

With respect to the general nature and character of the record, methods of exposition have been devised, diversified, and applied, in all the variety which the subject matter could suggest to vivacity of imagination and ingenuity of conjecture: “*tam varias* (as has been truly “ remarked), *et multa ex parte ineptas, ut qui* “ *omnes consideraverit, et inter se compara-* “ *verit, multo sit incertior quam antea fuit*” — “ so various, and in a great proportion so

PART II.

CHAP. II.

¹ ROSENMULLER, Sen. *Antiquiss. Tell. Hist.* p. 7.

PART II. "absurd, that whoever considers them all, and
 CHAP. II. "compares them all together, will be in greater
 "perplexity than he was before." No inter-
 preter has so simply, so briefly, and yet so
 critically, pointed out the rules for its true
 exposition, as the author of this just remark, the
 learned D. I. G. Rosenmuller, in his little
 tract entitled "*Antiquissima Telluris Historia;*"
 which rules are incorporated, by his learned
 son, E. F. C. Rosenmuller, into his "*Scholia
 in Genesin, Cap. 1.*" Although this venerable
 expositor has been incautiously drawn, by
 the imposing countenance of *mineral geolo-
 gists*—"metallicarum rerum periti"—into some
 concessions militating, in certain particulars,
 against the plain import of the record, yet
 the *principles* of his interpretation are so sound
 and true, that they supply the means of
 rectifying even his own aberrations in this
 respect; which, however, are not greater than
 those of our own learned commentator, Bishop
 Patrick, who has in a similar manner been
 seduced, by the same cause, into concessions
 injurious to the truth, because contrary to the
 import, of the record.

"All ingenuous and unprejudiced persons,
 " (says the learned German expositor,) will
 "grant me this position; that there is no
 "method for removing difficulties more secure

“ than that of an *accurate interpretation*, derived
 “ from the *words of the text themselves* and
 “ their *true and legitimate meaning*; and de-
 “ pending upon *no hypothesis*. Being im-
 “ pressed with this truth, and having repeat-
 “ edly perused the text with a view to this
 “ principle; I now submit the interpretation
 “ which appears to me to correspond the best,
 “ both to the *signification of the words*, and
 “ to the *nature of the subject to be explained*¹.”

PART II.

CHAP. II.

The rules which constitute the *canons* of this interpretation, are these two :

1. That “ *the style of the first chapter, as*
 “ *of the whole book of Genesis, is strictly HISTO-*
 “ *RICAL; and that it betrays no vestige whatever*
 “ *of allegorical or figurative description:—stylum*
 “ *hujus capitis, quemadmodum totius Geneseos,*
 “ *esse HISTORICUM; nec allegoriæ vestigium*
 “ *ullum apparere*²: the truth of which pro-
 “ position, (he justly adds), must be so manifest
 “ to any one who reads *with attention*, that it
 “ can need no proof—*id cuivis attente legenti*
 “ *ita clarum esse debet, ut probatione non*
 “ *egeat*³.” This position is alleged, against
 certain loose and visionary critics; who were
 more inclined to study the indulgence of their

¹ ROSENMULLER, Ser. p. 7. ² Id. p. 8. ³ Id. p. 9.

PART II. *fancies*, than to exercise the labour of their
 CHAP. II. *judgments*, on points which their reason did
 not instantly apprehend.

2. That, “*since this history was adapted to
 “ the comprehension of the commonest capacity,
 “ Moses speaks, according to OPTICAL, not
 “ PHYSICAL, truth:— quia tota hæc historia
 “ captui vulgi est accommodata, loquitur Moses
 “ ex veritate OPTICA, non PHYSICA*”¹. That is,
 he describes the *effects* of creation, *optically*, or
as they would have appeared to the eye; and
 without any assignment of *physical causes*:
 in doing which, he has not merely accom-
 modated his narrative to the apprehension
 of mankind in an infant state of society,
 and employed a method of recital best suited
 to a vulgar capacity; but, he thereby also
 satisfies an important requisition of experi-
 mental philosophy, viz. to describe effects
 accurately and faithfully, according to their
sensible appearances: by which means, the mind
 is enabled to receive a *clear and distinct impres-
 sion of those appearances*, and thus to *reduce* them
 to their proper *causes*, and to draw from them
 such *conclusions* as they are *qualified to yield*.
 For, as the mineral geology has justly remarked;

¹ ROSENMULLER, Sen. p. 13 and 63; and Jun. p. 14.

“ The determination of *causes*, must *follow* our
 “ *acquaintance with their effects*.”—“ From the
 “ oversight of which principle, (the learned
 “ expositor truly observes,) a great part of in-
 “ terpreters have wandered so far into error,
 “ as to imagine they have detected the *systems*
 “ *of modern physics* in the recital of Moses;
 “ and have perverted and tortured his language,
 “ into an *adaptation to their own preconceived*
 “ *opinions*¹.”

These two canons of interpretation, will
 thoroughly vindicate their validity, in the pro-
 gress of the following exposition; and will fully
 demonstrate, that the first chapter of the record
 “ discloses an interpretation, in which the
 “ *laws of physics* and the *language of the Hebrew*
 “ *text*, subsist in the *closest harmony*:—*quod*
 “ *hoc caput interpretationem legibus physices*
 “ *prorsus consentaneam, eandemque verbis textus*
 “ *Hebræi aptissimam, patitur*².”

¹ ROSENMULLER, Sen. p. 14. ² ROSENMULLER, Jun. p. 8.

CHAPTER III.

PART II. ACCORDING to the method of recital, exposed
 — in the preceding chapter, the historian thus
 CHAP. III. delivers the *First Article* of his sacred his-
 tory:

“ *In the beginning, GOD created the HEAVEN
 and the EARTH :*

“ *BUT, the EARTH was INVISIBLE, and UN-
 FURNISHED; and DARKNESS was upon the
 face of the deep.*

“ *THEREFORE the Spirit of God went forth
 upon the face of the waters, and God said, LET
 THERE BE LIGHT! and there was LIGHT!*

“ *And God saw the light, that it was good;
 and God divided the light from the darkness;
 and God called the light DAY, and the darkness
 He called NIGHT.*

“ *And the evening and the morning were the
 FIRST DAY.*”

It will be advisable, in considering this, and some others of the following articles of the history, that we should proceed, 1. by establishing the *interpretation* of the passage; 2. by

deducing its *true import*; and 3. by considering the *particular errors* which have resulted from a defective interpretation of the text.

I. 1. This article immediately presents a very important *grammatical* and *critical* question, which appears to have been entirely overlooked; but on which, nevertheless, as will presently be seen, the *true interpretation* of the sequel essentially depends. This question regards the Hebrew conjunction ׀, *vau*, which is employed no less than *fourteen* times in the original of this first article.

This conjunction, to which the elder Michaelis assigns *thirty-seven* different significations, and Noldius upwards of *seventy*, is a particle which discharges, in the Hebrew language, the functions of *all* the conjunctions, both copulative and disjunctive; its sense being determinable, in each particular case, only by the context, and by the practice and genius of the language; on which account it has been acutely remarked, that “ Since *we* are not exercised, as the *Hebrews* were, immediately “ to *adapt our thoughts*, upon the occurrence “ of this simple particle, to the different respects “ which the discourse requires; he who should “ always interpret ׀ by *et, and*, would not place “ us in the same position with the *Hebrews*; “ for *we* need a further guidance to fix its

PART II. “ actual significations, which *they* did not
 CHAP. III. “ need¹.” Now, almost all the modern ver-
 sions have uniformly rendered this particle,
 in the passage before us, by the copulative
 conjunction *et—and*, in all the *fourteen* places
 where it occurs. Hence it is, that our English
 version renders it: “ God created the heaven

¹ “ Dicendum fuit, ꝛ grammaticæ nihil magis *per se* significare quam ET; Ebræosque audientes ꝛ eo tantum moneri conjungenda esse sequentia cum præcedentibus, at modo conjunctionis eorum non designato. Modus autem ille quisnam esset, intelligi debuit *ex serie sermonis, rerumque antecedentium et posteriorum naturis ac relatione ad se invicem*, quatenus eæ aliunde quam ab hac particula ꝛ innotuerant; ita ut qui ꝛ aliter quam per ET exponit, suam interpretationem probare debeat.—Quapropter particulæ hujus varios usus tradere non est *grammatici Ebraici*, sed ad *rhetoricam* artem potius spectat. Traduntur ergo illi usus per accidens tantum, et respectu quodam externo, nempe in ordine ad alias linguas, et ad interpretes juvandos, ut pro ꝛ eam particulam substituant, quam quis lingua ista externa sermonem faciens tali loco positurus fuisset. Cumque hoc pacto simplicimæ vi conjunctivæ ipsius ꝛ aliqua alia notio superaddatur, agnoscendum est non sic *meram versionem* fieri, sed *paraphrasin* veluti aut *commentarium compendiosum*. Id tamen facere necessarium, quia versiones traduntur populis *non ita exercitatis, ac erant Ebræi ad inflectendam occurrente copulativa simplici cogitationem in eos respectus, quos requirit sermonis series*. Itaque, qui redderet ubique ꝛ simpliciter ET, nos non poneret in eodem statu quo erant Ebræi. Egentibus enim auxilio illud non dare non idem est, ac illud non dare non egentibus.”—Not. Tympii, ad Noldii Concord. Partic. Heb. p. 283.

PART II.

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CHAP. III.

“ *and* the earth; *and* the earth was without
 “ form,” &c. But, if we look to the *most*
ancient Hebrews; who were well exercised in,
 and familiarly conversant with, all the pecu-
 liarities of their own native language; we shall
 find, that they *all* interpreted it by the *disjunc-*
tive particle, *but*; none of them by the copu-
 lative, *and*. Thus it was rendered by the
first interpreters of the text, the Jews of
 Alexandria, nearly three hundred years before
 the Christian era: *εν αρχη εποιησεν ο θεος τον ουρανον*
και την γην η δε γη ην αρατος, &c.—“ In the be-
 “ ginning God created the heaven and the
 “ earth; *but*, the earth was *invisible*,” &c. In
 the same sense it was apprehended by the
 learned Jew, Josephus, who thus paraphrased
 the passage: *εν αρχη εκτισεν ο θεος τον ουρανον και*
την γην ταυτης δε υπ’ οψιν ουκ ερχομενης, αλλα βαθει
μεν κρυπτομενης σκοτει, &c. “ In the beginning
 “ God created the heaven and the earth; *but*,
 “ the latter *not coming into view*, but being
 “ *hidden in profound darkness*,” &c. In the
 same manner we find it in the Chaldee para-
 phrase; which, in the Latin, is rendered thus:
 “ In principio creavit Deus cœlum et terram:
 “ terra *autem* erat,” &c. The *old* Latin version
 renders the conjunction in the same manner:
 “ Terra *autem*, &c. ;” and so likewise does
 the *Vulgate*, translated by St. Jerom on the

PART II. Hebrew original, with the aid of the most

CHAP. III.

learned Rabbin of his time. And, of modern commentators, the eminently learned Vatablus, Drusius, Fagius, and Grotius, understand it with the sense of *autem*—*but*, as in the Vulgate; with which same signification, this particle occurs above five hundred times in the Hebrew Scriptures¹. We here learn, *how* it was understood, in this particular place, by those who knew how to connect it, “*ex serie sermonis, rerumque* “*antecedentium et posteriorum naturis, ac relatione* “*ad se invicem.*” This, then, it is evident, was the interpretation collected, by the rule of the *language*, in the *ancient Jewish church*. And it must be self-evident, to every scholarly mind; that this particle, repeated *fourteen* times in this short paragraph, could not each time be limited to the unvarying sense which pertains to our English conjunction, *and*; or even to the senses of the Latin *et*, and the Greek *καί*, which have somewhat a wider latitude of signification. But the truth is, that the Hebrew language did not possess, and therefore could not command, the diversity of particles which those languages enjoyed; and, therefore, it was constrained always to repeat the *same particle* ; the proper

¹ NOLDIUS, p. 301.

actual sense of which was impressed in the mind of the auditor, or reader, by the purport of the discourse and the tendency of the argument.

PART II.

CHAP. III.

But it is plain, that there must have been some *dialectical, or critical reason*, for this uniformity in all the earliest interpretations, of the sense, *δε—autem—but*, in this place. Now, the principle upon which the *disjunctive* sense was in them affixed to the particle in this place, and not the *copulative*, which we have adopted, will reveal itself on an attentive examination. The proposition — “God created the heaven and the earth; *and* the earth was *invisible*.” would seem to imply, that such was the design, in its creation — viz. that it should be *invisible*: Whereas, the proposition — “God created the heaven and the earth; *but* the earth was *invisible*.” carries a contrary implication, and excites an expectation of that which immediately follows; namely, the *formation of light*, by means of which the *invisibility* of the earth was to be remedied. “God created the heaven and the earth: *but*, the earth was *invisible*, and *darkness* was upon the face of the deep: *therefore*, God said, *Let there be Light!*” The repetition of the conjunction *and*, in this last place, which is still rendered by *and*, in our version, gives

PART II. it the proper force of *wherefore, therefore—*
 CHAP. III. *quare, quamobrem, itaque*¹; with which sense
 it occurs, in more than two hundred and fifty
 places in the Scriptures; and this force accrues,
consequentially, from the sense of *δε, but*, in the
preceding clause. And thus, the *mutual relation*
and dependence of the three clauses, is clear and
distinct, and *their connexion, necessary and indis-*
soluble. Josephus plainly shows, that he under-
 stood the three clauses with this intimate
 relation and correspondence: *εν αρχη εκτισεν ο*
Θεος τον ουρανον και την γην ταυτης ΔΕ υπ' οψιν ουκ
ερχομενης, αλλα βαθει μεν κρυπτομενης σκοτει, ΠΝΕΥ-
ΜΑΤΟΣ ΔΕ αυτην ΕΠΙΘΕΟΝΤΟΣ, γενεσθαι φως εκελευσεν
ο Θεος.

That we are to understand *but*, not *and*,
 in the passage we are examining, is therefore
 confirmed; both by the authority of all the
 earliest interpreters, and by the natural import
 of the text critically ratifying that authority.
 This *intimate relation* of the sentences, will be
 found a very material point for the reader to
 hold in recollection.

2. The criticisms which have been exer-
 cised upon the word *ברא*², *created*, are very
 trifling: viz. that it does not denote, *productio*

NOLDIUS, p. 297. ² MICHAELIS, *Suppl. ad Lex. Heb.*

ex nihilo—production out of nothing; but, *productio ejus quod antea non extitit*—production of that which before did not exist. It is difficult to find the difference intended between the two; which, however, resolves itself into this, that “the former idea is too metaphysical and abstract for man in his primitive state.” But, this will not prevent the latter from signifying exactly the same thing as the former; which it must necessarily do, when it relates to the production *εν αρχη*, or the *first production*, of a world, which could not have existed before it was produced.

3. The celebrated phrase, *תהו ובהו*, *tohu vabohu*, on which fancy and system have so largely and so unsubstantially built, and which our version, conforming to the *later* translators, has rendered, “*without form, and void*,” is rendered by the *oldest* Jewish interpreters, the LXX, *αορατος, και ακατασκευαστος*; *unapparent or invisible, and unfurnished or unprovided*. So also it was interpreted by the learned Jew, Philo¹; and that Josephus, whom Jerom calls “*vir Hebraeus, et ab infantia sacris litteris eruditus*,” understood the first of these words in the sense of *αορατος, invisible*, is manifest from his paraphrasing it, *ὅτι οψιν ουκ ερχομενη*—*not coming into view*.

¹ T. i. p. 5. ii. pp. 491, 610.

² Ep. MAGNO. Orat. Rom.

PART II. So likewise the oldest Latin version renders
 CHAP. III. the words. And Jerom evidently regarded this
 as the *established interpretation*; for, in his
 commentary on the 40th chapter of Isaiah, he
 says: "In the beginning of Genesis, where it
 " *is written*, 'But the earth was *invisible, and un-*
 " *furnished*;' the *other* interpreters (i. e. the *later*;
 " sc. Aquila and Theodotion,) have translated,
 " 'But the earth was *void, and nothing*'—in
 " principio Geneseos, ubi *scriptum est*, 'Terra
 " *autem erat invisibilis, et incomposita*:' *cæteri*
 " *transtulerunt*, 'Terra autem erat *inane, et*
 " *nihil.*'" It is, therefore, very questionable,
 whether the *present reading* of the Vulgate, in
 this place, is that of Jerom. Tertullian, Her-
 mogenes, Ambrose, and Augustin, employ the
 interpretation, *invisibilis, et incomposita*.

When, therefore, we find this passage ren-
 dered with the sense of *confusus*, as in the
 passage above quoted from Bacon, we are
 to understand it only with relation to *vision*,
 not to the *subject itself*; as, *confusus, indistinctus*,
 and *obscurus*, are used indifferently with rela-
 tion to *perception*. Thus, Statius designates a
 covered and darkened sky, "*confusus Olympus*." It
 is also certain, that where the same phrase occurs
 in Jeremiah, iv. 23, the *character* which accom-
 panies it, is *darkness*: "I beheld the earth, and
 " lo, it was *tohu vabohu*; and the heavens, and

“ they had *no light*.” So in Isaiah, xxxiv. 11, where we read the menace upon Babylon; “ He shall stretch out upon it the line of *tohu*, and “ the stones of *bohu* ;” the local testimony, of its *effacement from view*, by its ruins being *covered over* with accumulated soil and vegetation, supports the ancient interpretation of the passage in Genesis; that it intended to express *obscurity*, and *exclusion from sight*. All those *most ancient* authorities, confirmed by the subject matter of the text, concur to give a *determining weight* to the primitive interpretation of *αορατος*, *invisible*, above any other which modern oriental philology can maintain: “ terra enim vere *invisibilis* “ fuit, voragine aquarum obducta¹.” And, since the surviving dialects of Arabia and Syria possess no words of the same elements with *tohu*, and *bohu*, which signify *αορατος*, and *ακατασκευαστος*; it will be critical to apply to those two words, the judgment given by Michaelis upon the word מַשַׁל: “ soli linguæ “ Hebraicæ proprium, sed *antiquum*; reliquis “ linguis orientalibus omnibus, ipsi adeo Rab- “ bino-Chaldaico, *ignotum*.—Ergo, aut reliquis “ linguis orientalibus plane *perit*, aut, quod “ potius reor, est *exoticum*, jam ante Mosen “ ex alia lingua, non cognita, in Hebraicam in- “ vectum².” Theodoret thus explains the pas-

¹ ROSENMULLER, Jun. in *Genes*. p. 9. ² *Suppl. ad Lex. Heb.*

PART II.

CHAP. III.

sage: “*αορατος, invisible, on account of the water which covered it; and ακατασκευαστος — unfinished, because it was unadorned with herbs, or meadows, or groves, or fields.*” Again: “*αορατος — invisible, because darkness was over the abyss*¹.”

4. The “*spirit of God*” — רוח אלהים — πνευμα Θεου, has been expounded by some commentators, from the earliest ages of the Christian Church, to signify the *air*, or *wind*; and by others, to denote the divine person of the *Holy Spirit*. “Some,” says Theodoret, “think that it signifies the *All-holy Spirit*, vivifying the nature of the waters — but I think that the true interpretation is, that Moses, by the word *spirit*, intended the *air*².” — “It is an ambiguous phrase,” says Drusius: “for it signifies both a *wind*, and the *Holy Spirit*³.” It is strange, that a *third* interpretation did not prevent all ambiguity among the Christian commentators; since it was evidently that of the ancient Jewish church, in its purest state. It is plain, in the passage just quoted from Josephus, that the clause in which it occurs was not taken separately, as a proposition by itself; but, in connexion with that which follows: “*The spirit of God went forth upon the face of the waters,*

¹ *Quæst. in Genes. v.* ² *Quæst. viii.* ³ *Critici Sacri, in loc.*

“ *and God said:*” as where we read—“ he
 “ opened his mouth, *and said:*—he lifted up
 “ his voice, *and said.*” The “ *spirit of God*”
 will thus signify, the “ *breath of the word of*
 “ *God,*” by the *effusion* of which He pronounced
 His mandate, “ *Let there be light !*” So R. Sa-
 lomon interpreted it : “ *spiritum oris, et verbum*
 “ *seu mandatum ejus—the breath of His mouth,*
 “ that is, His *word or mandate*¹.” Thus we
 read in the book of Job, “ by *His spirit* He
 “ hath garnished the heavens² :” which is ex-
 plained in the Psalms³ ; “ *by the WORD of the*
 “ *Lord, (or, the VOICE of His word*⁴), *were the*
 “ *heavens made, and all the host of them by the*
 “ *BREATH OF HIS MOUTH.*” This *paraphrase*
 of the Psalmist, gives *critical determination* to
 this passage of Genesis ; for, the Hebrew word
 rendered *spirit*, by our English translators, in
 Job, and *breath* in the Psalms, is in both places
 the *same identical word*, רוח, which is employed
 by Moses in this passage ; and in each it re-
 lates to “ *the WORD,*” by which God pronounced
 the *fiat* of creation. If, therefore, we consider
 this *anthropopathical* form of speech with a *doc-*
trinal reference, it will plainly respect the
 divine ΛΟΓΟΣ, δι’ οὗ πάντα ἐγένετο, και χωρίς οὐ
 ἐγένετο οὐδε ἐν ὃ γέγονεν : “ the WORD, by whom all

PART II.

—
CHAP. III.

¹ *Crit. Sac.* ² Job. xxvi. 13. ³ Ps. xxx. 6. ⁴ Ps. ciii. 20.

PART II.

CHAP. III.

“ things were made, and without whom was
 “ not any thing made that was made;” and of
 whom we likewise read: “ *He BREATHED and*
 “ SAID¹.” The *new geology* has proposed an
entirely new sense; which, however, we cannot
 accept: “ *Spirit*,” it says, “ here denotes an
 “ *invisible elastic fluid, viz. the great evaporation*
 “ *that took place soon after the creation*².”

5. The verb מרחפת, expressing the *action*
 of that *spirit* or *breath*; which our version
 renders, “ *moved upon the face of the waters* ;”
 is interpreted by the Alexandrian Jews, ἐπεφύετο
 — *bore itself, or was conveyed upon*. Michaelis
 renders it, *delapsus est, descendebat*—*went or came*
down. The Chaldee paraphrase, gives it the
 sense of *insufflabat*—*blew upon*. In all these
 senses, it properly connects itself with the *action*
which immediately follows; forming but one pro-
 position—“ *the SPIRIT, or BREATH of GOD, went*
 “ *forth upon the face of the waters, and GOD*
 “ SAID,” &c. This interpretation is undeniably
 more natural, more intelligible, more congenial
 to the Scriptural style, and more consonant
 to the recorded impressions of the early Scrip-
 tural writers; than either the action of a *violent*
wind, before physical agents existed, or the *in-*
cubation of the divine person of the *Holy Spirit*,
 which conveys no real sense to the mind.

¹ John, xx. 22.

² KIRWAN'S *Geol. Essays*, p. 49.

6. The אֲבִיִּס , *deep* or *abyss*, covering the *whole globe*, is well observed by Rosenmuller to be the same as the מַיִם , *waters*, mentioned in the following sentence; which, by being afterwards collected and confined in *one place*, became the יָם or *sea*. For, the Greek $\alpha\beta\upsilon\sigma\sigma\omicron\varsigma$, *abyss*; by which the Alexandrian Jews render the former word; only denotes the *unlimited extent* of the aqueous surface. Hesychius explains it, by $\upsilon\delta\alpha\tau\alpha\ \alpha\pi\epsilon\iota\rho\alpha,\ \alpha\kappa\alpha\tau\alpha\lambda\eta\pi\tau\alpha,\ \pi\epsilon\rho\alpha\varsigma\ \omicron\upsilon\kappa\ \epsilon\chi\omicron\upsilon\tau\alpha$ —“waters, *without bound or limit.*”

II. Having thus determined the interpretation of the *terms* of the article, let us next consider the *instruction* which it conveys to us.

In this first sublime and comprehensive article, the sacred historian summarily comprises the history, of the *first formation* of the *entire mineral substance* constituting the *body* of this globe; produced “at the beginning,” (as Newton speaks) and “in one moment of time,” (as Bacon speaks) by the *mode* of “*creation*”; and with the *size, figure, properties, and proportion to space*, which *most conduced* to the “*end* for which God created it.” We hear of no further operation, or process, concerning the *first formation* of the *mineral part* of the globe. It was created *entire and complete*, as to its

PART II. *form and texture*; although it was enveloped by
 CHAP. III. a *separate marine fluid*, resting upon, and flow-
 ing over, every part of its compacted surface,
 which formed, for a *very short time*, the bed
 or bottom of an *universal sea*! There was
 no intermixture of that water with the particles
 composing the hard and solid body beneath,
 no *confusion of the two elements*; but, the *saline*
fluid was totally distinct from the *terrene solid*,
 and did not continue long enough upon a
 considerable portion of it, to penetrate far
 into its internal substance. That solid body
 was *concealed* by the cloak of waters, and *total*
darkness encompassed that cloak; so that the
 spheroid, speaking *relatively and optically*, was
invisible or unapparent; and, being a mere mi-
 neral mass, it was barren of all external pro-
 duction, and it was therefore *unfurnished* or
ungarnished.

But, it was the design of God, first, to ren-
 der it *visible*; and next, (to *furnish* it. He,
 therefore, first of all, commanded the existence
 of *light*; and immediately, *there was light!* At
 the same time, He *divided the light and the*
darkness; that is, He established, and gave first
 operation to, the laws of *proportion and succes-*
sion between the measures of the two; and,
 having given origin and action to those laws,

they accomplished, in their due course, the *First Day*.

In this brief, but pregnant description of effects, the historian records, by implication, the history of the commencement of time, by the ordination of the *instrumental causes* which were to produce the first diurnal measure, and succession, of darkness and light; for time, as Philo truly remarks, signifies nothing else but “the successive distances of days and nights, effected by the motions of the heavenly bodies:” *συμπαρ ὁ χρόνος ἡμερῶν καὶ νυκτῶν ἐστὶ διαστήμα*¹: and again, *διαστήμα τῆς τοῦ οὐρανοῦ κινήσεως ἐστὶν ὁ χρόνος*². The historian relates, that God first produced the effect of light; which effect following the darkness, and these succeeding to each other, from thenceforth, in regular diurnal alternations, show that the *instrumental causes*, which were to perpetuate the effect, were then first put in action. As he describes *optically*, and solely with a view to the practical and *sensible* apprehension of the facts which he relates, his description is confined to effects; but it is for the common knowledge and experience of his readers, to refer those effects to their plain and obvious causes. And so his ancient Hebrew readers referred them; who needed not that he should tell them,

PART II.

CHAP. III.



¹ Tom. i. p. 44.

² Ib. p. 4.

PART II.

—
CHAP. III.

that the light of which he spoke, proceeded from the same physical cause from which they derived their daily light; and they accordingly understood, as of course, that it proceeded from the *solar fountain of light*, though not expressly named. Ignorance, on the one hand, and system and hypothesis on the other, have variously contrived to perplex, or pervert, this simple recital; but sound learning, sound criticism, and sound philosophy, will receive and apprehend it according to the simplicity of description in which it is delivered. This subject we shall have occasion to examine more particularly, when we come to consider the historian's record of the transactions of the *fourth day* of creation; on which day, the *sun* and *moon* were first revealed in their *relative* functions, of *ruling* the day and the night.

The sublimity of the clause in which the *creation of light* is related by Moses, has long been a subject of critical remark and admiration; and the more that amazing operation is contemplated, the more will the mind be affected by a sense of that sublimity. The recent enlargement of the sphere of our acquaintance with the solar body, obtained by the discoveries of Sir William Herschel, contributes greatly to augment the force of that sentiment, by the distinctness which it imparts to the con-

PART II.

CHAP. III.

ception. That illustrious astronomer has discovered, that the *body* of the sun is an *opaque substance*; and that the splendid matter which dispenses to the world *light* and *heat*, is a *luminous atmosphere*¹ attached to its surface, figuratively, though not physically, as *flame* is attached to the wick of a *lamp* or a *torch*. So that the *creation of the sun*, as a part of “*the host of heaven*,” does not necessarily imply, the *creation of light*; and, conversely, the *creation of light*, does not necessarily imply, the *creation of the body of the sun*. In the first creation of “*the heaven and the earth*,” therefore, not the *planetary orbs* only, but the *solar orb itself*, was created in *darkness*; awaiting the light, which, by one simple divine operation, was to be communicated at once to all. When then the Almighty *Word*, in commanding *light*, commanded the *first illumination* of the solar atmosphere, its new light was immediately caught, and reflected throughout space, by all the members of the planetary system. And well may we imagine, that, in that *first*, sudden, and magnificent illumination of the universe, “*The morning stars sang together, and the Sons of God shouted for joy*!”²

¹ Job, xxxviii. 7.

² *Phil. Trans.* for 1795, p. 46; and for 1801, p. 265.

PART II.

CHAP. III.

But, that great cause of *light*, though *physically* co-existent with its effect, was *optically* non-existent, with relation to the earth covered by the waters; and, being at the same time the cause of *heat*, its new power, exercised upon the universal aqueous surface, necessarily exhaled an universal vapour, enveloping the whole globe, through which the light transmitted subsisted only in its *effect*; and thus light, without a manifested cause, was diffused over the globular surface, in the mode which we ourselves experience, during the prevalence of dense fogs. Nevertheless, the *effects*, of *light* and of the *alternation of darkness and light*, recorded by the historian, carry with them, virtually, the record also of the proper *natural causes*, which were newly ordained to produce them; and they inform us, that in this *first day* of creation, both the solar fountain of light was opened in the heavens, and this earth received its first impulse of rotation, on its axis and in its orbit. And, since we perceive, by the *intimate connexion, mutual dependence, and necessary sequence, of the clauses in this article*, which has been minutely shown, that all these great transactions were included within that *first day*, or first entire revolution of the new globe; we perceive also, that *time*, which only exists by reference to that revolution, began with the creation of the

globe, and the commencement of its revolution, in darkness; and, that the creation of *light* succeeded at that *proportion of distance in time*, which was thenceforth to constitute the perpetual *diurnal divisions* of the two. So that darkness, in its *relative* character of *night*, commenced from the moment that the earth was created and revolved; and *day* commenced, from the moment when light succeeded, at the distance ordained for their *division*. And hence it was, that in the Hebrew computation of days, the diurnal measure of darkness always preceded the diurnal measure of light; perpetuating a commemoration of the transactions of that *first day*.

PART II.

CHAP. III.

An unlearned question has been raised, by some compacters of systems, with respect to the sense in which we are to understand the word *day*, in this recital. This question has been chiefly moved by persons profound, perhaps, in *physical* science, but not equally so in *learning* and in *moral* philosophy; and it has been suggested to their minds, not by any real obscurity in the record, but merely by the opposition of the terms of the record to certain preconceived notions and speculations into which they have drawn their own judgments, or into which they have suffered their judgments to be drawn. Those persons constitute chiefly that

PART II. class of speculators, who resort to the schemes
 of compromise and concession to which I have
 CHAP. III. already adverted. Their *theories*, oblige them
 to seek for much larger measures of *time* than
 the historian supplies; they must, therefore,
 either accept, or reject, his testimony *in toto*,
 neither of which they can venture to do; or,
 they must compel his language to bend and
 conform itself to their speculations, which they
 vainly flatter themselves they are able to do.
 But, *why* did they need any other sense than
 that which the text *literally* imports? Only
 because they did not conclude with Newton,
 that "God, in the beginning, formed, and set in
 " order, all material things by the counsels of
 " His intelligence," nor admit, with Bacon,
 that "the earth was created in one moment of
 " time;" but maintained, in opposition to
 both, "that it rose out of a confused assem-
 " blage of elements, or chaotic ocean, by mere
 " laws of Nature," which demanded a *length of*
time proportioned to the supposed operation; and
 therefore, they must obtain that length of time,
somehow or other, from the text of Moses.

But, Newton and Bacon were in no such
 dilemma; their conclusions went directly to
 the point of the *literal statement* of the record,
 and therefore, the time assigned by Moses
 amply supplied all their demands. Since,

PART II.

CHAP. III.



then, such a violation of the record is only needed by those who advocate a geological system, which we have shown to be fundamentally erroneous, by showing it to be fundamentally contradictory to the philosophy of Newton; it remains for us to conclude with Rosenmuller, upon every ground of sound learning, criticism, and philosophy:—“ *Dies* intelligenti sunt *naturales*, quorum unusquisque ab una vespera incipiens, altera terminatur; quo modo Judæi, et multi alii antiquissimi populi, dies numerarunt¹.—That we are to understand *natural days*; each of which, commencing from one evening, is terminated by the next; in which manner the Jews, and many others of the most ancient nations, reckoned *days*.” In the *first* of these *natural days*, the *whole mineral fabric* of this globe was formed *at once*, of such size and figure, with such properties, in such proportions to space, and with such arrangement of its materials, as most conduced to the ends for which God created it. In this *first, immediate, universal formation*, the Almighty Artificer produced *effects*, analogous to those which were to result from the *new causes* which He then ordained; the *sensible*

¹ P. 47.

PART II. *phænomena* of which *alone*, could not reveal, or determine, *the mode* of their formation, because that mode was in direct contradiction to their sensible indications, and absolutely ἀνεξιχνίαστος¹—*untraceable*, and *past finding out* by any scrutiny of man.

CHAP. III.

III. Let us now consider the principal errors which have resulted, from a defective interpretation of this first important article of the historian, among erudite and genuine scholars.

It was the phantom of *Time*, which so much infatuates *physical* philosophy, that unwarily seduced the upright and learned Rosenmuller into the imagination of a *previous earth*, and the learned and pious Patrick into the admission of an *elemental chaos*; yet, mutually in contradiction to each other. Both these commentators fascinated into a belief, that they were bound, in deference to the *mineral geology*, to find in the Mosaic record *some great interval of time*, exceeding any measure of which it truly and really speaks, and unaware, that the power which had lured them into this weak submission, was a mere *ignis fatuus*; were led to violate the import of the text, the former *uncritically*, the latter both *uncritically* and *unphi-*

¹ Rom. xi. 33.

losophically. I make this distinction, because, though both of them forced the text *uncritically*, to make it produce the *length of time demanded*, yet Patrick alone admitted the *unphilosophical* doctrine of a *chaos*, which Rosenmuller sensibly and learnedly condemned.

PART II.

CHAP. III.

To enable himself to discharge his tribute of *length of time*, the learned German marshalled together all the particles *vau*, connecting the clauses of the first three verses; and, regardless of the caution contained in the sound criticism of Tympius, that this particle takes the place of all the conjunctions according as the sense and *sequence* of the discourse determines its signification; he took upon himself to give to it the new, unsupported, and *indefinite* signification of *posthac—afterwards*; not in any *particular place*, but *wherever* the reader might *choose* so to understand it, in *three* different places of which he gave him the *choice*. Thus, says he, “ we may *either* read :

“ In the beginning God created the heaven
“ and the earth. *Afterwards*, the earth was
“ desolate,” &c.

Or,—“ was desolate, and darkness was
“ upon the face of the waters. *Afterwards*, the
“ Spirit of God,” &c.

Or,—“ The Spirit of God blew upon the

PART II. “ face of the waters. Afterwards, God said,
 “ let there be light¹.”

—
 CHAP. III.

By this method of interpretation, the true and intimate connexion and articulation of the clauses, which has been shown, is violently destroyed; and an *hiatus* is artificially produced in the sequence of the narrative, which may be converted, *ad libitum*, into the *interval* required by the mineral geology; and may be stretched out into any “ *epocha of nature*,” which system and circumstances may demand.

“ *Whichsoever* of these explications you “ adopt, (adds this too compliant expositor,) “ it *must* denote a *twofold* creation:—1. The “ *first production* of all things; 2. The *renova-* “ *tion* of this earth. But, it will be asked, “ *which* of these *three interpretations* is to be “ *preferred* to the others? *That is a point which* “ *I do not take upon myself to determine*:—sed “ *quæritur: utra harum interpretationum al-* “ *teri sit præferenda? Ego nihil definiam*².” And why did this good man lend himself thus to a proceeding, so utterly unworthy of his learning, his judgment, and his piety? “ Because, for- “ sooth, those who are *skilled in mineralogy* have “ discovered, in the interior of the earth, many

¹ *Antiq. Tell. Hist.* p. 27.

² *Ib.* p. 28.

“ vestiges of a very ancient and long-con-
 “ tinued inundation, which they think must
 “ have preceded the deluge of Noah:—depre-
 “ hendunt enim *metallicarum rerum periti* in
 “ interioribus terræ multa vestigia vetustioris
 “ et diuturnioris cujusdam inundationis, quam
 “ diluvium Noachicum præcessisse putant¹.”


But this, to say the least, is evidently a very *uncritical* method of exposition; more especially, since, by adhering closely and rigidly to the text as it stands, we shall, in due time, arrive at the true solution of every difficulty. The sense of *posthac—afterwards*, cannot critically or philologically pertain to the particle in any one of the places in question; but the estimable writer has, too courteously, *forced* it upon it, in weak submission to the presumptuous demands of the mineral geology.

It was not thus, that Bishop Patrick sought to satisfy the same presumptuous demands. By hastily assuming the *tohu vabohu*, (which only expressed the *unapparent* and *barren state* of the *mineral globe*, but in no sense the *imperfect condition of its substance*,) to signify a state of *mingled and confused elements*, he deemed it necessary to espouse the doctrine of *a chaos*, in the most positive and unqualified manner; hop-

¹ *Ib.* p. 31.

PART II.
 —
 CHAP. III.

ing to save the credit of the sacred historian, by thus contriving for him an *indefinite length of time*, which his history absolutely disclaims. He therefore incautiously affirmed; that *Moses*, in *those two words*, gives “ a description of *that* “ *which the ancients called the CHAOS*; wherein “ (says he) *the seeds and principles of all things* “ *were blended together* :—which was, indeed, *the* “ *first of the works of God*; who, as *Moses* “ shows in the sequel, *produced this beautiful* “ *world out of this CHAOS*. *How long* all things “ continued in *mere confusion*, after the *CHAOS* “ was created, before this light was *extracted* “ *from it*, we are *not told*. It might be (*for any* “ *thing that is here revealed*,) a *great while*; and “ all that time the *Mighty Spirit* was *making* “ *such motions in it*, as prepared, disposed, and “ *ripened* every part of it for such productions, “ as were to appear successively in *such spaces* “ *of time as are here and afterwards mentioned by* “ *Moses*; who informs us, that after things “ were so *digested and made ready* (*by long fer-* “ *mentations, perhaps*,) to be wrought into form, “ *God produced every day, for SIX DAYS together*, “ some creature or other, till all was finished; “ of which, *light* was the very first.” The learned Bishop dwells long upon his “ *CHAOS*,” which he exhibits, in capital letters, five several times in the first six pages of his *Commentary*.

This exposition, was plainly directed with PART II.
an eye to a particular object; namely, to objec- CHAP. III.
 tions drawn from the visionary conclusions of 
 the *mineral geology*; and, with the pious desire of
 precluding those objections, by presenting an
 unobjectionable statement, in the first instance.
 But we may here truly say,

Incidit in Scyllam dum vult vitare Charybdim :

for, the *interpretation* is as directly contra-
 dictory of the sense of the record, as the *objec-*
tions which it was designed to overrule.

If all those various “*creatures*,” of which
 “*light was the first*,” were produced in six
natural days, then they could not have been
 produced by the *physical operation* of any *known*
secondary causes; and if they were produced,
 as in that case they must have been, by the
immediate act of the *First Cause*, why was the
 action of that first cause *preceded* by “*a great*
 “*while*,” during which “*things were digesting,*
 “*ripening, and making ready* by long ferment-
 “*ations*.” To what *end* were all those pro-
 cesses? Was it, that the *First Cause* could not
 act, until *secondary causes* had “*made the*
 “*subject matter ready*” for Him? Was it,
 that the Creator found Himself impeded by
 certain laws which He could not control; and

PART II.

CHAP. III.

that He was therefore obliged to wait the term of their operation? Or, was it that He first created secondary agents to retard an after-work, which He did not intend to execute by secondary agencies, but by immediate acts of His own divine power? The suppositions are all equally in opposition to reason and to the record. If then the *after-work* was not to be effected by secondary causes, but by God's own immediate causation, which is here granted; reason directs us to conclude, that no secondary causes were engaged to assist Him, by preparing an *antecedent work*; but that the truth is, as He Himself has pronounced: "I am the Lord, who made all things; who stretched forth the heavens ALONE, who spread abroad the earth BY MYSELF¹:— who spake, and it was done; who commanded, and it was confirmed²." Such also is the doctrine, which the historian here plainly designed to establish. And it is truly astonishing, that consequences thus inevitably and obviously resulting from the hypothesis, should not have exposed themselves to the apprehension of the learned and venerable Prelate.

Yet, we find the same visionary hypothesis heedlessly pursued by a much later writer. "To

¹ Isaiah, xliv. 24.

² Psalm xxxiii. 9.

“ the assemblage of these *as yet inert elements*, PART II.
 “ Moses gives the name of *abyss*; profane —
 “ authors have *called it chaos*. All seem to CHAP. III.
 “ *mean the same thing*; the *chemical laboratory*
 “ *of universal Nature*, the general deposit of the
 “ *embryos* of all existing natural substances¹.”

Rosenmuller remarks, with just reprobation, upon the preposterous inference of a *chaos*, from the language of Moses. “ It is wonderful,” says he, “ how so many interpreters could imagine, “ that a *chaos* was described in the words “ תהו ובהו—*tohu vabohu*. This notion unquestionably took its origin from the fictions of the “ Greek and Latin poets; which were transferred, by those interpreters, to Moses. But, “ to explain Moses by the poets, what is it, but “ to transfuse water from a muddy stream into “ a clear and limpid fountain?” He then recites all the fables of a *chaos*, from Berosus to Ovid, and concludes thus: “ But since these “ things are so, it is not so surprising that “ many interpreters, when they pass from the “ works of the heathen philosophers and poets “ to the exposition of Scripture, should imagine that they recognize the *same chaos* in the “ *Mosaic history*. Yet the Rabbins, who were

¹ HOWARD, *on the Structure of this Globe*, p. 483.

PART II. “ not prepossessed with these particular fic-
 —————
 CHAP. III. “ tions, apprehended the power and meaning
 “ of the original words far more correctly¹.”

The doctrine, of a chaotic mixture of elements or first principles of things, is not more abhorrent to the *philosophy of* NEWTON, who expressly reprobates it, than it is to the *record of* MOSES; if the latter be considered without any previous system, and if it be thoroughly and critically understood. The progress of tradition, through ages of darkness and ignorance, may have converted the simple *sea*, distinctly recorded by Moses, into a compound *chaos*, characterized by that darkness; but, to make the *chaos*, therefore, the rule for interpreting the *sea*, is to invert the order of rational argument, and to reason *ab ignoto ad notum*.

¹ Pp. 19 and 23.

CHAPTER IV.

THE historian proceeds to his *Second Article*; in which, he relates the events that distinguished the *second* diurnal revolution of this globe.

PART II.

CHAP. IV.

“ And GOD said, *Let there be a FIRMAMENT in the midst of the waters: and let it divide the waters from the waters.*

“ And GOD made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament.

“ And it was so: and GOD called the firmament HEAVEN.

“ And the evening and the morning were the SECOND DAY.”

The word רָקִיעַ, which our version renders *firmament*, from the Latin *firmamentum*, is rendered by the Alexandrian interpreters στερεωμα; which word denotes a firm and permanent support. This support, was to sustain a part of the waters, which were now to be separated from the waters beneath.

PART II.

CHAP. IV.

This article implies; that there were *waters* above the aqueous surface of the globe, which were *separable*, though not yet actually *separated*, from it. It therefore relates; that the universally incumbent *watery vapour*, which had been continually in course of exhalation, during the preceding day, from the universal watery surface, was now raised to a high elevation above it, by the creation of the *aerial atmosphere*; so that the vaporous body formed a canopy *above* the globe, instead of enveloping it, like a cloak, in *immediate contact* with the water. Rosenmüller well applies, to this place, the remark of Pliny: “*what can be more wonderful, than waters stationary in the sky!—quid esse mirabilius potest aquis in cælo stantibus!*”¹

The globe was thus disengaged from its incumbent vapour, but still, the *effect* of light was alone apparent; for, congregated *clouds* had succeeded to terrestrial *mist*, and continued to render the *cause* of that effect *non-apparent*, and therefore, *optically non-existent*: as we ourselves experience, during the prevalence of similar weather. It is this that the sacred historian describes, when he says; “*neither sun nor stars appeared*” — μητε ηλιου μητε αστρων επιφαινοντων επι πλειονας ημερας². Homer

¹ PLIN. *Hist. Nat.* l. xxxi.

² Acts, xxvii. 20.

describes, much in the same manner, the *optical effect* of a continued cloud, enveloping two contending armies during a day of obstinate conflict:

PART II.

CHAP. IV.

ΟΥΔΕ ΚΕ ΦΑΙΝΣ

ΟΥΤΕ ΠΟΤ' ΗΛΙΟΝ ΣΟΥ ΕΜΜΕΝΑΙ, ΟΥΤΕ ΣΕΛΗΝΗΝ·
ΠΕΡΙ ΓΑΡ ΚΑΤΕΧΟΝΤΟ¹.

Around, so dense the murky clouds arise,
It seem'd, nor *sun* nor *moon* possessed the skies.

The *cause* of the diversity of day and night, continued therefore to be *unapparent*, relatively to the earth; but that cause was now in course of perpetual operation, and it therefore now completed the *Second Day*.

¹ Iliad. xvii. 366.

CHAPTER V.

PART II. THE historian now proceeds to his *Third Article*,
 CHAP. V. which consists of *two parts* :

“ And GOD said ; Let the WATERS UNDER
 “ THE HEAVEN be gathered together unto ONE
 “ PLACE, and let the DRY-LAND appear. And
 “ it was so.

“ And GOD called the dry-land EARTH, and
 “ the gathering together of the waters called He
 “ SEAS. And GOD saw that it was good.

“ And GOD said ; Let the EARTH bring forth
 “ grass, the herb yielding seed, and the FRUIT-
 “ TREE yielding fruit after its kind, whose seed
 “ is in itself upon the earth. And it was so.

“ And the earth brought forth grass ; and
 “ herb yielding seed after its kind : and the
 “ TREE yielding fruit, whose seed was in itself,
 “ after its kind : and God saw that it was
 “ good.

“ And the evening and the morning were the
 “ THIRD DAY.”

I. In the *first* part of this article are briefly related, *two* vast and wonderful events; of the most essential importance to the science of a true geology: namely, 1. the formation of a bed, or basin, to receive the mass of waters hitherto equally and interminately diffused over the whole solid and compacted surface of the mineral globe; and, 2. the consequent immediate exposure of a large portion of that globe. The second part of the article, relates the first formation of all the vegetable matter, with which that exposed portion was immediately invested.

We may here again observe, with Rosenmuller¹; that תהום, in the second verse, denotes the abyss, not in any sense of a chaos, but simply, of the sea flowing without limits, as Hesychius explains αβυσσος²; for, what is called the abyss, in the second verse, is in the same verse called also, הַמַּיִם, the waters; and the same הַמַּיִם — waters, in this verse, become יַם, the sea, merely by being congregated in one place, and therefore, being reduced within limits.

II. Previous to these amazing operations, the globe, disengaged from its cloak of mist in consequence of the ascent of the vapours into the higher regions of the atmosphere, presents to

¹ P. 24, 25.

² See above, p. 155.

PART II.

CHAP. V.

the contemplation the appearance of an *aqueous spheroid*; its solid parts being as yet *concealed* beneath the waters. It was now the design of God, to *expose a portion of those solid parts*, and to *reduce the unlimited surface of waters, which concealed it, within limited bounds*; thus converting the *abyss*, into a *sea*. The record imports; that the *waters*, which occasioned the concealment, were to be *removed* and collected into *one place*, in order that, *הַיַּבֶּשֶׁה—הַיָּמִים*, *that substance which was dry*, might be *seen*, or rendered visible, *תִּרְאֶה—וּפְתַח*: so that the *latter* might reveal its nature and actual position, by a change in the place and circumstances of the *former*. So Josephus represents the general operation: *τη τριτη ἡσησι την γην, ANAXEAS περι αυτην την θαλασσαν*—“on the “third day God established the land, by causing “the *re-fusion of the sea around it*.” *αναχρω, re-fundo*. Virgil describes the *exposure of the seabed*, by the *retirement of the waters*; and, what in one place he represents as,

————— *unda dehiscens*

Terram inter fluctus aperit—

he presently after describes by,

————— *imis*

Stagna refusa vadis.

The briefness of this clause, and the nature of the subject, has caused it to be little con-

PART II.

CHAP. V.

templated in proportion to its importance; and therefore, it has not been observed, that the same sublimity which is universally perceived in the clause—*Let there be LIGHT: and there was light*; subsists equally in this—*Let the waters be gathered together unto ONE PLACE, and let the dry-land be seen: and it was so.* The sentiment of sublimity in the former clause, results from the contemplation, of an instantaneous transition of the universe from profound *darkness* to splendid *brightness*, at the command of God. All men feel the sadness of the former, and the delight of the latter; and they are therefore instantly sensible, of the glorious nature of the change which was then so suddenly produced. But, the nature of the change which must necessarily have taken place, in suddenly rendering visible a part of a solid globe whose surface was universally overflowed, and concealed, by a flood of waters, is not so immediately apprehended; the mind, therefore, does not dwell upon it, but is contented with the general statement of the fact, that the *sea was formed.*

But it is to the stupendous *mode* of that *formation*, that the historian here summons our contemplation. It is self-evident, that if the surface of a globe were entirely covered with a fluid attached to it only by the law of gravitation, and if the whole of that fluid

PART II. were to be afterwards collected in *one part*
 CHAP. V. *only* of that globe, so as to render the remaining
 part of its concealed surface visible, the aqueous
 accumulation must take place *below the level of*
the latter surface; which effect could only be
 attained, by the congregated waters acquiring
 that space in *depth*, which they had lost in
length and *breadth*: for, accumulation in *height*
 is contrary to the law of fluids. In producing,
 therefore, the effect described in the record,
 the surface upon which the waters rested must
 have been suddenly *deepened*, in all that portion
 of its extent on which they were to *remain*;
 and, to a depth proportionately profound to
drain them off from all that other part of the
same surface, which was to be exposed and
 made dry. This is an induction from the pre-
 mises, which will allow of no objection.

But, this operation of *deepening* implies, both
 a *disruption*, and a *depression* of the solid parts
 which were to be deepened; and, as the opera-
 tion was *immediate*, at the divine command, so
 must it have been *violent*. The mineral geology
 would infer, that “the word ‘*appear*’ (in this
 “article) denotes that *the disclosure of the earth*
 “*was successive*, and had not from the beginning
 “*fully and completely taken place*”¹. But the

¹ KIRWAN, *Geol. Essays*.

word evidently proves, that the disclosure *had not taken place at all*; otherwise, it would *already have "appeared."* And, that its ultimate appearance was not *successive*, in the sense designed by the criticism, is plain; because it was invested with its vegetation, *on the same day on which it did first appear.* The mineral geology must keep back its *secondary or natural causes* from the argument, so long as it is engaged with a period, in which the *First Cause* had not yet committed His work to their administration.

In the *first production* of the mineral globe, no *secondary causes* could have acted, because secondary causes could not exist, until the *first formations* in which they were to reside had received existence; as the laws of matter could not operate, until matter itself was in being. But, as soon as a first formation was produced, its laws received their force; subject always to the control and determination of their divine Author. In the *first act* of creation, this *mineral globe* was produced *at once*, compact, solid, and complete, in all its *mineral nature, order, and composition*; and, as the first tree received its various *successive folds*, apparently, but not necessarily or really, indicative of succession in time, so the *shell* of the earth received its various *successive primitive strata*, apparently, but not really, indicative of

PART II. such succession: both being essential to the ends for which they were respectively formed.
 CHAP. V. From that moment, the globe was subjected to its proper laws; as the *vegetable* and the *animal* systems were afterwards subjected to their proper laws, from the moment of their respective creations: for, as Bacon has pronounced, “the laws which we call of *nature*, “are nothing but the laws of *the creation*.”

In causing, therefore, the violent *disruption* and *depression* of that part of the solid surface which was to form “*a place*” for the reception of the *congregated* waters; that is, a *bed* for the *new sea*; the new laws and agencies of the mineral globe were rendered operative by their Almighty Creator, but by the rule of his own creative plan. The solid “*frame-work, or skeleton*” of the globe, was therefore burst, fractured, and subverted, by those agencies and according to those laws, at the will of the Legislator, in all those parts where *depression* was to produce the *profundity*; and it carried down with it, in apparent confusion, vast and extensive portions of the materials or soils which had been regularly disposed and compacted upon it; leaving other portions partially dislocated, and variously distorted from their primitive positions. So that the order of the materials of the globe; which, in the reserved,

unaltered, and exposed portion, retained their first positions and arrangement; were broken, displaced, and apparently confounded in the other portion, which was to receive within it the accumulated waters.

PART II.

CHAP. V.

Among the *secondary* agencies, either employed in producing, or necessarily accompanying, this tremendous *primitive revolution* of the mineral globe, we may assume the power and agency of *volcanic expansion* and *explosion*; by which, acting with extraordinary and extensive effect, a vast portion of the crust of the solid sphere would have become suddenly transformed from its native state, into a condition of laceration and apparent ruin. We know, that the admission of water to the subterraneous fires which are constituent within the system of this earth, produces volcanic action, as a *physical consequence*; and the *fiat* of God, which, by disruption, gave extensive admission for the incumbent waters into the interior of the newly constituted earth, would have been followed by volcanic explosion equally extensive, *in consequence of the provisions of His own laws*.

Thus, then, was formed that "ONE PLACE, " into which all the waters under the heaven " were to be gathered together." The *primitive mineral formations* were thus early interrupted

PART II.
 CHAP. V.

and disordered in their continuity, even upon the *third day* of their creation, and therefore, anterior to the existence of any organized beings; and the new sides and surfaces of those primitive mineral masses, produced by the breaches which they then sustained, became thenceforth exposed to the continual action of the waters; while the innumerable smaller fragments, lay subjected to perpetual trituration in their bed.

This stupendous *revolution of the globe*, is commemorated by the great poet of the Hebrews, in these words: “O Lord, my God,
 “Thou art clothed with honour and majesty!
 “Who laidest the foundations of the earth,
 “that it should not be removed for ever. *Thou*
 “*coveredst it with the deep, as with a garment;*
 “*the waters stood above the mountains.* At
 “*Thy rebuke they fled; at the voice of Thy thun-*
 “*ders they hasted away; they went over the*
 “*mountains, they went down by the valleys, unto*
 “THE PLACE *which thou didst found for them.*
 “*Thou didst set a bound which they should not*
 “*pass over.*” We have here a poetical commentary upon this passage of the record; which shows, how it was understood in the traditionary history of the ancient Jewish church. That violent and turbulent, though brief operation, by which *a bed* was suddenly

PART II.

CHAP. V.

opened for the waters to retire into from off a portion of the solid globe, is here represented, as “the waters flying from *the rebuke* and “*thunder* of God, down to a place opened beneath for their reception;” and the borders of the solid portion which was converted into a *dry land*, are described as “*a bound*,” fixed by God to the further diffusion of the waters. “The *rebuke*,” and the “*thunders*,” manifestly imply a crisis of stupendous and terrific *convulsion*.

But, that water, as we have seen, was not “*a vast chaotic ocean, very different in its chemical properties from our actual seas, and containing the elements of the primitive earth*;” an ocean, which never existed out of the imagination of the *Neptunian geology*: it was the *true briny ocean*, and (as far as we may speak of identity of water) the *identical ocean* that we now witness; which, after dwelling upon the entire surface of the *solid globe* for the space of two entire days, was, upon the third day, drained off from it into a *new and deeper bed*. It was denominated the *abyss*, so long as it flowed *unlimitedly*, and relatively to that *illimitation*; but, as soon as it was reduced *within a limit*, it ceased to be an *abyss*, and became the *sea*. These words,

PART II.

CHAP. V.

therefore, as has before been shown, do not denote any differences in the *nature* or *quality*, but solely in the *extent* and *circumstances* of the fluid; and thus, at the first creation of this globe, its mineral substance was so far from being in a *fluid state*; that is, its mineral particles, or *molecules*, forming a species of *mud*, or *paste*, by commixture with the water; that it existed a separate, hard, and solid body, upon which the ocean rested only superficially, and on which it had rested only two days, when it was suddenly withdrawn from one portion of it, leaving that portion perfect, firm, and compact.

This was the *first revolution*, which the mineral substance of this globe experienced; directed by the immediate intervention of the Creator; and it will be very material to the *sequel of our inquiry*, that the reader should dwell, with minute contemplation, on the details of the formation, and the consequent condition, of the *sea bed* thus constructed, and consisting of the fractured, and apparently ruined surface, of a portion of the globe.

When this great work was accomplished, and when the reserved portion was exposed to the action of light and of air, that portion exhibited a mere mineral surface, brute and barren. But

PART II.

CHAP. V.

it pleased God to employ it immediately to the end for which He had formed it, and for which He had disengaged it from the waters ; and to invest it, *at once*, with an universal covering of vegetation, formed to maintain, by the laws of *decay* and *reproduction*, a perpetual succession and increase of vegetable matter, to clothe and incase the mineral. The same immediate act of God, which, on the *first day*, gave instantaneous and perfect existence to His *mineral system*, and established its laws ; gave instantaneous and perfect existence also, on the *third day*, to His *vegetable system*, and established its proper laws, in all the individuals composing it. The first *tree* and its *wood*, like the first *rock* and its *grain*, were produced by a *mode* in which no secondary causes could possibly have a share ; and though the tree was afterwards to produce seed, in which a process of *lignification* should originate, yet itself was formed without the intervention of that process. And, although it would wear *the appearance* of that process, yet the same reason which tells us that it would wear that appearance, tells us, at the same time, that *the appearance alone* would be no indication of the *reality* of the process ; so that it could exercise no delusion, upon any sane and advised intellect.

Thus, then, the earth was *at once* invested

PART II. with the *maturity of vegetation* ; not only “ with
 — “ the herb yielding seed,” but also “ with
 CHAP. V. “ the TREE *yielding fruit*, after its kind.” In
 { the meantime, the clouded atmosphere still
 continuing, light continued to exist only as an
effect unconnected with its cause. Its course,
 however, still proceeding, the evening and the
 morning completed the *Third Day*.

CHAPTER VI.

THE historian at length arrives at his *Fourth Article*, and at the great and signal facts which it reveals. He relates:

PART II.

CHAP. VI.

“ And GOD said, *Let the LIGHTS in the firmament of Heaven, for dividing the day from the night, be for SIGNS, and for SEASONS, and for DAYS and YEARS; and let them be, in the firmament of Heaven, for LIGHTS TO GIVE LIGHT UPON THE EARTH! And it was so.*

“ And GOD made the TWO great lights, (that is,) THE GREATER LIGHT, to RULE the DAY, and THE LESSER LIGHT, to RULE the NIGHT, together with the stars. And GOD disposed them in the firmament of Heaven TO GIVE LIGHT UPON THE EARTH, and to RULE over the DAY and over the NIGHT. And GOD saw that it was good.

“ And the evening and the morning were the FOURTH DAY.”

1. The declaration of this important article, is of the utmost consequence to all the pre-

PART II. ceding exposition; because, it proves and establishes its correctness.

CHAP. VI.

It is truly and excellently remarked by Rosenmuller; that “ if any one, who is conversant with the genius of the Hebrew, and free from any previous bias of his judgment, will read the words of this article in their natural connexion, he will immediately perceive, that they import *the direction, or determination of the heavenly bodies, to certain uses which they were to supply to the earth.* The words מֵאֲרָתֵי הַיְיָ are not to be separated from the rest, or to be rendered, *fiant luminaria,*— *let there be lights; i. e. let lights be made;* but rather, *let lights be,* that is, *serve, in the expanse of Heaven—in serviant in expanso cælorum— for distinguishing between day and night; and let them be, or serve, for signs, &c.* For we are to observe, that the verb הָיָה, *to be,* in construction with the prefix לְ, *for,* is generally employed to express the *direction or determination of a thing to an end;* and not the *production of the thing:* e. g. Num. x. 31, Zech. viii. 19, and in many other places.” This consideration is most just and sound; and it is indispensably necessary, for the true apprehension of the passage before us.

2. The word מֵאֲרָתֵי—*lights,* signifies, *apparent luminaries:* as, in common language, we call *light*

—אור, that which is diffused as an *effect*, without referring to the cause; but we call *lights*—מארת, the *sources* of that light, as *lamps*, or *candles*. The same distinction, between a *sensible effect* and a *sensible cause*, is found in the different significations of these words, אור and מארת. The *sensible effect*, was produced on the *first* day; the *sensible cause*, is to be revealed on this *fourth* day.

PART II.

CHAP. VI.

3. The Hebrew word which we render “to rule,” is מושל; a word, whose primitive and radical sense is not to be traced by means of any of the surviving dialects of the East; from whence Michaelis conjectured, that it was either an Hebrew word which early became obsolete, or that it was an exotic word, anciently adopted into the Hebrew. Its *general* signification, is known to be *dominari, imperare—to rule*; but a question arises, *in what sense were those lights to rule?* since the *lunar light* is not constant through all the *nights* of the year, as the *solar* is through all the *days*. The Greek has rendered it by ἀρχεῖν; which word has the double sense, of *imperare* and *inchoare*. Now, the *old Latin Version* enables us to determine, in what sense the ἀρχεῖν of the Greek was understood, by rendering it *inchoare, ad inchoationem*; which fixes the sense of *imperare*, to that of *ducere—to rule by leading*: for, though *imperator* and

PART II. *dux* have a general sense in common, yet,
 CHAP. VI. each has a special and peculiar sense. To
 rule, in the sense of *ducere*, implies the *precedency* of a ruler at the head of his host; where he is, both “*dux et princeps, dux et præfectus;*” titles, which are often so united in the same individual. In this sense, as the *day* was to be led, or ushered in, by the *solar orb*, as its ruler, so was the *night* to be led, or ushered in, by the *lunar*; which further implies, that the *moon* displayed its orb upon the *fourth evening*, at the time when that of the sun disappeared, and that it thus *introduced the night*.

4. But, the difference between the singular יְהִי and the plural יְהִיּוּ , in the 14th verse, demands a corresponding difference in the interpretation; and therefore, if we would make that difference *literally apparent*, we must thus literally interpret: “*FIAT, luminaria in firmamento cæli ad dividendum inter diem et noctem, UT SINT in signa, et tempora, et in dies, et in annos; ET SINT—ad illuminandum super terram:*” i. e. “*Fiat, ut luminaria sint in signa, &c. et ad illuminandum,*” &c. The particle י , signifies *ut*, in upwards of 300 passages; and יְהִיּוּ , signifies *ut sint*, in several of these¹. This interpretation, therefore, will yield this literal sense in our

¹ NOLDIUS, *Concord. Heb.* p. 307.

“ language: LET IT BE, *that the lights in the*
 “ *firmament of Heaven for dividing between the day*
 “ *and the night, BE for signs, and for seasons, and*
 “ *for solemn days, and years,*” &c. i. e. “LET THE
 “ LIGHTS, &c., BE *for signs, &c.:*” so just and
 important is Rosenmuller’s induction from the
 construction of this passage; “ *de determina-*
 “ *tione astrorum ad certos quosdam usus orbi*
 “ *terrarum præstandos, esse sermonem—non*
 “ *de eorum productione*¹.”

II. In this article, the historian relates; that after that portion of the mineral surface of the globe, which had been extricated from the waters, and which, when it appeared, was *ακατασκευαστος*—*ungarnished*, had received its universal garniture of *vegetation*; this new order of matter was, upon this *fourth* day, to experience the *immediate and unobstructed influence* of the *cause* of light and of heat. Upon this day, therefore, the *clouds*, which had hitherto loaded the atmosphere, and which had excluded the heavenly luminaries, *were, for the first time, to be dispelled*; and those splendid bodies were to acquire *their first optical existence*, with relation to this earth. Wherefore, the learned commentator here recalls to the

¹ ROSENMULLER, Sen. p. 61, 2.

PART II. mind of his reader, his second canon of inter-

CHAP. VI.

pretation: “*Loquitur secundum veritatem opti-*
 “*cam, non physicam: nec mirum, cum vulgus*
 “*altiora non capiat—nam historia captui vulgi*
 “*est accommodata.—The historian speaks ac-*
 “*cording to optical, not physical truth; nor is*
 “*it surprising, since the common mass of man-*
 “*kind look no higher; and the history is*
 “*adapted to their apprehension.”* The amaz-
 ing *Calendar of the Heavens*, ordained to serve
 for the notation of time in all human concerns,
 civil and religious, so long as time and man
 should continue, was therefore to be now first
 unfolded to the earth, with all the visible
indices of time by which its measures were
 thereafter to be marked, distinguished, and
 computed; and the splendid *cause*, which had
 hitherto issued its effect of light through an
 interposed *medium*, was to dispense that light
 to the earth immediately, in the full mani-
 festation of its effulgence.

And let us now direct our very particular
 attention to *one signal circumstance*, in the
 allotment of this *Fourth Day* for this especial
 purpose,—“*the determination of the heavenly*
 “*bodies to the uses to which they were severally*
 “*designed to conduce, as indications of time;*” a
 circumstance of *internal evidence*, which con-
 firms and fixes the truth of this interpreta-

tion. It is this: that the particular luminary, which was to *lead on*, and so to *rule, the night*, and to become the most familiar and most important natural index for the measurement and division of time, viz. “*the MOON, the faithful witness in heaven,*” does not acquire *optical existence*, that is, does not become decidedly apparent to the earth, by the laws of *nature*, that is, “*of the creation,*” until the *third evening of its revolution*, according to our common computation, which answers to the *fourth evening* of the ancient *Mosaical day*, or *nycthemeron*; our computation connecting the evening with the *preceding day-light*, but the *Mosaical computation* with the *succeeding day-light*.

The fact, of this *coincidence*, is indeed most remarkable and surprising. It shows, that the Creator reserved the exposure of His heavenly calendar, for the day when the planet, which, by His own laws, was to *rule the night*, had acquired, by those same laws, the position which *first* enabled it to *display its domination*. From this wonderful correspondence and coincidence, of the day of *Creation* in which the sun and moon were first exhibited as “*ruling the day and the night,*” with the day of the *lunar revolution*, in which, by the laws of creation, the moon is first able to acquire

PART II.

CHAP. VI.

PART II.

CHAP. VI.

its *ruling character* in the heavens, we derive a very extraordinary and unlooked for confirmation of the soundness of our interpretation; and from hence we may, logically and philosophically, further infer; that when, in the beginning, “God created the heaven and the “earth,” when He gave to the earth its first impulse of rotation, and when He first *illuminated* the solar atmosphere by His Word, therein giving *origin to Time*; the two presiding luminaries were in that particular relation to the earth, which astronomy calls *inferior conjunction*; and that, in the *third* diurnal revolution of the earth, they first acquired, by their separation, that relative aspect, which qualified them to be manifested together as the two great *indices* of *annual* and *menstrual* time, but, for which manifestation, *both* would not have been prepared on an *earlier* day. And the *new moon*, being thus in the *third day* of its *revolution* (according to our vulgar computation), that is, of its *first quarter*, it would necessarily *appear* at the setting of the sun, and would thus be ready, *inchoare, ducere*, and therefore, *imperare noctem*—to *begin, lead on*, and so, *rule the night*. The *number* of the day, together with the senses of $\alpha\rho\chi\epsilon\iota\nu$ —*inchoare et imperare*, tend thus reciprocally to support each other; and to show, that the *first day* of crea-

tion, was both the *first day* of the *first year*, according to *solar* computation, and the *first day* of the *first month*, according to *lunar* computation.

PART II.

CHAP. VI.

The *light*, which caused the *first three* days, and the *light*, which caused the *last three* days, of the *Hexaëmeron*, being thus easily and naturally referrible to *one and the same cause*, it is unphilosophical, unreasonable, and unlearned, to assign them to *distinct and different causes*. It is *unphilosophical*, because it is contrary to those rules of universal science, which enjoin, 1. “ Not to admit *more causes* of natural “ things than are *sufficient* to explain their “ phænomena; 2. To assign, as far as it can “ be done, the *same cause* to *natural effects* of “ the *same kind*.” It is *unreasonable*, because we know of no other light in the creation, besides that of the *sun*, to which we can ascribe the *light of day*; and because we are not any where informed, that God has caused to cease any *mode of light* which He had previously ordained. And it is, moreover, *unlearned*, because it betrays an ignorance of that which moderate learning would have imparted; that the supposition, of *two* different causes of light, was a late unskilful *hypothesis*, unknown to the fellow-countrymen of the historian, who understood him to record, *only one cause*. “ Ac-

PART II.

CHAP. VI.

“ according to the opinions of the *Latins and*
 “ *Greeks*, says the learned Vatablus¹, the *sun*
 “ was created on the *fourth day*; — but the
 “ *Hebrews* say, that both the *sun and moon*
 “ were created on the *first day*: — they under-
 “ stood the *first light* to be that of the *sun*,
 “ because the sun is the *source and fountain*
 “ of *all light*².” It is very singular, that the
 learned Grotius rejects this interpretation upon
 the very principle which ought to have induced
 him to embrace it; namely, *simplicity of inter-*
pretation. “ Some of the Rabbins,” says he,
 “ understand that *first light* to have been the
 “ *light of the sun*; and that the sun is therefore
 “ said to have been created on the *fourth day*,
 “ because it then *exercised its influence for the*
 “ *first time upon vegetation*. But, to me it
 “ appears more consonant to the *simplicity of*
 “ the Scripture to suppose; that the *light*
 “ which was created on the *first day*, was
 “ *different from that of the sun*, which was
 “ produced on the *fourth day*³.” We might

¹ “ VATABLUS, professeur de la langue Hébraïque, florissoit
 “ sous le règne de Francois I. Il avoit une si grande con-
 “ noissance de la langue Hébraïque, que les Juifs même, qui
 “ assistoient souvent à ses leçons publiques, ne le pouvoient
 “ assez admirer.” — *Dict. de MORERI*. Ed. Amst.

² *Critici Sacri*, in loc. ³ *Ib.*

venture to affirm; that this illustrious scholar would have changed his notions of *simplicity*, if he had lived to witness the revolution in the sciences perfected in Newton, and to reflect upon his *Regula Philosophandi*. It is true, that Philo, amongst his other allegories, allegorized also the *first light*, so as to render it something distinct from the sun; but then, he did not consider it as a part of the *material* creation. Josephus does not distinctly show his opinion; further, than that he assigns the production of light to the first day, and the ordination of the heavenly bodies to their respective functions, to the fourth day. “ On the *fourth* day, (says “ he), God decorated the heaven with the sun, “ and moon, and the other luminaries; as- “ signing to them motions and courses by “ which the revolutions of times and seasons “ might be *manifestly marked out*” — ὥραν περισφοραὶ φανεραὶ σημαίνοντο¹.”

But, a critical and philosophical consideration of the recital of the sacred historian, added to the remarkable coincidence, of the day of the moon's first natural appearance in her orbit with the day assigned for her first assuming the presidency of the night in the *Hexaëmeron*, confirms

PART II.
—
CHAP. VI.



¹ *Antiq. Jud.* l. i. c. 2.

PART II.

CHAP. VI.

the interpretation founded upon *optical description*; which Rosenmuller has judiciously enforced. “ This exposition, (adds this learned “ commentator,) which is perfectly conform- “ able to the genius of the Hebrew tongue, “ removes all difficulties; and it is surprising “ that this passage of the history, which alone “ opens a way to a true interpretation, should “ have led interpreters astray in every direc- “ tion, and have given origin to so many mon- “ strous hypotheses. For, any one who will “ read this passage attentively, and without “ any previous bias of his judgment, must “ perceive; that Moses presupposes, as a cer- “ tain and unquestioned truth, that the hea- “ venly bodies *were already in existence*, but “ that they *now began*, by the will of the “ Creator, *to exercise those offices towards the “ earth which they still exercise*; and I doubt, if “ any one of the *Israelites* understood Moses “ in any other sense¹. And it would be “ absurd, (he observes,) for any one here to “ object, that the sacred Scriptures thus lead “ men into error; this objection could have no “ weight, unless it was the design of those “ Scriptures to instruct mankind in *Astronomy*; “ which no one will readily suppose².”

¹ P. 64. ² P. 63.

III. 1. The only error to be rectified in this learned commentator, results from his hypothesis before mentioned¹; into which he suffered himself to be seduced, and by which he deprived himself of the full benefit of his own lucid principle of interpretation. By the *artificial interval of time* which he forced into the record; confessedly without any authority from the text, (for he knew not where to place it,) but solely in compliance with the requisition of *the mineral geology*; he deserted the guidance of his own principle. Having once fatally admitted that false and indefinite interval, he was at a loss to assign the *particular physical character* which distinguished the *fourth day*; and he asked, “What was done on this day, if we look for the *physical truth*? for, we have hitherto only followed Moses with reference to the *optical truth*—Quid hoc die sit factum, si secundum *veritatem physicam* res consideretur? hactenus enim secundum *veritatem opticam*, Mosen duces secuti, rem consideravimus².”

He failed to perceive the *true origin* of the world at the period which the record declares, and he therefore was unable to trace the simplicity and order of its progress to the *fourth day*; and, having thus left himself without the aids

¹ See above, p. 164. ² P. 65.

PART II. both of *reason* and *criticism* to determine the
 CHAP. VI. question, he resorted to the dubious conjecture ;
 “ *either*, that the earth then received its first im-
 “ pulse in its *orbit*, having before only revolved
 “ upon its *axis* ; or, *that the moon was then first*
 “ *made a satellite of this earth.*” In the latter of
 these alternatives, he was not very far from the
 truth. But, if he had given himself time to dis-
 cover how unreasonable were those demands of
 the mineral geology to which he paid such hasty
 submission, and, that the text needed not, but
 protested against, the breach which he made in
 it to accommodate that science ; he would have
 traced the progress of creation during the first
 three days, in the order related by the histo-
 rian, and would have found, that the *manifesta-*
tion of the heavenly luminaries, and the *appear-*
ance of the moon, by the operation of the new
 planetary laws, on the *fourth day* of its revolu-
 tion, fully reveal the *physical fact* which dis-
 tinguished this particular day of the *Hexæ-*
meron.

2. The errors of De Luc in this question,
 are of a much graver and more reprehensible
 nature. In his pernicious scheme of compro-
 mise and concession, he has the temerity to
 discourse thus upon this article. “ The opera-
 “ tions which took place, between the great
 “ epocha of the creation of light, and the origin

“ of man, recited in the first chapter of Gene-
 “ sis, are there divided into *six periods*, called
 “ *days* in our translation; and it is upon the
 “ *undefined interpretation* of this word *day*,
 “ that *unbelievers* have founded their *most*
 “ *specious* attacks against revelation. For it
 “ was *easy*, with only a *very slight knowledge*
 “ of *geology*, to oppose *many phenomena* to a
 “ succession of such events in the compass of
 “ *six of our days of twenty-four hours*. But,
 “ it is *evident from the text itself*, that this in-
 “ terpretation is *erroneous*; for it is *obvious*,
 “ that days of twenty-four hours are measured
 “ by revolutions of the earth *in the presence of*
 “ *the sun illuminating it*, whereas the sun *does*
 “ *not appear in this recital until the fourth* of the
 “ days in question: *consequently—par consé-*
 “ *quent—these are not days of twenty-four hours*,
 “ but *periods of undetermined length*. And for a
 “ long time *ancient interpreters* have remarked,
 “ that the *same word* of the text is employed
 “ in *this latter sense* in other parts of *Genesis*,
 “ where the word *morning* denotes the *begin-*
 “ *ning*, and the word *evening* the *end*, of some
 “ *period*. This is the *only manner in which we*
 “ *can understand that description of each of those*
 “ *days*, ‘ And the evening and the morning
 “ ‘ were the first day:’ and the same of all the
 “ others. For, as the interval between even-

PART II.

CHAP. VI.

PART II.

—
CHAP. VI.

“ing and morning is only a part of a day of
 “twenty-four hours, and not one of those
 “days complete, whereas the beginning and
 “end of a *period* render it complete, WE see
 “clearly, by this difference, what must be the
 “sense of the words employed here by Moses.
 “This is the *only remark* which I have to make
 “upon *the text*¹.”

It is difficult to give a name to this attempt, to dogmatize in scriptural interpretation (with which he here trifles like an infant with fire), in total destitution even of the elements of the sacred learning, by which alone his argument could either be confirmed or confuted. For, there is no *tiro* in biblical learning who does not know; that it is utterly untrue, that the Hebrew ערב, signifying *evening*, and בקר, signifying *morning*, are used in any one instance, in any one part of the book of Genesis, to signify the beginning and end of a *period of undetermined length*; as he here asserts, with an hardihood totally unaccountable: that it is utterly untrue, that “*ancient interpreters have for a long time remarked—depuis long-tems les interprètes antiques ont remarqué—any such thing*: and, that it is equally untrue, that the

¹ *Lettres Géologiques*, p. 95—97.

word \square —*a day*, is any where employed by Moses, or by any other sacred writer, with the particular latitude which he here endeavours to affix to it, not by any rule or sufferance of the language, but merely to *carry a point of system*. His “*wish, was the wanton father of his thought;*” not his thought, the legitimate offspring of his knowledge. By such a mode of interpretation, any thing may be converted into every thing; and it would therefore be far more reasonable to deny the record, than thus to compel it to falsify itself.

The snare which drew him into this un-reputable experiment, was the popular assumption, of the *certainty* of the interpretation which ascribed the *creation of the sun* to the *fourth day*; and a total unconsciousness, that there existed any evidence to show that the popular assumption was erroneous. Yet, upon this single foundation, he has ventured to erect the whole of that part of his geology which respects the *mode of the first formation* of this habitable globe; and which he has confidently offered, as a *confirmation of the Mosaic veracity*: thus, taking a conspicuous lead among those philosophers of whom Rosenmuller has well observed; “*eo delapsi sunt, ut systemata recentiorum physicorum in Mose quærent, et verba misere ad opiniones suas præconceptas detorque-*

PART II.

CHAP. VI.

PART II. “*rent*”¹. But, let it only be shown (as it
 CHAP. VI. has been shown,) upon sound principles of
 critical interpretation and of Newtonian philosophy, that it is *more probable* that the light of the *first* day was derived from the *same* identical cause as the light of the *fourth* day, than that it was a *latent chemical principle*, (as he would suggest,) unknown to all mankind until the reformed chemistry of the eighteenth Christian century found it in a laboratory at Paris; and the whole of his “*Lettres Géologiques*” becomes at once waste paper, and subsists only as a type of that “*confused assemblage of elements*” from which he would derive this earth.

And what is the *motive*, which he sets forth to allure our *will* to his fantastical interpretation? for it is not our *reason* that he addresses, but our *will*. It is, to *conciliate unbelievers*. To conciliate unbelievers, by supplying them with every needful means of light for discerning the truths which they do not apprehend or recognise, is doubtless a high moral and Christian duty; but, to strive to conciliate them by a surrender of any particle of truth, to modify or change it, to cut and fashion it to the

¹ P. 14.

measure and mode of their *disposition to conviction*, is a breach of trust of the same kind, as to bid our master's debtor "take his bill, and write down fifty measures of wheat," when "an hundred measures" is the just amount of the score. We are not intrusted with any latitude, or discretion, for thus negotiating the good will of infidelity, in the article of revealed truth. We must take care, to present it pure and genuine; and unbelievers must then take it as it is, or they must leave it; but, those who attempt a compromise, by any *unauthorized concession*, are not the champions, but the betrayers of that truth: *non tali auxilio*¹, &c.

¹ Of the peculiarly untoward turn of this estimable person's mind, as a *professed defender of revelation*, a competent sample is afforded in the following note; which he subjoins to his assertion, that "we read of no miracle in which there was any *new creation*." "The *multiplication of loaves*, (says he), will perhaps be objected to me; and I shall certainly not do what I disapprove in many divines—reply by an explanation. *But, it is easy to conceive that this provision of bread might come there in many different ways; not indeed without a miracle, but without a new creation.*"—(*Lettres sur l'Hist. de la Terre*, tom. i. p. 236, note). He does not impart his conceptions to his reader, they are so easy of apprehension. But, would he have found the same facility in *conceiving the manner* in which the *barrel of meal*, and the *cruse of oil*, supplied the widow of Sarepta, without any waste of

PART II.

CHAP. VI.

It is not without sincere pain, that I feel myself compelled thus strongly to censure this particular work of the able and amiable De Luc; but, in so sacred a cause, there may be no complimentary reservation from man to man. He has himself rendered it indispensably necessary, that a strong and effectual caution should accompany his writings; because, they tend to dissolve the foundations of the edifice which they officiously offer to secure. They are calculated, therefore, to produce an evil which no hostile assault could effect; for, they are calculated to attract a confidence, which an hostile demonstration would repel. De Luc designed friendship; but, unfortunately, the execution of his friendly design is real hostility. He was eminently distinguished, and his memory is deservedly honoured, in the department of *physics*; he was great also, in showing the concord of many *natural phænomena* with the Mosaic record of *the deluge*; but there was

their quantities? Until we can comprehend the *essence* of matter, it is as unphilosophical as it is impious to dogmatize on the laws of its creation. There was *another course*, besides that which he rejected, and that which he adopted; which was, not to attempt an *easy conception* of what *cannot be conceived*. It is this *easy conception* of *first formations*, which has engendered the monstrous system of the *modern chaotic geology*. —See above, p. 83, 84.

the *limit* of his *true geology*. As soon as he attempted to proceed further, and to argue *the mode* of the *first formation of this globe*, his mind lost its guide; he had strayed *ultra crepidam*; and he brought himself into the same predicament with those whom he had before refuted and condemned in the article of *the deluge*. The *measures of time* which he had philosophically denied to them, he now unphilosophically and inconsistently demanded for himself: *they* could not explain the *revolution* of this earthly system, without the aid of exorbitant measures of time which the Mosaical record refused them; and *he himself* could not understand the Mosaical description of the *creation* of this system, without exacting measures equally exorbitant, and equally refused by the record. The natural *days*, asserted by Moses, were therefore to be turned into such successive *periods of ages*, as, in his calculation, would allow of a chemical precipitation and crystallization of the globe; the *evening* and the *morning* of those days, were to be perverted into the beginnings and ends of those imagined periods; and the *light* of the *first day*, was to be transformed into an *universal chemical substance*; “ *not proceeding* “ *from any luminous body, like the sun*, but “ *intermixed with the mass of terrene ele-*

PART II.

CHAP. VI.

PART II.

CHAP. VI.

ments; in order, 1. to penetrate that mass;
 “ 2. to produce *fire*, by its union with a *particular* element; 3. to cause the liquefaction of *water* by its union with fire; and
 “ lastly, to effect *different* chemical combinations of light with the other elements¹.”
 All this was to be done; not because the text of Moses stood in any need of these fantastical contrivances, but, “because (says De Luc) *it is the only manner in which we can understand the Mosaic description of those days.*” And therefore, because the mode illustrated by this obscurity is the only mode in which “we can understand it,” the text of Moses is to be interpreted by no other rule than *our incapacity to understand it*; although that incapacity proceeds, solely, from our deficiency in the knowledge requisite for understanding it. Let this principle be applied to any other object of research, and its *absurdity* will be at once manifest; to say nothing of its necessary consequence, with respect to truth. “*Take heed, that the LIGHT that is in thee be not DARKNESS,*” is a caution, which the mineral system of geology would do well to observe, with respect to its own science.

¹ *Lettres Géologiques*, p. 101, &c.

Dolomieu acutely remarked to De Luc; “that though *light* might produce *fire*, and fire *water*, yet no progress would thereby be made in the problem to be solved; because, the simple *liquidity* of water would be *inoperative*, without the accession of some *principle of activity* which does not essentially pertain to it¹.” To this forcible observation, which paralyzed the *primum mobile* of his *chemical chaos*, De Luc replied, as was usual with him on similar occasions, by referring to an answer in a *future* work; so sturdily did he now stickle for *time*.

Time, is the great fascinator of all unbelievers, semi-believers, and conditional and systematical believers; and equally sagacious are the various ways in which they seek to extend it. Professor Meinars, argued the *length of time* which must have been necessary for the *gradual discovery* of the great truth, of a *One, supreme, Creator and Governor of the world*. Bailly, argued the same; respecting other important principles of natural religion and morality. But, by the more philosophical supposition, which the Mosaic record confirms; that the *Intelligent Creator* endowed His intel-

¹ *Lettres Géologiques*, p. 95, Note.

PART II.
 CHAP. VI.

ligent creature with these principles at his first formation, in order to render him “*conducive to the end for which he formed him;*” those unnecessary and unphilosophical measures, are at once absconded from the true computation of time. The same error has sought the same measures, in imagining the time requisite for making and collecting the various celestial observations, by which man could arrive at a knowledge of the heavenly bodies, their movements, and indications, and apply them to the computation of time. But, the same philosophical principle will dispel the error in this case, as in the former; and the Mosaical record expressly acquaints us, in the article we have been now considering, that the Creator, on this *fourth day*, disposed His celestial calendar in its first sensible and complete order of indications, and appointed it to serve “*for signs, and for seasons, and for days, and years,*” preparatory to the proximate *creation of MAN*; to whom it was to be imparted, and for whom alone it was to be conducive to those relative ends.

Thus, then, it is sufficiently manifest, from the concurring authorities of learning and philosophy; that the *solar light*, which, upon the *fourth day* of creation, was transmitted *imme-*

diately and optically from the solar orb, was the same light that, during the three preceding days, had been transmitted through a nebulous medium, interposed between it and the earth: ματε ήλιου, ματε ασρων επιφαινοντων — “neither sun nor stars having been apparent,” during that covered and clouded period.

PART II.
CHAP. VI.

PART II.
CHAP. VII.

PART II. THE sacred historian goes on to his *Fifth*
 CHAP. VII. *Article*, and relates :

PART II. THE sacred historian goes on to his *Fifth*
 CHAP. VII. *Article*, and relates :

“ And GOD said, *Let the waters bring forth*
 “ *abundantly the moving creature that hath life,*
 “ *and fowl that may fly above the earth in the*
 “ *open firmament of heaven.*

“ And GOD created GREAT WHALES, and
 “ every living creature that moveth, which the
 “ waters brought forth abundantly after their
 “ kind; and every winged fowl after its kind.
 “ And GOD saw that it was good.

“ And GOD blessed them, saying : *Be fruitful*
 “ *and multiply, and FILL THE WATERS IN THE*
 “ *SEAS; and let fowl multiply in the earth.*

“ And the evening and the morning were
 “ the FIFTH DAY.”

The word שרצו, which our version renders
 “ *bring forth abundantly,*” is rendered by the
 Greek interpreters, εξαγαγετο, which simply
 expresses “ *bring forth,*” without the qualifica-

tion of “*abundantly*.” The same qualification is absent also in the Latin version of the Chaldee paraphrase. Yet the Hebrew verb implies abundance; its proper sense being that of *scaturivit, progenuit abundè*, as it is rendered by Castell; i. e. to *breed*, or *produce abundantly*.

In this article is related, the *first formation of animal matter* by the immediate act of Almighty Power, i. e. by *the mode of Creation*; a *mode*, which appears to constitute the great *tormentum* of the mineral geology; from the constraint of which it is ever labouring to extricate its science, but from which it never can emancipate it. This amazing operation it states thus: “*au bout d’un certain tems, ce liquide fut peuplé d’animaux*¹—at the end of a certain time, this (*chemical*) liquid was peopled with animals.” It does not tell us how, but observes; “*c’est un trop grand sujet*²—this is too great a subject, to treat in detail;” in order to maintain its *spurious distinction*, between the modes of *mineral*, and *animal, first formations*. Nor does it seem to be so much amazed at its *being peopled then*, as that it was *not peopled before*: “What is *astonishing*, it says, and *not less certain*, there have not been always living creatures on the

PART II.

CHAP. VII.

¹ DE LUC, *Lett. Géol.* p. 77.

² *Ibid.* p. 220.

PART II. "earth?" Unless it supposes that the earth
 CHAP. VII. *always existed*, it is difficult to understand the
 ground of its astonishment. For, if it supposes
 the earth to have had a beginning, the produc-
 tion of animals, on the *fifth day* of its forma-
 tion, was early enough to have satisfied it.

The same immediate operation of God, which, on the *first day*, gave perfect existence to His *mineral* system, and, on the *third day*, to His *vegetable* system; gave perfect existence, on this *fifth day*, to that first created part of His *animal* system, which comprehended every kind of *marine* and *winged* animal, in all the individuals pertaining to its *first formation*. These were formed in *full maturity of structure*, in all their component parts, by a mode disclaiming all secondary operation. And, though the *bones* of the first "*whales*" unquestionably bore the *appearance* of an *ossifying process*, as the textures of the first *rock* and of the first *tree* severally bore the appearances of a *crystallizing* and of a *lignifying* process; yet, that appearance was no indication to *reason*, that they were produced by such a process; because reason perceives, that they acquired their *ossified substance*, and *phenomena*,

¹ CUVIER, *Th. of the Earth*, § 6. p. 38.

before any *process of ossification* had begun to take place. PART II.

Thus, *marine animals* of every kind, from the largest to the minutest, were produced “*in abundance*;” and swarmed in the depths of that *sea*, into which the general mass of waters had been drawn from off the surface of the globe which was now clothed with vegetable matter, and whose bed had been formed by the disruption and subsidence of the other portion of that same surface. Let us again carry our thoughts into the structure of that bed, and into its apparently disordered and ruinous depths and recesses; I say *apparently* disordered, because the circumstances of its alteration were as much directed by the Divine Wisdom, as the regularity of its first formation. The mineral materials, which retained their primitive order and position in the undisturbed *dry-land*, were here fractured, severed, and dispersed, or in various ways disturbed; and the soils, which had at first rested on their rocky bases, were necessarily displaced by the rupture of those bases, and being precipitated into the new profundity, together with the innumerable fragments of the broken rocks, formed the slimy or the shingly bottom of the new sea. On that bottom, and in all the varieties of its parts, whether in its

PART II.
 CHAP. VII.

lowest depths, or upon the submerged masses which lay upon it, marine matter of every kind, vegetable and animal, was produced in abundance, with the power of perpetual reproduction; and it continued to increase in quantity, in a multiple ratio, during many ages. This is a fact, of the utmost concernment to a true geology; and which it will therefore behove the reader to impress deeply, and to retain fixedly, in his mind.

CHAPTER VIII.

THE historian at length arrives at his *Sixth Article*; which is the *last*, in the history of the *Creation* of the constituent parts of this earthly system.

PART II.
CHAP. VIII.

“ And GOD said; *Let the earth bring forth the living creature after its kind, cattle, and creeping thing, and beast of the earth after its kind. And it was so.*

“ And GOD made the beast of the earth after its kind, and cattle after their kind, and every thing that creepeth on the earth after its kind. And GOD saw that it was good.

“ And GOD said; *Let us make MAN in OUR IMAGE, after OUR LIKENESS; and let them have DOMINION over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that moveth upon the earth.*

“ So GOD created MAN in HIS OWN IMAGE, in the IMAGE OF GOD created He him: male and female created he them.

“ And GOD blessed them, and GOD said unto

PART II. “ *them, Be fruitful and multiply, and replenish*
 — “ *the earth, and subdue it: and have DOMINION*
 CHAP. VIII. “ *over the fish of the sea, and over the fowl of*
 — “ *the air, and over every living thing that moveth*
 — “ *upon the earth.*

“ *And GOD said; Behold, I have given you*
 — “ *every herb bearing seed, which is upon the face*
 — “ *of all the earth, and every tree in the which is*
 — “ *the fruit of a tree yielding seed; to you it*
 — “ *shall be for meat; and to every beast of the earth,*
 — “ *and to every fowl of the air, and to every thing*
 — “ *that moveth upon the earth wherein there is life,*
 — “ *every green herb for meat. And it was so.*

“ *And GOD saw every thing that HE HAD*
 — “ *MADE, and behold it was VERY GOOD.*

“ *And the evening and the morning were the*
 — “ *SIXTH DAY.*”

The creation of MAN “ *in the image and like-*
 — “ *ness of GOD*”—κατ’ εἰκόνα καὶ καθ’ ὁμοίωσιν Θεοῦ,
 relates, and can only relate, to the *intellectual,*
moral, and *immortal nature,* with which the
 infinite goodness of God was pleased to invest
 him; these are the only points of his nature,
 in which the most distant analogy can be traced
 to the nature of his infinite CREATOR. And
 the “ *DOMINION,*” with which God was further
 pleased to endow him, “ *over all the earth*”
 which He had now completed, showed, *that all*
that terrestrial creation was designed to be subor-

dinate to the END, for which He had placed within it that INTELLECTUAL, MORAL, and IMMORTAL BEING.

PART II.

CHAP. VIII.

In this concluding article of creation, we are instructed; *first*, that this *sixth* day was marked by a vast enlargement of the sphere of *animal matter*, completing the universal animal system, by the formation of every kind of animated being which was to inhabit and occupy the surface of the earth now provided with every variety of vegetable production. But we are informed, *secondly*, that the last *animal structure* of this creation, was that which God on this same day assigned to MAN, and into which He “*breathed a LIVING SOUL:*” thus uniting in his being, a nature which bore analogy to His own divine nature, and a frame analogous, in its general laws, to the animal natures of the earth, though furnished with many excellencies above them; of which, the faculty of *speech*, for communicating intelligence, and the conformation of the *hands*, for executing the purposes of intelligence, are chief and pre-eminent. Thus man, by his *animal* nature, was linked to the system of *this globe*; but, by his *moral* nature, and by the *unperishing essence* of that nature, he demonstrated a disparity to that system, and a relation to a *different* and a *far more exalted one*. This *mineral globe*

PART II. was formed, and assigned, for the *temporary*
 CHAP. VIII. *theatre* of his being; and with the purpose, of
 sustaining and serving the *animal* and *vegetable*
 systems, but chiefly, to supply the necessities
 of the *human resident*, and to exercise the
 various powers, *moral* and *physical*, with which
 his *mind*, and his *frame*, were severally endowed.
 To *him*, therefore, the Creator was pleased to
 assign the "DOMINION" over His *new-created*
earth.

And here it becomes necessary to notice
 the effect, continually resulting from the prac-
 tice to which I have already adverted¹, of
 pursuing *physics* as a branch of science com-
 plete in itself, and not necessarily requiring
 an association with *morals*: a practice, common
 among those who are immersed in the studies
 of the *natural sciences*, who appear to conduct
 them under a jealousy of *morals*, and under a
 settled principle, that the spheres of the two
 philosophies are distinct and independent of
 each other; so that any interference of *morals*
 in the sphere of *physics*, is an usurpation, and
 an infringement of the rights of the latter.
 By this melancholy estrangement, the due
 and natural subordination of the latter to the

¹ See above, p. 109.

former, which Newton inculcated and which right reason asserts, becomes in a great degree dissolved; and *physics*, confidently advancing alone in a state of misguidance, become sterilized of their noblest and richest fruits. This must be the case, when God is not habitually regarded as the *first physical principle*, as He was regarded by Newton; but only as the *first moral principle*, and therefore pertaining more peculiarly to another branch of mental contemplation. In this mutilated condition of the mind, the *moral* feelings which are sometimes roused, and as it were compelled, into action, in the physical contemplator, by the grandeur and sublimity of the objects which he witnesses, are vague, confused, and undigested; and the terms in which they are enounced, betray the defects of the conceptions from which they emanate. I shall illustrate the case to which I allude, by producing an example of this *semi-moral* sentiment; which, though it is common even to common-place among *physical* philosophers, I select, because it is the expression of one of the ablest and most deservedly celebrated mineralogists of our time.

“ If, in the midst of such meditations, (says
 “ this eminent naturalist,) the idea of the *little*
 “ *beings which crawl* upon the surface of this
 “ globe presents itself to the mind; if it com-

PART II. “ pares *their duration* with the *great epochas* of
 CHAP. VIII. “ *nature*, how will it be *astonished*, that, occupy-
 “ ing so *small a place* both in *space and time*,
 “ they could believe that they were the *sole*
 “ end of the creation and of the universe?—It
 “ is *here* (he exclaims, namely, on the *summit* of
 “ *Ætna*, which inspired these reflections,) that
 “ the *philosopher* ought to build the *Temple* of
 “ *Wisdom*; to say, with the *Chanter of Nature*¹,

“ *Suave mari magno, &c.*” i. e.

'Tis pleasant, when the seas are rough, to stand
 And see another's danger, safe at land.
 Not 'cause he's troubled, but 'tis sweet to see
 Those cares and fears from which *ourselves are free!*

CREECH.

We plainly perceive, *whither* this *physico-morality* tends. And, indeed, how is it possible that the “*philosopher*” should suppose, that the “*DOMINION*” over the vast theatre which he beholds from *Ætna*, was consigned in all formality, by its Creator, to the “*little crawling*” “*beings*” which he surveys in the landscape below; while his “*wisdom*” is engaged in chanting with the “*Chanter of Nature*,” who only chants that he may disclaim an *intelligent and governing Creator* of that theatre? Why the

¹ SAUSSURE, *Voyages dans les Alpes*, tom. i. *Disc. Prél.* p. 6, 7.

² LUCRETIVS, ii. 1.

animated mineralogist should have pitched upon that particular *stave*, does not very clearly appear. That the adventurous traveller, who, after much toil and hazard, has reached a place of refuge upon the summit, should sing it, we might perhaps comprehend; but, why the *philosopher* is to sing it in the *temple of Wisdom*, I must protest, for one, that I cannot in the least comprehend.

There may possibly, however, appear to some minds, on the first perusal of this reflection, a mixed character of sublimity and humility, of profound thought, and of devout sentiment; but, upon a nearer inspection, and upon an accurate analysis, all these characters will dissolve, and disappear. It may therefore not be amiss, to pursue the analysis.

Though the author uses the words *creation* and *universe*, yet it is evident, from the context, that his mind intended no more by those terms than the *expanse of earth*, exposed to his contemplation from the crests of the loftiest mountains; upon which, it is certain that the *spiritual affections* of the soul experience instinctively an *ascending* tendency, which is presently counteracted and depressed in the *sensitive affections*, by a consciousness of *weakness* and *inferiority*. The reflection conveys a censure upon all those who think, that the *little being* can be the *chief*

PART II.
 CHAP. VIII.



object, with a view to which this earthly system of creation was *originally framed*: for, no one ever yet imagined that he was the chief object of the *entire creation*, and unbounded *universe*; and it founds that censure, exclusively, upon the relative *magnitudes* and *durations*, of the *vast* features of the globe, and of the *small* human beings who inhabit, or as he expresses himself, who “*crawl*” upon it. Now, the vast magnitudes are *mountains*, and the small magnitudes are *men*; and it argues, that the disparity of those magnitudes and of their durations is so excessively great, that it is irrational and stupid to suppose, that the *larger* can be subservient to the ends of the *smaller*. But if there is any sense or virtue in this reflection, it must consist in duly estimating the *relative importance* of the *two* magnitudes and durations; and in concluding logically, the comparative insignificance of the *smaller*. And it will then necessarily follow, that the insignificance of the *smaller* would lessen, in the same proportion in which it might *increase in bulk*. If the little beings therefore were to be magnified in the proportions of 2, 3, 4, &c., their insignificance, relatively to the great features of the globe, would necessarily diminish in the same ratio. The smaller the disproportion between the man and the mountain, the less would be the relative

insignificance of the former ; and although the increase of magnitude in the smaller object be ever so inconsiderable, yet if it is *positive and real*, its dignity must be proportionately increased in the *true nature of things*: the *bigger* the being that crawls upon the surface of this globe, the *less absurd* would be the supposition that he is the final object of this terrestrial creation. The *Irish giant*, therefore, whose altitude exceeded the measure of *eight feet*, would exceed in relative dignity, by the same proportion, *Bacon* and *Newton*, whose height did not attain to *six feet*. The *Brobdignag*, would far excel the *Irish giant* ; while, on the other hand, that diminutive race of illustrious men, which, by Lord Clarendon's relation, distinguished the unhappy times in which he lived¹, would sink into extreme insignificance, compared with a magnitude so considerable and respectable as that of the *Brobdignag*. If this is *nonsense*, then must that also be *nonsense* from which it is the genuine conclusion: viz. that the *material magnitudes* of the little beings, or their *duration* upon the earth on which they "*crawl*," determines, in any manner, their importance in the creation, relatively to the pri-

PART II.
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CHAP. VIII.



¹ *Life*, p. 28, fol.—*Ld. Falkland, Hales, Chillingworth, &c.*

PART II.
 CHAP. VIII.

mordial mountains which arise above it, or to the extent of the regions which may be surveyed from their summits. For, if the same *physically small* beings possess *another magnitude*, which can be brought to another and a different scale of computation from that of *physical* or *material* magnitude; a scale, infinitely surpassing in importance the greatest measures of that magnitude; then, there will be nothing astonishing or irrational in the supposition, that the highest mountains, and the widest regions, and the entire system to which they pertain, may be subservient to the ends of those beings, and to that *other system* to which they pertain; which latter will thus be found superior in importance to the former. Such a scale is that, by which the *intelligent, moral, and immortal* nature of MAN is to be measured, and which the sacred historian calls, a formation “*after the image and likeness of God* :” a scale, so little taken into the contemplation of the science of *mere physics*. As soon, however, as that *moral* scale of magnitude once supersedes the *physical* scale in the apprehension of the mind; as soon as the mind perceives, that the *duration* of that intelligent moral nature infinitely exceeds the vastest “*epocha of Nature*” which the imagination of the mineral geology can represent to itself, and that, though the *physical* nature of

man is limited to a very small measure of time, yet his *moral* nature is unlimited in time, and will outlast all the mountains of the globe; it then perceives, at the same moment, the counterfeit quality of the reflection, which at first appeared so sublime and so humble, so profound and so devout. The sublimity and humility, betray themselves to be the disparagement and degradation of our nature; the profundity, is found to be mere surface, and the devotion to be a retrocession from the light of revelation.

But, if we would find the principle of this crude and abortive reflection brought to its full birth, and delivered forth in all the perfection of its symmetry; we shall find it ready to our hand, not indeed in the "*Chanter of Nature*," but, in the "*Psalmist of God*;" not in the sphere of *physical* inspiration only, but where *moral* inspiration exalted the mind to the immediate presence of the *Great First Cause*, as the final scope to which universal existence, both moral and physical, invariably and immediately tends. It will then assume this exalted form: "When I consider THY Heavens, the work of THY fingers; the moon and the stars which THOU hast ordained; what is MAN, that THOU art mindful of him, or the son of MAN, that THOU visitest him! For, THOU hast made him but a little lower than the

PART II. "angels, and hast crowned him with glory and
 CHAP. VIII. "honour. THOU madest him to have DOMINION
 "over the works of THY hands; THOU hast put
 "all things in subjection under his feet!"

Here, we trace the aerial soar of the eagle, instead of the heavy ground-flight of the earth fowl; we perceive the aspiring sublimity of revelation, instead of the flatulency of a terrene philosophy; we discern the true humiliation of religious gratitude, instead of an affected depreciation of our highly favoured nature; and we become practically sensible of the infinite disparity of the effect wrought in the soul, by contemplating the *chaotic precipitations* of the *mineral geology*, or the *creative fiat* of the *Mosaical*.

CHAPTER IX.

LET us now return to the record, which is thus concluded by the historian :

“ Thus the HEAVENS and the EARTH were finished, and all the host of them. And on the SEVENTH DAY GOD ended his work which HE had made, and HE rested on the seventh day from all HIS work which HE had made. And GOD blessed the SEVENTH DAY, and SANCTIFIED it; because that in it HE had ceased from all HIS work, which GOD created and made.”

“ Thus, in the distribution of *the days*,” observes Bacon, “ we see, that *the day* on which God rested and contemplated His works, was blessed above *all the days* during which the fabric of the universe was created and arranged¹.”

This concluding article presents much matter for our serious consideration.

Great and inestimable have been the ends

¹ *De Aug. Scient.* v. iv. l. i. p. 37.

PART II. attained by that sacred ordinance, which appointed *all time* to proceed by perpetually recurrent measures of *seven days*. For, while God provided in the heavens, on the *fourth* day, a perpetual *natural* calendar of time divided into large measures, which attracted the attention of the mind to *natural* and *material* objects; He provided, by the *sanctification of the seventh day*, an entirely distinct, *moral* calendar, subdividing those large measures into smaller and more convenient measures, and directing the attention perpetually, and immediately, to HIMSELF; and which was founded upon a principle, and proceeded by a ratio, that prevented the possibility of its ever becoming confounded with, or lost in, the former. For, although some *physical* philosophers of the last century perversely attempted to ascribe the *hebdomal* computation, or computation by *weeks*, to the *quarters* of the moon as marked by its different phases, in order to invalidate the divine origin of that computation; yet, a child in calculation is able to show, that the ratios of the two computations are so essentially and perpetually at variance with each other, that though they can always be adjusted by *equation*, yet they can never fall into each other; but their diversity must have been apparent at the end of the first month, and would have con-

tinued more and more to manifest itself as time continued to advance: the *hebdomadal month* consisting exactly of 28 days, but the *lunar* of $29\frac{1}{2}$.

PART II.

CHAP. IX.

We thus perceive, that the *inchoations* of all the three computations of time, *solar*, *lunar*, and *sabbatical* (if described according to their *indications*); or, *annual*, *menstrual*, and *hebdomadal* (if described according to their *measures*), were *concurrent*. That, the first day of creation, was the commencement of the first *year* and first *month*, testified by the *phænomena* of the fourth day; and the commencement of the first *week*, testified by the sanctification of the seventh day. We thus apprehend the order in which the new creation and system of *time* began, by the counsel and disposal of God; which order has proceeded uniformly and without interruption from that period, and will continue so to proceed, until the conclusion of *time*, which will be no other than the cessation of the stupendous machine of this planetary system. If we could look back through all history, we should find a precise concurring date of *year*, *month*, *week*, and *day*, affixed to every event which has occurred in time; which consideration will make us sensible, that what we are apt to term the obscurity of time, is no other than the obscurity of our own knowledge,

PART II. with respect to past time. But, by thus contemplating it *in itself*, and in its general nature, we shall be sensible how admirably its compound relations have been preserved from its commencement. It presents to the thoughts a perfect, minutely noted calendar, whose leaves are blank to our intelligence, where history has not filled them up; so that our confusion of early history does not result from the want of a precise date to affix to events, but from our incapacity to apply the events to the dates which properly and perpetually pertain to them.

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CHAP. IX.

What renders it material to impress this fact upon the mind is, that the mode which learning and science have adopted to facilitate the arrangement of *historical events*, is, unfortunately, founded upon a principle, which, though it may serve a purpose of *history*, produces radical confusion in contemplating *chronology*. For, since chronology is the *science of time*, and since *time* signifies nothing else than the succession of the *diurnal revolutions* of the earth, collected into *annual revolutions*, and these multiplied by 100, and 1000; our general view of time ought to commence with the *first revolution of the earth*. This is its *true origin*, or *epocha*, with respect to *fact*. But, instead of this *true epocha*, an imaginary scheme of time,

having its commencement 532 years, or one entire *Victorian*, or *Dionysian*, cycle, before time actually did commence, has been substituted; by which means, our retrospective view of that admirable system is, by man's artifice, contrived to terminate in *obscurity and nothing*. A distinct apprehension of that system, demands a distinct perception of its *first procession* and *succeeding progress*; but, by fixing that first procession by a rule of *hypothesis*, and not of *reality*, we adapt historical facts to an *imaginary* and not to a *true* scale of time. Such is the celebrated JULIAN PERIOD, invented by the learned Julius Scaliger in the sixteenth century; which was presently adopted by all the learned world, and still remains the most general scale to which the events of ancient history are referred. That eminent scholar conceived the idea, of multiplying into each other the *numbers*, of the solar cycle, 28; of the lunar cycle, 19; and of the indiction, 15; which yielded him the number, 7980. Of this *number*, he made a *scale of years*; fixing the *year of the Creation*, to the *year 533 of his scale*. It is manifest, therefore, that the 532 years preceding the year assigned to the creation, are mere arithmetical fictions; having no more relation to reality than the *chuoitic ages*, or *epochas of Nature*, of the mineral

PART II.

CHAP. IX.

geology. The mind, thus habituated to refer the course of *time* to an origin which has no reference to *historical fact*, but merely to the *first term of an artificial arithmetical calculation*, views it falsely in principle, and without any character of its true nature. Instead of tracing it to its real commencement, and perceiving both time and history to proceed from thence in parallel and equal courses, and with exact and perpetual correspondence between all their parts, it is taught to leave history and creation behind, and to fix its view upon an imaginary point in unreality and non-existence. And from thus considering time without any *real* origin, a notion of obscurity is necessarily excited, and combined with the notion of past time; and thus, man's artifice defeats the gracious purpose of God, which was, to impart to him a distinct and clear idea of the *origin and progress of time*.

To recover the benefit thus wantonly lost, was the object of the meritorious labours of a learned German of the middle of the last century; who was justly sensible, both of the evil of the prevailing system, and of the value of that which was so inconsiderately neglected. In introducing his new scheme, he thus expressed himself: "Many, and almost innumerable, systems of

PART II.

CHAP. IX.

“ chronology are before the learned world, of
 “ which, if we may venture to speak the truth,
 “ not one has hitherto been proposed which is
 “ free from doubt and uncertainty; the reason
 “ of which is the want of a *fundamental chrono-*
 “ *logy*, in which the *first year* of the world and
 “ all the succeeding years might be accu-
 “ rately described according to the courses
 “ of the *sun* and *moon*. This, Scaliger in-
 “ tended to effect by means of the *Julian*
 “ *Period*. But, since that period does not
 “ begin with the creation of the world, but
 “ *very long before it*; since it does not consist of
 “ complete solar years, but merely of Julian
 “ years; and since it is not *historical*, but merely
 “ *hypothetical*; it is evident, that it cannot serve
 “ for a *basis of chronology*. In this uncertainty,
 “ I perceived the means of obtaining a true
 “ fundamental chronology in the golden period
 “ of the *Jubilee*, which God Himself has shown
 “ us in the sacred Scripture. However sur-
 “ prising this may appear, it will nevertheless
 “ be clearly demonstrated, in the following
 “ pages; that this period begins with the *first*
 “ *year of the world*; that it proceeds equally
 “ by the courses of the *sun* and *moon*; and,
 “ that, by means of epacts which it most
 “ accurately describes, it indicates the new
 “ and full moons through all the ages of the

PART II. " world, and therefore constitutes a foundation
 CHAP. IX. " for universal chronology¹."

Without inquiring into the success of this learned writer's important undertaking, it is quite evident; that, whether our intellectual efforts are or are not able to discover the relations of past events with those distinct characters of time, yet *time itself* has ever proceeded with those distinct characters, and in the constant order here described by the learned and laborious German.

¹ " PRELUSIO CHRONOLOGIE FUNDAMENTALIS, qua
 " omnes anni ad solis et lunæ cursum accuratè describi, et
 " novilunia à primordio mundi ad nostra usque tempora et
 " amplius ope epactarum designari possunt: in CYCLO IOBELEO
 " BIBLICO detectæ, et ad Chronologiam tam Sacram quam
 " Profanam applicatæ," à IOHANNE GEORGIO FRANK, &c.
 Goettingæ, 1774.

CHAPTER X.

LET us now review this “*revealed history of the creation,*” to which Bacon introduced us, with relation to the *mode of first formations*; by the standard of Newton’s conclusions on the one hand, and by the conclusions of the *mineral geology* on the other.

This history records; 1. That all the *first formations of mineral, vegetable, and animal matter*, were severally effected, in order of succession, by a *mode* uninvestigable by any scheme or science of man, namely, *the mode of CREATION by God.* 2. That each of those operations was *immediate*; the formations resulting in their full perfection, without any instrumental mediation, from the actual exercise of the divine wisdom, will, and power. 3. That although the Divine Intelligence thought fit to create and set in order His first formations *in successive moments of time*, yet He produced them *without any agency of time*. 4. That, by His Almighty “*Fiat,*” He caused the *first formations*, and disposition, of all the *mineral matter* of this globe, in one immediate simultaneous

PART II.

CHAP. X.

PART II. operation, commencing at the same moment its
 CHAP. X. *first diurnal revolution*, in which operation, the
 solid body of the earth was formed and consti-
 tuted in all its parts distinct from the body of
 waters, which were diffused over its whole super-
 ficies. 5. That, on the third day, by a similar
 simultaneous operation, He caused the *first*
formations of all *vegetable* matter, in their full
 maturity; and, 6. That on the *fifth* and *sixth*
 days, He in a similar manner caused the *first*
formations of all *animal* matter.

We thus find, in the *Mosaical* geology, the *three kingdoms* of matter equally connected with their *common Intelligent Cause*; by whom they were both “ created, and set in
 “ order, in such sizes and figures, in such pro-
 “ portions to space, and with such other proper-
 “ ties, as most conduced to the end for which
 “ He formed them; and therefore, *that none of*
 “ *them rose out of a chaos, by the mere laws of*
 “ *nature.*”

But, this is the very induction of Newton himself, derived from *universal analysis*. Which induction, therefore, being in perfect concord with the *Mosaical* geology, but in total discord with the *mineral* geology, decides the question with which we set out, namely, the *MODE* of *first formations*. For, *both* the geologies appealed to Newton; and, upon this appeal, Newton

determines, without hesitation, in favour of the *Mosaical*, and formally affixes to the conclusions of the *mineral*, the stigma of *unphilosophical*.

PART II.

CHAP. X.

Bacon's philosophy, no less decidedly disclaims all *chaotic formation*, together with the *periods of time* to which it lays claim. He acknowledges no other agency, either in the act of *power* which *created*, or in the act of *wisdom* which *arranged* this globe, than the hand of God Himself: the former, in "*one moment of time*," the latter, in "*six days*," natural and consecutive; and he could discern no true, philosophical objection, to the admission of those facts. He calls the first formation "*confusa*," in deference to the text of the received versions, and attempts no critical explanation of the word; but we have seen, that it is to be understood with relation only to *vision*, and not to the *subject*¹. He allows of no "*fermenting, digesting, and preparing*;" of no "*dissolution, precipitation, or crystallization*;" of no "*creative seeds or elements*;" of no other *actor* in arrangement, than *God Himself*, and of no other *mode* of his action, than *immediate*; and he pronounces all those laws, which *physical philosophy* denominates *laws of nature*, and to

¹ See above, p. 132 and 150.

PART II. which the mineral geology would ascribe the
 arrangement of first formations, to be no other
 than the *laws of the Creation*; which did not,
 and could not, *begin to operate*, until God had
 called this mineral globe into being, in *one*
moment of time, and had *finished* the perfect
 arrangement of every thing pertaining to its
 system. And he thus professes his belief:

CHAP. X.

“ I believe, that God created heaven and
 “ earth; and gave unto them constant and
 “ perpetual laws, which *we call of Nature*;
 “ which is nothing but *the laws of the Creation*:
 “ —that the *laws of nature*, which *now* remain,
 “ and govern inviolably till the end of the
 “ world, *began to be in force when God rested*
 “ *from His work*:—that, notwithstanding God
 “ hath rested from *creating*, since the *first*
 “ *sabbath*, yet, nevertheless, He doth accom-
 “ plish and fulfil His divine will in *all things*,
 “ *great and small, general and particular*, as full
 “ and exactly by *providence*, as He could do by
 “ *miracle and new creation*; though His working
 “ be not immediate and direct, but by com-
 “ pass; not violating *nature*, which is *His own*
 “ *laws*, upon his creatures¹.”

¹ *Confession of Faith.*

PART III.

CHAPTER I.

It is now decided, upon a comparison of the two geologies with the philosophy of Bacon and Newton respecting the PART III. CHAP. I. first great object of our inquiry, viz. *The MODE of First Formations*; that philosophy and truth lie exclusively with the *Mosaical*. It remains for us, to institute a similar comparison with respect to the PART III. CHAP. I. second great object; viz. the PART III. CHAP. I. *MODE of the universal Changes, or Revolutions*, which the *mineral substances* of the earth have since undergone.

But, a question here arises, with respect to the *course* by which this ulterior object ought to be pursued. In the former part of this disquisition, we began our investigation by examining the pretensions of the *mineral* geology; in order to bring it into a comparison with the *Mosaical*, and to try the validity of each by a *common test*. This object we have

PART III.

CHAP. I.

accomplished, with respect to the *first question*; and the result has been, a clear demonstration of the validity of the *latter*, by the rule of that test, and the invalidity of the *former*. This issue of our examination, appears to render it reasonable, that we should now alter our course; and that, continuing to pursue the thread of the record thus far confirmed, we should apply our close attention to what it relates concerning an *Universal Revolution*, effected in the substance of this globe by the intervention of the same Power, who alone acted in the work of *Creation*; carefully examining, whether the *evidences of revolution*, which the earth reveals, correspond with the statements of the record, and are sufficiently accounted for by it; or, whether the *mineral geology* has discovered the evidence and the statements to be at variance, or has found evidences of revolution which are not reducible to those stated in the record; for, if they are so reducible, it will be equally contrary to philosophy and logic, to assume any others upon a ground of *mere conjecture*.

But, there is another reason why this course is to be preferred for this latter part of our inquiry, besides the superiority which the record has already acquired from the decision of the test, which is this: *physical philosophy*, for a long time past, had taken upon itself to deny

the truth of the Mosaical geology, and with PART III.
 much sarcasm, because it assigned a date of CHAP. I.
 not more than about *four thousand years ago* for
 the period of a revolution, which was able
 to cause marine substances to be imbedded
 in all parts of this habitable earth; even in
 places the most remote from the sea, and in
 elevations very considerably above its level.
 But, the progress of physical research, during
 the last few years; conducted by naturalists
 of acute, sober, and honest minds; has at last
 terminated in so signal a concession to the
 testimony of the Mosaical record in this par-
 ticular, that, added to the authority of Bacon's
 and Newton's philosophy, it renders that testi-
 mony paramount, as the rule by which all
 inquiries, concerning *revolutions general to the*
globe, ought henceforth to be conducted. For,
 the *mineral geology* has been brought at length,
 by *physical phænomena* alone, to this conclu-
 sion; "that the soils of all the plains were de-
 " posited in the bosom of a tranquil water; that
 " their actual order is only to be dated from
 " the period of the retreat of that water; and
 " that the date of that period is not very an-
 " cient¹." Dolomieu, Saussure, De Luc, Cuvier,

¹ D'AUBUISSON, i. 252.

PART III. and the most distinguished naturalists of the
 CHAP. I. age, have coincided in this conclusion, to which
 they have been led by the evidence of various
 monuments, and *natural chronometers*, which the
 earth exhibits; and which remain perpetual
 vouchers for the veracity of the Mosaical *chro-*
nology, with respect to the epocha of the re-
 volution which the Mosaical *history* relates.
 Let us, therefore, prosecute the thread of that
 history, until it brings us to the relation of
 the *Revolution* in question.

CHAPTER II.

THE first act of Almighty God, after the work of *Creation* was completed; and when, by the formation of a female, he had provided for the perpetuation of the race of man, under the sacred bond of matrimonial union; was to prescribe a *moral rule* to those highly favoured beings, whom His goodness had called to a happy existence, and to whom He had granted the “DOMINION” over his earthly system, *in subordination only to HIS OWN SUPREMACY*. For that purpose, and in perpetual evidence of that *subordination*, He reserved and prohibited *one, and only one* object, out of the *universal grant*; the reservation and prohibition of which, though trivial in itself, was amply sufficient for the end designed, which was, to prove whether the *moral being*, thus bountifully endowed, acted with a due sense of his subjection; or whether he aimed to act *in chief*, and without respect to his divine Sovereign and Benefactor. That slight and solitary privation, was imposed upon the declared principle of divine judgment: “*He who is faithful in that which is LEAST,*

PART III.

CHAP. II.

PART III. “ *is faithful also in much ; and he who is unjust*

CHAP. II.

“ *in the LEAST, is unjust also in much.*” Under that trial, MAN *failed* ; he was found “ *unfaithful in that which was LEAST ;*” he was, therefore, ejected from the state of happiness, of which a *perfect obedience* was rendered the *indispensable condition* ; he fell, and in his fall brought down a *curse upon the new earth*, from its offended Creator.

After a period of 1656 years, the principle of disobedience, which had been introduced by the first, created man, had spread its destructive influence through the whole of his descendants, *one family* alone excepted ; and this enormous disproportion between *obedience* and *disobedience*, by which “ *God saw that the wickedness of man was great in the earth, and that the imagination of his heart was only evil continually,*” caused Him “ *to repent that He had made man,*” and to determine upon his “ *destruction.*” Therefore, God said to Noah, who alone had “ *found favour in His sight ;*” “ *I will destroy MAN, whom I have created, from the face of the earth ; both MAN, and BEAST, and the creeping thing, and the fowl of the air ; for it repenteth ME that I have made them. The END OF ALL FLESH is come before ME : because THE EARTH is filled with violence through them, behold, I will destroy THEM, TOGETHER*

“ WITH THE EARTH!”—καιρος παντος ανθρωπου ηκει εναντιον μου’ οτι επλησθη ‘Η ΓΗ αδικιας απ’ αυτων, και ιδου εγω καταφθειρω ΑΥΤΟΥΣ ΚΑΙ ΤΗΝ ΓΗΝ.

PART III.

CHAP. II.

The *execution* of this tremendous threat, produced that *universal revolution* of the globe which the historian proceeds to relate; it is therefore of the utmost consequence, that we should understand, correctly, the *import of the threat*, before we proceed to investigate the *details of its execution*.

The *climax* of the threat, is awfully remarkable: “ I will destroy *man*:—I will destroy *man and beast*:—I will destroy *all flesh*:—“ I will destroy *all flesh, together with the earth!*” But, the reason of this conclusion will be found declared in the text, if it be correctly rendered, and punctuated: “ *because the earth* is replete “ with wickedness through them, (*therefore*) I “ will destroy them *together with the earth.*” The construction of the original is exactly the same as in chap. iii. 14 and 17, “ *because* thou hast done “ this, (*therefore*) thou art cursed above all “ cattle:—*because* thou hast eaten of the “ tree, (*therefore*) cursed is the ground.”

The *sum* of the threat, is comprised in the last clause, הַגִּנִּי מִשְׁחִיתֶם אֶת הָאָרֶץ — “ I will destroy “ THEM, (i. e. *all flesh*) *together with THE EARTH* ;” the correct interpretation of which important passage, depends entirely upon the true and

PART III. and proper sense of the Hebrew particle וְ .

CHAP. II.

If we look into the *Concordance of the Hebrew Particles*, we shall perceive, by a general view, that its *most frequent* signification is that of *cum, unà cum—*with, together with. In this sense it was understood here by the *earliest interpreters*, who render it, $\epsilon\gamma\omega \kappa\alpha\tau\alpha\phi\theta\epsilon\iota\rho\omega \alpha\upsilon\tau\omicron\upsilon\varsigma \text{ KAI } \tau\eta\nu \gamma\eta\nu$ —“I will destroy them, *and* the “earth;”—“*and* the earth,” being equivalent to “*with* the earth,” and confirming and enforcing the *conjunctive* signification: as in the Latin, the preposition *cum* is often used for the conjunction *et*¹. The Chaldee paraphrase, and both the Targums, likewise interpret it in the same sense: “ego disperdam eos *cum* “terra—I will destroy them, *with* the earth;” which interpretation Aben Ezra thus lucidly paraphrases, “perdam eos, *et* perdam terram—“I will destroy them, *and* I will destroy the “earth.” This, therefore, was the established interpretation of the passage in the ancient Jewish church.

There must have been a *sufficient cause* for this *uniformity* of interpretation, of the particle וְ , by the ancient Hebrews; which cause, could be no other than the *traditional sense* with which the passage was trans-

¹ See GESNER'S *Thes.* col. 1309, 10.

mitted through their generations. What that traditional sense was, is distinctly declared by the apostle St. Peter; who, adverting in his second epistle¹, to the catastrophe of *the deluge*, expressly affirms, that “the world which *then* “*was, being overflowed with water, perished—*ὁ “*τοτε κοσμος, υδατι κατακλυσθεις, απωλετο.*” To which *τοτε κοσμος—world which then was*, he opposes, *η νυν γη—the earth which now is*; and he proceeds to declare, that “the earth which “*now is, is reserved for destruction by fire,*” as the earth which *then was*, sustained destruction by *water*. He thus enables us to judge of the *extent* of the destruction of the former, by affirming the destruction of *both* to be equal; and therefore, rendering them *rules* for mutually explaining each other. Of the *latter*, we are apprized, that its destruction by *fire* will be final; and we are therefore, in consistency, to infer of the *former*, that its destruction by *water* was also final: the *instruments* of destruction are different, but their *effects* are co-extensive, according to the diversity of their natures. So that the sense in which the old interpreters understood the words, viz. “*and, or*” “*with, the earth,*” is thus both expounded, and confirmed, by the highest authority in the Christian church.

PART III.

CHAP. II.

¹ Chap. iii. 6, 7.

PART III.

CHAP. II.

We have another, very ancient and very remarkable, testimony to the same point of traditionary evidence, in the book of Job; where we read—"Hast thou marked the *old way which wicked men have trod, who were cut down before their time, whose foundation was destroyed by a flood of waters*¹?" Vatablus here comments: "hoc est; visne tueri opinionem illam antiquorum qui perierunt tempore *Diluvii*?—wilt thou follow the opinion of that ancient race, which perished in the *time of the Deluge*?" The Greek interpreters, in varying the import, tend to increase its force; for they render it, "their foundations (*are become*) an overflowing flood" ποταμος επιρρων οι θεμελιοι αυτων. To the same point is the rendering of the old Latin version: "fluminis decurrentis fundamenta eorum." The original of this notable passage, נהר יצק יסודם, Michaelis interprets, "*fluvius eluit fundamenta ipsorum—a flood obliterated their foundations*;" and he subjoins this observation: "The thread of the discourse, appears to demand this interpretation; which indeed the Vulgate has anticipated, by rendering the passage, '*fluvius subvertit fundamentum eorum—a flood overturned their foundation*.'" This authority is not to be slighted; since Jerom, when he translated

overflowing
in E.V.
& Hebrew.

¹ Chap. xxii. 16.

“ the book of Job, followed the guidance of PART III.
 “ his Rabbin of Lydda ; who, as he affirms in
 “ his preface, was accounted the first among CHAP. II.
 “ the Hebrew scholars¹.”

The word נהר, which is here rendered *fluvius—flood*, denotes, not only great rivers, as the Tigris and Euphrates, but likewise the *collective mass or flood of the sea*. So it is used in the Psalms: “ The earth is the Lord’s: He
 “ hath founded it upon the *seas*, He hath
 “ established it upon the *floods*—נהרות.” So also in the prayer of Jonah: “ Thou hast cast me
 “ into the *deep*, into the heart of the *seas*; and
 “ the *floods*—נהרם—compassed me about.” The word יסד, denotes the lowest base of support necessary to sustentation: we thus read, “ the
 “ *foundations* of the earth, כּוּסְדֵי, do shake, the
 “ earth is utterly broken down.” With regard to the sense of the verb יצק, Michaelis defers altogether to Jerom’s learned Rabbin; who has expounded it to signify, *subvertit—overthrew, destroyed*. The author of the book of Job, therefore, affirms; *that the waters of the FLOOD destroyed, not only the wicked race themselves, but also the FOUNDATION of the dwelling on which they had existed*. And such also in the proper interpretation of that other passage of St. Peter, κατακλυσμον ΚΟΣΜΩ, ασεβων επαξας—“ bringing a

¹ *Suppl. ad Lex. Heb.* No. 1036.

PART III. “deluge upon *the world* of the wicked¹ ;” as his declaration, before recited, fully confirms.

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CHAP. II.



The same ancient author adverts pointedly, in another place, to the *two* vast operations; by which, God first *made dry the earth*, and afterwards *submerged it*. Speaking of the irresistible power and wisdom of the Almighty, he appeals to *facts*: “Behold, He “withholdeth the waters, and *they dry up*; also, “He sendeth them forth, and they *destroy the earth*”²:” or, as the Greek renders it: If “He restrain the water, it maketh *the earth dry*; if He impel it, it *returneth and destroyeth it*.” This passage cannot be *critically* explained, otherwise than by reference to those *two great historical facts*. It is against all just criticism, to *generalize* from *one particular*; and there is only *one* instance upon record, of God having *made the earth dry*, by withdrawing the waters, and having *destroyed it*, by bringing them back. And, since the same author, as we have just seen, has cited the latter event in another place, the passage before us ought to be received with allusion to the same.

From not having looked thoroughly into

¹ 2 Peter, ii. 5. The apostle, in both these places, employs *κοσμος*—the *world*, in the same sense as Philo, to signify the *earth*, in its state of complete *order and adornment*; according to its etymon.

² Job, xii. 15.

this subject, most modern commentators have revolted at the *primitive interpretation*; and, without inquiring into the cause of its adoption, have only endeavoured to *give* to the passage, a sense which should be clear of the import that perplexed and offended them; but, *sound criticism* does not consist in *giving* a sense, but in *receiving* a sense. “The moderns,” says the learned Drusius, “read, *à, è, de— from, or off from;*” but, I conceive, *incorrectly* “—*dubito an bene:*” and with good reason, for it is a *forced* interpretation; the particle מִ occurring only *once* in each of those significations in the book of Genesis, but about *fifty* times in its familiar sense of *cum, unà cum—with, together with*; in which sense it is employed above two hundred and fifty times in the Hebrew volume. The very learned annotator on Noldius, from not having apprized himself of the true state of the question, objects to the sense of *cum—with*, upon the ground of its not being applicable for expressing the destruction of the *mere productions* of the earth; for, says he—“*terra diluvio non fuit perdita quoad substantiam, sicut homo—the earth was not destroyed by the deluge with respect to its substance, as man was*”¹. But, in this remark

¹ Not. Tympii, p. 797, n. 599.

PART III. he only shows that he was unaware of the *fact*,
 —
 CHAP. II. which we have ascertained; that the ancient
 Jewish church understood the *reverse* of what
 he assumes; namely, that the *substance* not
 only of *man*, but also of the *earth*, perished in
 the deluge, as the same is expressly declared and
 confirmed by the apostolical authority of St.
 Peter. Drusius, from the same cause, reduces
 himself to the same perplexity: “ an ille *alius*
 “ mundus ab eo *qui nunc est*? Quoad *substantiam*
 “ unus et idem est, quoad *qualitatem* fortasse
 “ aliqua est diversitas.” But, the true import of
 the terms stands confirmed by every consistency
 of criticism; and can only be rejected upon a
 ground of inconsiderate and preconceived hy-
 pothesis. Not only did God, *before* the flood,
 pronounce, “ I will destroy them, *together with*
 the earth;” but, *after* the flood, He declared;
 “ *neither* shall ALL FLESH *be cut off* any more
 “ by the waters of a flood; *neither* shall there
 “ any more be a flood to *destroy* THE EARTH:”
 thus emphatically marking and distinguishing
 the *destruction of each*. And the last mysterious
 clause of that divine assurance is unfolded in
 the inspired declaration of St. Peter; “ the
 “ earth which *now is*, is reserved unto *fire*.”

Such being the consentient understanding
 of all those principal Hebrew authorities, it
 establishes the terms of the threat, to signify;

the destruction, not of man only, and of all the animals which co-existed with him, but likewise, of the very EARTH ITSELF which they had hitherto inhabited.

PART III.

CHAP. II.

Nor ought this interpretation to embarrass, or in any way to surprise us; for, let us remember that the *earth* had received the *curse of God*, from the moment of the first act of disobedience committed upon it; and, “*that which is CURSED of Him shall be CUT OFF.*” For it is to be noticed, that the *curse* was not pronounced upon *man*; but, upon *the earth*, on his account. And although its productions were immediately affected, yet the full consequence of the curse does not appear to have been limited to that immediate and actual affection. Even at the birth of Noah, that malediction seems to have carried forward the minds of the pious to *some crisis*, by which it was to be *terminated*. On that occasion, his father was led (no doubt by some inspired warning) to exclaim: “This child shall comfort *us* concerning our work and toil of our hands, *because of the earth, which the Lord hath cursed:*” so our common version; but the Alexandrian interpreters render it with a very observable difference, and with a closer conformity to the Hebrew: “This child shall relieve *us*, from our toil, and from the distress

PART III. “ of our hands, *and from THE EARTH which the*

CHAP. II.

“ *Lord hath cursed!*” In which word “ *us,*” we are not to understand *themselves, personally,* but their *race.* And, after the retreat of the waters of the deluge, God did not *revoke* the curse which He had formerly pronounced, because it had been fully executed in “ *cutting off the* “ *cursed thing;*” but He declared, that He would not *again* pronounce a curse, i. e. pronounce a *second curse,* upon the earth; that is, upon the *new earth,* which He had provided to succeed that which had been cursed, and cut off:—ου προσθησω επι καταρασθαι την γην.—“ *non* “ *addam maledicere rursus terram:*” which implies, that the curse was terminated by the deluge. Neither is there any mention in Scripture of a *general curse upon the earth,* except, 1. When it was originally pronounced to Adam; and finally commemorated at the birth of Noah. 2. When God, after the flood, declared that He would not curse the earth a *second time.* 3. When a warning is given in Malachi, not to provoke a curse upon the earth.

But, if that *first earth,* which had been produced on the third day of the creation *by the removal of the waters* that covered it, perished indeed, according to the menace of God; what was that *second earth,* upon which the Ark was

brought to its rest by His favour and providence, and which has continued to be the abode of the generations of mankind, from the time of Noah to the present day? From *whence* did it acquire its *origin*?

And can we find any difficulty in resolving this question to ourselves, who have the record open before us, and who have seen *how* that *first* habitable earth was brought to light? We cannot fail to perceive, that a *repetition* of the *same* process, a *renewal* of the *same* divine operation, which produced the *former* earth, was alone requisite to bring to light *another* earth to replace it, now that the counsels of its Creator had determined to remove it. We have already seen, that a violent disruption and subsidence of the solid surface of *one* *portion* of the subaqueous globe, produced at first a *bed*, or *basin*, to receive the diffusive waters; and that those waters, drawn into that bed from off the *other* *portion* of the same globe, left it *exposed*, and fitted for the reception of vegetation, and for the habitation of man. That *exposed* *portion* was now, in its turn, to sink and disappear. By a *similar* disruption and subsidence of its surface, which should depress it below the level of the first depressed part, or *basin* of the *sea*, the waters, flowing into a *still* *lower* *level*,

PART III.

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CHAP. II.

would leave their basin empty, exposed, and dry; and thus, by a *similar operation*, render it in its turn an habitable earth, applicable to all the same uses as the former, which had been obtained by a similar drainage of the waters. We are enjoined by sound philosophy, to refer similar effects to similar causes; and the effects which we are considering, being in both cases similar, we are to refer them to similar causes. And, since the record contains nothing which opposes the application of this principle to the case in question, we are authorized by reason to conclude; that the production of a *second earth*, was effected by means exactly corresponding to those, which had given origin to the *first earth*. The evidence which the mind is able to discern, of the *means* by which that *first earth* was produced, becomes evidence to the reason, that a *second earth* might be produced by *similar means*; and therefore, it directs us to look to those means for its production.

CHAPTER III.

THUS, then, from the terms of the divine menace, and from the concurring testimony of the ancient Jewish church, we are to conclude by critical induction, antecedently to all investigation of monuments or phænomena; that it was the determination of Almighty God, to destroy, *not only man and every living creature*, but likewise, THE EARTH ITSELF; that *earth*, upon which He had pronounced His *curse*. To give effect to that tremendous design of His counsels, the order of things which He had established was to undergo a temporary suspension and alteration; and His Almighty agency was to reassume an *immediate* operation, in the works of His terrestrial creation.

By a new exercise of His incomprehensible power, and by a new direction of the instruments and agencies which He had provided, He caused the irruption of violent inundations, sufficient to commence the work of destruction, and, at the same time, to raise and float the Ark, from the station on which it had been constructed; the direction

PART III.

CHAP. III.

PART III. of which fabric, was thenceforth taken under
 CHAP. III. the immediate care of His own divine provi-
 dence. Vast causes were put in action, and
 vast effects produced, which are expressed in
 the record by “*the fountains of the great*
 “*deep being broken up,*” and “*the windows of*
 “*heaven being opened;*” phrases, which plainly
 imply, the *inroad of the sea upon the land,* and
 the *descent of violent rains from the heavens.*

But, here it is asked; “*to what purpose a*
 “*rain of forty days, to overwhelm a continent,*
 “*that was to be immersed under a whole ocean¹?*”
 Doubtless, if the immersion of a continent
 under an ocean, as a *mere physical effect,*
 was the whole design of the revolution of
 the deluge, a rain of forty days was a very
 superfluous agent. But, since the *chief end*
 to be attained by the operation, was not a
physical, but a *moral end;* and since the
physical effect was wholly subservient to that
moral end; the rain of forty days was a neces-
 sary, and a most efficient agent. The con-
 demned race of mankind, was to *witness* the
 progress of the vast scheme of destruction
 which their wickedness had provoked. They
 were to be taught, *experimentally,* that their

¹ KIRWAN'S *Geol. Essays*, p. 63.

PART III.

CHAP. III.

place of habitation was passing away from them, and was no longer to remain a dwelling accommodated for the service of animal life; that it was at length to receive the consummation of the *curse*, pronounced at the disobedience of their first parent, and confirmed by their own incorrigible wickedness. They were to be terrified by the sight of the various instruments of vengeance, by which the power of God could execute His curse; and they were to *foretaste destruction* in every stage of its advance, until its actual and ultimate arrival. They were “*to call upon the mountains to cover them, and upon the hills to fall on them!*” Great, therefore, was the purpose, and equal must have been the effect, of the terrific prelude of a rain of forty days, and of all the accompaniments of horror which attended it; which are thus awfully represented by the learned Jew Philo, either by reasonable inference, or from national tradition. “The vast ocean (says this writer) being raised to an height which it had never before attained, rushed with a sudden inroad upon the islands and continents. The springs, rivers, and cataracts, confusedly mingling their streams, contributed to elevate the waters. *Neither was the air quiet; dense and continuous clouds covered the whole heavens; violent hurricanes,*

PART III. “ *thunders, and lightnings, were blended with*
 CHAP. III. “ *unintermitting torrents of rain; so that it*
 “ *seemed as if all parts of the universe*
 “ *were resolving themselves into the single*
 “ *element of water: until, the fluid mass*
 “ *having at length accumulated from the waters*
 “ *from above and from below, not only the*
 “ *lower lands, but even the summits of the*
 “ *highest mountains, were submerged, and dis-*
 “ *appeared. For, every part of the earth*
 “ *sunk beneath the water—*εδυ καθ’ ὕδατος—*and*
 “ *the entire and perfect system of the world*
 “ *—ὁ κόσμος ὁ πάντελης καὶ ὁλοκληρος— became*
 “ *(what it is not lawful either to speak or*
 “ *to think) mutilated, and deformed by a vast*
 “ *amputation!*” — *ακρωτηριασθέντα μεγαλῶ τμηματι*
λελωβησθαι¹.

But, (it has been asked,) what was the *immediate cause* which first put these powerful agents in motion? “ If we would discover the *cause* of
 “ this catastrophe, (says the mineral geology,)
 “ we must look for a *cause foreign to our globe,*
 “ *foreign to the whole solar system, capable of*
 “ *inundating continents, and giving to the waters*
 “ *of the deep unexampled impetuosity.*” This is most truly observed; but, wherefore does it

¹ PHILO de Abrahamo, p. 7.

subjoin—"this is a point on which I forbear to give any opinion¹." Is it upon the same principle on which De Luc would abstain from introducing the mention of *creation* in a treatise of *physics*²? The opinion which Newton would have given, without an instant's hesitation, respecting *such a cause as is here described*, is fully evidenced by the general tenour of his arguments in his *Letters to Bentley*. Since he ascribed the *natural tendency of the sea towards the equator*, to the laws of planetary motion; and since he ascribed the *first impulse* of that planetary motion, to the "*Divine Power*—the "*Divine Arm*," *immediately*³; he would have deemed it unphilosophical, and irrational, to ascribe the *first impulse* determining that *preternatural action of the waters*, to any other cause, than the same "*Divine Power*"—the same "*Divine Arm*." And since we see no reason whatever for supposing, that a similar catastrophe will ever occur by the operation of any known laws of nature; and since we are assured, by the Author of those laws, that it never will occur again; Newton would not have wasted a moment in searching for

PART III.
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 CHAP. III.
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<sup>1</sup> GREENOUGH'S *Geology*, p. 196, 8.

<sup>2</sup> See above, p. 53.     <sup>3</sup> *Letters to BENTLEY*, 1, 2, and 4.

PART III. the cause by which it was produced; but would  
 CHAP. III. have concluded: "certainly, that which can  
 " never be *hereafter* without a supernatural  
 " power, could never be *before* without a  
 " supernatural power<sup>1</sup>."

An eminent French mathematician, however, deprives himself of this consolation, by choosing to *doubt* of "the nature of the *stability of equilibrium in the sea*;" and propounds, "that there is *reason to fear*, that some *extraordinary cause* may communicate to the sea a concussion, which, though inconsiderable at first, may increase more and more, and raise it above the highest mountains; *which* (he observes) *would explain many phænomena of natural history*<sup>2</sup>." Until, however, he shows *reason for doubting* the stability of equilibrium, we certainly have *no reason to fear* that calamity; and Moses and Newton concur to relieve us from all doubt. Neither need we wait for that event, to enable us to explain the *phænomena of natural history* to which he so plainly alludes; for we have already ascertained the *extraordinary cause* which alone could effect such a revolution of the sea, and also, the nature of the revolution which was actually effected by that cause; and, therefore,

<sup>1</sup> *Fourth Letter to BENTLEY.*

<sup>2</sup> LA PLACE, *Système du Monde*, c. ii. p. 265.

we are already possessed of the means for explaining the phænomena which were occasioned by that revolution.

PART III.  
CHAP. III.

By the continued action of the powerful agents thus employed by God, His awful purpose was at length fully effected; namely, the destruction of “*every living thing—of all flesh, clean and unclean,*”—excepting only those few individuals which were destined to keep seed alive upon the face of all the earth—“*together with THE EARTH ITSELF,*” on which they had subsisted. Meanwhile, the ark and its inhabitants, guided throughout all this period of devastation by the particular providence of God, obtained at length a lodgment upon a solid base; which, after the waters had entirely subsided, and were a *second* time “*gathered together into ONE PLACE,*” proved to be the summit of a mountain on the new earth, which was afterwards denominated *Ararat*, in the region of *ARMENIA*.

The time allotted for the completion of this amazing revolution, was *twelve months*; during which period, as Josephus speaks, “*God changed the continent into sea*”—*εις θαλασσαν την ηπειρον μετεβαλε*. But, that the transfer of the waters from the old into a new bed, was not *immediate* or *instantaneous*; on the contrary, that it was

PART III. conducted with much *gradation* and *calculable*  
 CHAP. III. *succession*; is evident, both from the time employed in the process, and from the description of the record. And here we must observe; that the historian, having notified, in the divine threat, the *fact* of the *destruction of the earth*, proceeds, as in his narration of the *Creation*, to describe the progress of the catastrophe *practically* and *optically*, as the events would appear to the eye of the spectator; and it is for us to refer those events to their causes, by principles of reason exercised upon their appearances, as in the former case; and to deduce from them such conclusions, as that optical description is justly qualified to yield.

The record points out *the period*, when the waters, having diffused themselves a *second time* over the globular surface by the subsidence of the former continents, began to abandon their *ancient bed*; from which they continued to descend, until they left it,  $\xi\eta\rho\alpha$ , a *dry-land*, as the former earth had been rendered,  $\xi\eta\rho\alpha$ , a *dry-land*, by the retirement of the waters. That period, was at the end of *one hundred and fifty days*, or *five months*, from the commencement of the flood. As long as there remained any of the ancient lands to repel the action of the sea, its superficial



agitations and reflux continued; but when the last land disappeared, those effects ceased also. The waters then became “assuaged”—*εκοπασε το υδωρ*; and, as its *new bed* deepened more and more, its *transfusion* became more and more apparent. At the moment when this latter operation was about to commence, the divine Providence *grounded the ark*, which would otherwise have been carried forward by the general deflux; whereas, by being arrested on the mountains, the waters retired from beneath it, leaving it to possess the surface of the earth first exposed and rendered dry.

But, though the waters then began their descent, yet even the tops of the mountains were not disengaged from them until after *seventy-three days*, or nearly *two months and a half more*; and they were not entirely drained off from the new earth, until after *sixty days*, or *two additional months*: so gradual was the transfer of their mass. Nevertheless, continually diminishing in depth in their *first bed*, and labouring for their final discharge, they were acting with enormous power upon the yielding materials of their basin, and producing excavations and accumulations, which must have generally altered its surface from the state in

PART III.

CHAP. III.

PART III. which it subsisted, during the long period of  
 their stationary occupancy.

CHAP. III.

Had the former continents sunk *all at once*, the immediate and violent influx of the great body of the ocean, to fill the *vacuum* thereby created, must have hurried the ark into its enormous vortex, and have caused it to be presently ingulfed; whereas, the record represents the ark, like an ordinary vessel, riding securely upon the surface of the ocean. “The ark *went upon* the face of the waters;” or, as the Alexandrian Jews render the passage—*επιφεροτο ἡ κιβωτος επανω του υδατος*—*was borne, or carried along upon the water*: so also the Chaldee paraphrase, “*ferebatur arca super faciem aquarum*;” which would not have been the case, had not the operation been conducted by a rule that should leave underanged the established nature of the sea. The transfer of the waters was therefore gradual and progressive, like that of the waters of a *lock*, in which a vessel descends imperceptibly from a higher to a lower level; which implies, gradual and successive subsidences of the former earth, admitting of proportionate advances of the water. So that the inhabitant of the ark was insensible of the operation; and when, after the entire loss of land, he found it again at the depth

of *fifteen cubits*, it seemed as the inundated heights of the land which he had left, and which had been only temporarily submerged by the flood. Mineral geologists, who acknowledge that the sea once covered our present continents, dispute whether its retreat was *sudden* or *gradual*. Sudden, and gradual, are relative terms; and that which is sudden by one comparison, may be gradual by another. A retreat of the entire ocean, effected in the space of *twelve months*, will be a *sudden* operation, compared with that imperceptible mutation of its bed, proceeding through an unassignable number of *ages*, which has been engendered in the imagination of some physical geologists; but it will be *gradual*, compared with that immediate and instantaneous operation, by which the diffusive waters were reduced within the bed of the *primitive sea*, within the *third day* of the Creation.

Thus, then, we discern two principal stages of this vast revolution: 1. That of the gradual subsidence of the primitive land, until the surface of the primitive sea, again diffused over it, was lowered to the level of fifteen cubits above its highest internal eminences. 2. That of the further subsidences of that primitive land, until all the remaining waters were entirely drawn out from their *first bed*, into the *deeper bed* formed

PART III.

CHAP. III.

PART III. by those subsidences. And thus, the DRY  
 CHAP. III. LAND, provided by the counsels of God, in  
 this revolution, to receive the *new generations* of  
 mankind, was no longer the *same*, on which the  
*former generations* had subsisted during a course  
 of 1656 years.

This true interpretation of the *threat pro-  
 nounced by God*, was perceived by Catcott, in  
 his treatise *on the Deluge*; but it availed him  
 little, since it was presently smothered in a  
 wilderness of ingenious but untenable hypo-  
 theses. King<sup>1</sup>, and Hollmann<sup>2</sup>, severally con-  
 jectured the *result of the threat*, namely, the *submer-  
 sion of a former earth*, and the *evacuation of the  
 primitive sea-bed*, as *physical inductions from phæ-  
 nomena*; but, without reference to the *history*.  
 De Luc, both recognized those *physical results*,  
 and duly connected them with the *terms of the  
 threat*; but, as he subjected the history to the  
 rule of his own opinion, instead of endeavouring  
 to form his opinion by the rule of the history,  
 he necessarily deviated from the guidance of  
 the history in many particulars, and was con-  
 sequently led astray, by his conjectures, into  
 many contradictions to it.

Thus, he denied the *universality* of the

<sup>1</sup> *Phil. Trans.* vol. lviii. p. 44.

<sup>2</sup> ROZIER, *Obs. sur la Phys.* tom. ii. p. 118.

deluge; of which, Mr. Greenough justly remarks, that “ a general view of the structure of our globe, if taken with accuracy, would tend to convince us of the *universal operation* of the deluge<sup>1</sup>:”—“ that the universal occurrence of mountains and valleys, and the symmetry which pervades their several branches and inosculations, are further proofs, not only that *a deluge* has swept over every part of the globe, but probably *the same deluge*.” To maintain his own hypothesis, De Luc indulged himself in many salvos, evasions, and ingenuities. Thus, he affirmed, that the summits of the higher mountains, and of Ararat itself, were islands in the primitive sea, which continued to be fertile during all the period of devastation; in direct contradiction to the declaration of the record, which expressly relates, that the summits of the *highest mountains* were fifteen cubits *below the aqueous surface*: making the history bend, in every particular, to a rule drawn from his own preconceived opinions. Nevertheless, the general discernment and assertion of the great fact of *the Deluge* was the bright point in his geology. So long as his view was confined to the contempla-

<sup>1</sup> P. 153.<sup>2</sup> P. 155.

PART III. tion and exposition of that fact, his mind was  
 CHAP. III. collected and concentrated<sup>1</sup>. When he quitted  
 it, to put himself in search of *the mode* by  
 which *secondary causes* produced *first formations*,  
 it became perplexed and bewildered<sup>2</sup>. So long  
 as he confined himself to the defence of that  
 strong post, he evinced great skill, conduct, and  
 resolution; but, when he once began to *parley*  
*with the enemy*, and suffered them to draw  
 him *out of his fort*, he fell into their hands, and  
 became convertible to their uses. They were  
 able to neutralize all his objections to *their chro-*  
*nology*; by objecting to him *his own*, and  
 showing him, that if he would not concede to  
 them an *anti-Mosaical chronology* in the article  
 of the *deluge*, he conceded it most liberally in  
 the article of the *creation*; which would equally  
 serve their purpose. Thus much it has been  
 indispensably necessary to expose as a caution-  
 ary distinction, and to insist upon, relative to  
 this well-intentioned but dangerous instructor;  
 lest his success in the *one argument*, should  
 become a snare to draw his readers into his  
 own failure in *the other*.

Many naturalists seem to have granted the  
 Mosaical statement of the *deluge*, as by a sort of  
 compromise; that they might be free to contro-

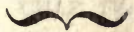
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<sup>1</sup> *Lettres sur l'Hist. de la Terre.*    <sup>2</sup> *Lettres Géologiques.*

vert, or, at least, to twist and bend to their own fancies, the Mosaical statement of the *creation*. They appear to have thought, that the concession of the *former* was a full discharge from the necessity of submitting their judgments to the authority of the *latter*; and that nothing but theological bigotry and intolerance, could impose such a restraint upon their speculations. But, sound *philosophy*, *learning*, and *criticism*, unite to restrict the naturalist, equally in his speculations on the *creation* as on the *deluge*; and to demand the assent of his reason, in *both*, to the precise statements of the Mosaical record.

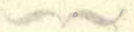
PART III.

CHAP. III.



PART III.

CHAP. III.



## CHAPTER IV.

PART III. BUT, if this was truly the case; if the earth  
 CHAP. IV. which we *now* inhabit, is not that *same* “dry  
 “land” which was *first* brought out of the  
 waters, after their incumbency for only *two*  
*days*; but, *another*, and a *different earth*, brought  
 out of the waters after *their* incumbency for  
 1656 years; which new earth, during all that  
 long period, constituted the SEA-BED formed by  
 that universal process of *disruption* and *depression*  
 which we traced and contemplated in the  
 events of the *third* day of creation; if this was  
*truly* the case, we shall reasonably look, and it  
 will be our bounden duty diligently and industriously  
 to search for, evidences testifying to so  
 amazing a fact. And, in such research, we  
 shall naturally,

First, take a general view around us of the  
 earth, as it lies exposed to our common obser-  
 vation and experience; and we shall inquire;  
*Whether it bears, universally, any appearance of*  
*having been, at any period, subjected, for so long an*  
*interval of time as more than a millenary and a*  
*half of ages, to the presence and perpetual occu-*



pancy of the SEA ; and therefore, of having been, PART III.  
 during all that time, the dwelling of the marine CHAP. IV.  
 portion of the creation? And, if it should bear  
 such appearance, we shall then further inquire ;  
 Whether it offers any evidence, that the removal of  
 those waters was effected no longer ago, than the  
 period assigned by the record for its removal? We  
 shall reasonably insist upon these testimonies ;  
 which must necessarily exist, if the fact averred  
 in the record be really and historically true.

We commit this research altogether to the  
 mineral geology ; and are content to abide by its  
 decision. And, in truth, it thus reports : “ It  
 “ is unnecessary to stop to prove that our con-  
 “ tinent has formed the bed of the sea ; there is  
 “ no longer any division of opinion among  
 “ naturalists upon this point<sup>1</sup>.” — “ In fact,  
 “ philosophers are only agreed in this one point,  
 “ that the sea has changed its bed<sup>2</sup>.” — “ In ex-  
 “ amining the mineral masses of the earth,  
 “ every thing concurs to indicate, that this our  
 “ habitation has undergone great changes and  
 “ great revolutions ; the sea-shells, incrustated in  
 “ the masses of mountains, present irrefutable  
 “ testimony to our eyes, that the sea anciently  
 “ subsisted upon our present continents ; and,

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<sup>1</sup> DE LUC, *Lett. Géol.* p. 301.

<sup>2</sup> CUVIER, *Th. of the Earth*, § 23. p. 70.

PART III. “ *that animals inhabited those shells before the*  
 — “ *mineral masses, in which they are imbedded,*  
 CHAP. IV. “ *were formed: it will be manifest to our eyes,*  
 “ *that those masses could not always have been*  
 “ *solid*<sup>1</sup>.—Every thing also concurs to indicate,  
 “ *that the plains of the earth, such as those of*  
 “ *Alsace, Holland, Lombardy, &c. were not*  
 “ *deposited by the present rivers, but in the*  
 “ *bosom, or bed, of a tranquil water; that*  
 “ *the actual order of the earth dates only from*  
 “ *the retreat of that water; and, that the date is*  
 “ **NOT VERY ANCIENT**<sup>2</sup>.”

“ The lowest and most level parts of the  
 “ earth, when penetrated to a very great  
 “ depth, exhibit nothing but horizontal strata,  
 “ composed of various substances, and con-  
 “ taining, almost all of them, *innumerable ma-*  
 “ *rine productions.* Similar strata, with the  
 “ same kind of productions, compose *the hills,*  
 “ *even to a great height.* Sometimes the shells  
 “ are so numerous as to constitute the entire  
 “ body of the stratum. They are almost  
 “ every where in such a state of preservation,  
 “ that even the smallest of them retain their  
 “ most delicate parts, their sharpest edges,  
 “ and their finest and tenderest processes.

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<sup>1</sup> D'AUBUISSON, tom. i. p. 8.

<sup>2</sup> *Ib.* p. 252.

PART III.

CHAP. IV.

“ They are found in elevations *far above the*  
 “ *level of every part of the ocean, and in places*  
 “ *to which the sea could not be conveyed by*  
 “ *any existing cause. They are not only en-*  
 “ *closed in loose sand, but often incrustated and*  
 “ *penetrated on all sides by the hardest stones.*  
 “ *Every part of the earth, every hemisphere,*  
 “ *every continent, every island of any size,*  
 “ *exhibits the same phenomena.*—They have,  
 “ *therefore, once lived in the sea, and have been*  
 “ *deposited by it; the sea, consequently, must have*  
 “ *rested in the places where the deposit has taken*  
 “ *place.*—We are, therefore, forcibly led to  
 “ *believe, not only that the sea has at one period*  
 “ *covered all our plains, but that it must have re-*  
 “ *mained there for a long time, and in a state of*  
 “ *tranquillity; which circumstance was neces-*  
 “ *sary for the formation of deposits so exten-*  
 “ *sive, so thick, in part so solid, and containing*  
 “ *exuvie so perfectly preserved.*—Hence, it is  
 “ *evident, that the basin, or reservoir containing*  
 “ *the sea, has undergone some change, at least,*  
 “ *either in extent, or in situation, or in both.*  
 “ *Such is the result of the very first search, and*  
 “ *of the most superficial examination<sup>1</sup>”*

Thus the mineral geology reports, in an-

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<sup>1</sup> CUVIER, *Theory of the Earth*, § 4. p. 31, 32.

PART III. swer to our *first* questions, respecting the *fact*,  
 CHAP. IV. of the sea having at some period occupied the  
 present continents, and the *time* of its departure  
 from them; and we find, that, although it has  
 prosecuted the inquiry with considerable in-  
 dustry and caution, and with no little jealousy  
 of the Mosaic record, it is nevertheless con-  
 strained, by the evidence of *phænomena*, to  
 testify in confirmation of the conclusions which  
 we deduced from the statements of that record,  
 in these particulars.

We shall, therefore, be anxious to inquire,  
 in the next place; *Whether we can find monuments*  
*equally evident of the great PRIMÆVAL CONVUL-*  
*SION, which, according to our induction from the*  
*record, must have attended the formation of the bed*  
*or basin of the departed sea, now converted into this*  
*habitable earth; in which convulsion, that bed or*  
*basin was violently deepened to receive the congre-*  
*gated waters, by means of a vast disruption and*  
*depression of the solid frame-work, and softer*  
*materials, of a part of the subaqueous globe? If*  
 that bed was *really* formed by a process so  
 extensively *destructive*, and if we actually oc-  
 cupy that bed, we must, in all necessity, find  
 abundant monuments of that *destruction*.

In this inquiry, the *mineral* geology, indeed,  
 anticipates our question; by exclaiming: “ Are  
 “ not all those *pointed pyramids*, which detach

PART III.

—  
CHAP. IV.

“ themselves, as it were, from the bodies of the  
 “ mountains, and shoot up into the air; all  
 “ those *bare needles*, which rise like pinnacles  
 “ from the Alps; *eloquent witnesses of the destruc-*  
 “ *tion of the soils which once encompassed them,*  
 “ *and of which they formed a part?*—All the pro-  
 “ *jecting points of rocks, which jut out of moun-*  
 “ *tainous masses, are of a similar character; and*  
 “ *further prove the destruction of the surrounding*  
 “ *soils.*”—“ However strong a partisan I am of  
 “ *crystallization*, (exclaimed Saussure,) it seems  
 “ to me impossible to believe, that *such obelisks*  
 “ *were originally so formed by the hand of nature:*  
 “ *all the substance which they now want, has been*  
 “ *broken off and swept away; for we can discern*  
 “ *nothing around them but other summits, whose*  
 “ *bases are equally rooted in the soil; and whose*  
 “ *sides, equally fractured, indicate immense ruins.*”  
 “ —The numerous blocks of rock which are  
 “ frequently found in certain soils, especially  
 “ those of granite; and which are shown,  
 “ by every indication, to be lying near the  
 “ places where they were first broken; *is a*  
 “ *manifest effect, and therefore proof, of the*  
 “ *depression of the soil.*—The consideration of  
 “ *insulated mountains*, often offers to the geolo-  
 “ gist many subjects for meditation upon *the*  
 “ *revolutions which our globe has undergone, and*

PART III. “ upon the very considerable depression of its  
 CHAP. IV. “ soils<sup>1</sup>.”

“ Some geologists have thought, that the  
 “ intermediate, or transition class of soils, might  
 “ be suppressed; but I am very far from  
 “ agreeing with them: the idea of Werner, in  
 “ establishing it, was very happy; for, it leaves  
 “ in all their purity, if I may so speak, the two  
 “ other classes, of *crystalline* and *sedimentary*  
 “ formations. It relates to an *epocha*, when the  
 “ mixture of those two kinds of formations began  
 “ to be produced; and when a *revolution* took  
 “ place in nature, which, from the numerous  
 “ indications that we witness, is, perhaps, the  
 “ most violent of all those which occurred during  
 “ the formation of the mineral shell of the  
 “ globe<sup>2</sup>.”

Thus far, then, the mineral geology concurs to substantiate proofs also of that *primæval convulsion*, that first “ most violent revolution,” which we have deduced from the record.

But, what agencies are there, which, by the *laws of nature*, i. e. the *laws of the creation*, have principal power to produce the effect of *ruin*, in the substance of the earth? The most powerful

<sup>1</sup> D'AUBUISSON, t. i. p. 230.

<sup>2</sup> *Ib.* 199.

are, unquestionably, *volcano* and *earthquake*. PART III.  
 Let us then consider the nature and operation of these two agents. CHAP. IV.

“ Earthquakes,” says the mineral geology,  
 “ are most frequent in the midst, or in the  
 “ neighbourhood of, *volcanos*; so that there is  
 “ *an intimate connexion between them, showing*  
 “ *them to be, in all probability, effects of the*  
 “ *same cause; namely, subterraneous fiery agents.*  
 “ The most common and best attested effects  
 “ of earthquakes, are *cracks* or *crevices* wrought  
 “ in the mineral strata, when they experience  
 “ a *great concussion*.—When the concussions  
 “ are sufficiently violent to fracture the vaults  
 “ beneath, either primordial, or formed by the  
 “ conjunctions of the lavas, or to burst the  
 “ pillars by which they are sustained, those  
 “ mountains and soils fall back into the gulf  
 “ from which they had arisen. It was thus,  
 “ that, in the earthquake at Jamaica, in 1692,  
 “ the highest mountain of the island was  
 “ swallowed up, and was replaced by a lake:  
 “ that, in Iceland, a mountain of a considerable  
 “ height was buried in one night by an earth-  
 “ quake, and its place occupied by a very  
 “ deep lake: that, upon the 11th of August,  
 “ 1772, the largest volcano of Java, the circuit  
 “ of whose base was upwards of twenty miles,  
 “ suddenly sunk, after a short and violent

PART III. “ eruption, carrying down with it forty vil-  
 — “ lages, and two thousand inhabitants: that,  
 CHAP. IV. “ in 1638, the volcano of *the Peak*, in the  
 { “ Molucca islands, which was visible at sea at  
 “ a distance of thirty miles, and which com-  
 “ monly served as a beacon or light-house,  
 “ totally disappeared in the middle of a violent  
 “ eruption; and its place is filled by a lake at  
 “ the present day. We are indebted to M. de  
 “ Humboldt for the knowledge of many facts  
 “ of the same nature: we have seen the *Car-*  
 “ *guairazo*, in 1698, crumble away, and over-  
 “ whelm the neighbouring districts with its  
 “ mud. And ancient tradition relates, that  
 “ the volcano of the *Altar de los Collanes*, in  
 “ Peru, the height of which, it is said, sur-  
 “ passed that of the Chimborazo, sunk down  
 “ after eight years of continual eruption; and  
 “ its inclining eminences only exhibit, at the  
 “ present day, traces of its destruction. In  
 “ the soils occupied by *extinct volcanos*, we  
 “ still perceive indications of sinkings or de-  
 “ pressions, particularly lakes, which are pre-  
 “ sumed to be the ancient sites of craters or  
 “ volcanic mountains: such are those of Laach,  
 “ near the abbey of the same name, a few  
 “ leagues from Andernach; such also is the  
 “ little lake, perfectly circular, of Paven in  
 “ Auvergne. And besides volcanic soils, we



“ meet with many sorts of mountains, espe- PART III.  
 “ cially those which are of a calcareous CHAP. IV.  
 “ or gypseous nature, which contain great  
 “ caverns and cavities; and it is very natural  
 “ to think, *that the concussions of earthquakes,*  
 “ *when they are violent, may occasion the rupture*  
 “ *and downfall of the masses which are above*  
 “ *them.*”

But what is the *immediate cause* which gives action to these powerful agencies? “ We have  
 “ seen that the volcanos which are in *activity,*  
 “ are situated in islands, or on coasts *not far*  
 “ *from the sea.* Those which we find in the  
 “ *interior countries* of the earth, are *all extinct.*  
 “ These observations naturally lead us to con-  
 “ clude; *that the vicinity of the sea is a con-*  
 “ *dition essential to the existence of volcanos:*  
 “ they further lead us to think, *that the water*  
 “ *of the sea, penetrating into the volcanic cavities,*  
 “ *is a cause of eruptions.* — But how should  
 “ water penetrate into volcanic cavities? If  
 “ it penetrates in *great quantity,* (and it would  
 “ seem that it cannot be otherwise of *the sea-*  
 “ *water,*) would it not rather tend to *extinguish*  
 “ the volcanic fire, than to *increase its action?*  
 “ This certainly is a question, the solution of  
 “ which is difficult; but, though it may be  
 “ much complicated, its solution is not im-  
 “ practicable. I shall not enter into any details

PART III. “ upon this subject; but I shall confine myself  
 —  
 CHAP. IV. “ to the statement of the *known fact*, that the  
 “ *presence of water, and in great quantity, is*  
 “ *incontestable in volcanic phenomena.* We know  
 “ the astonishing power of this fluid, when  
 “ *reduced to vapour*; but, our steam-engines can  
 “ hardly convey to us an idea of *the power*  
 “ *which it is capable of acquiring in caverns*  
 “ *whose sides are several thousand yards in*  
 “ *thickness, and which sustain the mountains of*  
 “ *Ætna and Chimborazo: heat may extend its*  
 “ *elasticity to a point of which it is difficult to*  
 “ *form any idea.* Nor is water reduced to  
 “ vapour the only elastic fluid which exercises  
 “ a power in volcanic *foci*<sup>1</sup>.”

And what evidence do we discover, of the  
*ancient action* of volcanic power? “ In con-  
 “ sidering the different volcanic soils, with  
 “ relation to their different *epochas*, we dis-  
 “ tinguish, among the productions of *extinct*  
 “ *volcanos*, some which, speaking by *geological*  
 “ *comparison*, are of a *recent epocha*; since they  
 “ are of a *date posterior to the excavation of*  
 “ *valleys.* But we discover others of a much  
 “ more ancient *epocha*, since they are *anterior*  
 “ *to the formation of valleys*; these are lodged

<sup>1</sup> D'AUBUISSON, tom. i. p. 213—5.

“ upon the *summits*, while the former rest  
 “ upon the *low ground*<sup>1</sup>.”—Those of the *most*  
 “ *ancient epocha*, are almost entirely composed  
 “ of *basalt*<sup>2</sup>. This substance was emitted from  
 “ the earth in the form of streams of matter in  
 “ a state of fusion, which ran and spread them-  
 “ selves upon a soil already existing. These  
 “ flowing masses, sometimes of several leagues  
 “ in length, and of more than a league in  
 “ breadth, often assumed the form of layers,  
 “ or beds, one above the other. The basaltic  
 “ matter, in cooling, experienced condensation  
 “ or contraction; it separated; and the crevices  
 “ being perpendicular to its surface, as must  
 “ have been the case, divided it into prisms  
 “ more or less regular. The most celebrated  
 “ assemblage of the columnar prisms of basalt,  
 “ is that which is seen on the north coast of  
 “ Ireland, and which is known by the name of the  
 “ *Giant’s Causeway*.—The volcanic soil which  
 “ forms the north of Ireland, constitutes also  
 “ the soil of the Hebrides; in one of which  
 “ islands, that of *Staffa*, is the celebrated *grotto*  
 “ of *Fingal*, the finest basaltic monument  
 “ known, according to M. Faujas de St.  
 “ Font<sup>3</sup>.”

PART III.

CHAP. IV.

Powerful, however, as these tremendous

<sup>1</sup> D’AUBUISSON, tom. ii. p. 516.

<sup>2</sup> *Ib.* p. 553.

<sup>3</sup> *Ib.* p. 570, 1.

PART III.  
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 CHAP. IV.  
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agents are, some eminent geologists¹ have undertaken to pronounce them unequal to the production of effects so vast as those which we are investigating. But then they have drawn their conclusion from the limited effects of the *conical volcanos*, now operative upon the globe. It is one thing, to compute the power of *a volcano*, and another thing, to compute the power of *volcanic action*; to compute the *actual* effects of an *individual volcano*, whose focus is limited to one point, and which from that point has effected perpendicularly a channel of discharge; and to compute the *possible* effects of *volcanic power*, rendered *general* within the globe, and acting simultaneously against its solid crusts, without any regular vent to determine its issue. No sound inference can be drawn from the former, to limit the power of the latter; on the contrary, the former furnishes a *datum*, by which we are enabled to form a judgment of the multiplied power of the latter. The former, exhibits a *particular application* of the latter; but the latter, in its *principle*, is the proper subject of our inquiry. We may securely pronounce, that the *power*, or *principle of action*, which we contemplate in an eruption of *Ætna* or *Vesuvius*, is

¹ CUVIER, §. 17. p. 53. D'AUBUISSON, i. p. 254—267.

PART III.

CHAP. IV.

physically capable of being extended as much beyond the effects which we witness in that eruption, as the principle of action which blasts a rock, or blows up a fortress, is extended beyond the action which we witness in the spoutings of a *gerbe*, or a *Roman candle*. We cannot therefore, philosophically, limit the general question of volcanic action to the measure of the action exercised in the particular case proposed. And, of the insufficiency of the rule, we have *experimental* evidence; because, we are utterly unable to form an estimate, by the action of any existing volcano, of the amazing primæval operation which discharged the *Giants' Causeway* and the *Island of Staffa*. Those immense fusions of basalt, demonstrate a remote period of *volcanic effort* in the interior of the earth, totally different in circumstance from the ordinary phænomena of conical volcanos; and of which we have no experience whatever, except in those effects. And, if we superadd to the *indefinite extent of volcanic power*, the ordination and direction of its agency to a particular purpose, by its *Divine Author*; we shall at once perceive, that it was an instrument, calculated by its laws to operate to the *fullest* extent of the effects which we here ascribe to them.

The eminent naturalists, who raised this objection, carried their conclusions much too

PART III. far. Their first object, was to refute those
 CHAP. IV. speculators who would ascribe the *formation of mountains* to volcanic action. This they have effectually done, by demonstrating the extent of volcanic power in *mineral formations*. But, they wished to make their argument *doubly sure*; and extended it, beyond the virtue of its premises, to limit the possible extent of that power in *mineral ruin*; in this however they have totally failed.

We collect, therefore, from all that has been said, the following general facts :

1. That the face of this earth exhibits vast monuments of *derangement* and *ruin* of its general *frame-work*; the parts of which, at first *united*, have, by some cause, been violently severed, fractured, and scattered; and the surrounding and subjacent soils ruptured and depressed :
2. That the most powerful known agent of mineral ruin, is *volcanic action* :
3. That volcanic action is produced by the *admission of the sea water* to the *subterraneous fires* constituted in the interior of the globe :
4. That evidences of volcanic action previous to the *formation of valleys*, that is, previous to the *depressions of the terrestrial surface*, still appear :
5. That *earthquake* is intimately connected with *volcano*, showing them to be in all probability *effects of the same cause* :
6. That the concussions of earthquakes

may occasion the *rupture*, and *downfal* of the superior masses into *cavities* beneath them : 7. That the effect to be produced, was the rupture and downfal of a vast portion of the surface of the solid globe ; sufficient to produce, for the universal waters, that space in *depth*, which they were to lose in *length* and *breadth* by being collected into *one place* : 8. That this was the *end* designed, and directed, by the *same Power* who established the laws of volcanic action.

If we now combine all these several particulars, we shall perceive ; that, since the *admission of water within the earth*, at the commencement of a concussion tending to depress generally a considerable portion of its surface, must have given violent and proportionably extensive action to volcanic energy, as a powerful accessory, if not as a principal agency ; since the vicinity of the sea appears to be a condition essential to the action of volcano, and since the sea, previous to the depression of that surface, was in *equal vicinity*, nay, in *immediate contact* with *every point* of it, so that the admission of the water, at one and the same moment, beneath a considerable extent of it, was able, by the new laws of volcanic action directed by their Author, to cause, at one and the same moment, an equally extensive dis-

PART III.

CHAP. IV.

PART III. ruption and consequent depression of that
 CHAP. IV. surface; and since we see monuments of primitive *disruption* and *downfal* in all the *primordial mountains*, of *depression* and *subsidence* in all the *valleys*, of *displacement* and *disorder* in all the primitive strata, and of *volcanic action*, coeval with the *origin of all this ruin*; we may reasonably conclude, *that we behold in our continents the monuments of that great PRIMÆVAL CONVULSION, which formed the basin, or reservoir, of the primitive sea.*

The chains of the highest mountains, which resisted that convulsion, remain in the positions where their substance was *first formed*; and exhibit unperishing examples of their *first formation*. While the distribution and outspreading of the depressed parts, into *plains* and *valleys*; the trituration of the fractured rocks in every dimension, of stone, pebble, and *sand*, “ which, it is well known, is only “ an assemblage of *very minute grains*, resulting from the *destruction of ancient rocks*, “ chiefly of quartz, and sometimes constituting “ soils of immense extent, as the *great desert of Barbary*¹,” &c.; and the enormous quantities of marine organic matter, which are found below the surface of the plains, and in

¹ D'AUBUISSON, tom. ii. p. 465.

elevations far above the level of the present sea ; exhibit positive proofs, of THE SEA *having occupied for a long time this portion of the globe, which has been rendered the habitation of mankind, by the departure of that sea.*

PART III.

CHAP. IV.

Thus far, then, the general result of the researches of the mineral geology, seems to coincide exactly with the declarations of the record, respecting the primæval history of this earth ; and establishes, conformably to that record, two *great revolutions of its substance*, subsequent to its first perfect formation : the *FIRST, anterior to the production of animal or vegetable matter ; the SECOND, posterior to the production of both.* The *first* producing, by the violent action of mechanical agencies directed by the Supreme Will, *a bed to receive the waters* previously diffused over the whole sphere of the earth ; the *second* producing, under the same direction, and by a repetition of the same operation, *a new bed*, into which the waters were *transfused from their former bed.* It moreover establishes the fact, of the sea having occupied that former bed during the entire compass of time intervening between those *two revolutions* ; and finally, of *that former bed being now the earth on which we inhabit.* The *causes* employed in effecting the *first revolution*, those which were in action during the *succeeding interval*, and those which

PART III. operated in accomplishing the *second revolution*, comprehend all the causes of *general revolution* of which the earth exhibits any phænomena.

CHAP. IV.

We can thus proceed, with full confidence, by the guidance of *the record*. We know, and are sure, that no revolution general to the globe, has taken place *since the last of those two*; we know also, that no general revolution can have *preceded* that which *first* interrupted and altered the primitive continuity of the solid surface of the globe, to open a basin for the primitive sea; and we have *no reason* to imagine, that any *general revolution* occurred *between the two*. There have, therefore, been *two, and only two, general revolutions* in the substance and circumstances of this globe; so that *all effects* discoverable, or appearances discernible, which are truly attributable to *general revolution*, must find their physical causes in *one or other* of those, or in the period of time intervening between them; and they are amply competent to supply every requisition of reason and philosophy, in the inquiry after those causes. By this *historical guidance*, we are able to reduce them to their *true order in time*; and to determine their periods with security, and with sufficient accuracy.

CHAPTER V.

BUT, if the researches of the mineral geology have *really* produced monumental evidences of these great facts; and if it has so powerfully enforced the attestation of those evidences as to demonstrate the exact correspondence of the facts with the statements of the Mosaical geology; why are not the two geologies *one and the same*, at least in the *second* question, viz. : the *revolutions* which this earth has experienced? *in what do they differ?*

They differ in *this*: that whereas the *latter* geology alleges *two*, and *only two*, general revolutions of the globe, the *former* affirms, “*that the revolutions have been numerous*¹ ;” and, therefore, in explaining the phænomena, it ascribes them to various causes, entirely different from those to which, according to those *two* revolutions, they ought to be ascribed. Thus, the *low levels*, or *plains*, between chains of mountains, it ascribes to *the hand of time*; which, with the aid of *atmospheric agents*, has gradually and

¹ CUVIER, *Th. of the Earth*, § 5. p. 34.

PART III.

CHAP. V.

imperceptibly *eroded*, and *wasted away*¹, all the immense mass of matter which once filled up the *void* now existing, between the level of the mountainous summits, and that of the low surface beneath; leaving the mountains themselves untouched;

Sed *quæ corpora* decedant in *tempore quoque*,

Invida præcluserit speciem *Natura* videndi²:

but *how*, or *when*, this mighty *waste* took place,

Invidious *Nature* grants us not to trace:

no reason however is assigned, *why* the mountains, which are composed of the same materials with the substance *eroded* and *wasted*, chanced to be *spared*. So that *time* and the *atmosphere* must have been unceasingly and capriciously at work, during a lapse of ages to which the remotest date of the Mosaical chronology is, by comparison, only as yesterday.

But, upon what authority does it ground this contradiction of the record? Is it upon *some other record* which it can produce, and which it can show to be deserving of *more credit* than that of Moses? for the question, is entirely a question of *historical fact*. No! it can produce no *historical testimony* whatso-

¹ D'AUBUISSON, i. p. 231.

² LUCRETIVS, i. 321.

ever; it grounds its contradiction, wholly and absolutely, upon the same mode of argument and induction, by which, in the first part of this inquiry, it concluded the formation of this earth from an *elementary chaos*; and, with the same philosophy and logic with which it there contradicted *Newton*, it here contradicts *Moses*.

This *multiplication of revolutions*, is no other than a *multiplication of causes*; a procedure, always suspicious in philosophy, because it always wears, *primâ facie*, a character of *deficiency*, either of *judgment* or *inquiry*. For, true philosophy abhors a multiplication of causes; and always seeks to reduce effects to the *fewest causes* that reason will permit. Its “*rule of philosophizing*” is, to refer effects of the *same kind* to the *same cause*, “*quantum fieri potest— as much as it is possible*”¹. Whereas, the *mineral geology*, far from making the effort which this precept supposes, seeks for a *new cause*, that is, a *new revolution*, upon the occurrence of every *new difficulty*; so that its multiplied causes are, in fact, not proofs that the effects *required* the causes, but merely, evidences that *it* could not reconcile the effects to its own conceptions, without *supposing those causes*. But, since *causes* imply *facts*, the supposition of the

¹ See p. 44.

PART III. former, is a supposition of the latter; so that *sup-*
 CHAP. V. *posititious facts* become the basis of its science; and when it would assign *dates* to those *facts*, it is manifest, that its whole system must be a compound of *supposititious history*, and *supposititious chronology*. Thus it is, that the mineral geologists of Germany, as we are assured, have gravely determined, upon the pretended authority of Werner's principles, that *four* different seas have *successively*, and *at distant periods*, covered the whole of this globe¹:

Nor less, not more, but just *four seas*.

Thus also it is, that Cuvier affirms, that *the "revolutions of the earth have been numerous;"* that "it has *frequently happened*, that different parts of our continent have risen from the basin of the sea, and that they have been again covered by the water²." And such is the mode in which the mineral geology reasons in general, upon the *revolutionary phenomena* of the earth.

¹ " Dans les ouvrages de géognosie dernièrement publiés en Allemagne, d'après les principes de WERNER, on regarde les diverses formations minérales comme le produit de *quatre grandes mers successives*." — D'AUBUISSON, i. p. 357.

² § 5. p. 36.

In the midst of these aberrations, it is with no small pleasure that I find myself able to oppose to such incautious and unphilosophical speculations, the high authority of *Werner himself*.

“ I shall observe (says his able and upright “ disciple, M. D’Aubuisson), that Werner was “ *very cautious* on the question of *deluges* and “ *revolutions of nature*; he never declared him- “ self in a positive manner; probably, because “ he had not established a definitive opinion “ upon those matters; but, perhaps also, *his “ respect for the SACRED WRITINGS made him “ apprehend, that the opinion he might express “ would be misunderstood*.” Here is an example, deserving of the serious attention and close imitation of the mineral geology; but, from which it so greatly deviates. We receive from the hands of the disciple, and with peculiar gratification contribute to record, this faithful testimony of his eminent master’s mind. We reverence the *geological teacher*, who held his science under the control of that high paramount authority; and we honour the *disciple*, who has rendered this justice to his memory. And we the more regret, that he did not so direct his general studies, as to enable himself to trace out, and to expose, the direct *correspondence*,

! Tom. i. p. 369.

PART III. between the *phænomena* which he contemplated, and that *authority*; and thus prevent the union of his name with a doctrine of “*four successive seas*,” which so pointedly contradicts those sacred writings which he duly respected. But, his attention having been principally and ardently devoted to *mineralogy*, he had not provided himself with the other branches of knowledge, which were indispensably requisite for enabling him to establish that important correspondence. He has, however, bequeathed to us *a caution* in this recorded sentiment; which is of virtue sufficient to curb the precipitancy of physical conjecture, in every mind in which intellectual acuteness is not deserted by moral ingenuousness.

By the sure guidance of the Sacred Record, we are able to reduce, to their *true chronological order*, the various effects, or phænomena, which the mineral geology arranges confusedly and anachronically, through neglect of the *historical rule*; arbitrarily and fancifully creating *facts* and *dates*, by multiplying *revolutions*. For, let us examine what general phænomena the earth presents, which may not be philosophically referred; either, to the *first formation*, or *creation*, of the general frame-work and mineral substance of the earth; or to the *first revolution*, which formed the *basin of the primitive sea*; or, to the long

period which succeeded, during which, that sea remained in its primitive basin ; or, lastly, to the *second and last revolution*, in which the sea was *transfused* from that basin into a *new bed*, formed by the *depression of the primitive continents*. To the *first* of these, are plainly to be referred the *sensible characters*, and *diversities*, of all *primitive rocks and soils* ; to the *second*, are to be referred the universal characters, of dislocation and subversion, of downfall and ruin, of disunion, fracture, and dispersion, in those rocks and soils ; of subsidences, in valleys, plains, and lakes ; of primitive volcanic eruption and fusion ; all which, mark the *first period of change* from the first perfect condition of the mineral sphere. To the *third*, are as plainly to be referred, the triturated character of all the fractured parts of those rocks, in their larger and smaller fragments ; the moulding of the loose soils over their solid substrata, displaying the evidence of *watery action* as plainly, as the surface of a stuccoed edifice displays evidence of the action of the *artist's trowel* ; likewise, those many *extinct volcanos*, whose vestiges are found on the *lower levels* of the earth, and in *mediterraneous regions*, remote from the sea ; and which are *therefore extinct*, because their former activity resulted from a communication with the waters, which have been removed from them. To

PART III.

CHAP. V.

PART III.

CHAP. V.

this *interval* are also to be referred, the incredibly numerous accumulations of *marine substances*, existing both in loose and in compact soils; and in levels far above the surface of the present ocean. To the *fourth and last* of these periods are to be referred, with equal evidence, the *excavation of valleys* in *secondary* soils, leaving other parts undisturbed, of different altitudes; the aggeration of marine mineral masses; the exposure, exsiccation, and induration of those masses, now exhibiting *secondary mountains, hills, and rocks*; also, various peculiarities of form and disposition, caused, from *local circumstances*, by the mass of waters in the progress of their retreat; and finally, the confused mixture of organic terrestrial fragments, animal and vegetable, previously constituting a part of the furniture of the *perished earth*; which are every where found in soils into which they were precipitated, while those soils formed the soft and yielding bottom of the retiring sea.

We thus clearly perceive the *fallacy* under which the composers of the first French *Encyclopédie* reasoned, when they pronounced those *phenomena* to be wholly irrelative to the catastrophe of the *universal deluge*. “It is a *truth*,” (said they,) now recognized by the most enlightened naturalists, that *the sea, in the most*

PART III.

CHAP. V.

“ remote times, occupied the greater part of the
 “ continents which we inhabit; it is to its resi-
 “ dence, that is owing the prodigious quantity of
 “ shells, of skeletons of fishes, and of other
 “ bodies, which we find in the mountains and
 “ strata of the earth, in places often very
 “ distant from the bed which the sea actually
 “ occupies. *In vain would any one attribute*
 “ *these phænomena to the Universal Deluge; we*
 “ *have shown, under the article ‘FOSSILS,’ that*
 “ *that revolution, having been merely transient,*
 “ *could not have produced all the effects which*
 “ *the greater part of naturalists have attributed*
 “ *to it. Whereas, in supposing the residence of*
 “ *the sea upon our earth, nothing will be more*
 “ *easy than to form to oneself a clear idea*
 “ *of the formation of the strata (i. e. the se-*
 “ *condary strata) of the earth; and to conceive,*
 “ *how so great a number of marine bodies are*
 “ *found in a soil which the sea has abandoned*¹.”

Those writers were little aware, that they were urging the *very statement of the record*; and that what they so authoritatively opposed, was, in fact, not the *record itself*, but the *mis-interpretation of the record*.

With the clear and satisfactory authority of this *historical clue*, to guide our reason in in-

¹ Tom. x. art. MER, p. 359. Ed. fol. 1765.

PART III. vestigating the various phænomena of the earth,
 CHAP. V. one would have thought that *adequate causes* were assigned, and in rich abundance, to account *generally* for every phænomenon that can occupy the attention of geology; for, the mineral geology itself does not presume to account for *every particular effect*; but is constrained to refer many of them to “*causes which are unknown,*” or, to “*causes which have ceased to act.*”

Yet, those causes are not sufficient to satisfy the mineral geology, even where it is led to infer the very same *four periods* in the history of the earth. For, thus it likewise states: “The *epocha*, in which we perceive that so great a quantity of *brescia, sand-stone, coal, &c.* were produced, differs so entirely from that which *preceded* it, and from that which *followed* it, that one would be tempted to discern in it a *real change*, rather than a mere *oscillation*, in the course of nature. It proves to us, a *time of destruction*; it indicates a *violent* and almost *sudden action*, between the *tranquil formation of primitive rocks*, and the *formation, generally tranquil, of calcareous soils*¹.” We here perceive a remarkable *approximation*, by the acuteness of

¹ D'AUBUISSON, i. p. 361.

observation alone, to the *true order of events* as they are reported in the record. The able observer perceives, 1. a *primitive* period, in which *primitive rocks* were tranquilly formed; 2. a period of violent and sudden *destruction*; 3. a *long interval*, in which the *calcareous formations* were more or less tranquilly *deposited in the sea*; And, 4. he has elsewhere noted the *retreat of that sea*¹. Here, then, are *all the true periods*, which the Mosaical record enables us to arrange in their proper order, and to assign to their proper dates. But, through neglect of that guide, imagination interferes; and the periods, thus correctly stated, are afterwards *multiplied* by the *insertion of conjectural revolutions*, in order to account for the *variety of effects*, which those *four periods*, in fact, alone produced.

Let us, therefore, proceed to examine, with some attention, the *reasons* which have prompted those *conjectural insertions*; and to investigate, in their detail, the *principal phænomena*, which have seduced the *mineral geology* to require *more revolutions*, than it can be supplied with from the *Mosaical*.

But, first of all, it must consent to renounce, and for ever to relinquish, all those *revolutions*, which it had *invented* merely to contrive the *first*

PART III.

CHAP. V.

PART III.

CHAP. VI.

¹ See above, p. 277, 8.

PART III. *formation, or primitive composition, of the mineral system of the earth, by the chemical modes of dissolution, precipitation, and crystallization, in an elementary Chaos; such process being absolutely denied, disclaimed, and derided, by true philosophy, and flatly contradicted in history, by adequate witness of the fact, as has been fully shown in the two preceding parts of this disquisition. Our inquiry concerning revolutions, must be exclusively limited to such phænomena as bear unequivocal characters of mechanical action, or, if of chemical, of such as has been exercised in the decomposition of first-formed or created substances, or in their recomposition; it cannot extend to any thing but that, in which alteration or real revolution, of parts or place, is distinctly and incontestably manifested.*

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CHAP. V.

CHAPTER VI.

THE first great difficulty, which the mineral geology has created for itself, occurs in that amazing and principal phænomenon, the remains of animals of all species and climates, which are discovered in exhaustless quantities in the interior of the earth; so that the *exuvia* of animal species now subsisting only within the torrid zone, and those of species which no longer exist at all, are found confusedly huddled together in the soils of the most northerly latitudes. “ In examining the
 “ mineral masses in the interior of the earth,
 “ says the mineral geology, the observer is
 “ astonished at the prodigious quantity of the
 “ fragments of *animals* and *vegetables* which it
 “ contains. He will recollect the *order*, in
 “ which organic beings are distributed upon
 “ the surface of the globe; some, can only live
 “ in the bosom of the *sea*, others, in *fresh-water*;
 “ some, are only to be found within the *torrid zone*,
 “ while there are others, which would perish
 “ the moment they should be removed from the
 “ *frigid zone*; in a word, each species appears as

PART III.

CHAP. VI.

PART III.

CHAP. VI.

“ if it were fixed to an element, or climate, proper and peculiar to it. Whereas, in the strata of the earth, *every thing is dislocated*; the remains of animals which can exist only in the depths of the *ocean*, are found kneaded into rocks which form the *summits of mountains*; the bones of those which can live only in the *torrid zone*, are found buried in the frozen soil of the *polar regions*. Almost every where he will find relics of animals and vegetables, different from those which now exist. Every thing will indicate to him, that the place of his habitation has undergone *great changes and great revolutions*¹.”

The mineral geology, contemplating these *relics*, and reflecting upon the *places* in which they are found, immediately demands a *revolution* different and distinct from either of those intimated by Moses, in order to account for their *presence* in the places where they now lie. But *why* does it need that *other revolution*? solely, because it reasons thus upon the evidence before it: These *exuvia* of equatorial animals, *are found* in northern latitudes; *therefore*, their ancient owners must *have died* in those latitudes; *therefore*, they *must have lived*

¹ D'AUBUISSON, tom. i. p. 8.

*in those latitudes*¹. And yet, they could not have *lived* in those latitudes, unless a *revolution* has taken place, either in the *nature of the species*, or in the *climates of the earth*. But, no such revolution is shown in the Mosaical record, or can accord with its recital, therefore, *other revolutions*, in one or other of these, must be *assumed*, to supply the *chasm* in the Mosaical record.

PART III.

CHAP. VI.

Thus it reasons; in perversion of all logic, and in exclusion of the true explication of the phænomenon. For, unless there is no such thing as *change of place*, and unless the *exuvie* of all the game consumed in *London*, are proof that the grouse and hares *died there*, and therefore that they *lived there*; the mere *presence of the fossil exuvie*, is no evidence whatever that the animals owning them *died* where they are found; consequently, it is no evidence whatever that they *lived where they are found*: and, if that is the case, all the rest of the argument, which was devised only to *account for their living there*, vanishes at once into air.

The first, simple idea, which the phænomenon in question raises in a plain understanding, uninctured with system, is an idea of *disorder* and *confusion*, not one of *order*; and it would

¹ CUVIER's *Geol. Disc.* JAMESON, p. 258. Ed. N. York. D'AUBUISSON, tom. ii. p. 513.

PART III.

CHAP. VI.

therefore *first* ask, how came all those varieties and disparities of animals to be *jumbled together* there? not, how came they all to *live and die* there? For, their being *jumbled together* there, is an *unquestionable* fact; but their living and dying there, is a very *questionable* one. And since we know, that an *entire earth perished*, and that its *whole furniture of animal and vegetable life, of every climate, perished also* in the sea which absorbed that earth; it is certainly much more reasonable to assume, in the first instance, that the vast accumulations of animal fragments, which are found mingled together indiscriminately in all parts of the present earth, were *part of the ancient furniture of animal life, pertaining to the earth which was destroyed*. For we know, that such animals existed; that they were indiscriminately destroyed; and that they were absorbed indiscriminately into the mass of waters by which their destruction was effected. If, then, it was *physically possible*, that they should have been *transported* by those waters from the surface of the former earth into the bed of the former sea, and if that bed is now become our habitable earth, it was highly probable that we should discover such remnants of them as have not entirely mouldered away; and it will be much more philosophical to resort to that *possible cause*, than to violate by our *conjectures* the laws established,

either for the nature of animals or for the climates of the globe. Now we shall find, that the *second revolution* of the record comprehends *such a cause*, and therefore, the *proper cause* to which we ought to ascribe the phænomenon; and it will then be *unphilosophical*, to seek for any other cause in order to explain it.

But, observes a respectable writer, “in this hypothesis, the *ancient continents must have existed in those tracts now covered by the Atlantic and Pacific oceans*; if so, *I do not see, how elephants could have been brought into Siberia, or a rhinoceros be found in it. For, Siberia being then the bottom of some ocean, the sea must have moved from it, to cover the sinking continents, instead of moving towards it, to strew over it their spoils*¹.”—“There seems no reason, observes another respectable writer, *why the current should have taken a northern, rather than a southern direction*².”

These are indeed intelligible and tangible objections, and which place the question upon a distinct, philosophical ground; they therefore claim a full and minute consideration. The question then is; *by what known law could the sea, in moving from its bed, carry backward, and deposit within its bed, the spoils that it absorbed from the*

¹ KIRWAN'S *Geol. Essays*, p. 62.

² GREENOUGH'S *Geol.* p. 153.

PART III.
 CHAP. VI.

PART III. *continents which it had moved forward to submerge?*

CHAP. VI.

and, if there exists any such known law; *why should the current have taken a northern direction?*

I have endeavoured to put the question as pointedly, and as forcibly, as I am able.

This question, though not of *difficult solution* in itself, will not be of *easy apprehension*, unless we will *expand our thoughts* to the full measure and magnitude of the subject; and unless we will combine within them, the agents acting generally over the entire surface of the globe. But, if we will only do this, we shall find the solution both simple, and obvious to our apprehension; for, the *actions* to be explained, are the necessary consequences of the *fact* admitted in the objection.

We have perceived, by rational induction, that, in this vast revolution, the *transfer* of the mass of waters could not have been *immediate* or *instantaneous*; but, that it must have been conducted with much *gradation* and *calculable succession*, proceeding through several months, and proportionate to gradual and successive *subsidences* of the primitive earth¹. That *graduality*, left the aqueous surface subject to the ordinary operations of *winds* and *currents*. The *limits*, or *coasts*, which circumscribed the

¹ See above, p. 267—270.

sea, gradually *receded* in those subsidences ; but, its violence, continually discharged against *succeeding limits*, was followed by the same common effect, of *reaction* and *recession of its waters*, which universally attends it. Though the first “ *bars and gates*” which resisted its fury were thrown back, yet they were succeeded by others, against which, for a time, it “ *raged and swelled*” in vain, and which prescribed its bound, until another subsidence permitted it another measured progress : which process continued, until at length the whole became submerged. But, whatever was the *actual barrier* against which its waves at any time broke, those waves, after breaking against that barrier, *receded*, and yielded their place to the waves which immediately followed, in unintermitting succession ; and they thus formed *retiring currents, retrograding as the flux advanced*.

This natural and necessary operation, will be best illustrated by considering the manner in which the sea *actually operates*, upon a coast against which it is continually discharging its waves. “ Whilst we see the general phænomena of the flow and ebb of the sea modified by particular circumstances, we also recognize, (says De la Lande,) an *important and general effect of the same phænomena* : that is, the common motion of the sea from east to west ; which forms a very sensible current

PART III.

CHAP. VI.

PART III. “ between Africa and America. It is affirmed,
 — “ that there is always an *higher elevation* of the
 CHAP. VI. “ waters upon the *eastern coast* of America, than
 { “ upon the *western coast*. Both of these are
 “ a consequence of the tides; for, the *aqueous*
 “ *spheroid*, carried towards the *west* by the
 “ diurnal motion of the earth, is stopped by,
 “ and accumulated against, the *eastern coast* of
 “ America; from whence it can only *return*
 “ partially, and very slowly, by an opposite
 “ current, which probably takes place in the
 “ bottom of the sea; while *the water of the*
 “ *surface returns to wash the western coasts of*
 “ *Africa and Europe by the natural weight of the*
 “ *waters, which recoil after having struck the*
 “ *coasts of America*. It is the same in the South
 “ Sea; its waters, stopped by the continent of
 “ Asia, *fall back naturally* to the coasts of
 “ Chili, Peru, and Mexico¹.”

Without inquiring here, whether that great equatorial current is caused by the diurnal motion of the earth, according to De la Lande, or rather, by the trade winds, according to the explanation of La Place; the fact is undeniable, that the body of the sea, at the equator, constantly moves towards the eastern coasts of Asia, and of America; and that it returns to the western coasts of America,

¹ Flux et Reflux de la Mer, tom. iv. p. 305.

in the first case, and to those of Europe, and of Africa, in the second.

PART III.

CHAP. VI.

This is the great law of *equilibrium*; which governs the motion of the sea, antecedently to the cooperating or counteracting agencies of winds and tides. The great *Atlantic flood*, which *flows to the eastward*; and of which a part is received into the Bay of Biscay, and being stopped by the west coast of France, and confined by the north coast of Spain, escapes to the north-westward, and pursues its course partly into St. George's Channel, and partly along the western side of Ireland, "continually casting up articles of various kinds, known to have come from the southward and south-east, in Galway Bay¹;" is no other than the *reflux* of the oceanic waters cast by the *great equatorial current* on the eastern coasts of America; which current, perpetually propelling its northern branch, along the coast of Brasil, into the gulf of Mexico, and occasioning the *repletion* of that gulf, obliges it to seek a discharge for part of its mass of waters through the straits of Bahama, thus producing the *Gulf-stream*; while the general mass falls back to the eastward, by the *common law of equilibrium*.

¹ RENNELL'S *Observations on a Current W. of Scilly*, p. 67. *Note.*

PART III.

CHAP. VI.

By this *law*, easily apprehended, it is evident; that as the waves of the sea, which strike an opposing coast, are constantly following each other, the preceding waves, which can advance no further, must always effect for themselves a *retreat*, in proportion as the succeeding waves attain the coast. And thus, a *general reflux* is the necessary and inevitable *consequence* of the sea's *progress*, against a limit disappointing that progress, and repelling the action of its waters.


Let us then suppose, that the *eastern* coast of America were to yield to the sea by successive subsidences of its land, yet leaving after each subsidence a new resisting coast, sufficient to repel the waves; the reflux must still be the same as if the continent remained entire, and the *retiring current* must equally *make its way back to the coasts of Africa and Europe*. Let us further suppose, that, in the progress of those subsidences, *half* the continent of South America were to be successively submerged; and that *half* its surface of vegetation, together with the millions of its animal inhabitants, were to be received and floated off by the waters. It is manifest, that a considerable portion of this accumulated ruin would continue to float, for a considerable time, and be carried, by the back current, *in a direction*

towards the coasts of Africa and Europe; and, although at first taken up by an advancing sea, would be transported to different distances, and there be deposited, by the same sea retiring. It is thus manifest; that the waters, which would be the *first* to enter a bed whose mouth should be *unobstructed*, would, if an obstruction of temporary duration were opposed, be compelled to *retire into the rear of their mass*, and so be the *last to enter that bed*. As then the sea, which *moves westward from Africa and Europe*, is compelled, by the *reaction of the American coast*, to *move eastward, towards the same regions again*, and so in repeated successions; by which returns it is capable of transporting, and *has actually transported*, floating bodies to the shores of Europe; we easily perceive, “*how the sea, receiving an extraordinary impulse which should cause it to move from its northern bed, in Siberia, to cover continents gradually sinking in the southern ocean, might nevertheless move towards that bed, and strew over it the spoils which those continents had successively delivered over to the action of its waters.*”

Let us now follow this operation, with some minute detail, in its application to *the waters of the deluge*.

By the inundation of the earth, from the incessant cataracts of rain and the consequent

PART III.

—
CHAP. VI.


overflow of the rivers during forty days, the whole of its superior surface, or moveable soils, would have become drenched, supersaturated with moisture, and loosened from their immediate base; and they would thus have been rendered capable of being taken up in dissolution by the waters of the sea, on the first failure of that base, and have been fitted for precipitation on whatever new surface they might afterwards be deposited. But, with the superficies thus disunited and separated from its base, and by the failure of that base, the entire investiture of vegetation, all its plants and herbs, all its woods and forests, together with the whole animal creation, would have become successively a prey to the waters, and would have been carried off, and floated away, by the *reflux*. But, they would not have been *immediately submerged* in the places where they were first seized, in consequence of the gradual procedure of the operation; they would have floated for a longer or a shorter time, and would have been driven by winds and currents in vast accumulated masses, and in various directions. How *far* they could have been transported before they sunk, and how *distantly* they might have sunk from the places of their first capture, are questions which must depend, 1. upon the length of time bodies can float without

sinking, which again must greatly depend upon their bulk, and the texture of their substance and integuments; and 2. on the power of tides, currents, and winds, for wafting and propelling floating bodies. We know, that some bodies, impervious to water, have floated from the West Indies to the coast of Europe; these were brought to an eastern land by the very sea which had moved to the westward, and it was the return of that great western flood, that, in seeking its equilibrium, brought them to our shores.

Let us then suppose, (what must have been the case,) all the woods and forests of the former earth, of every latitude, uprooted, entangled together, and floating upon the bosom of the ocean; let us further suppose, all the races of animals, of all climates, crowded confusedly in close contact and in numberless masses, implicated in those floating forests, and buoyant upon the face of the waters; and let us suppose all these, while buoyant, to be operated upon by the impulsory powers of retiring currents, tides, and winds. It is impossible to deny, that such immense conjoined masses, presenting in their cohesion vast surfaces to the winds and retreating waters, would be driven before them to very great distances, before all would be submerged. If the continents from which they came, were south of the sea-bed, and if the sea flowed to the southward, they

PART III. would then be transported *in a northerly direction*; just as the waters of the equatorial current, which fall against a *western* land, retrograde to an *eastern sea*. In the *antediluvian sphere*, the space now almost entirely possessed by that great *central current*, must have been in a great part occupied by the former *equatorial continents*. The subsidences of the external borders, or advanced lines, of those continents, would not have prevented the advancing waters from being *repelled* by the *new lines* successively opposing themselves to its fury; and, *the general movement of the FLOW being towards the EQUATOR*¹, and consequently, *the general direction of the REFLEX being towards the POLES*, the latter would, in this our hemisphere, have conveyed whatever its surface might sustain, in a *northern direction*; so long as there remained any portion of those *equatorial continents* to disappoint and repel the progress of the waters. And thus, the spoils successively gathered from those continents, would have been transported to, and driven over, the *northern* parts of the primitive sea; would have been sunk upon different parts of its bed; and would ultimately have become buried in its soils. And, if a *great moral end* was capable of being effected by the opera-

¹ See above, p. 34, and 264, 5.

tion; a fact, which the present argument renders wholly indisputable; the *direction* of those amazing *monuments*, to their *actual stations*, by the instrumentality of the *natural agent*, was in every respect consistent with the intelligence and the power of Him, who afterwards “caused a *wind to pass over the earth*, that the waters might be “assuaged¹.” Upon what calculation Mr. Greenough affirms, that those bodies must have moved over an extent of *thirty-six thousand miles*, from the Indian to the Frozen Ocean², I am at a loss to understand. For, the whole circumference of the globe is not quite *twenty-five thousand miles*; and, if we suppose the former continents to have existed in the Atlantic, or Pacific Ocean, we need only deduct from that circumference the distance from the *equator* to the *pole*, as an extreme average measure; which will be only a *fourth part* of that extent, or about *six thousand two hundred miles*. Over this extent they would have moved in *direct lines*, northward, and without finding any lands to obstruct their progress.

A vessel, which sailed from Halifax, in Nova Scotia, on the morning of the 12th of

¹ Gen. viii. 1.

² *Geology*, p. 153.

PART III. last December, 1821, came to an anchor at
 —
 CHAP. VI. Spithead on the morning of Christmas day¹;
 having traversed a space of *three thousand miles*, in *thirteen days*. Had it not been for an interruption of *forty-eight hours*, occasioned by foul winds encountered in the passage, the course would have been run in *eleven days*. As the wind blew almost a continued hurricane, very little sail was carried. The average of *progress*, was therefore *two hundred and seventy-three miles in the twenty-four hours*. On one day, the vessel actually ran ninety-six leagues, or *two hundred and eighty-eight miles*. Now, the distance from the equator to Tobolsk, in Siberia, is *four thousand miles*; so that with the same velocity, uninterrupted, a floating mass might have been propelled from the former to the latter parallel in *fifteen days*. The mouth of the river *Lena*; is in the parallel *nine hundred miles* north of Tobolsk; or, *four days* further, with the same velocity of progress.

As we have thus found a *law*, by which an *advancing sea* may float and convey bodies into the *rear of its waters*; and as we can therefore now “see, *how* elephants could have been brought into *Siberia*,” and “*why* the current “should have taken a *northern* direction;” let

¹ The NEWCASTLE, 60 guns, Captain FANSHAWE.

us next consider, the natural consequence of such transport to the bodies, when brought, and at length deposited upon its bottom.

PART III.

CHAP. VI.

That bottom, consisting of the loose or fractured materials of the parts which had been depressed to form the bed, and which, during 1656 years, had been subjected to the mechanical and chemical action of the superincumbent sea, was in most parts penetrated deeply by its water, and formed a yielding paste or mud. Many bodies would be buried in that mud, by their own weight, or by the weight and ordinary action of the waters rolling over them. Others, would become profoundly immersed, by the peculiar power of the sea in the latter stages of its retreat, when the violent action of its surface would have been more strongly communicated to its bottom, in consequence of the increased and increasing shallowness of its depth; with diversity of circumstances, arising from various and unassignable *local causes*. To form a judgment of the amazing force of the sea while in violent action, and of its tendency and power to bury large bodies deeply in its bottom, we have a very applicable example in the *Bore*, or extraordinary high tide, experienced at the mouth of the Amazon, and other rivers of the east coast of America; of which potent agency, Condamine has given the

PART III. following account from his own experience on
 the spot.

CHAP. VI.

“ Between Macapa and the North Cape,
 “ in the place where the great canal of the
 “ Amazon river is most confined by the is-
 “ lands, the tides present a singular phæ-
 “ nomenon. During the three days nearest
 “ the full and new moons (the times of the
 “ high tides), the sea, instead of employing
 “ nearly *six hours* to rise, attains its highest
 “ elevation in the space of *one or two minutes*.
 “ It may be supposed, that this is not effected
 “ very quietly : one hears, at the distance
 “ of one or two leagues, a terrific noise which
 “ announces the *Pororoca* (*Barre*, or *Bore*);
 “ such is the name which the Indians of the
 “ district give to this terrible tide. In pro-
 “ portion as it advances, the noise increases,
 “ and presently one beholds a promontory of
 “ water from twelve to fifteen feet in height ;
 “ then a second, then a third, and often a
 “ fourth ; which follow close upon each other,
 “ and which occupy the whole breadth of the
 “ canal. This surge advances with a prodigious
 “ rapidity, breaking down, and *shaving clean*
 “ *away*, every thing that opposes it. I have,
 “ in some places, seen an extensive tract of
 “ soil carried away by the *Pororoca*, trees
 “ of very large dimensions uprooted, and

“ devastations of every description. Wherever
 “ it passes, the coast is laid as smooth as if it
 “ had been intentionally and carefully swept¹.”

PART III.

—
CHAP. VI.

Of the astonishing power of this aqueous agent to *imbed large bodies*, I hold the following instance from an eye-witness: “ At
 “ the mouth of a river in Nova Scotia, a
 “ schooner of thirty-two tons, laden with live-
 “ stock, was lying with her side to the tide
 “ at the influx of *the Bore*; which was then
 “ about *ten feet* in perpendicular height. No
 “ sooner had this mass of water reached the
 “ vessel, than that great body was instantly
 “ turned over and over, like a common barrel,
 “ and presently disappeared. After the tide had
 “ ebbed, the schooner was so totally absorbed
 “ into the sand and ouze, that the *taffel*, or
 “ upper rail of the deck, was alone visible.”

Thus, then, we find in the established order of things, *physical* powers capable, 1. of transporting the bodies of *elephants*, *rhinoceroses*, &c., from the torrid zone to the north of Europe; and, 2. of *imbedding* them at all the various depths in which they are now found, in England or in Siberia: and this, without requiring any change, either in the *natures of the species*, or in the *climates of the earth*. The

¹ *Voyage de la Rivière des Amazones*, p. 189, 91.

PART III.
 CHAP. VI.



certain knowledge, that an *entire animal creation* was once overwhelmed and destroyed by an *advancing ocean*, which, by its *reflux*, was able to *transport*, in a contrary direction, individuals of that creation of every climate, indiscriminately mingled together; accounts satisfactorily to the *reason*, for the discovery of the *confused fragments of animals*, of all climates, in the strata of our earth; and evinces the incongruity of the assumption, that those animals must necessarily have *died* where their *exuviae* are found; and therefore, the further incongruity, of speculating *how* they could all have *lived* there?

But Cuvier, under the bias of his own ingenious but fallacious theory, denies the fact of the *transport* of those bodies, on the following argument; which does not appear eminent, either for the correctness of its *logic*, or for its *consistency*.

“ Those bones, he says, are almost every
 “ where found in beds nearly similar; namely,
 “ of *moveable* soil, as sand or marl, and not
 “ very far beneath the surface. We have no
 “ authentic account, that they are ever covered
 “ by regular layers of stone, containing sea-
 “ shells; as if the sea had continued long upon
 “ them, in a settled and tranquil state. The
 “ catastrophe which sunk them, was therefore
 “ a great but *transient* inundation of the sea.

“ The bones, are neither *rolled and triturated*, PART III.
 “ nor united in *entire skeletons*, but dispersed, CHAP. VI.
 “ and partly broken; they have *therefore* not
 “ been brought by an inundation from a dis-
 “ tance, but were found by it on the places
 “ where it covered them; as must have been
 “ the case, if the animals to which they per-
 “ tained had *inhabited* those places, and had *died*
 “ in them. Before this catastrophe, *therefore*,
 “ those animals *lived* in the climates where their
 “ bones are now dug up; *the northern parts of*
 “ *the globe, therefore, once nourished animals of*
 “ *the species of the elephant, hippopotamus, &c.*”

Let us examine these several positions, and the conclusions. 1. “ They have *not been triturated*, therefore they have *not been transported.*” But, if the animals had been transported by water, and had been deposited and immersed in a deep bed of sand, or other soft and conservative substance, they would have remained there *incased*, and would have been *protected against trituration*; this character, is therefore no proof whatever against transport. 2. “ They have *not been collected together in entire skeletons*, but are scattered and broken; therefore *they have not been transported.*”

¹ CUVIER'S *Geol. Disc.* JAMESON, p. 258. D'AUBUISSON, tom. ii. p. 513.

PART III. Wherever those animals died, they must have
 CHAP. VI. died with their *entire skeletons*; and if parts
 only of those skeletons are found, the other
 parts must have *mouldered away*. But, would
 there have been any difference in this respect,
 whether they had died where they are found,
 or whether their bodies had been transported
 thither, and there deposited? This statement, is
 much too equivocal and systematic, to yield the
 extensive conclusion which Cuvier wishes to
 establish by it. In the case of the American
mastodon exhibited in London a few years ago,
 most parts of the skeleton were found lying in the
 same place; but the other parts had mouldered
 and perished. At Tonna, in Thuringia, the entire
 skeleton of an elephant was found, at a depth of
 fifty feet; whilst near the small town of
 Canstadt, in the kingdom of Wirtemberg, an
 immense quantity of the bones of elephants,
 rhinoceroses, hyenas, &c. were discovered lying
 mixedly and confusedly together¹. The rhi-
 noceros found in the banks of the Vilhoui, and
 the elephant discovered near the mouth of the
 Lena, which Cuvier particularly notices, had
 their entire skeletons². The latter had, more-
 over, all its flesh and hide, being preserved by
 the polar ice into which it was incorporated. The

¹ D'AUBUISSON, ii. 504, 5.

² § 6. p. 37.

mere circumstance, that only *parts* of skeletons are occasionally found, can prove nothing, one way or the other, with respect to *transport*. But, let us consider the difference of the two explanations, with relation to the *ulterior* inferences which they require. Both suppose a *preternatural action of the sea*. But, in the case of *transport*, nothing need be altered in the established constitution of the globe; whereas, in the other case, we must proceed to speculate further, *how* animals of the *torrid zone* could *live* in a *northern latitude*; and we must invent an *hypothesis*, and assume a *revolution*, in order to assign a cause. The simplicity of the former solution, is therefore philosophical evidence of its truth.

But it has happened, that the circumstances of *position* of these animal *exuviae* are very different. Some are separately and deeply buried in sandy, calcareous, or argillaceous soils; while others are found in multitudinous masses in caverns, as in Germany and Hungary¹. The mineral geology must therefore have *different revolutions*, to account for this *diversity of positions*. But, let us recollect; that when the countless numbers of the brute creation, which were transported by the waters, were finally

PART III.

CHAP. VI.

¹ D'AUBUISSON, ii. p. 383.

PART III. deposited, they would have found *different*
CHAP. VI. *bottoms.* The bodies which were lodged upon
beds of *sand, clay, or other loose soils,* would
sink within them, and become encompassed by
them; while those which fell upon a *rocky*
bottom, in which were cavities and caverns,
would not be imbedded, but would be gradually
rolled, propelled, or drawn into those cavities,
by the action of the water, continually entering
and returning; for, the returning water would
not have equal power upon the bodies with the
entering water, which moved with the weight
of the whole mass. So that where the soil was
not sufficiently soft to receive them, they would
be driven forward, and finally urged into the
inmost recesses of the caverns; where they
would afterwards be found, in confused, mul-
titudinous, and exposed masses, with all the
circumstances which they now exhibit. And
because they would have been fixedly lodged
before their skeletons were stripped of their
integuments, and because the sea presently
abandoned them, no appearance of *trituration*
would be discoverable in their bones; which is
a phænomenon that much embarrasses the
mineral geology. This diversity of *position,*
would be the necessary consequence of *one*
and the same revolution, in different localities. It
is therefore quite unnecessary to resort, with

De Luc, to *two* different revolutions; or to embrace his whimsical conclusion, that “these ancient caverns were—*comme des cimetières pour les animaux*—a sort of burying-place in ancient islands for sick animals, which retired thither to die; and which, he says, *can alone account* for the prodigious quantity of their bones, heaped together, and incrusted with *stalactites*!”

Thus, then, every thing concurs to testify; that the bodies of *equatorial animals*, found in *northern soils*, were *transported* thither by the great agent which we have ascertained; and thus we perceive, that the phænomenon of their *presence* in those soils, is amply accounted for by the *second revolution* reported in the Mosaic record.

Lettres Géologiques, p. 219.

PART III.

CHAP. VI.

PART III.

CHAP. VII.

CHAPTER VII.

PART III. THERE is a phænomenon, intimately connected
 CHAP. VII. with the preceding, which will demand our
 very particular consideration.

The Mosaical record asserts, that the catastrophe which caused the universal destruction of the *brute creation*, caused likewise that of the whole *human race*; one family alone excepted. But, if the *human* creation perished at the same time with the *brute*, we naturally expect to find *human exuviae*, as well as *brute exuviae*; whereas, “ it is very remarkable, ob-
 “ serves the mineral geology, that in all the
 “ extensive moveable soils in which we find
 “ the bones of these large quadrupeds, and
 “ in which we find also bones perfectly
 “ similar to those of our horses, oxen,
 “ dogs, &c. *no human bones are ever found.*—
 “ And yet, these bones are *as durable* as those
 “ of the brute species, if placed in *similar cir-*
 “ *cumstances*. Every thing, therefore, induces
 “ us to believe, that the human race did not
 “ exist at the period when those fossil bones
 “ were buried, and in the countries where they

“ are found, *although they may have existed* PART III.
 “ *elsewhere.* The establishment of man in CHAP. VII.
 “ *these regions,* that is, in a great part of *Europe,*
 “ *Asia,* and *America,* must necessarily have
 “ been *posterior,* not only to *the revolution* which
 “ imbedded those bones, but also, to *that* which
 “ exposed the soils enclosing them : which *re-*
 “ *volutions,* are the *last* that our globe has sus-
 “ tained.—In examining, attentively, all that
 “ has passed on the surface of the earth since
 “ it was rendered dry *for the last time* ; we see
 “ clearly, that *this last revolution,* and conse-
 “ quently the establishment of the actual so-
 “ cieties of nations, *cannot be very ancient.* This
 “ is one of the results the best proved, and the
 “ least expected, of *sound geology* ; a result the
 “ more valuable, as it connects, by an uninter-
 “ rupted chain, *natural history* and *civil his-*
 “ *tory*¹.”

This is, indeed, an important remark of the *mineral geology* ; but there is yet a step or two for it to take, before it can become “ *sound geology.*” We find here many valuable concessions to the Mosaical geology ; viz. “ that *mankind* did not inhabit our *present* continents, “ until *after* the revolution which imbedded “ that confused multitude of bones within their

¹ D'AUBUISSON, tom. ii. p. 514, 5.

PART III.

CHAP. VII.

“ soils :—that they *never* occupied the regions
 “ in which those bones are found, *prior* to the
 “ revolution which buried them :—that the
 “ human race may have existed *elsewhere* :—
 “ that the revolution which exposed the soils
 “ containing those bones, is the *last* which our
 “ globe has sustained :—and, that this last revo-
 “ lution, and consequently the establishment of
 “ the *actual societies of nations* in Europe, Asia,
 “ and America, cannot be *very ancient*.”

These are, indeed, remarkable concessions ; but we find them associated with the constant error, of *multiplying revolutions* without any reason ; which must necessarily falsify both history and chronology. This able writer assumes, gratuitously, that *the revolution* which exposed the soils containing the *fossil exuvie*, was *different from*, and *posterior to*, that which imbedded them ; and different again from *that*, which gave origin to the *actual societies of nations* ; consequently, that *all the three* took place in *different periods of time*. Whereas, we must perceive, by the record, that *all* were effects of *one and the same revolution* ; and where *one cause* accounts simply, and with high probability, for *two or more effects*, it is improbable to reason that they should be the effects of *different causes*. The mineral geology, however, does not draw any inference, from the

absence of *human exuvia*, against the Mosaical PART III.
 declaration, that both *man* and *beast* perished, CHAP. VII.
 in the same revolution; because it perceives,
 that “ *the place which man then inhabited may*
 “ *have sunk into the abyss, and that the bones*
 “ *of that destroyed race may yet remain buried*
 “ *under the bottom of some actual seas: all,*
 “ *except a small number of individuals, who*
 “ *were destined to continue the species*¹.” The
 justness of this inference, I shall endeavour to
 render manifest.

If we carry back our thoughts to that great
 period, and if we contemplate it in all its parti-
 culars, it will be evident; that there must have
 been an extreme difference in the condition of
 the two orders of beings, *brute* and *human*,
 under the circumstances of that tremendous
 catastrophe. The *brute creation*, devoid of
 reflection and forethought, in any new and
 strange circumstance of nature which excites
 in them the sense of alarm, are prompted by
 their instinct merely to seek each other, and
 to congregate together; where they await, in
 trepidation, the unknown evil against which
 their natures are unprovided with any means
 of preservation. These, therefore, surprised by

¹ CUVIER, § 32. p. 133.

PART III. the sudden subsidences of land on the spots
 CHAP. VII. where they chanced to be assembled, would
 have been taken off by the inundation in its successive progresses, would have been launched upon the surface of its waters, and have been carried away by the reflux. Whereas, the *human population*, endowed with observation and reflection, and strongly actuated by the passions of fear and hope, would have watchfully and anxiously *retreated from the waters* gradually advancing towards them on all sides; and would have drawn themselves more and more towards the centre of the circumference continually diminishing. Until, at length, assembled in a multitudinous mass in the narrowed central interior, they would not have been washed into the waters and carried away by any *reflux*; because they would have been *absorbed* into the *vortex* created by the *conflux* of the two seas meeting from the opposite hemispheres, on the subsidence of the last intervening land; and would thus have been immediately carried downward with violence, into the profundity of the *new sea*.

If we contemplate the event in its detail, without any bias of prepossession, we must be sensible, that such would have been the most probable course of things. And if we add to this *natural* consideration, the *moral* reflection;

that this catastrophe was designed to act with particular efficacy upon the *moral feelings* of the condemned race; we shall find reason to believe, that while it was a matter of indifference how speedily the *brute* creation encountered their destruction, it was essential to the dispensation that the moral sufferings of the *human*, in the prospect of destruction, should be protracted and extended until it had worked its destined effect. Nor is this reflection in any way affected by the divine declaration, that the hardened race were wholly without concern “ *until the day when Noah entered into the ark, and the flood came AND destroyed them all;*” because, the Greek scholar will know, that the last *and*, *καὶ*, in this passage, is equivalent in import to the pronoun *which*: “ *until the flood came, which destroyed them all.*” It was not, therefore, the *destruction*, that came suddenly upon them, but, the *proof* of the reality and certainty of the destruction; the denunciation of which they had slighted and derided; by the entrance of Noah into the ark, and by the actual commencement of that disorder in the elements which was to produce it. The *human* population, would therefore not have been suddenly entrapped in the early stages of the inundation, like the *unintelligent* part of the creation; but

PART III. would have prolonged their own miserable duration, by their endeavours to escape from the catastrophe. For, the gradual progress of the waters would have allowed measures of time for reasoning and acting, according to the circumstances which they witnessed, and the dangers which threatened them. And thus it would happen, in one and the same revolution; that, while the *brute creation* was successively carried away by the reflux from the first commencement of the flood, and transported and deposited in the *distant regions* where we now find their remains in great abundance, the *human population* would be suddenly and simultaneously immersed in the centre of the *new sea*, as the last term of their destruction; where their *exuviae* must remain for ever, uninvestigable by man.

We cannot, therefore, by any means, concede the point which an ingenious follower of Cuvier would confidently convert into an *axiom*: “hence,” says he, “it may be considered as an *axiom*, that *man*, whose bones are not found intermixed (*with those of other animals*), did not co-exist in time and place¹,” because we plainly see, that their *separation in death*, is

¹ *Phil. Transact.* vol. civ. p. 110. Letter from C. Konig, Esq. to Sir Joseph Banks.

perfectly reconcilable with their *co-existence* PART III.
in life, both in *time* and *place*. And certainly, CHAP. VII.
 it is a great evidence of the consistency of
 the *moral* part of the geology of the record;
 that, while a vast proportion of the *brute* race
 were scattered over the surface which was to
 constitute the *new earth*, the *moral* race, which
 had provoked the revolution, should have
 perished in the *same locality* with the *ancient*
earth, on which their immortality had ratified
 the *curse*.

The *human skeleton* discovered in a calca-
 reous rock forming a part of the coast of the
 island of Guadaloupe¹, and which is to be
 seen in the British Museum, does not furnish
 sufficient *data* to authorize any inference bearing
 upon the present question.

We now perceive, how perfectly the secure
 and simple thread of the Mosaic history enables
 us to arrange, and to adjust in their due order of
 time and succession, the *conclusions* which the
 mineral geology has been led to deduce, in part
 correctly, but in general confusedly, from the
phænomena. We find, 1. " That mankind did
 " not inhabit the continents of Europe, Asia,
 " and America, until *after* the revolution which

¹ *Phil. Trans.* vol. civ. p. 107.

PART III.

CHAP. VII.

“ imbedded animal *exuviae* in their soils,” *because*, that revolution gave the first sensible existence to those continents: that is, 2. “ That they did not inhabit the regions in which those *exuviae* are found,” *because*, those regions then formed the basin of the primitive sea: 3. “ That they existed *elsewhere*,” *because*, they existed upon an earth which was submerged by that revolution: 4. “ That human bones are not found in the bed of the *ancient sea*,” *because*, the human race perished in the bed of the *new sea*: 5. we are able to determine, That “ the *last revolution* of the mineral geology, from which is to be dated the establishment of the societies of the present race of mankind, and which *cannot be very ancient* ;” is the *identical revolution* in which God executed his menace of destroying all the former race of mankind, excepting only those individuals who should become the progenitors of a new race: and we thus perceive, 6. That these results of *physical investigation*, not only “ connect, by an uninterrupted chain, *natural history* and *civil history* ;” but, when duly rectified by the rule of the Mosaical record, that they moreover connect both these with *Sacred History*.

CHAPTER VIII.

BUT, there is still a phænomenon, connected with those which we have examined, for the explanation of which the mineral geology requires *more revolutions*; and that is, the discovery of the *exuvix* of animals whose species no longer exist. This phænomenon appears to the mineral geology, to be incapable of a reasonable reference to the revolution reported by Moses.

This is indeed a phænomenon well calculated to perplex a science which neglects Newton's inculcation, of combining *morals* with *physics*, and subjecting the latter to the former; and which excludes all inquiry into the *mode of the first formation* of the animal and vegetable structures, confining its speculation to one *inanimate* member of the creation, and to *chemical* and *mechanical agencies*. There is no *mere physical principle*, that will serve to explain this phænomenon; nor can it be expounded, unless by reference to the principle which explains the *mode of the first animal formations*, namely, *Creative Power*.

PART III.
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CHAP. VIII.

PART III.
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 CHAP. VIII.

But, the *Mosaical geology*, which is founded upon *that principle*, and which therein accords with the philosophy of Newton, guides us to a solution of this mysterious problem. The *sole author* of the *last* great revolution of the globe, was its *Creator*, who also caused its *first* great revolution; and, evidences of that *identity* were of great *moral* concernment. When God made known to Noah the animal species which He designed to preserve, “*to keep seed alive upon the earth;*” it is manifest, from the testimony which we are here considering, that He was pleased to *except some from that preservation*¹. We know, that the formidable animal, the *carnivorous*² *elephant*, to which science has given the name of *Mastodon*, and others, to which the names of *Palæotherium*, &c. have been assigned, have *not been perpetuated*, but were ordained to *perish altogether*. He who planned and regulated the *creation* of the earth, unquestionably planned

¹ See after, CHAP. xiii.

² CUVIER has described this animal as *herbivorous*, but this description appears to be altogether arbitrary and theoretical. We can judge of its *nature*, only by its *remains*; and, as the most striking character of those remains is found in the enormous *grinding teeth*, resembling those of carnivorous animals, whereas those of the elephant, known to be herbivorous, are very differently formed, it is difficult not to entertain a strong persuasion, that the difference of those *organs*, evinces a difference in the nature of the *food* of the two species.

and regulated also its *renovation*; and the *extinction of certain animal species*, which existed prior to that last revolution, is proved, by their *exuviae*, to have been a part of *His plan in the renovation*.

PART III.
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 CHAP. VIII.
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It is wisely remarked, in a passage cited from Camper by a writer whom I have lately quoted; “that it was not contrary to the “Divine Wisdom to ordain the cessation of “animal species, when they had entirely fulfilled the purpose for which they had been “created, although that purpose is unknown to “us:—*Sapientiae Divinae non repugnare legem, “qua res illas vel animalia illa desinere jubeat, “simulac scopo primario, nobis incognito, satisfecerunt penitus*”<sup>1</sup>. That those species existed then, is manifest; but there is no evidence whatever, that they have existed *since*. What more probable *physical* cause can be assigned for the *extinction* of their races, than *that universal revolution*? What more probable *moral* cause, than the *will* and *design* of their *Creator*, the sole Author and Manager of the revolution? To our preserved progenitors, who were eye-witnesses of all its details, the extinction of those several species, must have been a subject of devout contemplation; not of that cold

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<sup>1</sup> *Phil. Trans.* vol. civ. p. 108.

PART III. speculating sentiment, which their fossil re-  
 CHAP. VIII. mains now produce in the cabinets of *mere*  
*physical curiosity*. *Moral* argument, can alone  
 reach this question; mere *physical* reasoning  
 can no more attain to it, than the rule of *simple*  
*addition* can resolve a problem in *trigonometry*.

By ascending to the *first moral and physical*  
*cause* of Newton, we obtain a direct and intel-  
 ligible solution of the question; but, with the  
 utmost labour of search among the *secondary*  
*causes* of the mineral geology, we can never ob-  
 tain it; we only encounter the same perplexity,  
 resulting from the same imperfection of analysis,  
 that we witnessed in our inquiry concerning  
*first formations*. From that *first cause* alone  
 it has happened, or can have happened; that  
 “ *racés have become extinct, and have left no*  
 “ *memorial of themselves, except some small*  
 “ *fragments, which the NATURALIST (magnus*  
 “ *Apollo!) can scarcely recognize* <sup>1</sup>.” The evi-  
 dence, of *extinct species* and of *changes in the*  
*forms* of organized beings, demonstrates, to  
*rational thought*, the intervention of the same  
 intelligent power who gave origin and primitive  
 order to the general system; and exhibits, for  
 the apprehension of the intellect, as it were, the  
*Sign-Manual of the Creator*.

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<sup>1</sup> CUVIER, § 6. p. 38.

A difficulty, which some of these extinct species occasion to this geology, arises from the circumstance of their not being found *in the same places*, or—*the same strata*, with those animals whose species have been preserved. Hence, it concludes, that they *cannot have co-existed*, but must have perished in *different revolutions*. Assuming the fact alleged to be universally confirmed, which is not the case; yet, the resort to *different revolutions*, is as unreasonable in this case as in all the preceding. For, suppose that the *palæotheria* and *elephants* did not inhabit the *same regions* of the submerged continents, as the *camelopard* and the *kanguroo* do not inhabit the same regions in the present continents, and that they were therefore not congregated in the *same places*, which is not only possible, but highly probable; and suppose that their races perished in *different subsidences* of land, and at *different periods* of the inundation, which is equally probable; then, they would not have been carried off by the *same currents*, at the *same times*, and in the *same directions*; and then, they would not have been deposited in the *same places*. Or, if the one was deposited before the other, with an interval of time sufficient to allow the continually agitated bottom of the sea to cast up and accumulate vast masses

PART III.

CHAP. VIII.

PART III. of its moveable soils above it, before the other  
CHAP. VIII. was brought and deposited; then, although  
they had co-existed, yet the one would become  
imbedded in deeper strata than the other; and  
thus, the hypothesis of *different revolutions* is  
not required, nor sustained, by the phænomena.  
It is not, therefore, by endeavouring to deduce  
*geological theories* from *fossil remains*, that the eminent  
naturalist, who has devoted so much ingenuity and  
zeal to the examination of them, will serve the cause  
of *true knowledge*; it is, by applying his *anatomical*  
and *zoological* skill and experience to discriminate  
between the *extinct* and the *preserved* species,  
and thus, to bring us acquainted with those  
*animal races*, which the Author of creation thought  
fit to exclude from His renovated earth.

## CHAPTER IX.

AGAIN, the mineral geology demands *more revolutions*, to enable itself to unriddle a phænomenon which is presented to it in penetrating the different strata of the globe. “If,” it says, “we examine with greater care these remains of organized bodies, we shall discover in the *midst* even of the *most ancient* secondary strata, other strata that are crowded with *animal* or *vegetable* productions which belong to *land* and *fresh water*; and amongst the *most recent* strata, that is, the strata which are nearest to the surface, there are some of them in which *land animals* are buried under *heaps of marine productions*. Thus, the *various catastrophes* of our planet have not only caused the different parts of our continent to rise *by degrees* from the basin of the sea, but it *has also frequently happened*, that lands which had been laid dry have been again covered by the water, in consequence either of these lands sinking down below the level of the sea, or of the sea being raised above the level of the lands. The particular portions

PART III,

CHAP. IX.

PART III. “ of the earth also, which the sea has aban-  
 — doned by its *last* retreat, had been laid dry  
 CHAP. IX. “ *once before*, and had at that time produced  
 ~~~~~ “ *quadrupeds, birds, plants, and all kinds of ter-*  
 “ *restrial productions*; it had, then, been inun-
 “ *dated by the sea, which has since retired from*
 “ *it*, and left it to be occupied by its own
 “ proper inhabitants. The *changes* which have
 “ taken place in the productions of the shelly
 “ strata have not, therefore, been entirely
 “ owing to a gradual and general retreat of the
 “ waters, but to *successive irruptions and re-*
 “ *treats*; the final result of which, however, has
 “ been an *universal depression of the level of*
 “ *the sea*¹.”

We here plainly perceive the consequence, of navigating an unknown ocean *without card and compass*. Had the ingenious geologist piloted his course by the *Mosaical card*, he would have pursued a direct and simple track, conducting him to the haven which he sought; but, having left his card behind him, he traverses and counter-traverses the same ocean in all directions; sees the same head-lands over and over again; and imagines that he is making a steady progress, and that all those head-lands follow each other in regular order of succession. Because

¹ CUVIER, § 5. p. 36.

PART III.

CHAP. IX.

animal and vegetable relics are found buried in the midst of soils which are too confidently pronounced *the most ancient* secondary strata, and because *land animals* are found buried *under* heaps of *marine productions*, Cuvier at once assumes, that the various *positions* of these relics constitute evidences of as many *different terrestrial surfaces*, successively overwhelmed in the order in which they present themselves; and that they therefore indicate, so many *different revolutions*. And this might be inferred, with some plausibility, if there were no such thing in the world as *mixture* and *confusion*, and if all substances existed, necessarily and always, in a state of unchangeable *order* and *regularity*. But, if that is not the case, the ground of the argument at once disappears.

It is surprising that it should not have occurred to this able naturalist, before he concluded, that *every stratum in which animal exuvie are found, must have been once a permanent upper surface of the globe, on which the animals dwelt and were nourished*; to examine, *whether those strata reveal any characters betokening such surfaces*, which characters could not have been *totally obliterated*. But, no such characters pertain to the soils in which the fossil *exuvie* of terrestrial animals are found; on the contrary,

PART III.

CHAP. IX.

these lie in the heart of a mere mineral mass, the same above, below, and on every side; like a stone thrust into a lump of thick mortar, or inclosed within coatings of a more fluid. Hence, then, there can be *no reason* for supposing the *strata* in which they lie to have once “*produced quadrupeds, birds, plants, &c.*;” and consequently, none for supposing, that they were there “*inundated by the sea, which has since retired from it.*”

But, as the characters of the phænomena in question plainly betoken a condition of *disorder* and *confusion*, we can easily explain it from the *data* of the *Mosaical* geology. We have seen; that innumerable *land animals*, pertaining to the submerged continents, were transported and precipitated indiscriminately into the sandy, or slimy, bottom of the primitive sea, and were sunk deeply within it. Now, if a *cause* can be found that might, in the same revolution, cover the *bed* in which those *land animals* were thus inclosed, with a *fresh mass* containing *marine* productions, the whole difficulty will be removed. And need we seek far to find such a *cause*, when we reflect upon the *powerful agency* which was in *unceasing operation* during the whole of that turbulent and destructive *crisis*? Can we fail to

PART III.

CHAP. IX.

perceive, that after *terrestrial* substances had been successively transported, at different moments, from different parts of the subsiding continents, and had been deposited; violent and particular agitations of the restless sea within its basin, especially in the latter stages of its draining, might have dislodged, ploughed up, and put in motion, enormous masses of its loose soils, and have driven them, loaded with *marine* substances, upon the beds into which the *terrestrial* animals had been previously sunk? Repeated instances of similar confusion may, and *must*, have occurred in the depths of the ocean, during that disorderly and tumultuous crisis; producing *various alternations*, diversified by local circumstances, and reducible to no rule of regularity and order. And these, being eventually exposed to the observation of man by the removal of the waters, must be found to retain all the characters of disorder and confusion which accompanied their formation. To trace, in their detail, *all* and *each* of the particular local effects produced, and to assign them severally to their respective *immediate causes*, is a task beyond the ability of man, whether he adopts the *Mosaical* or the *Mineral* scheme of geology; and we may therefore refer those effects, generally, and with far better title than the *latter geology*, to—"des

PART III. “ *causes qui nous sont inconnues*¹—*causes which*
 — “ *are unknown to us.*” And thus, the *one, last*
 CHAP. IX. *revolution* of the Mosaical record, will be found
 amply sufficient to account generally for the
whole of this particular class of phænomena;
 from which the mineral geology would infer,
 “ *various catastrophes of our planet,*” and “ *suc-*
 “ *cessive irruptions and retreats of the sea.*”

The *fresh-water* shells alleged to be found
 in some of these accumulations, are inade-
 quate to sustain the objections which the
 mineral geology would ground upon them;
 1. because, in the subsidence of the ancient
 continents, the contents of all the *river-beds*
 must have become absorbed by the sea, and
 it is impossible to fix a limit to the trans-
 port of such light and buoyant articles, in
 so turbulent and active a state of the ocean:
 2. because a very just and pertinent doubt is
 raised by Mr. Greenough;—Whether the dis-
 tinction between *fresh-water shells* and *sea shells*
 is so certainly and securely ascertained, as to
 allow of a conclusive argument founded upon
 that distinction?

Another plea for requiring a concession of
more revolutions and *more time* than are supplied

¹ D'AUBUISSON, t. i. p. 271.

by the Mosaical record, is to account for a PART III.
 phænomenon affirmed to have been lately dis-
 covered in Norway¹; namely, a *granite* forma-
 tion resting upon a base of *shell limestone*—
calcaire coquillier. Now, (argues the mineral
 geology,) *shell limestone* is unquestionably a
secondary formation; yet here is *granite* formed
 upon it, and therefore, posterior to it in date;
 because, that which supports, must always
 be more ancient than that which is sup-
 ported. Here then is a proof, of the *actual*
 crystallization of a *recent granite*; which virtu-
 ally confirms the doctrine, of the crystallization
 of *primitive granite* in a *chaotic fluid*. Both
 required the *time*, necessary for the operation
 of their production; and they will therefore
 concur to prove, a period irreconcilable with
 the Mosaic chronology.

CHAP. IX.

To this argument, influenced entirely as it
 is by a devotion to the *Neptunian* geology, I may
 oppose a question addressed by the same geo-
 logy, to an argument, urged with equal zeal
 in support of the opposite, or the *Plutonian*:
 “ Est-elle un *fait positif*? est-elle en *réalité* ce
 “ qu’elle est en *apparence*? On pourroit en
 “ *douter*.” This cautionary question may

¹ D'AUBUISSON, ii. p. 197, 226.

PART III. be confidently asked, when it is affirmed by the
 CHAP. IX. same writer, that “*we have only this one direct*
 “*example of such a superposition*¹.”

The *fact* to be explained, is simply, *the appearance of a granite formation upon a limestone base*; which *appearance* must be investigated, before we can treat it as a *reality*. Yet the Neptunian geology instantly *assumes* it for a *reality*, and that the cause is certainly *chemical*; and, upon that assumption, it proceeds to argue the *mode* and *time* of its *formation*. But, if the true cause should chance to be *mechanical*, and not *chemical*, then, all the chemical argument must fall to the ground.

Now, supposing the fact of the superposition to be well proved; one of two *mechanical* operations, may have been sufficient to cause the effect apparent in the sensible phænomenon. 1. If a mass of displaced primitive granite had been so stationed, in the *first Mosaical revolution*, as to leave *cavities* or *recesses under any of its sides*, those cavities or recesses might, during the *second Mosaical revolution*, or during *the interval* between the two, have become entirely filled with marine matter, calcareous, siliceous, or argillaceous;

¹ D'AUBUISSON, ii. p. 226.

and, during the ages which have elapsed since that last revolution, that marine matter might have become moulded in close adhesion to the upper mass, and have become hardened into rock of one or other of those species; presenting the *appearance* of a bed, on which the granite has more recently been formed. Thus, the *superposition* of the *granite*, would turn out to be, the *subposition* of the *secondary rock*; and the phænomenon would fail to prove, what the *chemical* argument would endeavour to prove by it.

Or, 2. if, in the violent circumstances attending, or concluding, *the second revolution*, any vast dislocations of the “rude frame-work of the globe” took place, as they did in the *first* revolution; the overthrow and projection of a granite mass or masses on the bed of the sea, abundant in marine matter and organic productions, would produce the same sensible appearance at the present day; and we know, that *shell limestone* constitutes the soil of parts of the Scandinavian peninsula¹. Thus, then, *mechanical* causes were capable of producing the sensible effect, which the Neptunian geo-

¹ JAMESON'S *Mineralogy*. Ind. *Shell limestone*.

PART III. logy determines arbitrarily and precipitately to
 CHAP. IX. *chemical*; and in so far they nullify its induction.

And it is the more surprising, that the possibility of this *mechanical* cause did not suggest itself to our able mineralogist; because he himself reports, that immense masses or fragments of *primitive* rock, of double the bulk of the Norwegian granite¹, are found in the valleys of the Alps, which have been disunited from the parent mass, and have been “evidently “transported” to a bed of *secondary* formation. This fact, the *Mosaical* geology guides us to interpret. The *mineral* geology is forced to ascribe all such transports to the agency of *water*; because it can find no other impulsive force of equal power. Now, if in the first *Mosaical* revolution, by which the primitive sea was formed, the convulsions which caused so general a breach and depression of rocks and soils had shattered and separated some masses of *primitive rock*, without dislodging them from their base; and if, in the agitations of the ocean in the second revolution, when it was draining from its former bed, its violence at length displaced those separated portions from their base, and

¹ Comp. D'AUBUISSON, i. p. 232, and ii. p. 228.

projected them into the sea-bed in which *secondary formations* had been in course of production for 1656 years; then, the result must have exhibited the general phænomenon which is to be explained, whether in Norway, or in the Alps; varying only in details, equally open to investigation. It will therefore be wise, to observe the caution which the same geologist prudently suggests upon this subject: "Let us *wait* until a positive and accurate observation has *proved*, directly or indirectly, the superposition of a granite *formation* upon strata containing relics of organic beings; before we displace it from the class, to which observation has hitherto assigned it¹."

PART III.

CHAP. IX.

PART III.

CHAP. IX.

In assigning therefore a cause for those formations, it makes the singularity of time an- swerable to D'AUBUISSON, tom. ii. p. 199. To reduce that indefiniteness of time into finite parts and smaller measures, it has indeed suggested, for our convenience, what it terms epochs, borrowed from the archives of the old Chaldean philosophy: "It (it says) the dif- ferent epochs or revolutions, in which our planet was reduced from a chaotic state to its present habitable form; be measured by those

CHAPTER X.

PART III. THE forms of *valleys* exhibit phænomena, which, in the view of the mineral geology, suppose
 CHAP. X. *physical* operations that cannot be limited to the periods of time and the revolutions represented in the Mosaical geology and chronology. It is especially in the *formation of valleys*, that this science observes; “*Time*, which has such
 “ narrow limits for *us*, has none for *Nature*; for
 “ *her*, it is as indefinite as *space*: both surpass
 “ even the conception of our imagination¹!”
 In assigning therefore a *cause* for those formations, it makes the *indefiniteness of time* answerable for the soundness of its conclusions. To reduce that indefiniteness of time into *finite parts* and *smaller measures*, it has indeed suggested, for our convenience, what it terms *ecliptic days*, borrowed from the archives of the old *Chaldaic philosophy*: “*If* (it says) the dif-
 “ ferent *epochas* or *revolutions* in which our
 “ planet was reduced from a *chaotic state* to its
 “ present habitable form, *be measured* by those

¹ See above, p. 24.

“ great ecliptic days, (*each consisting of above* PART III.
 “ 20,000 years,) sufficient time will *be allowed*
 “ for the various changes¹.” This is very CHAP. X.
 accommodating; but, one material thing is
 here forgotten, which defeats the whole intent;
 and that is, to inform us *who* it is that has
 authority, either to *use that measure*, or to
make that allowance: for certainly, it is not left
ad libitum of the mineral geology.

There is no article in geology, in which the
mineral system betrays more manifestly its need
 of a guide to conduct it, with relation both to
fact and *time*, than in speculating upon the
causes which produced *valleys*. Let us hear it
 pronounce its own speculations upon this
 subject. “ The disposition, direction, and
 “ structure of valleys, their form, the stratifica-
 “ tion of the mountains which border them,
 “ are *indications of their origin*. Every body
 “ has remarked the *manner* in which *rain-water*,
 “ especially after a violent thunder-shower,
 “ furrows the surface of hillocks, or any ground
 “ presenting a *sloping* surface. In the disposi-
 “ tion of these *minute ravines* relatively to the
 “ declivity on which they occur, in the
 “ sinuosities and deviations of their directions,
 “ in their ramifications, in the form of the

¹ BAKEWELL, *Elem. of Geol.* p. 429.

PART III. “ portions of soil enclosed between them, &c.
 CHAP. X. “ we possess the *most faithful representation of*
 “ *the facts of the same kind, which are presented*
 “ *by valleys and mountains. In examining in*
 “ *our cabinets the models in relief of mountain-*
 “ *ous chains, we seem to behold some of those*
 “ *very hillocks furrowed in the manner which*
 “ *has been described. At the sight of this*
 “ *singular disposition and ramification of*
 “ *valleys, we cannot but acknowledge, with*
 “ *Mr. Playfair, ‘ that it is the blows of the same*
 “ *‘ instrument often repeated, which has engraved*
 “ *‘ these characters so deeply on the surface of the*
 “ *‘ globe;’ and this is, above all things, the*
 “ *erosive and decomposing force of water. With*
 “ *respect to myself, it is impossible for me to*
 “ *doubt it, when, stationed in a chain of moun-*
 “ *tains, I consider all these characters, that is*
 “ *to say, the valleys of different orders and*
 “ *their gorges; and when I see them all, even*
 “ *to their last ramifications, directed according*
 “ *to the line of the greatest declivity of the*
 “ *sides of the mountains. For, in fact, the*
 “ *waters are capable of producing the effect;*
 “ *they tend to produce the effect; and every*
 “ *thing is as if they had actually produced it¹.”*

¹ D'AUBUISSON, tom. i. p. 245, 6.

There is nothing more fallacious, or against which reason ought habitually to guard itself with more vigilant circumspection, than general and superficial resemblances which tend “*naturally to lead us to infer identity.*” We have exposed this fallacious principle, in the first part of this disquisition; and, perhaps, few more striking examples to confirm the importance of the remark could be found, than this which this able mineralogist here inadvertently affords us.

It is evident, that in this scheme of geology, the *origin* of *valleys* and of *the beds of rivers* must be ascribed to *one and the same cause*; namely, the action of water, eroding and excavating “*avec le tems¹—with the aid of time,*” both the valleys and the river-beds. For, the excavation of river-beds, must have been a *continuation* of the effect of the excavation of the valleys from which their waters proceeded; and the erosion of the valleys must therefore, according to this hypothesis, have been accompanied by the erosion of the channels which carried off the waters that are supposed to have formed the valleys; so that the *river-beds*, equally with the *valleys*, will answer to the *minute ravines* furrowed by the erosive and decomposing power of

¹ D'AUBUISSON, tom. i. p. 238.

PART III. the *rain-water*. The question therefore proceeds,
 CHAP. X. from the power of water to erode and excavate,
 generally; but it terminates, in its power to erode
 and excavate *the channels of rivers, in particular*.

Let us then consider this supposed operation in the latter case, with some attention; because, if physics and sound reasoning should find that it is an operation impracticable in the latter case, it will go to determine the probability of the operation in the former case. Now, it will be plain to reflection: 1. That there is no known power, or law, in what we denominate *nature*, by the operation of which the waters of a river could form for themselves a *bed*, such as are the actual beds of rivers, in a surface originally compact, extended, and nearly horizontal. 2. That the waters of rivers would never have reached the distant points, at which they now discharge themselves into the sea, if beds *leading to those points* had not *previously* been opened to conduct them thither. 3. That there would, consequently, have been *no rivers* on the globe, if river beds had not been provided, anterior to the procession of their waters.

1. It is granted, that a mass of waters descending from a mountainous ridge, through a passage determining the first diameter of its bulk, would form a column of water whose

weight and force would make a breach in the surface that should receive it; and, that the descending waters, while laterally confined, would, by the same mechanical action, extend the breach, and plough up the soil, to a certain extent and within a certain angle of declivity. It might, also, by the same power, and by its erosive quality, enlarge an aperture into which it should be *directed by an existing channel*; as in the *particular* case adduced by M. D'Aubuisson to prove the *universal* power of water for originally excavating beds of rivers: where, near the sources of the *Ardèche* in the high Vivarais, a stream, whose granite bed had been choked by an ancient volcano, had worked itself a new bed, not in the upper surface of the lava, but, *between* the lava and the granite¹.

But, let us suppose a flood of waters to descend, *for the first time*, from a mountainous source, and to arrive, *for the first time*, at an horizontal, compacted, expanded, and *unchannelled* surface of *plain*, propelled by the waters continually following with equal and unremitting violence and rapidity, and diverging by the expansion of the lowest valley; and what would be the necessary consequence? If the *first head* of those waters found *no bed* ready to

¹ Tom. i. p. 241.

PART III. receive and confine them, and to *guide* their
 CHAP. X. course, they would diffuse themselves *laterally*,
 and equally, in all directions, over the horizontal surface; and, flowing in a state of wide and uncontrolled inundation, they would follow the first and nearest declinations. How could they possibly form for themselves, in the *first instance*, a narrow and confined channel *below* that horizontal surface, and between upright banks continuously paralleled, as by an artist's line? Let any one, for instance, survey the course of the Rhine from the tower of Godesberg, and see that majestic river journeying for upwards of thirty miles, from the *Seven Mountains* to Cologne, through a vast and level plain, and in a bed whose *uniform breadth* appears in the distance like an *azure ribbon* drawn along that plain; and he will be sensible, that no operation of *wild and diffusive waters* could ever have *reduced* them *within the particular line of soil*, in which he sees the flood of that river now necessitated to flow. Such diffusive waters might have formed a lake, or a morass, but they never could have formed such a bed or channel.

For, let us only consider, with some attention, what the *bed* of a river is, abstracting the water. It is a vast and extensive *trench*, preserving general proportion in its width. We

know how a *trench* must be made: the soil must be *dislodged*, between two corresponding lines, by beginning at one end, and successively displacing the matter which is to be removed. If we *will* suppose that trench to be formed, at first, by the *waters* of a river, we must not content ourselves with an indolent and general cast of the *imagination*; we must submit to the pains of tracing the operation, so as to satisfy the demands of the *reason*. Let us then suppose the sources, whose confluence produces the Danube, discharging their waters for the *first time*; and let us follow those collected waters, until they *first* attained an *horizontal* surface, in which was no bed or channel to receive them. If we suppose them to begin the work of excavating a measured trench at that point, we must first determine, whether the operation was *mechanical*, or *chemical*; whether the waters acted upon the materials to be removed by the *impulse of weight*, or by the *decomposition of erosion*. Whichever process we fix upon, we must at the same time suppose, that all the waters in the rear were kept back and suspended in their flow during that tardy operation; and that they were only permitted to advance, in proportion as the *pioneers* in front proceeded in opening the trench. We must suppose, that they worked with a previous

PART III.

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CHAP. X.

PART III. design to conduct the trench to the point of the
CHAP. X. *Black Sea*, at a distance of *seven hundred leagues*,
and often through a level country; that the waters filed successively and orderly into the trench in proportion as it was opened for them; and that the parent sources did not deliver out all their stores, in unrestrained measures, until the trench had been perfectly conducted to its outlet at that sea. All this we must suppose, and suppose some unknown process, by which water can *bore* without overflowing its channel, if we suppose the first waters of the Danube to have worked out that bed in which they now journey to the Black Sea.

But, as this supposition would be manifestly absurd; let us consider, what would *really* have been the case. If the head of the Danube, on its first reaching a compacted and plain surface, came with any power, chemical or mechanical, *tending* to displace the soil which it there first encountered, the violent, rapid, and multitudinous mass of waters immediately and continually succeeding, would have allowed it no time to indulge the *tendency* of either of those powers; but would have overruled them both, and have frustrated the operation, by compelling the first waters to advance, and obliging them to diverge with equal force on all sides; and thus gain their equilibrium *upon the surface*,

by the laws of hydrostatics, before any progress could have been made in the process of *boring* or *furrowing* a trench *within it*.

PART III.

CHAP. X.

The case of a river *already confined between banks*, and by its concentrated weight propelling in the same plane loose alluvial soils, and thereby changing the direction of its course; can afford no analogy whatever to a mass of tumultuous and rapid waters, flowing forward perpetually, and without any confinement, *over* an expanded and closely compacted surface.

But, if the trenches in which rivers flow were their own work; if their beds are the consequence of “the blows of the same instrument often repeated;” how has it happened, that since the instrument supposed has been always striking its blows, and is still striking them, it has not proportionately extended its work? for, though the erosion of *valleys* has ceased, the erosion of *river-beds* which are only the processes of the valleys, and their erosion the continuation of that of the valleys, is still going on. If such then was truly the cause, the beds of all rivers ought now to be of precipitous depths; because a *cleft* always grows *deeper* at each successive blow upon the wedge. Whereas, we have no reason to believe, that the Rhine is wider or deeper now than it was in the time of Cæsar, or the Euphrates than it was in

PART III. the time of Cyrus. This then could not have
 CHAP. X. been the *cause* which originally gave to those
 rivers their *beds*, otherwise it would have constantly and uniformly increased its effect. In truth, we might with equal reason suppose, that the sea *eroded* its present bed in the surface of the globe, as that rivers eroded their beds in the same surface.

2. It follows then, that the waters of the earth, flowing originally without confinement, would follow the nearest declivities. The sources of the Danube, discharging their waters on an *untrenched surface*, would never have had any relation with the particular remote point of the *Black Sea*; because, many intervening *passages* and *declensions*, from which those waters are now precluded by the *restraint of their banks*, would have drawn them in *other directions*. And, the same is to be said of all other rivers; which would never have reached the particular points, to which the confinement and artifice of their beds now conduct them.

3. Consequently, there would have been no rivers on the globe; but the earth would have presented a surface exposed to, and unprotected against, an *universal inundation* of its waters, continually accumulating.

Since then the mere action of water could

not, either chemically or mechanically, have eroded or excavated the beds of rivers; and since the erosion and excavation of river-beds, must have been the sequel and continuation of the erosion and excavation of valleys, if these had been really formed by either of those operations; we are directed by reason to conclude, that the cause thus shown to be *inadequate* for effecting the latter part of the system, could not have been the true cause of the former part; especially, since we can discern an *adequate* cause, *common* to the formation both of valleys and river-beds, and resting upon far more solid ground of evidence than any which mere *physical* speculation is able to adduce.

The systems of valleys and mountains are evidently *co-ordinate* and *correlative*; and mutually suppose each other; a *mountain*, signifies nothing but an *elevation above a valley*; and a *valley*, nothing but a *depression below a mountain*; and, as *valleys* signify narrow depressions between mountains, so *plains* signify extensive depressions between chains of mountains. The surface of our earth is thus always described by relative comparisons of height within itself. This diversity of surface, we have traced in the preceding discussion to *two causes*:

PART III.

CHAP. X.

1. To a primitive violent *depression* of parts of the terrestrial surface, leaving other parts *stationary*, on their primitive bases; the *latter*, are the *primordial mountains* of the globe, the *former*, are its *first order of valleys and plains*. This great operation was effected by the *immediate* power of God, in the FIRST REVOLUTION of the globe; with the *proximate* design, of the formation of a *bed* to contain the *primitive sea*.

2. To a vast displacement of the *soils of that primitive sea*: partly, while it continued permanent; and partly, during its retreat in the SECOND REVOLUTION, when, diminished in quantity, and bearing its turbulent mass towards its *new bed*, its latter billows ploughed up and propelled immense portions of its *ancient bed*, thereby excavating deep and irregular hollows, and raising vast accumulations. For, as the mineral geology truly observes; “ the immense floods of the sea must have
“ produced, upon the soils on which they
“ acted, effects proportioned to their mass and
“ rapidity. Currents, which displace sand-
“ banks, undermine rocks, and open straits,
“ are able to transport materials deposited
“ on the bottom of the sea; to furrow a soil
“ devoid of consistence; and to *excavate sub-*

“*marine valleys*¹.” By these mighty agents, were produced those *valleys* or *plains*, which intersect heights of secondary formation whose strata correspond to each other; the substance of which, though now compact and solid, was soft and incohesive when the oceanic currents violently displaced and expelled the intermediate portions of their masses. These form the *second order* of high and low levels, which we witness upon the terrestrial surface.

But, although the formation of a *bed for the primitive sea* was the *immediate* object of the divine plan in the *first revolution*, yet, the same intelligent and provident Agent had an *ulterior* and *more important* end in view; namely, that that *bed* should become, at a future period, the *habitation* of the principal generations of mankind, and the *theatre* of the chief moral transactions for which He had created their race. When we contemplate the stupendous operation, by which He first opened a receptacle for the universal waters; when we trace in thought, the immediate effects of the disruption and infall of a portion of the continuous surface on which they rested; when we reflect, upon the sudden breaches thus made in its regularly arranged

PART III.

CHAP. X.

¹ D'AUBUISSON, tom. i. p. 220.

PART III.

CHAP. X.

materials and general frame-work, upon its fractured and crumbled parts, and its loose soils discharged and scattered over its lowest bed in all directions; the mind, at first, perceives nothing but a scene of *ruin and devastation* of a work just before created in *perfect order and regularity*; and it is confounded by the appearance of a *contrast* so extreme, as the *work of destruction* and the *wisdom of the Artificer*. But, when it proceeds to the consideration, that this operation of *apparent destruction* was governed by the same Wisdom, “*whose ways are not as our ways, neither His thoughts as our thoughts*”¹, and that it was directed with a view to a *future purpose*, which it has so admirably attained, and for which it was so perfectly adapted; that it was contrived with the design, that *the bed of the primitive sea* should eventually become the theatre of a *second human race*, as *the bed of the primitive abyss* had been made the theatre of the *first human race*; and consequently, that the apparent ruin was conducted on a *plan* which should produce the *best means* of supplying the wants and accommodating the subsistence of that race; that the breaches then made were effected in such a manner as

¹ Isaiah, lv. 9.

should, among other ends to be attained, constitute an universal and perfect system, for supplying the surface of the future earth with the *waters* indispensably necessary to sustain animal and vegetable life; for facilitating intercourse between its future inhabitants; and for producing every kind of culture requisite for their necessities, by various and different inclinations of the terrestrial surface; it contemplates that *first revolution* with amazement, when it reflects upon the *providential skill* which it discerns in the *final results*. When we examine the innumerable *monuments of that primæval ruin* amongst the highest mountains of the globe, we find their very *forms* essentially necessary (to borrow the language of the mineral geology) “for separating the beds of “ rivers from one another; and serving, by “ means of their eternal snows, as reservoirs “ for feeding the springs¹.”

When we consider these objects by the rule of the *Mosaical geology*, we can find no difficulty in solving the problem, of the *origin of valleys and the beds of rivers*. “By what “ *miracle* (exclaims the mineral geology) have “ the *depressions*, which are supposed to have

¹ See above, pp. 70, 71.

PART III. “ produced the *transverse valleys*, been made
 CHAP. X. “ perpendicular to the mountainous chains or
 “ ridges, and with a view to that chain? *How*
 “ have the depressions of the secondary valleys
 “ been made perpendicular to the branches of
 “ the chain, and with relation to their summits?
 “ *How* did those depressions produce all the
 “ *ramifications* by which the valleys lose them-
 “ selves at last in those ridges and those sum-
 “ mits¹?” That is, in other words, “ by what
 “ *miracle*, has such *correspondence of parts* been
 “ observed in the *depressions*?” I answer,
 according to the philosophy of Newton, by *no*
miracle; but, by the operation of the *first phy-*
sical principle of all things, the intelligence and
 power of the Creator. Whence is it, that this
first principle is so constantly and habitually
 overlooked? Is it, that the object itself is *too*
small, or *too remote*, for the mental eye to per-
 ceive it? Or, is it rather, that the mental eye is
 become *too dim*, through want of exercise, to
 perceive it? The term *miracle*, is properly
 applicable to those acts only which the Creator
 may think fit to exercise in His physical world,
 in opposition to, in suspension of, or without
 the ministry of, the laws which He ordained for

¹ D'AUBUISSON, tom. i. p. 249.

its *continuance*, after He had created and completed it; not those which He exercised in creating and completing it. For, the combined action of His intelligence and power is as necessarily the *first principle* in *universal physics*, as the attraction of gravitation is the *first principle* in a subordinate branch of physics; which last resolves itself into the former. And, however admirable and amazing to our contemplation the exercise of those combined attributes may be, yet it is not *miraculous*, according to the proper use of the term; because, we cannot apprehend the origin of any thing without recognizing it.

The varied system of *valleys*, and their intimate and direct relations both to *mountains* and *rivers*, which the mineral geology perceives, but for which it is at a loss to account, are referrible to, and can only be explained by, that great *first principle*. Why then is it at any loss? Because, in taking a view from the crests of mountains, it traces a superficial and illusive resemblance, between the directions of *valleys* and the streams which they send forth, and the *furrows* fantastically drawn by rain water upon the surface of a declivity after a thunder-shower. But if, instead of thus surrendering the *rational* faculty to the first importunities of the *imaginative*; and, in-

PART III. stead of confining the thoughts to the *model*
 CHAP. X. *in relief* of any particular system of valleys
 and their streams, it had surveyed the *uni-*
versal system as it is delineated upon a globe,
 or map of the whole earth; and if, instead of
 comparing that delineation with the rambling
 furrows of the thunder-shower, it had com-
 pared it with an *anatomical delineation of the*
vascular system, by which the fluids necessary
 to *animal and vegetable life* are transmitted to
 every part and extremity of the animal and
 vegetable structures; it would have found
another resemblance, disclosing *another principle*
of analogy by which to argue; and which
 would have caused it to reject, at once, the
 inadequate argument grounded upon the de-
 lusive resemblance of the *rain furrows*.

It would then have found, that those rea-
 soned with *most philosophy*, who anciently drew
 their conclusions from the *Mosaical geology*.
 The position, “*when the waters gushed out, the*
*streams overflowed*¹,” is undeniable in physics.
 That “*every thing shall live, whither the river*
*cometh*²,” is equally undeniable in physics.
 But, if “*the streams had overflowed*,” without
 confinement and direction, many things, and

¹ Psalm lxxviii. 20.

² Ezek. xlvii. 9.

many portions of the earth, must have perished, PART III.
 because, “*the river would not have come to*
 “*them;*” because, the unconfined waters would
 have stagnated in inundation, or have pursued
 the nearest declivities tending to the sea.
 Therefore, that “**GOD CUT OUT THE RIVERS**
 “*among the rocks*¹ — *and sent the springs into*
 “*the valleys*² ;” that “**HE CLEFT THE EARTH**
 “*with rivers*³ ;” was the inevitable conclusion
 which those who were taught by the geology
 of Moses deduced from his principles, in exact
 coincidence with the philosophy of Bacon and
 Newton.

CHAP. X.

Nor did the *consequence*, and therefore the
end of this admirable arrangement, escape their
 discernment ; for, “ all the rivers run into
 “ the sea ; yet, the sea is not full ; *from*
 “ *the place from whence the rivers come,*
 “ *thither they return again*⁴.” The first direc-
 tion of the waters, from their *sources* into the
valleys ; their *process* from the valleys along
 the plains, and *below the surface* of the plains
 to their respective *seas* ; from which general
 receptacle they are again raised by *evaporation*
 into *clouds*, which are returned by the *winds*

¹ Job, xxviii. 10.

² Psalm civ. 10.

³ Habak. iii. 9.

⁴ Eccles. i. 7.

PART III.

CHAP. X.

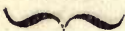
to the *mountainous chains*, and, in the form of *rain*, or *snow*, continually replenish the *sources*, in *perpetual circulation*; constitute a system so profoundly stamped with the characters of *intelligence* and *power*, that they can never be attributed by any one, whose mind is in the smallest degree imbued with Bacon's or Newton's philosophy, to any other *cause*, than that which originally caused the universal system of *animal and vegetable life* which that *circulation of waters* is destined to sustain; and which likewise contrived the ducts and channels, in which the *circulating fluids* of the first animal and vegetable structures were conducted throughout their respective systems: so intimate and inseparable was the *mode of first formation*, in all the *three kingdoms* of terrestrial matter. If, therefore, the mineral geology asks, what was the *mode* of the first formation of the *fluvial circulating system*; I reply, that it was the same as that of the first formation of the *vascular circulating system*; if it will name to me that mode, I will also name to it the mode of the former. If it hesitates, or replies, οὐκ οἶδαμεν — “*we cannot tell!*” I also shall reply, after the highest example — οὐδε ἐγὼ λέγω ὑμῖν — “*neither tell I you!*”

Is it not astonishing, that the author of so masterly a work as the section “*of mountains*

“ *and chains of mountains,*” in the *Traité de Géognosie*, should conclude, by ascribing the admirable and stupendous *fluvial system* to the same *blind cause* which furrows a sloping footpath after a violent shower; rather than to the *Intelligent Cause*, which contrived and executed the *vascular system* in created animals and vegetables? especially, since he dwells much upon the rules for forming a *correct chart* of that fluvial system, namely, the *rivers of the globe*¹? How could such a *delineation* combine itself in his superior mind with that of the fortuitous rain-furrows, and form no combination at all with the *delineation* of the *arterial and venal conduits*, to which they bear so much sounder and more philosophical an analogy? From whence can have proceeded so strange an oversight in a writer, than whom no one has displayed more ability, acuteness, general circumspection, and integrity? It has arisen, solely, from the *seduction of SENSIBLE PHÆNOMENA, in physics*; and from a neglect to inquire, philosophically, into their *real competency to reveal the MODE of FIRST FORMATIONS*.

However “*naturally*” the rain-furrows may tend “*to lead us to admit an identity of cause*”

¹ D'AUBUISSON, tom. i. pp. 111, 115.

PART III. with the formation of valleys, it is certain,
CHAP. X.  to suffer ourselves to be so led by them. If we view the subject from higher ground, we must at once disclaim the conclusion. This is a case, in which the contradiction of *fact* and *phænomena*, is easily detected. If we had nothing else to consider, but how the earth's surface might be furrowed by streams of water having *no reason* for their course, it would be of minor consequence to contest the analogy, or to point out its deficiencies. But, there is an essential disparity in the *effect*; and, therefore, there must be an equal disparity in the *cause*, of the two operations. The rain-water, which runs down a sloping footpath, works its way *at random*; it is a matter of *indifference*, every inch it moves, whether it travels on this side or on that side, in this direction or in that direction. But, how widely different are the directions of the streams and rivers which flow over the surface of the earth, from their sources to their mouths! These are all so skilfully and so equally distributed over that whole surface, for the necessary service of the animal and vegetable creations; so artfully *diverted*, in many places, from the *nearest seas*, and conducted through *extensive inland regions*, as the Danube in Eu-

rope, the Ganges in Asia, the Nile in Africa, and the Amazon in America; that they disclose an irresistible evidence of uniformity of plan and contrivance. The direction of all these *rivers* is determined, in the first instance, by the direction of the *valleys* in which they commence their course; the first formation of those valleys must, therefore, in sound philosophy, be ascribed to the Designer and Artificer of the general system so manifestly intended for *irrigating* the whole surface of the globe; and without which *system of irrigation*, the entire system of vegetation must necessarily have perished. And, if the *vegetable system* is to be ascribed to the divine intelligence; how much more rational and philosophical is it to suppose that the correlative *irrigating system*, to which the formation and direction of *valleys* and *river-beds* was as necessary as the formation of *arteries* and *veins* to the animal frame, was a corresponding part of the same intelligent ordinance; than that it was effected by the mechanical *chance*, by which rain trickles down a footway; and that it was by that *chance* alone, that the vegetable system, *created by intelligence*, was prevented from perishing through a *lack of providence!*

PART III.

CHAP. X.

CHAPTER XI.

PART III. THE formation of *coal*, is a problem which still
 CHAP. XI. engages the researches and speculations, not of
 the *mineral geology* only, but of *pure mineralogy*
 and *chemistry*. M. D'Aubuisson entertains a
 philosophical doubt, whether this substance
 ought to be classed with *intermediate*, or with
secondary formations; and he therefore leaves
 the point undecided. Upon the *nature of*
coal, he defers to the judgment of Mr. Hatchett;
 whom he duly designates, as "one of the most
 "able chemists of our time, and who has
 "applied himself, more than any other, to the
 "discovery of the *origin of coal*¹." This dis-
 tinguished chemist pronounces this question to
 be "a difficult problem in the natural history
 "of minerals²." He states the different
 opinions, which have been propounded with
 respect to the origin of this substance; and he
 then declares his own.

The different opinions which Mr. Hatchett

¹ Tom. ii. p. 298. *Note*.

² *Philosoph. Trans.* vol. xcvi. p. 135.

states are these *four*, of which the first *three* are *chemical* and *scientific*; the *fourth* is altogether *speculative*, and pertains exclusively to the *mineral geology*, viz.:

PART III.

CHAP. XL

1. That *coal* is a *mineral* substance — an *earth*, chiefly *argillaceous*, impregnated with *bitumen*.

2. That it is a *vegetable* substance — consisting of *vegetable accumulations*, mineralized under vast strata of earth.

3. That it is an *animal* substance — consisting of the fat and unctuous matter of *marine animals*.

4. That it is derived from the *primæval chaotic fluid*.

Mr. Hatchett declares his opinion to coincide with the *second* of these; and he establishes that opinion upon *experiments*, accurately made and repeated, in which he obtained *coal* in large proportion by the action of *sulphuric acid* upon *oak saw-dust*. These experiments, have determined the opinions of the best naturalists to regard *coal* as a mass of *vegetable matter*; converted, by some natural process, into the substance which it now exhibits.

Notwithstanding, however, the success of those experiments, there was always *one deficit*, rendering the coal *imperfect*. Mr. Hatchett could

PART III. never obtain *bitumen* with his coal; which is nevertheless an essential ingredient in *true coal*; and he therefore refers the production of bitumen to some *unknown process of nature*.

CHAP. XI.

But, with the deference so justly due to that eminent chemist, I beg leave to suggest; that it would seem to be time enough to resort to that ultimate principle, when all previous research shall have been exhausted; which does not yet appear to be the case. Experiments have indeed been skilfully made on *vegetable matter*, but it has hitherto been, only on *terrestrial vegetable matter*. It seems to have been forgotten, in these investigations, that *terrestrial vegetation* is only *one part of universal vegetation*; and that immense tracts of *marine vegetation* flourish in all parts of the *bed of the sea*. We may judge, from the vast quantity of *fuci*, and other marine plants vulgarly united under the general denomination of *sea-weeds*, which are occasionally cast upon some of our coasts, and which are commonly used for fuel in the islands of Jersey and Guernsey, of the immense quantities of these tribes of *vegetation* which must be contained in the different basins and depths of the sea.

Now, since “all naturalists are agreed in this one point, that our *present continents*

“ were heretofore the *bed of the sea*¹ ;” since beds of coals are found to lie in “ *concavities* ” varying greatly in extent, from a few to many “ miles, and containing numerous strata of coal “ alternating with *sand-stone, clay, &c.*²,” which describes a formation analogous to an ancient *sea-bed* ; since *marine* substances are found in the *adjoining* strata³ ; and since “ numerous “ sea-shells, and even bones of marine animals, “ are found in *imperfect coal*, as in that of “ Pomiers in Dauphiny⁴,” although none remain recognizable in *perfect coal*⁵ ; a strong argument of *probability* seems to arise, that if the substance of coal is of *vegetable* origin, we are

¹ See above, p. 277.

² BRANDE, *Manual of Chemistry*, vol. iii. p. 291.

³ DE LUC, *Lett. Géol.* p. 196.

⁴ D'AUBUISSON, tom. ii. p. 299.

⁵ M. D'AUBUISSON subjoins the following note to his discussion of *Coal*, tom. ii. p. 294. “ M. PROUST concludes, “ from his chemical observations *on coal*, that its matter pertained to *organized substances* ; and, after having remarked, “ that it yields a much greater quantity of *carbon* and *bitumen* “ than our vegetables, he says ; ‘ If *coal* is the result of “ organic productions similar to ours, its *imbedment* in the “ earth has not only annihilated every vestige of organization, “ but has entirely dissolved and recomposed its elements, so “ as to convert them into these fossil masses.’ ”—*Journal de Physique*, tom. lxii.

PART III. to seek for that origin in *marine vegetation*, and
 not in *terrestrial*; that the beds of coals, in their
 extensive *concavities*, were perhaps immense accumulations of *fuci*, &c., loaded with the various animal substances which shelter among them; and which were overwhelmed by vast aggrerations of the loose soils of the sea in the course of its retreat, and were left for decomposition by the chemical action of the *marine fluid* which they contained, and with which the *enclosing and compressing soils were saturated*. In this class of vegetation, *so circumstanced*, it is perhaps *possible*, that the ingredient may yet be found which was uniformly wanting in the carbonization of *wood of earthly growth*. At all events, there would seem to remain an higher probability, if *coal* be a *vegetable* substance, that such immense, continuous masses of that substance pertained to the *sea-bed* in which they are found collected, than that they were transported thither from a distant continent; especially, since so vast a proportion of the *vegetable creation*, as that peculiar to *the sea*, could not have been altogether annihilated, and remains to be accounted for.

And this may guide us to a final explanation of the phænomena which caused M. D'Aubuisson to doubt, whether he ought to connect *coal* with *intermediate*, or with *secondary* formations;

PART III.

CHAP. XI.

in the statement of which doubt, he approximates so nearly to the Mosaical geology. “The *intermediate* class (he observes, with Werner), pertains to an *epocha*, when a *revolution* took place in nature, which, according to the evidence of the numerous indications which we see, was perhaps the *most violent* of those that happened during the formation of the mineral crust of the globe. There is, indeed, great uncertainty in fixing the limits between this class and those which adjoin it; but, I think that they will be assigned with sufficient exactness, if we say; that the *intermediate class* is composed of the same rocks as the *primitive*, but alternating with some others containing relics of organic beings, and a particular sand-stone. We may, perhaps, further say; that the *intermediate soils* are those which succeed, in the order of time, from *coal-beds* to the first appearance of *organized beings*. I purposely avoid affirming, in this definition, whether or not the *coal* pertains to the *intermediate class*¹.”

But, if *coal* be *marine vegetation*, originally produced in a *bed* which must have been of the *earliest intermediate formation*, since it was

¹ Tom. ii. p. 199.

PART III. formed by the *first disruption and depression of*
 CHAP. XI. *primitive formations*, according to the Mosaical
 geology; then it will naturally be found at *the*
point, at which the definition of M. D'Aubuisson
 supposes; and it will have been subsequently
 buried under the accumulations of *secondary*
formations which are now found above it, and
 which will have taken place during the agita-
 tions and struggles of the *departing ocean*.

It would be gratifying to learn, that the
 eminent chemist who has already applied his
 mind to this inquiry, or his able and dis-
 tinguished friend the author of the *Manual of*
Chemistry, have been disposed to lend the benefit
 of their skill and science to the *examination*,
 at least, of the subject, which is here, with
 great deference, suggested for their consider-
 ation.

CHAPTER XII.

I SHALL now beg leave, in my turn, to propose a problem to the mineral geology, relative to its assumption; that the revolution which occasioned the destruction of the animal races of which we discover fossil *exuvie*, was *different* from that which established the progenitors of the present human race in Asia. And I shall propose my problem in the words of a writer, of whom the mineral geology can entertain no mistrust, as writing under too strong an influence of the Mosaical geology.

“ The *Camel*,” says Buffon, “ is more completely a slave than any other of the domestic animals; because, in all the other species, such as the *horse*, the *dog*, the *ox*, the *sheep*, the *swine*, &c. we find some individuals in a *state of nature*; animals of the same species which are *wild*, and which man has never brought under his subjection. Whereas, in *camels*, the entire species is enslaved; it is no where found in its primitive state of independence and liberty¹.” Now, the domesticity of an

¹ *Hist. Nat. du Chameau*, tom. iv. p. 338. 4to.

PART III.

CHAP. XII.

PART III. *entire race* of animals, is assuredly a phænomenon as well worthy of investigation, as the
 CHAP. XII. *extinction* of an *entire race*; and it must have a *cause* equally specific and distinct.

This general assertion of Buffon, however, requires to be qualified, and to be reduced to its exact measure of *truth*. It is *true* only of the *Arabian camel*, or the camel with *one hunch*; for, of the *Bactrian camel*, with *two hunches*, we know that the race exists in a wild state in Tartary¹, (where was the ancient *Bactria*,) and in the north of China. “Both the “*wild* and *tame* camels,” says Duhalde, “are found in the countries which border “upon the north side of China; at present, “the *wild* ones are only to be met with in the “country which lies north-east of China. “Chi Tchin gives the following account of “this animal. ‘The *camel* has very much “the resemblance of an horse in its body, “and has a head like a sheep; it has a “long neck, and ears that hang down; it has “three joints to its legs, and *two bunches of flesh* “on its back, which form as it were a kind “of saddle².’” This is the *Bactrian camel*. Of the *Arabian camel*, the assertion of Buffon re-

¹ *Nouveau Dict. d'Hist. Nat.* art. CHAMEAU.

² *History of China*, vol. iv. p. 33, 8vo.

mains *true*, in all its extent; this animal *alone* exists not in a wild state, but only in a state of domesticity. Cuvier has inadvertently affirmed, that “the *dog* is the animal which man “has reduced *most completely* under subjection¹.” We know that this is not the case, for the *dog* is found in a wild state; but, the *Arabian camel* exists no where in a wild state. This singular animal, from the earliest periods of Asiatic history, has constituted a principal part of the wealth of the regions in which it is possessed. Buffon’s ridiculous conceit, that the Bactrian camel had originally but *one hunch*, and that it acquired its *two hunches* from the condition of servitude to which the race has been subjected, is confuted by the two facts; 1. That the *only* species of camel which exists in a *free*, or *native* state, is that with *two hunches*; which alone could endure the climates of the high latitudes in which it is found in that state. 2. That the continuance in servitude of the Arabian camel, has never discovered any tendency to produce such an alteration in its conformation. This hypothetical whim of Buffon, is rejected by all the best and latest naturalists².

That the *Arabian camel* does not exist in a

¹ *Theory of the Earth*, § 30. p. 124.

² *Nouveau Dict. d’Hist. Nat.* art. CHAMEAU.

PART III. state of nature, but only in a state of *domesticity*,
 CHAP. XII. is a fact thoroughly ascertained. Nor can it be
 suggested, that it may hereafter be discovered
 in a natural state; for, the remark of Cuvier,
 concerning a research for the *extinct species*, is
 equally applicable to that of this species of
 camel in a *state of nature*. “ If there still
 “ remained any great continent to be dis-
 “ covered,” says he, “ we might perhaps expect
 “ to find them; but it is sufficient merely to
 “ glance the eye over a map of the world, and to
 “ observe the innumerable directions in which
 “ navigators have traversed the ocean, to be
 “ satisfied, that there does not remain any
 “ large land to be discovered; unless it may
 “ be situated toward the Antarctic pole, where
 “ eternal ice necessarily forbids the existence
 “ of animal life¹.” Throughout the entire
 globe, now so well known to us, *this camel*
exists only as a property of man.

Now, to *what cause* are we to attribute this
 most extraordinary fact? There are but *two*
 causes imaginable, in the nature of things:
 either, that the entire race, after having spread
 itself, like all other brute races, in free range
 over the globe, had at some period been chased,
 collected, caught, and secured by the con-

¹ *Theory of the Earth*, § 25. p. 76.

federated efforts of mankind; and so successfully, that not a *single pair* escaped in any of the solitudes of the earth to reproduce a free race: or, that at some period the whole of that race was, *by some cause to be assigned*, reduced and placed within the power of man, *from which it never afterwards escaped*.

The *first* of these cases, every sound understanding will discern to be morally impossible. We might as well account for the extinction of the race of the *mastodon*, by a similar confederacy; which the wildest speculator has never yet imagined. The *last case*, therefore, can alone be *true*. But, what *cause* can *physics* assign, for the reduction of this race of camels, at any period or *epocha of nature*, so entirely within the power of man, that it never again acquired its original freedom? Is it not amazing, that a naturalist of pre-eminent celebrity, who has been designated, by excellence, *the Historian of Nature*; and whom physical adulation has even entitled "*majestati Naturæ par ingenium*;" is it not amazing, that he should have stated thus forcibly so extraordinary a *fact of natural history*, and yet should not have given himself the concern even to make an attempt to assign its cause?

But, the Mosaical record enables a child to assign the cause; for it relates, that this race of

PART III.

CHAP. XII.

PART III.
 CHAP. XII.

camels perished, with all other animals, in the catastrophe of the deluge, excepting only *one pair*¹, reserved “*to keep seed alive upon the earth;*” and that thus, the *entire race*, diminished in number to *two individuals*, became actually *reduced and placed within the power of man*. And, when their possessors, quitting the ark, commenced their new establishment in *Asia*, these valuable animals, formed to render such important services in those regions, were carefully *preserved*, as they increased and multiplied with the generations of mankind, and were never suffered *to escape from domesticity*, like individuals of every other species; and therefore, *they alone* never recovered their “*primitive state of independence and liberty.*” Hence, they were always accounted a race *pertaining to Arabia*²; in which region they have been transmitted, in a direct line, from the patriarch who introduced them, as a *reserved property* of one branch of his descendants. And the same care,

¹ The camel (Levit. xi. 4) was classed among the *unclean* beasts; of which, God instructed Noah to take only “*two, the male and his female.*”

² αἱ καμηλοὶ ἀμφοτέρωθεν, αἱ Βακτριαναὶ, καὶ αἱ Ἀραβιαὶ. — ARISTOT. *Hist. Animal.* L. ii. c. 1. “*Camelos inter armenta pascit Oriens, Bactriæ et Arabiæ.*”—PLIN. *Nat. Hist.* L. viii. c. 26. Hardouin.

which prevented their escape to freedom in the first age of the renovated globe, is still notoriously exercised, in their preservation. It is equally notorious, that the *Arabs*, to this day, hold their *camel* in peculiar veneration, accounting it a *sacred animal*, a gift of God to man; the origin of which traditionary sentiment, may reasonably be referred to the *origin* of this *postdiluvian* race.

Thus, then, a *cause* is incidentally found in the record, which perfectly explains, and which alone can explain, a phænomenon in natural history; which the professed *Historian of Nature* had not, either the skill to detect, or the frankness to avow. And, what was it that so warped his mind, as to cause him, either to overlook or to withhold this obvious cause? His *geological prepossessions*: for, how should the framer and propounder of a *theory*, which maintained, that this earth was originally a lump of matter knocked off from the body of the sun by some rude and awkward *comet*, which struck against it in the eccentricity of its orbit, resort for the cause of the domesticity of an entire race of animals to the authority of a record, which *contradicts* and *exposes* his false and lunatic theory?

It may be advisable to notice here a very material error, in a work professedly designed for the instruction of youth in natural history.

PART III.

CHAP. XII.

PART III.
 —
 CHAP. XII.

In this work, treating of the Arabian camel, the author states: “the *Arabian camel* is chiefly found in a *wild* state in the deserts of *Arabia* and *Africa*, and in the temperate parts of *Asia*. It is that with a *single hunch* on its back. In many parts of the East it is *domesticated*¹.” The whole of this statement is in direct contradiction to the *fact*. The author omits all mention of the *Bactrian camel*, with *two hunches*, which *alone* exists in a wild state; and that, in no other part of the globe but in Chinese Tartary, and the regions contiguous to it. But, the *Arabian camel* exists not in a wild state, either in *Asia* or in *Africa*; and the individuals of that species are not *domesticated*, but the entire race is *born domestic*. By this statement, therefore, this important fact of natural history is corrupted, and a most instructive truth is withheld from the knowledge of the juvenile reader.

The translator of *Norden's Travels* has fallen into a ridiculous mistake, which also may here be rectified. He thus renders his author: “We saw that day (on the Nile) *abundance of camels*; but they did not come near enough for us to *shoot them*.” And he adds in a

¹ *Animal Biography*, vol. ii. 2.

note : “ In the original it is *chameaux d'eau*; PART III.
 “ whether they are a *particular species of camel*,
 “ or a different kind of animal, I do not know¹.” CHAP. XII.

These *chameaux d'eau*, or *de la rivière*, are the *Gemel el Bahr* of the Arabians, which is no other than *the pelican*; of which Buffon gives this notice : “ the Egyptians have denominated
 “ this *great bird the river-camel*, with allusion
 “ to the manner in which it retains the water
 “ in its *pouch*².”

The domesticity of the entire race of this peculiar species of camel, is therefore a living and perpetual evidence, both of *the revolution* in which the whole animal creation perished excepting a *reserved few*, and of *that* also in which the human race was first established on the *continent of Asia*; and it is therefore evidence, that those revolutions, supposed by the mineral geology to be *different and distinct*, were, in fact and truth, *one and the same*. Bishop Watson remarked, that he never saw a *Jew*, but he beheld in him a living testimony of the *truth* of the *Old Testament*. In the same manner, we never see a *camel of this species*, but we may behold in it a living testimony of the

¹ P. 11, fol.

² *Oiseaux*, tom. viii. p. 296, 4to.

PART III. *truth* and *unity* of the revolution, which both
 CHAP. XII. loaded the soils of northern Europe with
 animal spoils from the perished earth, and
 fixed the progenitors of the present race of
 mankind in the western regions of Asia.

CHAPTER XIII.

How far the *Creative Power* was exercised upon the *new earth*, is a point on which we are not informed; although we are left to deduce the *assurance* of its exercise, with respect to *vegetation*. Where we cannot look for operation in *secondary* causes, we must necessarily resort to the first principle of universal physics, *the intelligence and power of God*. The vegetation which invested the mineral surface rendered dry by the *second* revolution, cannot be ascribed to *any other cause* than that, which invested with vegetation the mineral surface rendered dry by the *first* revolution: this is an induction, which reason does not merely *allow*, but positively *demand*s. It is saying nothing, to say with the mineral geology, “after the deluge, vegetation *quickly ensued*.” How did it ensue? Had the *same* earth remained, vegetation could not have *ensued* by virtue of any known law of what we term *nature*; for, the universal lodgment of the sea upon its surface, for nearly *ten months*, must, by those laws, have extinguished every prin-

PART III.
CHAP. XIII.

PART III. ciple of germinating life. But, it was *not* the
 CHAP. XIII. same earth, but a *new, brute, marine surface*,
 in which the seeds of *terrestrial vegetation* had
 never been sown. It must, therefore, have been
 called into that vegetation by the same *creative*
word, which called into vegetation the surface
 of the *former* earth, when it was first extricated
 from the waters of *the abyss*.

Again; we are told, that the summits of
 the highest mountains appeared above the
 aqueous surface, only on the *first* day of the
tenth month, from which level the waters de-
 scended gradually for *forty* days; and yet,
 after *seven* other days, or on the *seventeenth*
 day of the *twelfth* month, we find, in this *marine*
soil, an *olive tree in full foliage*. This vegetable
 production cannot, with any assent of reason,
 be referred to any other cause than the same
 divine *fiat* which at first commanded, “*Let*
 “*the earth bring forth the TREE yielding fruit;*”
 and which, long afterwards, caused “*a gourd*
 “*to come up in a night,*” and to form a shelter
 impervious to the inclemency of an Assyrian
 sun¹.

With respect to the *animal* creation, we
 are equally left without any positive informa-

¹ Jonah, iv. 6, 10.

tion. Yet, the abundant *monumental evidence* which we possess of animal species *entirely withdrawn* from the earth in that revolution, establishes a strong argument of moral probability, of other animal species having been *subsequently produced, to supply their place in the sphere of animal life.* And this brings us to the consideration of a question, which has been raised; not upon a speculative, but upon a *critical* ground; respecting the *portion* of the animal creation which was contained in the ark.

The ground of the question, is this: The record relates, that God commanded Noah, “*of every living thing, of all flesh, pairs of every sort shalt thou bring into the ark, to keep seed alive with thee.*” Now, it has been urged; that, although the terms of this command are *universal*, yet the scriptural style so often employs universal terms with *limited* significations, that the universality of the *terms* will not necessarily prove that an *universal sense* was intended, unless it be otherwise circumstantially fixed. And this is undeniably true, in very many instances; upon which account Dr. Hammond, in his notes on 1 Cor. xiii. 7, has been led to remark: “the word *παντα*—*all things*, though “it be an *universal*, is not to be taken in

PART III. “ the *utmost extent*; but, according to the use
 — “ in like phrases in all languages, wherein
 CHAP. XIII. “ the *universal sign* affixed, either to *persons*,
 ~~~~~ “ or *times*, or *places*, or *things*, signifies only  
 “ a *greater number*, but not *all* without ex-  
 “ ception.” Schleusner likewise observes:  
 “ that the word  $\pi\alpha\varsigma$ —*all, every*, is often em-  
 “ ployed in Scripture, *indefinitely*, to signify  
 “ *various, of different kinds*; and often also,  
 “ to denote *many, a great number*<sup>1</sup>.” Michaelis  
 remarks to the same purpose: “ The Jews  
 “ have well observed, that כָּל, *all, every*, is  
 “ not to be understood, on all occasions, with  
 “ the mathematical sense of *all*; because, it  
 “ is also used to signify *many*. Thus in Isaiah,  
 “ xxiv. 10, where we read, ‘*every house is shut*  
 “ *up,*’ Kimchi most truly observes: ‘*though*  
 “ *he says, every house, he only means many*;  
 “ *as it is said, all countries came into Egypt.*’  
 “ I quote the judgment of a *Jew*, rather than  
 “ of a *Christian*, that I may not be mistrusted.  
 “ But, if we reflect upon our own native  
 “ tongues, we shall find, that we often use  
 “ the term *all*, for *many*, or *most*<sup>2</sup>.” It is  
 thus, that in the vision of St. Peter, in which  
 it is related by the historian, that he beheld

† *Lex. Gr. in N. Test.*

<sup>2</sup> *Suppl. ad Lex. Heb. No. 1158.*

a large vessel containing “*παντα τα τετραποδα της γης*”<sup>1</sup>—*all the four-footed beasts of the “earth,”* &c. it is not necessary to suppose that they were, zoologically and numerically, *all the quadrupeds of the creation*; but, only a number and a variety sufficiently great, first, for the selection which St. Peter was called upon to make between *clean* and *unclean*; and next, to prove to him how extensively those distinctions were now done away by God. Accordingly, the passage is rendered by Schleusner, “*varii generis quadrupedes—quadrupeds of various kinds*;” and it is paraphrased by Pyle, “*abundance of beasts.*” And with good reason; for, where St. Peter himself afterwards relates the vision to the apostles, he omits the word *παντα*—“*all,*” and says only, *τα τετραποδα*<sup>2</sup>—“*four-footed beasts.*” We have a remarkable example of this strong mode of speech in 1 Kings, xviii. 10; where Obadiah affirms thus forcibly and solemnly to Elijah: “as the Lord thy God liveth, there is *no nation or kingdom* “whither my Lord hath not sent to seek thee<sup>3</sup>.” Which affirmation, though universal in its terms, was evidently not designed to be universal in its signification; and innumerable instances of the same mode of speech, are to be found

PART III.

CHAP. XIII.

<sup>1</sup> Acts, x. 12.<sup>2</sup> Ibid. xi. 6.<sup>3</sup> 1 Kings, xviii. 10.

PART III. in the sacred writings. In the same manner, it is alleged, we are to understand with limitation the terms of the record in the passage which we are considering; there being nothing in the history to controvert such an interpretation, which other considerations tend to render probable, namely, the correspondence between the dimensions which are given of the capacity of the ark, and our present extended knowledge of the varieties of the animal creation. For, the calculations of numbers and capacity exhibited by Prideaux, Pole, and some other pious foreign divines of a former age, are more ingenious than they are truly available.

CHAP. XIII.

And, indeed, there is nothing in this acceptance of the history which is not perfectly consistent with the text; considering, that universal terms are often to be taken in Scripture with limitation, and, that the text contains nothing to define and fix the signification in the instance which we are considering: for, the words "*all flesh*," are here only equivalent to the words "*clean, and unclean*," in the succeeding chapter. And if such is its sense, that only a *numerous selected portion* of the animal species were preserved in the ark; then it would seem, that the divine purpose in that partial preservation was, first, the preservation of the progenitors of a new human race; secondly, the preservation of a number of animal



species sufficiently great to provide an *impressive memorial*, of the faith of Noah and of the fact of that fearful catastrophe, to be transmitted circumstantially by tradition to succeeding generations; and thus to constitute *τυπον*, a *type*, of divine deliverance, of which St. Peter has pointed out *αντιτυπον*, an *antitype*<sup>1</sup>. For, we are certainly not to understand, that God could not have had animals to inhabit His earth, unless He had taken a provident care of those which He then had alive.

But, this determination of the question gives immediate rise to another question, viz. *from whence* then proceeded all those *other species* of animals now existing upon the earth, of which *none* were contained in the ark? Hypothesis and system are at once ready with their answer. But, before we admit of any answer, we must lay down *two* indispensable conditions, to which that answer must submit; 1. It must *not contradict the history*: 2. It must be *in consistency and harmony with the history*. Every judgment exercised to reasoning, will admit the justness of these two preliminary conditions. And these being admitted, we can by no means allow the explanation proposed by De Luc; that those species subsisted, during the deluge, upon certain *islands in the*

<sup>1</sup> 1 Peter, iii. 21.

PART III. *ancient sea, which, as the sea retired, became the summits of mountains on the new continents.*

CHAP. XIII.



1. Because this explanation, however ingenious it may appear, is plainly a mere shift and contrivance of the invention, which betrays its fallacy upon a moment's reflection; for, as Mr. Kirwan justly observes, "if such islands did exist during the deluge, it would surely have been more convenient for Noah, his family, and animals, to have been transported, at once, to one of these, than to have remained pent up in the ark," for upwards of twelve months. But, 2. and principally, because it is so far from being *in harmony* with the history, that it directly *contradicts* it. For, the history expressly declares, that "*every living substance* was destroyed, except Noah, and they that were with him in the ark." And, the words "*every living substance,*" cannot be taken here with *limitation*, as in the former passage, although the younger Rosenmuller would so interpret them<sup>1</sup>; because, the universality of their signi-

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<sup>1</sup> This learned commentator, seduced by the same error which had seduced his learned father, uncritically contends; that the proposition, "ALL the high hills and mountains under the whole HEAVEN were covered," is not to be understood universally, because we find the same phrase, "*under the whole heaven,*" used with limitation in Deut. ii. 25. But, how is it used there, if properly rendered and punctuated? "*This day*

fication is *fixed* by another passage, which distinctly states, that the waters were elevated for some months, *above the summits of the highest mountains*; so that every part of the earth,

PART III.

CHAP. XIII.

“ *will I begin to put the dread of thee, and the fear of thee,*  
 “ *upon THE NATIONS under the whole heaven WHICH SHALL*  
 “ *HEAR of thee; and they shall tremble,*” &c. Here, the universal term “*all*” is omitted, and is exchanged for the particular restriction, “*the nations WHICH SHALL HEAR of thee;*” and these are specified in Exod. xv. 14, 15, to be the inhabitants of Palestine, Edom, Moab, and Canaan. Whereas, in the passage of Genesis, not only “*all the high hills and mountains*” “*under the whole heaven*” are without restriction; but the common *law of fluids* demonstrates, that the proposition, if true at all, must be universally and equally true of all hills and mountains *of the same elevation*, over the whole earth. (*Schol. in Gen. vi. 24. p. 64, 5.*) The *four* hypothetical and fallacious arguments, which this expositor is led to adduce in favour of a *partial* operation of the deluge, are fully refuted in this disquisition: “ 1. That God did not design to destroy  
 “ all animals, but *man* only, whose race had not spread  
 “ beyond the regions of Tigris and Euphrates. 2. That  
 “ the *high mountains covered by the waters*, were only those  
 “ of the countries adjoining those rivers. 3. That all the  
 “ waters of the sea and atmosphere *would not suffice* to in-  
 “ undate the whole earth. 4. That the inundation of *the flood*  
 “ could not have conveyed shells and marine animal relics  
 “ to the tops of mountains, but that these must have been  
 “ the effect of some *anterior inundation.*” (*Ibid.*) All these suggestions, manifestly proceed from an *original misapprehension* of the *true nature* of that second great revolution of the globe.

PART III. on which animals might have continued to  
CHAP. XIII. exist, was submerged. If, therefore, we are  
 to understand from the record, that only a  
*selection* of animal species was preserved in  
the ark; we must necessarily understand also,  
that *all* the remaining species, and the *entire*  
remainder of the animal creation, *perished in*  
*the waters.*

But now it will be asked; *from whence* then  
proceeded the *first* of all the species actually  
existing, of which there were *none* in the ark?  
I ask, in reply, from whence proceeded the *first*  
of all the species actually existing, of which there  
were *some* in the ark? The solution of the *latter*  
question, will be the solution of the *former*.  
The *renovation* of the earth, and its *creation*, are  
events which bear so direct and true an ana-  
logy to each other, that reason directs us to  
conclude of the one from the other; and, in  
defect of knowledge concerning the one, to  
deduce it from our knowledge respecting the  
other. *Vegetation*, in the new earth, must have  
been a *new creation*; and why should not new  
creation have extended, in the *new earth*, to the  
*animal* as well as to the *vegetable* kingdom, if it  
was the intention of the Creator, that the ark  
*should not contain individuals of every species?*  
That such was His intention, is proved by the  
multitude of fossil remains of animal species

which *no longer exist*. That it was His intention that the ark *should contain some*, is proved, both by the terms of the record, and by the extraordinary evidence of the *camel of Arabia*. In understanding the historian to relate, that only a limited number of species were preserved, and that all the rest perished; and in inferring, as a necessary consequence, that the Creator replenished His new earth with new species, by His own divine act, after He had brought it to light; we do *not contradict* the history, which is altogether *silent* upon the subject, and we interpret *consistently* with the history, because we interpret in conformity with its declarations in *a case analogous*. There is no other difficulty whatever in this solution, than that with which *mere physical science* has always to contend, in admitting *immediate creation* as the true *mode of all first formations*; and which urges it to insert as many imaginary causes as it can devise, between *all effects* and a *first cause*, even where no secondary cause can possibly have intervened. It has thought fit to assume, gratuitously, that it is *unphilosophical* to argue, in *physics*, beyond *secondary causes*; that we are bound to find the causes of *all sensible phænomena*, among *secondary causes*; and, that the mention of *creation* is not to be admitted in *physics*. This was the great principle which the materialism and infidelity of the two

PART III.

CHAP. XIII.

PART III. last centuries laboured so industriously to  
 CHAP. XIII. establish, in order to exclude all *moral in-*  
*terference*, and which *physical science* so gene-  
 rally and so absurdly conceded: with the  
 vast exceptions, however, of Bacon and New-  
 ton. But, in so doing, it only proved itself  
 to be “*unphilosophical* ;” and rendered itself  
 incapable of reasoning to “*the most general*  
 “*principle.*”

Τι ἀπιστον κρίνεται παρ’ ἡμῶν<sup>1</sup>—“*Why should it*  
 “*be thought a thing incredible with us,*” that  
 God, who created once, should create more  
 than once? Is it, that His creative power was  
*exhausted* in its first effort? Is it, that we are  
 in possession of *the rule* by which alone creative  
 power may be exercised? Or is it, that we  
 are any where told, that God has *never* exer-  
 cised that power since the first *universal crea-*  
*tion*? When He pronounced the *fiat*, “*Let the*  
 “*river bring forth frogs abundantly*,” &c. ; it  
 was the same *fiat* with which He had at first  
 pronounced, “*Let the waters bring forth*  
 “*abundantly the living creature that hath life.*”  
 The naturalists and philosophers of Egypt, nay,  
 Moses himself, concluded that this innumerable  
 swarm, “*which covered the land, and filled the*  
 “*villages, and houses, and fields,*” must have

<sup>1</sup> Acts, xxvi. 8.

<sup>2</sup> Exod. viii. 3.

been the natural inhabitants of the Nile; and they therefore prayed, "that they might depart, and remain in the river only<sup>1</sup>." But, when their prayer was heard, those animals were not caused to depart and to remain in the river, of which they were *not* the natural inhabitants; for, being only designed as a *temporary burthen on creation*, "the Lord did, indeed, according to the word of Moses, *but the frogs died, and they gathered them into heaps*<sup>2</sup>." De Luc would "*easily conceive*, how this production might have been contrived; not indeed without a *miracle*, but without a *new creation*<sup>3</sup>." But, this is a capricious and irrational distinction; for, *if it was by miracle*, that miracle might as probably have been exercised in *new creation*, as in any other *supernatural mode*. It is just as easy, to an unsophisticated intelligence, to deduce *primitive formation* from *creative power*, as to deduce *secondary formation* from *generative power*. It is certain, that if it was by *miracle*, we are absolutely incapable of determining, of ourselves, *what mode it was*. All *physical probabilities*, are here *vain and impertinent*.

To determine to refer every effect to a secondary cause, in a crisis in which the First

<sup>1</sup> Exod. viii. 9, 10, 11.

<sup>2</sup> Ib. 14.

<sup>3</sup> See above, note to p. 207.

PART III. *Cause* was in immediate and manifest operation,  
 CHAP. XIII. is, setting aside all moral considerations, most  
 unskilful and irrational; and demonstrates an  
 entire alienation from the philosophy of Newton,  
 of which the great principle is, “*de DEO ex*  
 “*phænomenis disserere, ad philosophiam naturalem*  
 “*pertinet—It pertains to natural philosophy, to*  
 “*reason from phænomena to GOD.*” Now, the  
 phænomena which we are considering, neces-  
 sarily lead us to God.

In the case of the *human* race, it was es-  
 sential to the *moral* purpose of God, that the  
*whole race* should descend from *one and the same*  
*first parent*; because, His mysterious scheme for  
 their *ultimate destination* was founded upon their  
*common relation* to that *first parent*: “*IN ADAM,*  
 “*ALL DIE*<sup>1</sup>.” Therefore, “*He made of one and the*  
 “*same blood, all nations of men*<sup>2</sup>.” But, since that  
 purpose did not extend to the *brute* species,  
 we have *no reason whatever* for supposing, that  
 it was indispensably necessary that *every post-*  
*diluvian brute race* should descend from an *ante-*  
*diluvian parent*; and *physics* cannot pretend to  
 assign any law, which can *prescribe bounds* to  
 the creative power of Him who “*killeth and*  
*maketh alive*<sup>3</sup>, and who will do all His pleasure<sup>4</sup>.”

I conclude, therefore, 1. from *the record of*

<sup>1</sup> Cor. xv. 22.    <sup>2</sup> Acts, xvii. 26.    <sup>3</sup> 1 Sam. ii. 6.    <sup>4</sup> Is. xlvi. 10.



*the deluge*, that the whole animal creation, excepting only that selected portion of animal individuals which was preserved in the ark, perished in that catastrophe. I conclude, 2. from the *innumerable fragments of extinct species which remain*, that individuals of *all* the antediluvian animal species were not preserved in the ark. And, if there is reason to infer, either from the genius of the historian's language, or from the dimensions of the ark which he has so carefully and minutely imparted to us, that he does not affirm, that individuals of *all the post-diluvian species* were contained within that fabric, I then conclude, 3. and finally; that he has left us to infer from his relation of the *creation*, that the same Almighty Being whose operations he has therein recorded, exercised His *creative power* in *animal*, no less than in *vegetable* formations, in the *renovation* of His globe; that "He took away their breath, and they died, and returned to their dust; that He sent forth His Spirit, and they were created, and He renewed the face of the earth<sup>1</sup>."

It is *manifest*, from the *exuvia* of the *extinct species*, that the ark *excluded many varieties of animals*: this is a conclusion from the *phæno-*

PART III.

CHAP. XIII.

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<sup>1</sup> Psalm civ. 29, 30.

PART III. *mena*, infinitely more *sound* than any which the  
 CHAP. XIII. speculations of the mineral geology have been  
 able to extort from them. It is therefore probable, that the animals assembled for preservation were collected from only *a part* of the primitive continents, namely, that part in which the patriarch himself resided ; and it will then become further probable, that a *new animal creation*, of various species, followed the production and exsiccation of the *second* earth, as the same had followed the production and exsiccation of the *first* earth. And such *must* have been the case, if it was the design of the Master and Disposer of this globe so to distribute the *habitable surfaces* of His new earth, by the *interposition of waters*, that the brute races *could not*, like the human race, pass from the one surface to the other, *by the laws which He assigned to their natures*. And accordingly, the *characteristic peculiarities*, which have been so notably and admirably provided to distinguish from each other the animal species of the different continents, *testify powerfully in confirmation of this fact*, to every mind in which *moral reasoning* maintains its due supremacy.

The *creation*, and *renovation* of the earth, are co-ordinate events, corresponding by various and true analogies ; and they are both to be referred to the same intelligence and the same

power. Whether we consider, the production of an habitable land by the removal of the waters which covered it; or, the clothing that land with universal vegetation; or, the commencement of new human and brute races to inhabit and possess it; the resemblance is so exact, and the correspondence so peculiar, that reason instructs us to employ our knowledge of the former, to guide us to a just apprehension of the latter. “God,” says Philo, “thought fit to make NOAH both the *end* and the *beginning* of our race; the end of that which was *before* the flood, and the beginning of that which was *after* the flood<sup>1</sup>.” So similar, indeed, were the positions of the *first parents*, of both races, and so intricately did the origins of both races become at length involved in ancient tradition; that we often find the *same region*, and the *same seat*, confusedly ascribed to the progenitor of each race.

We may here observe; that as ADAM, the common parent of the *first race*, was the *source* from which the knowledge of the important truths imparted to him by his Creator was transmitted to that first race, so NOAH, the common parent of the *second race*, was the *source* through which that same knowledge was

PART III.

CHAP. XIII.

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<sup>1</sup> De Abrahamo, p. 7.

PART III. extended to the second race. Hence it is,  
 CHAP. XIII. that in the antiquities of the heathen world, we  
 discover such manifest evidence of *original identity* in principles and traditions. Hence it was, that the learned Thomas Burnet thus contended:  
 “ What should hinder us from believing, that  
 “ those heads of theology and philosophy,  
 “ which are found among the ancient barbaric  
 “ nations, descended to his posterity, the per-  
 “ sons who lived after the deluge, from THIS  
 “ FOUNTAIN, this ORIGINAL MAN, whose  
 “ knowledge extended to both worlds? Noah is  
 “ reported to have delivered *moral precepts* to  
 “ his sons and kinsmen, which are usually  
 “ called ‘ *the precepts of Noah* ;’ and why not  
 “ also *doctrines*, which may as justly be called,  
 “ *the doctrines of Noah*? For, as those *precepts*  
 “ were not about inconsiderable things, or  
 “ duties of little moment, but had a reference  
 “ to those which were highly necessary to the  
 “ *improvement of human life*; so, also, these  
 “ *doctrines* respect the principal orders and  
 “ most important articles of the *natural world*;  
 “ as, *how it began—in what form and structure it*  
 “ *first appeared—what changes or violent motions*  
 “ *it has already undergone, or may hereafter*  
 “ *endure—whether it is to be dissolved or renewed,*  
 “ *and what is to be the last exit and final con-*  
 “ *clusion of all things.* In these general and

“ important heads (if I mistake not) the pri- PART III.  
 “ mæval wisdom was concerned, or that part —  
 “ of it which had relation to the *world* and CHAP. XIII.  
 “ *nature*. Now, NOAH was the *common heir*  
 “ of all: therefore, in my opinion, *this* IN-  
 “ HABITANT OF BOTH WORLDS *then delivered the*  
 “ *lamp of learning from ONE to the OTHER*; and  
 “ propagated through the universe, together  
 “ with his offspring and primitive people, some  
 “ seeds both of *natural* and *moral doctrine*. But,  
 “ in after ages they very much declined; and I  
 “ must freely acknowledge, that those seminal  
 “ doctrines were almost choked by *the pre-*  
 “ *vailing tares*<sup>1</sup>.” In which vicious crop, we  
 know that the doctrine of a CHAOTIC GEOGONY  
 was eminently luxuriant.

<sup>1</sup> *De Originibus Rerum*, P. I. c. 14. *Eng. Tr.* p. 244.

## CHAPTER XIV.

PART III. THERE remains a question, which the proposition of the *destruction of the ante-diluvian earth*, will naturally suggest to the mind; and which ought, therefore, not to be passed over without notice. It will be asked; if the first earth perished, what are we to understand concerning the description of the *rivers of Eden*, contained in verses 11, 12, 13, and 14, of the second chapter of Genesis? We cannot cut the knot of this difficulty with so little ceremony as De Luc; who, without hesitation, affirms that the rivers therein enumerated were *not the present Euphrates, &c.* but “*certain ante-diluvian rivers, whose names were afterwards transferred to rivers of the new earth; as is common in colonies, where new places are called after the names of the mother-country*”<sup>1</sup>.


This is a question, pertaining to an entirely distinct branch of inquiry; yet it is very

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<sup>1</sup> *Lett. Géol.* p. 327, 8.

material to the present subject, that it should be resolved here. PART III.

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CHAP. XIV.



That this *description of rivers* constitutes a *parenthesis*, intersecting the direct thread of the history, and that it has been inserted for the purpose of *illustration*, is manifest upon the face of the text; but, a *critical* question arises upon this *parenthesis*, which those will best apprehend who are most conversant with *ancient manuscripts* and with the history of their *transcriptions*: viz. whether this illustrative insertion was written by the *author of the history*, or, whether it is not more probable that it was originally a *marginal gloss*, which, in process of time, became *incorporated* into the body of the text? To such *glosses*, Bishop Lowth has occasion to advert in his notes on *Isaiah*, and Kennicott has treated of them, more diffusely, in his dissertations on the *Hebrew text*; and there are few ancient authors whose writings have not, in some degree or other, suffered depravation by similar incorporations. Both the *Sacred Testaments* are known to have sustained such depravations, in several instances.

In order to illustrate this subject for those who may not have had experience in this branch of investigation, I shall adduce an example of

PART III. an *incorporated gloss* in the New Testament,  
 CHAP. XIV. which is but little known, but which is both  
 very important in itself, and very applicable to the case before us. It is remarkable, that Michaelis has passed over it in his criticisms on St. John's Gospel: Bishop Marsh, however, has duly remarked it in his notes on that work, and has deduced from it the conclusions which it obviously suggests.

In the Royal Library at Paris is a remnant of a very ancient Greek MS. of the New Testament, the *Codex Ephremi*<sup>1</sup>. This valuable relic is pronounced by Wetstein, (in whose enumeration it is marked C,) to be of the same age as the celebrated Alexandrian MS.; but, the passage which I am about to produce, will certainly not tend to diminish its comparative antiquity. Montfaucon has given a *fac-simile*<sup>2</sup> of the first six verses of the 5th chapter of St. John's Gospel, as they stand in this MS.; in which that portion of the evangelical history is thus read:

μετα δε ταυτα ην η εορτη των  
 Ιουδαιων, και ανεβη ο Ιησους

<sup>1</sup> MICHAELIS' *Introd. to the New Testament*, by MARSH, vol. ii. p. 258.

<sup>2</sup> *Palæograph. Græc.* p. 214, 5.



## PART III.

## CHAP. XIV.

αγγελος γαρ κατα- εις Ιεροσολυμα. εστιν δε εν  
 κρον κατεβεν εναντι τοις Ιεροσολυμοις επι τη προ-  
 κολυμβηθρα και βατικη κολυμβηθρα, η επι-  
 εταρασε το τω λεγομενη Ιβραϊστι Βεθεσδα,  
 υδαρ. ο ουν προτος λεγομενη Ιβραϊστι Βεθεσδα,  
 εμβας μετα την πεντε στοας εχουσα. εν τρυ-  
 ταραχιν του υδατος ταις κατεκειτο πληθος των  
 υγιης εγινετω ο αι ασθενουντων, τυφλων, χωλων,  
 ποτε κατηχετω νο σηματι. ξηρων. ην δε τις ανθρωπος εκδεχομενον την του  
 υδατος κινισιν.  
 εκει τριακοντα και οκτω ετη  
 εχων εν τη ασθενεια αυτου.  
 τουτου ιδων ο Ιησους κατακει-  
 μενον και γνους οτι, κ. τ. λ.

After this there was a feast of the Jews, and

For an angel went down at a certain season, into the bath, and troubled the water; whosoever then first, after the troubling of the water, stepped in, was made whole of whatsoever disease he had.

Jesus went up to Jerusalem. Now, there is at Jerusalem, by the sheep-market, a bath, which is called in the Hebrew tongue Bethesda, having five porches. In these lay a great number of impotent folk, of blind, halt, withered. And a certain man was there, which had an infirmity thirty and eight years.

waiting for the moving of the waters.

## PART III.

## CHAP. XIV.



When Jesus saw him  
lie, and knew that, &c.

In the Greek MS., the text and the marginal sentences, though both are in the uncial character, are written by different hands; and it will be evident, from the language, and from the *Itacism* perceptible in the latter, that these are of a date posterior to the former. It will be equally manifest, that they were *marginal notes*, annexed with the design of *illustrating the popular superstition* under which the infirm man was waiting at the bath; but, at the same time, adopting the superstition, and averring it to be *true*. The original text, was free from that blemish; and the simplicity and close sequence of the recital, bear *internal* evidence that those marginal passages are alien to it. The superstitious clause, therefore, does not pertain to the evangelic<sup>al</sup> historian, but *has become incorporated into his history in the progress of transcription*.

Bishop Marsh thus speaks concerning this passage: “The *Codex Ephrem* has many  
“ marginal notes written in uncial letters,  
“ without accents. This proves what has been  
“ sometimes doubted, that marginal notes were  
“ made in the most ancient MSS., and that  
“ this practice prevailed in the early ages of

“ Christianity. But, these marginal *scholia*  
 “ seem to have been confined to such MSS. as  
 “ were in the hands of private persons ; while  
 “ those which have been used for church ser-  
 “ vice, such as the *Codex Bezae*, are without  
 “ them. It is likewise remarkable, that in this  
 “ MS. the disputed, or rather *spurious* text of  
 “ John, v. 4, is written, *not in the text* ; but in a  
 “ marginal *scholion*. Now, as this verse is  
 “ totally omitted in the *Codex Bezae* and the  
 “ *Codex Vaticanus*, which are the two most  
 “ ancient MSS. now extant ; as it is likewise  
 “ omitted in the *Codex Ephrem* (which is in-  
 “ ferior in age to the *Codex Bezae*), but written  
 “ in the margin as a *scholion* ; is written in more  
 “ modern MSS. *in the text*, but marked with an  
 “ *asterisk*, or *obelus*, as *suspicious* ; and in MSS.  
 “ still more modern is written without any  
 “ mark ; we see the *various gradations* by which  
 “ it has *acquired its place in our present text* ;  
 “ and have proof positive that the verse was  
 “ originally nothing more than a *marginal scho-*  
 “ *lion*, and of course *spurious*. Other passages  
 “ likewise in the Greek Testament owe their  
 “ present existence in the printed editions  
 “ to the same cause<sup>1</sup>.” What the learned  
 prelate here affirms of the *Greek Testament*,

<sup>1</sup> *Introd. to N. T.* vol. ii. p. 732, Note 113.

PART III. Kennicott has shown to be the case also of the  
 Hebrew.

CHAP. XIV.

In the second chapter of Genesis, there appears an internal critical evidence of an insertion of the 11th, 12th, 13th, and 14th verses, similar to this in St. John, constituting, in a similar manner, a *parenthesis* intersecting the thread of the narration; and introduced, solely for the purpose of illustration. It does not wear the character of the simple narrative in which it appears; but, of a gloss or note of a later age, founded upon the fanciful traditions prevailing with respect to the situation of the ancient *Paradise*. The reader will find evidence of the unconquered difficulty of reconciling this description with true geography, if he consults Michaelis' *Supplementa ad Lex. Heb.* on the names, of *Eden*, and of the *four rivers* mentioned in the verses in question. I have therefore long been confirmed, on *critical* grounds alone, and without any relation to the particular argument of the present treatise, in the persuasion, that those *four verses* were a *gloss* of very ancient date; which became incorporated into the text, either during the captivity, while the Hebrews were dwelling in the regions bordering upon the Hiddekel (or *Tigris*) and Euphrates, or after their return from that captivity; and that the text, and gloss, stood originally thus;

PART III.  
CHAP. XIV.

And the Lord God planted a garden eastward in Eden; and there he put the man whom he had formed.

And out of the ground made the Lord God to grow every tree that is pleasant to the sight and good for food; the tree of life also in the midst of the garden, and the tree of the knowledge of good and evil. And a river went

out of Eden to water the garden, and from thence

it was parted and became into four heads.

And the Lord God took the man, and put him into the garden of Eden to dress it, and to keep it, &c.

*cond* river is *Gihon*: the same is it that encompasseth the whole land of *Ethiopia*. And the name of the *third* is *Hiddekel*; that is it which goeth in front of *Assyria*<sup>1</sup>. And the *fourth* river is *Euphrates*.

The name of the *first* is *Pison*; that is it which compasseth the whole land of *Havilah*, where there is gold; and the gold of that land is good: there is bdellium and the onyx-stone. And the name of the *se-*

<sup>1</sup> The *Hiddekel*, or *Tigris*, runs along the western side of ancient Assyria; that is, along that front or face of Assyria which looks towards Judea. The word קדם, signifies both, ante, antrorsum—before, in front of, and, versus Orientem

## PART III.

## CHAP. XIV.

That the illustration intended is unskilful, and does not answer to the text, is manifest; for, the text describes *one* river, whereas the gloss assigns *four* rivers. Michaelis learnedly shows, that ראשי, *heads*, denotes *sources* in all the Oriental languages<sup>1</sup>; so that the *confluence* of four streams, proceeding from the *four sources* or *heads* to which the historian traces them, produced the *one river* related by Moses; which therefore can have no relation to the *four rivers* recited in the gloss. The younger Rosenmuller, who interprets “*quatuor fluvii—four rivers,*” is obliged nevertheless to add, “*fluvius ille, ex quo quatuor alii orti sunt hodie frustra quæritur—* that river, out of which four other rivers arose, *is in vain sought for at the present day*”<sup>2</sup>. Nor can we wonder at this ill success, for it is the nature of all rivers to grow by *confluence*; no river *separates* its waters into *different rivers*, unless at the *delta* formed of alluvial soil at its mouth by

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—*towards* or *on the east*; and much error has been occasioned by confounding the two significations. In this place, it manifestly signifies *in front of*, and therefore, *on the west of Assyria*; not “*towards the east of Assyria,*” as our version renders it in common with many others. The first interpreters have correctly rendered it, κατεναντι Ασυριας—*“in front of Assyria.”*

<sup>1</sup> *Suppl. ad Lex. Heb.* n. 2300.

<sup>2</sup> *Schol. ad Gen.* p. 23.

the perpetual conflict between the sea and its flood. PART III.  
CHAP. XIV.

But, since all the rivers adduced in the Hebrew gloss have their origin in *Armenia*, the *locality* alone enables us to perceive, that its author was deeply impressed with the traditions respecting the *seat of the renewal of the human race*, and that he identified it with that of its *origin in Eden*; and that he thus *violently* applied to the *latter*, the characters properly and exclusively pertaining to the *former*. The fluvial description introduced into the *four verses*, cannot therefore be regarded, critically, as any part of the *Mosaical history*; and consequently, it can have no weight to affect the strong evidence which has been deduced from that history, and from the sense of the ancient Jewish and Christian churches, of the *DESTRUCTION of the PRIMITIVE EARTH by the waters of the DELUGE*.

## CONCLUSION.

CONCLUSION. WE have now considered the principal arguments which have induced the mineral geology to assume, that there must have been *more* general revolutions of this globe than the two recorded in the Mosaical history; and we have found, upon due examination, that the *plurality* thus assumed is the offspring of defective investigation and unregulated fancy, and that the "*numerous revolutions*" alleged are all reducible, in point of fact, to *those two only*.

In this *second* question, therefore; relative to the *changes* which this globe has undergone since its *first formation*, and to the *mode* by which those changes were effected; the Mosaical geology has maintained the superiority over the mineral, which it established in the *first* question, relative to the *mode* by which that *first formation* was produced. It has maintained that superiority by showing, that in



each question it can endure the most rigid trial, by the test of Newton's principles of *universal philosophy*, and of his method of *analysis* and *induction*; whereas, the mineral geology, applied to the same test, is altogether rejected by it in *both questions*. Having therefore ascertained what we were originally to seek, viz. *which* of the two guides it behoves us to follow, as competent to conduct us, with the *most perfect security*, to a knowledge of those great *historical secrets of time and nature* which constitute the proper objects of *true geology*; let us now collect, and reduce into order, the *general principles* which we have obtained; and let us sketch out for ourselves a *General Scheme*, which may at all times guide our view in contemplating the *phænomena* apparent in the globe, and which may secure us against the fascination of *unsubstantial theories*, and the seduction of *illusive analogies*.

And, 1. We take our ground upon the concurrent principle of MOSES, BACON, and NEWTON: That GOD, *in the beginning*, created by *His power*, and set in order by the counsels of *His intelligence*, ALL material things; in such sizes and figures, and with such other properties, and in such proportions to space, as most conduced to THE END for which He formed them. This is the *first principle* in sane physics.

CONCLUSION.



## CONCLUSION.

2. That *all first formations, in all the three kingdoms of terrestrial matter, mineral, vegetable, and animal, were therefore created, at once, equally perfect and complete in their respective structures, compositions, and arrangements.*

3. That, *after creation, God subjected all those material things to certain laws of His own enactment; by the operation of which, the order, which He alone had first established, was to be maintained and continued: which laws, as Bacon inculcates, are the same which vulgarly, and in physics, are called the laws of nature.*

4. That the *first formations, or creations, of all material things, were prepared with relation and correspondence to the laws which were afterwards to obtain in them, and, as it were, in anticipation of their operation; so that the phenomena of first formations could not indicate the mode by which the formations were really produced, although they might appear to exhibit such indications.*

5. That *this globe, so constructed at its origin, has undergone two, and only two, general changes or revolutions of its substance; each of which was caused by the immediate will, intelligence, and power of God exercised upon the work which He had formed, and directing the laws or agencies which He had ordained within it.*

6. That, by the FIRST *change* or *revolution*, CONCLUSION.  
*one portion* or *division* of the surface of the globe was suddenly and violently *fractured* and *depressed*, in order to form, in the first instance, a *receptacle* or *bed* for the waters universally diffused over that surface, and to expose the *other portion*, that it might become a *dwelling for animal life*; but yet, with an *ulterior design*, that the *receptacle of the waters* should eventually become the *chief theatre of animal existence*, by the portion first exposed experiencing a *similar fracture* and *depression*, and thus becoming, in its turn, the *receptacle of the same waters*; which should then be trans-fused into it, leaving *their former receptacle void and dry*.

7. That, this FIRST *revolution* took place before the *existence*, that is, before the *creation*, of any *organized beings*.

8. That the sea, collected into this vast *fractured cavity of the globe's surface*, continued to occupy it during 1656 years; during which long period of time, its waters acted in various modes, *chemical* and *mechanical*, upon the several soils and fragments which formed its bed; and *marine organic matter*, animal and vegetable, was generated and accumulated in *vast abundance*.

9. That, after the expiration of those 1656

CONCLUSION. years, it pleased GOD, in a SECOND *revolution*, to execute *His ulterior design*, by repeating the amazing operation by which HE had *exposed the first earth*; and, by the disruption and depression of that *first earth* below the level of the bed of the *first sea*, to produce a *new bed*, into which the waters descended from their *former bed*, leaving it to become the *theatre of the future generations of mankind*.

10. That THIS PRESENT EARTH, was that FORMER BED.

11. That it must, therefore, necessarily exhibit manifest and universal evidences of the *vicissitudes* which it has undergone; viz. of the *vast apparent ruin* occasioned by its first violent disruption and depression: of the presence and operation of the *marine fluid* during the long interval which succeeded; and, of the action and effects of that fluid in its *ultimate retreat*.

Within the limits of this *General Scheme*, all speculations must be confined which would aspire to the quality of *sound geology*; yet, vast and sublime is the field which it lays open, to exercise the intelligence and experience of sober and philosophical *mineralogy* and *chemistry*. Upon this legitimate ground, those many valuable writers, who have unwarily lent their science to uphold and propagate the vicious

doctrine of a *chaotic geogony*, may geologise with full security; and may there concur to promote that true advancement of *natural* philosophy, which Newton holds to be inseparable from a proportionate advancement of the *moral*. They may thus at length succeed in perfecting a *true philosophical geology*; which never can exist, unless the *principle of Newton* form the *foundation*, and the *relation of Moses*, the *working plan*.

CONCLUSION.



Beyond the limit of this *Scheme*, is the region of shadow and phantasm. What we cannot find *within* it, is not permitted to the sphere of our real knowledge. Let us not then strive to fill the inevitable voids in that substantial knowledge, by phantasms collected from the region of shadow; nor entertain the pernicious principle, that the *presence of fiction* is always more desirable than the *absence of truth*. “*Melius est aliquid nescire secure, quam cum periculo discere.*” To *know* that we *cannot know* certain things, is, in itself, *positive knowledge*, and a knowledge of the most safe and valuable nature; and, to abide by that *cautionary knowledge*, is infinitely more conducive to our advancement in *truth*, than to exchange it for any quality of conjecture or speculation. It is this knowledge, that constitutes our great *preservative against error*; it is, as

## CONCLUSION.

the *embargo* by which *truth* would prohibit us from passing its frontier, and by that means secure us from the malignant contagion of scepticism and infidelity. It, moreover, maintains the *reason* in health, by not suffering the mind to waste its vigour in the enervating indulgences of the *imagination*.

By adhering to the tried and approved guidance of the *Mosaical geology*, and by directing our view according to the general indication of the *Scheme* which we have here drawn from it, we shall presently perceive a *light* diffuse itself over every object of our contemplation; whether it pertains to the *physical* system, or to the *moral*.

When, thus prepared, we journey amidst the sublimities which the face of this globe presents to our admiration; when, for example, we ascend the upper valleys, and climb the primordial eminences, of *the Alps*, and survey those awful and magnificent scenes over which the ignorance of *mere physical science* has so long spread a veil “*of gloominess, of clouds and thick darkness,*” the favourite repair and refuge of all the evil spirits of infidelity; we shall, on opening our *Scheme*, instantly see the darkness dispelled; the exposed night-birds scared, scattered, and gone; and a bright and serene effulgence invest and sanctify the

universal scene. What before was all perplexity and confusion, will become order and distinctness ; uncertainty and anxiety will be past for ever ; and we shall find ourselves able to *read* with fluency, what physical science *alone*, with all its labour and all its industry, has not been able even to *spell*.

CONCLUSION.

When we survey those stupendous chains of granite summits, with their mural sides, whose *internal substance* and *texture* are laid open to our inspection, we shall behold with admiration a part of the *first formation* of this globe ; the *mode* of which first formation, like that of the *bone* of the *first parent*, was *creation by the immediate act of God*. We shall guard ourselves against the contradiction, of reasoning from any character apparent in that texture to a *secondary cause* ; because we shall be *sure*, that no character or appearance in *formations by creation*, can indicate causes, which did not exist until those formations were produced and perfected. And we shall impress ourselves deeply with a sense of the illogical and absurd quality of all such reasoning, that our senses, or our imagination, may not seduce us into the adoption of it.

When we contemplate the *fractured sides* or *faces* of those granite summits ; the vast masses and blocks *severed* from them, and cast and rolled in various places ; the smaller

CONCLUSION. fragments, and even the crumbled and powdered grains, lying in the vast chasms below, or scattered over the valleys and adjacent plains; when we observe the *depressions* of those valleys and plains, until other lines of *stationary primordial eminences* give notice of a continued alternation of similar relations of *height* and *depth*; and when we extend the same characters, in thought, over the whole surface of the globe; we shall instantly recognise the evidence of that tremendous operation, *the FIRST REVOLUTION*, the source of all the sublimity which the face of this earth displays; by which, *one vast division* of the globe was suddenly *rent and sunk*, to receive the congregated waters, leaving only those parts of that division stationary on their bases, to which we give the name of *primordial mountains*. We shall reflect, with astonishment, that a work of such early apparent disorder and desolation;

Crags, knolls, and mounds, confusedly hurl'd,  
 The fragments of an earlier world —  
 Hurl'd by *primæval earthquake shock*,  
 And here in random ruin piled;

was destined to produce objects of the *grandest beauty*, and to become sources of the *sublimest sentiment* to a *future* race of mankind; and, at the same time, to constitute *vital organs* of a



system, by means of which *life* was to be circulated to every part of a *future earth*. But, we shall regulate our thoughts of the *magnitude* of the ruin thus occasioned, by the consideration; that the *highest* of those fractured eminences, so stupendous to our perception, “ are no larger, with relation to the mass of “ the globe, than the inequalities on the rind “ of an *orange* with relation to the bulk of the “ fruit; and that, on a globe whose diameter “ should be *four feet*, the *loftiest* of them would “ not acquire an elevation of *half a line*.”

CONCLUSION.

When, amidst such scenes most distant from the sea, we discover traces of *ancient volcanic action* where no such agency has been exercised for many ages; we shall remember, that *volcanic action* proves the communication of the *sea*, at some period, with the *internal fires* constituent in the globe; that the *breach*, which first depressed a portion of the *terrestrial crust*, must have occasioned an *extensive communication* of the *superincumbent waters* with those *internal fires*; and, that *extensive volcanic action* must have ensued, if not as a principal cause of the breach, yet as a necessary concurrent. So that the *extinct volcanos* whose

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<sup>1</sup> D'AURUISSON, tom. i. p. 59.

## CONCLUSION.

vestiges are apparent in all parts of this present earth; far from betokening to us some remote epocha of *Chaldaic*, or *pseudo-geological* antiquity, overlooked by the Mosaical record; will be hailed by us as perpetual evidences of that general reception of the external sea into the interior of the globe, which constitutes the **FIRST REVOLUTION of the MOSAICAL GEOLOGY**<sup>1</sup>.

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<sup>1</sup> It is only an act of justice, to introduce here the testimony of DOLOMIEU, little known amongst us, respecting the Canon RICUPERO; who is represented by BRYDONE, in his *Tour to Sicily and Malta*, as having contested the veracity of the Mosaical history, upon the ground of the *volcanic phenomena* of Ætna. “The Canon RICUPERO, (says “this distinguished mineralogist,) deserves neither the praises “which have been bestowed upon his science, nor the doubts “which have been raised concerning his *orthodoxy*. He “died without any other affliction than that, which was “caused to him by the work of Mr. BRYDONE. He could “not conceive, for what purpose this stranger, to whom he “had rendered services, endeavoured to excite suspicions “concerning the orthodoxy of his faith. This simple man, “very religious, and attached to the faith of his forefathers, “was far from admitting, as an evidence against the book “of Genesis, pretended facts which are *false*; but from “which, even if they had been *true*, nothing could have “been concluded. *Vegetable earths between beds of lava, do “not exist*; and the *argillaceous* earths, which are some

What we have observed of the substance and texture of *granite*, we shall extend to *all rocks* which are truly of *primitive formation*; that is, rocks in which there exists no evidence whatever of the *recomposition* of a substance *previously decomposed*, but whose grain displays that perfect uniformity and *homogeny*, which cannot be the effect of any known power or operation of what we term *nature*. Being *certified*, by the principles of true philosophy, that *first formations* could not have been produced from a *chaos*, by any *secondary agents* or *laws of nature*, but that they were *created, in the beginning, with the properties which most conduced to the ends to which they were to serve*; we shall consider the absence of all evidence of secondary causes as demonstration, that we are engaged with a substance whose *mode of first formation was DIVINE CREATION.*

CONCLUSION.




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“ times found between them, may have been disposed there  
 “ by causes totally independent of the *antiquity* of *Ætna*.  
 “ It is not in such facts that we are to trace the *age* of  
 “ that volcano; the *deposits of the sea* which cover its lavas,  
 “ are much more certain proofs of its *antiquity*.” *Mémoire sur les Isles Ponces*, p. 470, 1. We perceive, in the Mosaical geology, that, as *primitive volcanic action* must have preceded *all marine deposits*, so *all marine deposits* must necessarily have followed the *primitive discharge of volcanic matter*.

CONCLUSION.

Here then, upon this ALPINE SUMMIT; instead of our mind roving with ceaseless uncertainty and increasing perplexity, in speculative contemplation of the primæval ruins whose awful sublimities surround us on every side; instead of committing ourselves to the *blind guidance* of the mineral geology under any of its Proteus forms, “*prius imperitorum*” “*magistra quam doctorum discipula*,” or betraying ourselves to the *stratagems* of any mode of infidel sophistry, we shall close the eyes and ears of our imagination; and, with the undisturbed illumination of our reason, we shall pause and meditate upon the exalted truths which reveal themselves before us. We shall become perfectly sensible, that if “*we feel after the Creator*” of this stupendous fabric, we shall most certainly “*find HIM*;” for that, “*HE is not far from every one of us*!” The idea of *Nature*, will perish from the thought in the presence of HIM, “*the same yesterday, to-day, and FOR EVER.*” We shall *know*, that He is still surveying His own glorious work, and pronouncing it to be “*very good*!” In this presence, we shall feel and exclaim like the apostle, *καλον εστιν η̄μας ω̄δε*

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<sup>1</sup> Acts, xvii. 27.

ΕΙΠΑΣ—“ *it is good for us to be HERE!*” And, if CONCLUSION.  
 we here feel a desire, like him, “ *to make a taber-*  
 “ *nacle,*” or, like the great mineral geologist,  
 “ *to build a Temple,*” we shall dedicate it to  
 “ *THAT WISDOM which was from everlasting, be-*  
 “ *fore ever the earth was, by which the GREAT*  
 “ *ARTIFICER founded the earth and established*  
 “ *the heavens;*” but, we shall assuredly not  
 admit into its ritual the psalter of “ *the chanter*  
 “ *of nature,*” nor sing the *stave*, “ *Suave mari*  
 “ *magno,*” &c.


When, turning from the amazing monuments of that *first* great revolution, and from the contemplation of the providence and skill which converted them into essential requisites for the *present earth*, we survey the widely extended *plains* moulded upon their irregular bases, and view them, in thought, stretched in succession over the entire surface of the earth; when we observe the irresistible evidence of the *watery agent*, which could *alone* have spread them out in their continuity; when we see the interior soils of those plains crowded every where with relics of *marine organic formations*, and observe similar relics in many of the eminences which rise above them; when the faces of rocks, and all the numberless accumulations of their fragments caused by the *first* revolution, show, by their smooth ex-

CONCLUSION. teriors, and by the loss of their angles of fracture, a very long and continued state of *trituration in a bed of waters*; we shall be sensible, that we are standing in *the BED of a VAST OCEAN*, and shall inquire for the *element* which once owned it for its "PLACE." We shall plainly recognise *the interval of time* which succeeded to that *first* brief but turbulent revolution, and which left the ocean in possession of that bed for 1656 years, "to bring forth abundantly after their kind the living creature that moveth," and "to fill the waters of the sea;" and we shall thus, without any difficulty, explain "the vestiges of that ancient and long-continued inundation which mineralogists suppose to have preceded that of Noah<sup>1</sup>:" vestiges, which the mineral geology could not account for, but to account for which nevertheless, by the rule of its own ignorance, it demanded the *perversion*, if not the *contradiction*, of the Mosaical record.

We shall distinctly perceive, that the *diluvium*, or *deluge of waters*, took place only upon the earth which was destroyed, according to the declaration of the record; and that the *aqueous phenomena*, which we witness around us on every

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<sup>1</sup> See above, pp. 166, 7.

side, exhibit the *immediate consequence of that* CONCLUSION.   
*diluvium, in the vacuity of the bed from which*  
 the waters were *transfused* to overwhelm and  
 destroy that former earth.

The *successions* of the secondary strata, which we perceive in penetrating deeply into this *evacuated bed*, will demonstrate to us the *primitive operation* of the departed sea; when, on being first drawn into it, in the FIRST REVOLUTION, and rushing impetuously downwards from the encircling boundaries into the new profundity, its concentrated violence stirred up, and dissolved with agitation, all the loose or soluble materials of the newly fractured and fallen surface which it there encountered; and left them, while it regained its own tranquillity, to be precipitated and deposited again upon its bottom, according to the rule of their respective gravities.

When we inspect hills or mountains whose soils reveal themselves not to be of primitive formation, by the *recomposition* of their substances, and by the *foreign matter* which they contain; whatever be the *hardness* of their present texture, or the magnitude of their bulks, we shall recognise in them the action of the sea, during its established occupancy, but more especially, in the strange and violent agitations which attended the last stages of its retreat; agitations, altering and

## CONCLUSION.

increasing in mode and power, in proportion as its diminished depth enabled it to transmit the action of its surface with greater and greater intensity to the yielding materials of its bed. The *rocky hardness* which many of those masses have since acquired, will declare to us the *mode* by which their former plastic nature has become fixed and consolidated. As, in the *sea-sand* on the coast of Messina, near the gulf of Charybdis; which remains *loose* and *incohesive* so long as it continues *within the sea*, but, when driven *upon the shore*, becomes cemented and *indurated*, by means of a calcareous fluid insinuated between its particles, into a sand-stone of which *mill-stones* are made<sup>1</sup>; so, in the firmest and hardest of these compound rocks, we shall discern evidence of their former *softness* and *pliancy*, until the SECOND REVOLUTION transferred the water from the bed which it had so long occupied, and left those aggerated masses of its basin to a similar process of *conglutination*, *exsiccation*, and *induration*.

We shall be aware, that in many cases the exsiccation of enormous masses originally saturated with the water of the departed sea, must have been followed by vast *failures* and

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<sup>1</sup> D'AUBUISSON, tom. i. p. 158 and 381.



*settlements*; by which, the *planes* of those masses would be altered from their first directions in various degrees between horizontal and vertical, determinable principally by the surface of the disordered *primitive base* on which they were deposited, and, in the repeated instances of such declinations occurring to our observation, we shall often see combined, the *united effects* of the TWO REVOLUTIONS. CONCLUSION.

Of those *two revolutions*, and of the *intervening period of time*, we shall recognise a summary, and irrefutable evidence, in that species of compound rock, which is vulgarly called *plum-pudding stone*; composed of *conglutinated fragments of primitive rock*, and found in elevations above the level of the present waters of the globe<sup>1</sup>. The *substance* of the several fragments, will exhibit to us the *grain* and *texture* of the FIRST FORMATION of the rock. The *actual fracture* and *separation* of the parts, will testify to the FIRST REVOLUTION; “being  
“ fragments of ancient rocks, brought together  
“ by some mechanical agent; and the *results*, and therefore the *indications*, of a  
“ *revolution in nature*,” by which the primi-

<sup>1</sup> *Nouv. Dict. d'Hist. Nat.* art. POUDINGUE.

<sup>2</sup> D'AUBUISSON, tom. ii. p. 205.

CONCLUSION.

tive continuous mass was violently broken in portions of all sizes, from the largest blocks to the minutest sand <sup>1</sup>. The *rounded forms* of the fragments, will bear witness to the LONG SUCCEEDING PERIOD, during which they were subjected to incessant *trituration in the sea*; by whose continual action their angles of fracture were gradually worn down, their present surfaces imparted, and themselves finally congregated in a mass of *marine cement*. Lastly; the *present hardness* of that *cement*, by which they are now become consolidated into one compound mass, will attest to us the SECOND REVOLUTION, in which the *departure of the sea* left it, like the *sea-sand of the Sicilian coast*, to the process of exsiccation; and empowered the chemical principle to act, which has effected that close and firm *cohesion* which we witness. In these, therefore, we shall see before our eyes an *epitome of the Mosaic record*; which cannot be read, otherwise than as we here read it. Those several processes must have followed each other, and in the order of succession in which they are here arranged; and they thus correspond to the record, as a *general table of contents*. They note, exactly, the *changes* intimated in the record; and, what

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<sup>1</sup> See above, p. 292.

is very remarkable, they neither note, nor will admit the introduction of, *any other*. The *last* of which, being acknowledged by the mineral geology to be the *last general revolution* which has taken place in *the earth*, we need not seek for any later.

CONCLUSION.

Finally; when we contemplate the discharge of the primitive sea to *the southward* of our present continents, and yet encounter the spoils of the southern continents which it submerged buried in the *most northern* regions of this its primitive bed; we shall recognise the *ordained*, and therefore the *natural*, results of a vast ocean cast against a *southern coast*, which presented to it *resistances successively receding*; which successive recessions caused it, in each succeeding advance, to *flow forward* with a violence continually increasing; and, consequently, to *return* with a proportionate *reaction*, loaded with accumulated spoils animal and vegetable, into the *northern regions* from which it had proceeded.

We shall thus contemplate, compare, and reduce into their *true order of time*, the effects of the *two revolutions*, and of the *intermediate period* between the two. To *one or other* of these, subsequently to *first formation or creation*, we shall refer *every revolutionary phenomenon common to the earth*; and we shall account it unscientific,

CONCLUSION. unskilful, and visionary, to suggest *any other general revolution*, besides these which are so powerfully and so thoroughly authenticated. We shall be quite sensible, that none preceded the first of these; that none has followed the last; and further, that none intervened between the two. Where we are absolutely unable to trace *particular relations* between effects and their immediate causes, we shall consider ourselves to have reached the boundary of our knowledge; but we shall never consent, much less shall we *attempt*, to explore beyond that boundary under the illusory and desperate guidance of *anti-Mosaical theory and hypothesis*. “*Ignorance*,” said De Luc, “often differs from what is called *knowledge*, only by a *less degree of error*. “It ought to be inculcated upon all men, that, next to the positive knowledge of things which *may be known*, the *most important science* is to know *how to be ignorant*.—‘*I don’t know*,’ ought to be a frequent answer of all teachers to their pupils, to accustom them to make the same answer, *without feeling ashamed*<sup>1</sup>.” A golden maxim! but, which it behoves the teacher to *practise*, as well as to *inculcate*. The French have a rude *truth* in proverbial saying:

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<sup>1</sup> *Lett. sur l’Histoire de la Terre*, tom. i. p. 228.

“ *On feroit un gros volume de tout ce que vous ne savez pas.*” Shakspeare speaks to the same point, but with more dignity, when he says ;

There are *more things* in heaven and earth, Horatio,  
Than are *dreamt of in your philosophy !*

This is a *truth*, which bears with its full force upon every one of us ; and certainly, not least upon the mineral geology.

It was doubtless through inadvertency, that a recent able and ingenious critic suffered himself to be drawn into the following remark. “ From *architecture*, the earth derives its *moral physiognomy*. *Inanimate nature* forms no part of *human nature* ; it is only when we behold the *productions of men*, that we connect *Her* with the *human kind*. The *naked spires of primitive granite*, losing themselves in the *clouds*, the *course of the river*, the *stratification of the soil*, relate the *revolutions of the globe* during successive ages. Tremendous convulsions are indicated by these tokens ; but, the *accidents of inert matter* are, perhaps, of less immediate interest, and certainly of *less immediate importance to us*, than the events which raised the *obelisk* and the *pyramid*, the *temple* and the *tower*, the *basilic* and the *hall*. These are the memorials of *human civilization* ; marking the progress of

CONCLUSION. “ the mind, attesting man’s *power*, his *virtues*,  
 “ and his *crimes*!”

I must frankly confess, that my judgment reverses the whole of this reasoning. But then it is, from denying all the premises: that the *spires of primitive granite*, the *courses of rivers*, and the *stratification of the soil*, can only be contemplated as *inert matter*; that there is nothing *moral*, in these features of the *earth’s physiognomy*; that the *revolutions of the globe*, have been mere *accidents of matter*; and therefore, that they are *certainly of inferior importance to us*. From denying *all* these premises, I am obliged to assert; that those *human monuments*, the *obelisk* and the *pyramid*, the *temple* and the *tower*, the *basilic* and the *hall*, with all their venerable honours of decay, vanish from importance and from thought, in comparison with the *Divine monuments* presented, for the *highest moral contemplation*, in the *spires of granite* and the *courses of rivers*, surveyed by the light of the *Mosaical geology*.

The *former* of those monuments, tell us only of that which is *gone by for ever*, and from which, therefore, *our being* can never derive a positive, real, and permanent interest; whereas the

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<sup>1</sup> *Quarterly Review*, No. 49, p. 117.

*latter*, in leading the thoughts by an indissoluble chain from what “*was*,” and what “*is*,” to that which “*is to come*,” gives *forethought* of an *interest*, most positive, most real, and most permanent. The Mosaical geology, by putting us familiarly in possession of convulsions and revolutions *which have actually taken place*, capacitates us to adapt our forward view to *that revolution which still impends*, and which will *ultimately and certainly* take effect. And, while it acquaints us, that the earth which then was being overflowed with water perished, and, “*that there shall be no more A FLOOD to destroy the earth;*” it brings our mind into an ability to apprehend the *reality* of that assurance of the oracle which pronounces, in exposition of the latter sentence, “*the earth which NOW IS, is reserved for FIRE:*” of the *existence and presence* of which *element*, as a constituent principle in our globe, we possess evidence as sensible, as constant, and as universal, as that which the *first* race of mankind possessed of the surrounding *watery element*, whose agency was foreshown to them, by the same oracle, as the instrumental means of the destruction of *their earth*. With this consideration, therefore, the thoughts naturally travel *forward*, in contemplation of *another earth*, promised by the same oracle to succeed to

## CONCLUSION.

*this*; not figurative or allegorical, but real and actual, though of a very different nature from the present; in which, though “*man’s virtues*” will indeed be admitted, “*man’s crimes*” will for ever be excluded<sup>1</sup>.

This is a subject of contemplation well qualified to regulate and adjust our estimate, both of *this mineral mass*, which so powerfully attracts and engages the energies of the mineral geology, and of the *pyramid and basilic*, the *obelisk and tower*, which are wasting to decay upon its surface. It must tend, to turn our meditations from too earnest an admiration of this *κοσμος*—*this material fabric*, to a due contemplation of the *Κοσμοποιος*, the *eternal and almighty Artificer*<sup>2</sup>; whose ulterior purposes with respect to us, are not confined to a structure, of *feld-spath, mica, and quartz*. Thus, the Mosaical geology not only directs our view *backward* in time, to the *origin* of the globe, but it prompts us to look, *ἀμα προσω και οπισσω*—not merely *back*, to the *past*, but *forward* also, to the *future*, the *latter* of which is, assuredly, an object not less worthy of *philosophical contemplation* than the *former*; since the *former*, we *never can witness*, but the *latter*, we *most certainly shall witness*. And thus it will be found, that the

<sup>1</sup> 2 Pet. iii. 13.

<sup>2</sup> See above, p. 112.



earth derives a far sublimer, and more profoundly stamped *moral physiognomy*, from its features of “*inanimate nature*,” its “*naked spires of primitive granite*,” and its awful “*tokens of convulsions and revolutions*,” than it can possibly derive from all the united works which “*man’s power and his crimes*” have been able to achieve in *architecture*, from the *first pyramid* raised in *Egypt*, down to the *column* in the *Place Vendôme*.

“During a long time,” observes M. Cuvier, “two events or epochas only, the CREATION and the DELUGE, were admitted as comprehending the changes which have occurred upon the globe; and all the efforts of geologists were directed to account for the present actual state of the earth, by arbitrarily ascribing to it a certain primitive state, afterwards changed and modified by the deluge<sup>1</sup>.”

“At that period,” observes M. D’Aubuisson, “when all scientific questions were submitted to the rule of *theology*, those facts, as manifest as they were remarkable, (of *animal* and *vegetable substances* found in the midst of *mineral masses*,) were ascribed to an *universal deluge*; and it was long disputed, how it could have effected them<sup>2</sup>.”

<sup>1</sup> *Th. of the Earth*, § 19. p. 5.

<sup>2</sup> *Disc. Prél.* p. 4.

## CONCLUSION.

I beg leave, in terminating this disquisition, to tell those two great and valuable naturalists, with all the respect which is personally due to them, and which I sincerely entertain towards them both; that, until they shall “ask for the OLD PATHS, and walk therein<sup>1</sup>,” until they shall simplify their systems, and reduce their “numerous revolutions” to the “two events or epochas only, the SIX DAYS OF CREATION and the DELUGE,” they will never “find rest” for their science of *mineral geology*. The difficulties which have attended, and the errors which have followed, inquiries concerning the *fossil phænomena* of the earth, are in no manner chargeable upon *theology*, considered in itself; but have resulted from two separate causes, unskilfulness of *theologists* in *physics*, and unskilfulness of *physical philosophers* in *theology*.

When I thus use the word *theology*, I do so only in conformity to the writer last quoted; for, the question does not relate to *theology generally*, but, to that part of it alone which respects the *sacred history* in particular. I should therefore have said with more propriety, that those errors have resulted from unskilfulness of *theologists* in *physics*, and of *physical philo-*

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<sup>1</sup> Jerem. vi. 16.

sophers in the *sacred history*. The question at issue, is a *compound question*; it is both *physical* and *historical*; for, it seeks the *historical truth* of a *physical fact*. It is therefore indispensably necessary to understand, both the *physical fact* which is to be accounted for, and the *history* which undertakes to account for it; before we can be duly prepared to assert or to deny the concord of the *history* with the *fact*. Theologians, formerly, were not accurately skilled in physics; and physical philosophers were very imperfectly instructed in the history, that is, in the *original document*; and from thence resulted, great and irreconcilable discordancies between them. But, many theologians, at the present day, apply their minds to *physics* with the same ardour as physical professors; and, if the latter would apply their minds, with the same diligence and industry, to scrutinize and understand the *sacred history*, the result would probably be, an *union of opinions* in both, and an ascription of *all* the general revolutionary phenomena of the earth to those *two events* only, the CREATION and the DELUGE; that is, to the *two revolutions* effected in those *two* great periods, inclusive of the *time intervening between the two*: as, I think, has been not unsuccessfully shown in the preceding discussion.

And here I must freely acknowledge, that if

CONCLUSION.



**CONCLUSION.** physical science has often betrayed a precipitate and irreverent temper, in rejecting the causes assigned from the record, by theological learning, for the mineral phænomena of the globe; theological learning, on the other hand, has not been sufficiently accurate, in the exposition of the record which it has presented to physical science for its acceptance. It has propounded only *one* universal revolution of the globe, inadequate to all the effects which are so manifestly experienced; whereas we have seen, that **THE RECORD** really, and most distinctly, points out to us *two* revolutions. But, those *two* sufficiently indicate the *causes* of all the revolutionary phænomena, for which *one* revolution was *insufficient*, and for which *more than two* are *unnecessary*. And therefore, it is for the mineral geology now to return from the theoretical excursions into which the insufficiency of that *one* revolution had driven it; and to *conform* and *adapt* its science to so authoritative a document, after that its contents have been thoroughly investigated, and accurately ascertained.

I do not include, in this remark, its *chaotic revolutions*, devised for the sole purpose of maintaining a *chemical mode of mineral first formations*, and which pertain to the *former parts* of this inquiry; all these, like "*gorgons, and hydras,*

“*and chimeras dire,*” and all other spawnings of a misordered fancy, are to be at once extinguished upon *another* account; their intolerable offence to *genuine reason, sound philosophy, and true religion.* So long as the mineral geology shall continue to rest its science upon such *phantasmata*, it will be as remote from the real truth of things as “*the chanter of Nature;*” who likewise taught,

CONCLUSION.



The various *molecules* of Nature's frame,  
 Of air, of earth, of sea, of liquid flame;  
 How, aggregated wide in space, they all  
 Grew from those elements to this fair ball;  
 How, the moist soil condensing by degrees,  
 Press'd from the hardening mass the exuded seas,  
 Till Earth at length Her perfect *form assumed*<sup>1</sup>.

If it be asked, to which *particular form* of the mineral geology I direct this remark? I answer, to *every form.* Certainly, there is none which is better entitled to it than the *Protogæa*<sup>2</sup>, or *geological hypothesis*, of the celebrated Leibnitz; the great rival, and antagonist, of our own superior Newton, whose *characteristic principle* was, “*HYPOTHESES NON*

<sup>1</sup> VIRG. Ecl. vi. 31.

<sup>2</sup> *Acta Erud. Lips.* Jan. 1693. p. 40.

CONCLUSION. “ FINGO—I FRAME NO HYPOTHESES <sup>1</sup>.” “ *I Believe*, (professes that bold and fearless speculator,) that *our globe* was at one period in a state similar to that of a *burning mountain*: the *rocks*, which are as it were *the bones of the earth—les ossemens de la terre*—were the *scoriæ*, or vitrifications of that *ancient confusion*; the *sand*, is nothing but the *glass* of that vitrification pulverized by motion; the *water of the sea*, is a sort of *oleum per deliquium*, caused by *cooling* after calcination. Here, then, are *three* materials widely extended over the surface of our globe, namely, the *sea*, the *rocks*, and the *sand*, explained *naturally enough* by FIRE; and which it would *not be easy to account for by any other* HYPOTHESIS. This *water*, at one period covered all the globe, and caused in it *many changes* even before the deluge of Noah<sup>2</sup>.”

In this portentous formulary of *hypothetical faith*, we can have no difficulty to perceive, that the sublimest intelligence, when it forces a progress beyond the guidance of reason and evidence, and is determined to travel forward under the conduct of fancy and speculation

<sup>1</sup> *Schol. Gen. Pr. Math.* iii. *in fin.*

<sup>2</sup> *LEIBNITZII Opera*, tom. vi. p. 213.

alone, passes into a lunar sphere ; and the quint-  
 essence of ingenuity which it therein concocts, CONCLUSION.  
 is indeed found, on *cooling*, to be a production  
*per deliquium* — sc. “ *sanitatis ac mentis.*” The  
 MODE of the *first formations* of the *mineral*  
*substances* composing this globe, is a *matter of*  
*fact* which lies as far beyond the scrutiny of  
 any mineral geology, whether by scientific  
 inspection or chemical analysis, whether by the  
 method of *water* or the method of *fire*, as the  
 mode of the first formation of the *bones of Adam*,  
 or of the *wood of the trees of Paradise* ; and it is  
 not *theology* that pronounces this, but, “ *sound*  
 “ *physics, exact logic, and the philosophy of*  
 “ *Bacon and Newton.*”

We are told that Archimedes affirmed,  
 that he could raise the globe of this earth  
 by the powers of mechanism, if he could  
 only find a *place* on which to fix the *fulcrum*  
 of his lever ; but, as he knew that he could  
 not find such a place, he did not give himself the  
 trouble to seek for it. The CHAOTIC GEOGONY,  
 in its attempt to determine the mode of first  
 formations by secondary causes, resembles  
 Archimedes and his school, not merely *seek-*  
*ing* for the place, but *confident that they had*  
*found it*, and busily engaged *in the operation* of  
*elevation* ; and the contradictory hypotheses of  
 that geogony, resemble the disputes which in

CONCLUSION.

that case might very probably arise, concerning the *fittest point of the place* for fixing the *fulcrum*.

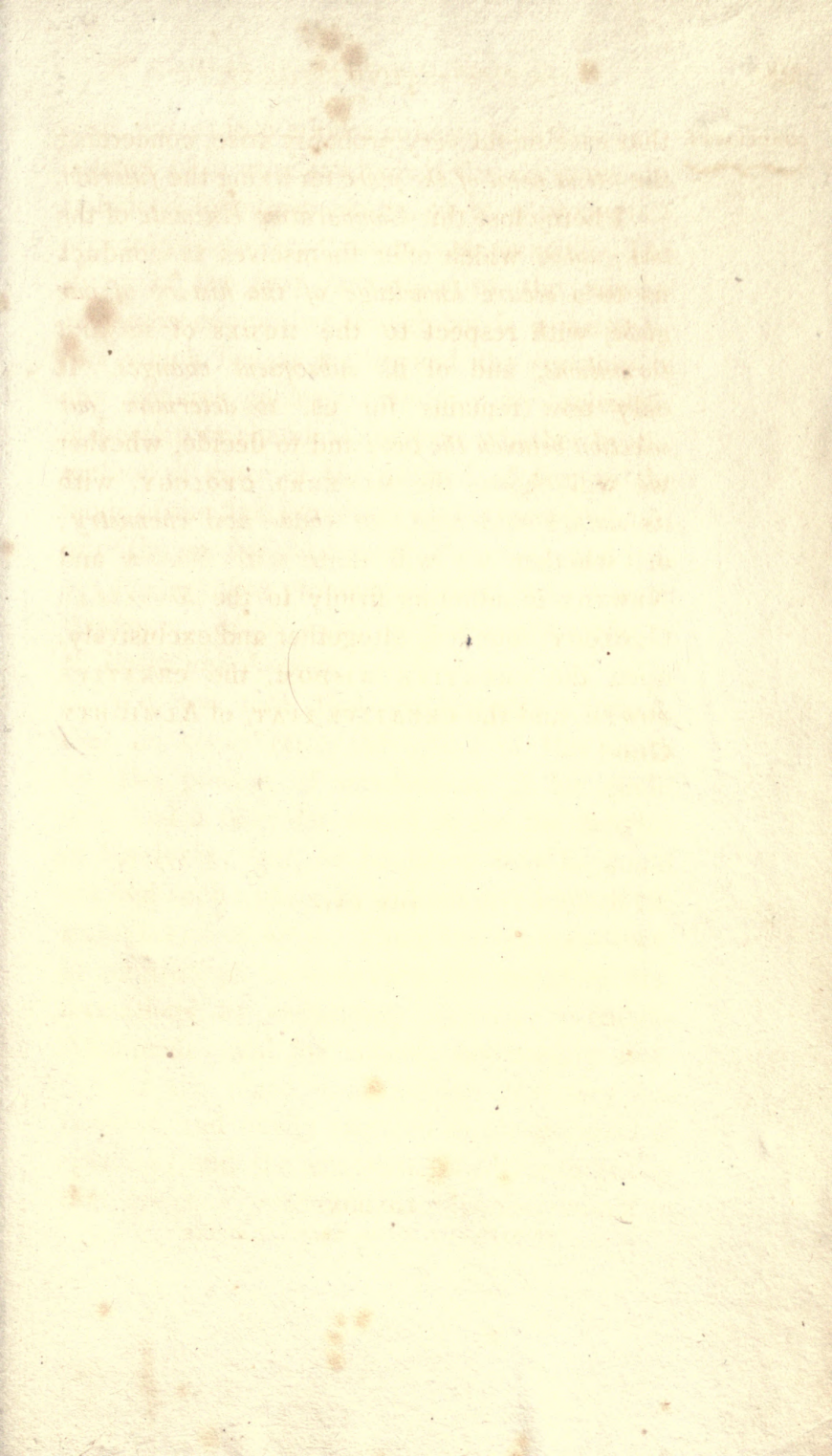
I here close this *Comparative Estimate* of the *two guides*, which offer themselves to conduct us to a *secure knowledge of the history of our globe*, with respect to the *MODES* of its *first formations*, and of its *subsequent changes*. It only now remains for us, to *determine our selection between the two*; and to decide, whether we will choose the *MINERAL GEOLOGY*, with its *nature and time*, its *chaos and chemistry*; or, whether we will unite with *BACON* and *NEWTON* in adhering firmly to the *MOAICAL GEOLOGY*, founded, altogether and exclusively, upon the *CREATIVE WISDOM*, the *CREATIVE POWER*, and the *CREATIVE FIAT*, of *ALMIGHTY GOD!*

THE END.

LONDON:

PRINTED BY J. MOYES, GREVILLE STREET.





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