



XIX. On the importance of knowing and accurately discriminating Fossil-Shells, as the means of identifying particular Beds of the Strata, in which they are inclosed: with a list of 279 species or varieties of shells, of which the several stratigraphical and geographical localities are mentioned, which seem to require the particular and minute attention of the collectors and examiners of fossil shells in their natural deposits

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but a small excess of either of these. The formation of superoxide of copper requires another precaution: the deutoxide of copper must be put to the oxygenated muriatic acid in such portions that the acid shall be always in excess; for if the oxide predominate, the greater part of the oxygen will be disengaged. In every case the oxide is precipitated in a gelatinous mass, or in the state of a hydrate: that of zinc is yellowish,—of copper, olive-green,—of nickel, a dirty-looking dark apple-green. The two former allow a portion of their oxygen to be liberated at the common temperature. When boiled in water the liberation of oxygen is still more abundant; but they still retain (especially the superoxide of zinc) a portion of the oxygen which they had absorbed; for if dissolved afterwards in muriatic acid, and heat be applied, a new quantity of gas is given off. The oxide of nickel is likewise decomposed at the boiling temperature; and even below that point its decomposition commences. Treated with muriatic acid it dissolves, like the oxides of zinc and copper, and is deoxygenated by heat without giving off chlorine. These different oxygenated hydrates recover the colours which characterize the common oxides after they have been boiled in water: thus the hydrate of zinc passes from yellow to white,—of copper, from olive-green to dark-brown. It had already been observed by M. Rothoff, a Swedish chemist, that the deutoxide of nickel is decomposed by desiccation.—These new hydrates, as we see, resemble those of barytes, strontian and lime, and form a class analogous to that of the oxygenized acids.—I expect to discover some more of them.

XIX. *On the Importance of knowing and accurately discriminating FOSSIL-SHELLS, as the means of identifying particular Beds of the STRATA, in which they are inclosed: with a List of 279 Species or Varieties of Shells, of which the several Stratigraphical and Geographical Localities are mentioned, which seem to require the particular and minute attention of the Collectors and Examiners of Fossil Shells in their natural Deposits. By Mr. JOHN FAREY Sen. Mineral Surveyor.*

To Mr. Tilloch.

SIR,—ON taking a review of the many particulars regarding the Fossil Shells and other organic remains of Britain, which were published by Edward Lhwyd (or Luid) in 1669, by Dr. Plot in 1686, by Dr. Woodward in 1729, by G. Brander in 1766, by Da Costa in 1776, and by John Walcott, Rev. David Ure, and others prior to the time when Mr. William Smith began his investigations of the Strata of England, about 1792; it cannot fail of exciting surprise, that these learned and ingenious Writers, and the

the many of our countrymen who wrote on Geology in this period, should have been so little aware, of the important aids which a correct knowledge of Fossil Shells would afford, towards real and untheoretical investigations of *the internal structure of our Country*, and regarding the early history of its Strata.

Mr. *William Martin*, in 1794, began the publication of his "*Petrificata Derbiensia*," and completed the first volume thereof in 1809, (having previously in the same year, published his "*Outlines of the Knowledge of Extraneous Fossils*,") yet Mr. M. notwithstanding his industrious search through so many years, for perfect specimens and new species of Fossil Shells, in one of the most distinctly and regularly stratified Districts of England, free from Alluvia, and particularly rich in organic Remains, had but in a very slight and imperfect degree perceived, *the order and regularity*, with which the different species of Shells are almost invariably arranged, in the different beds of the Rocks he had examined, such as Mr. Smith was fortunate enough to perceive, elsewhere, almost from the outset of his investigations.

The works of Mr. Martin which are mentioned above, and his Letter in your 39th Volume, bear ample testimony to the justness of the above remark, which I was particularly enabled to make, on the occasion of paying Mr. Martin a visit at Macclesfield, in April 1809, and on showing and explaining to him my Map of the Strata of Derbyshire, and mentioning to him the discoveries which had been made and communicated to me and many others by Mr. Smith, relative to *the invariableness of the stratigraphical situations of Fossil Shells*, and the important uses which Mr. S. had been able to derive from them, in commencing and carrying on his novel and extensive investigations of the Strata and sub-facial structure of England and Wales.

Mr. *James Parkinson's* extensive research into the writings of the greater part of the previous authors on Extraneous Fossils, in our own Country and on the Continent, and his industry and judgement in the formation and description of a large Collection of Specimens of such Fossils, are fully shown, in the three volumes entitled "*Organic Remains*," which he published in 1804, 1808, and 1811 ; which work fully evinces, until approaching the conclusion of its third volume, the truth of the foregoing remarks, as to the slight and imperfect knowledge which existed of *the Fossil Shells, in relation to, and as the means of identifying particular Strata*, until the discoveries, and the practical applications of the same to the general surface of England, began to be made more generally known, by the communications of Mr. Smith and myself: and in consequence of which, Mr. Parkinson was led to review, to question, and at length to abandon many positions and opinions which had been formed and advanced,

in the long progress of preparing his work, with the degree of confidence, which the almost entire concurrence of the numerous authorities he had consulted, was naturally enough calculated to inspire; amongst the most prominent of these changes of opinion, so honourable to Mr. P's liberality, is that which relates to the previously alledged formation of the Strata of Coal and those which intervene, (and of course, of all those which overlie the Coal Series) *during the Noachian Deluge*. See vol. III. pp. 443 and 441.

The early Numbers of Mr. *James Sowerby's* "Mineral Conchology" appeared in 1812, and through them, until near the conclusion of his first volume in 1815, when Mr. Smith's "Map of the Strata of England and Wales" had just appeared, additional evidence is furnished to the same point, in the conflicting opinions and doubts which Mr. Sowerby has therein expressed, as to nearly every inference which follows from the discoveries and labours of Mr. Smith; yet, notwithstanding the almost entire agreement of authors, in his own previously expressed opinions, Mr. S. then liberally took Mr. Smith by the hand, and offered him that assistance, in the bringing out of one of his proposed works on Fossil Shells and other Organic Remains, which has enabled three Numbers of "Strata Identified" to appear, in a state highly conducive to the progress of stratigraphical knowledge, and a fourth Number to be now nearly ready for delivery.

In the mean time Mr. Smith persevered, and by the aid of an ingenious young man his nephew and assistant, Mr. *John Phillips*, (who had made himself enough acquainted with the language and works of some of the best systematic writers on natural history,) was enabled to bring out, in 1817, the first part of his "Stratigraphical System of Organized Fossils:" and since, to complete the manuscript (as I have been informed) of the second and concluding part, of this truly important and nationally creditable work: if fortunately, his publisher's account of the sale of No. 1, had hitherto justified the putting of No. 2 to press!

It is, Sir, from the sincere desire which I feel to remove this impediment to the more rapid diffusion of *the stratigraphical knowledge of Fossil Shells*, which, as far as relates to the lower and most useful part of the British Series, has too long been withheld from great numbers, who, like myself, are anxious to make a more perfect use of this knowledge, in the mineral investigation of our Island for the advancement of Science, and in the practical application of this knowledge to the purposes of mining for the benefit of its inhabitants, that I have to request the favour of your insertion of the foregoing remarks in your Magazine: which remarks might have been spared, if—happily, every writer amongst us would imitate the praise-worthy liberality of the three individuals to whom I have particularly adverted, or would follow the
practice

practice of our neighbours on the Continent, who from national feelings, seem to make a point of forwarding the publications of their countrymen: I am sorry however to perceive, that this is not here the case; the article "Conchology," not long published in that respectable work the "Supplement to the Fifth Edition of the Encyclopædia Britannica," intended to bring down the subjects to the time of writing the Supplementary Articles, in the chapter expressly "on Fossil Shells," not only omits all mention of Mr. Martin's works, (whose widow and orphans languish for the comforts which the sale of the copies on hand would produce), but it also totally *omits the mention of Mr. Smith* or his works!; it would have given me pleasure to have added, if I could have done so, that this omission, by the Rev. Dr. John Fleming the writer of the article, might have arisen, from the mention of Mr. Martin and Mr. Smith not having come before him, in the works from which he was quoting at the time: the reverse however is the case, see *Min. Conch.* I. 153, &c.

Whoever attentively examines the great number of Strata, some of them in groups consisting of several successive Strata, of many Beds collectively, and others in single beds, of various thickness, which are as utterly *devoid of Organic Remains*, as any of those more crystalline masses, which inconsiderate Theorists have on these accounts pronounced to be "primitive," that is, of a date antecedent to the first existence of living Beings!; and attentive Persons who at the same time observe, that these Strata without Organic Remains, are interposed between others which abound in such Remains, in nearly an equal degree of plenty throughout every part of the plane which they occupy: such observers of Organic Remains in their natural deposits, can hardly fail I think of concluding (as I have done many years ago) that every individual Shell or Organic Remain, which appears after each of these non-organic Strata or Beds, (or next above such in the Series, especially those of considerable thickness) *must have then begun to exist, or they were created* since the deposition of the Stratum which underlies them, and contains no Organic Remains.

The conclusion of such careful observers, will scarcely I think be less certain and undoubted, that Shells of a defined species in a particular Bed, which covers a series of Beds containing none of that defined Species, but other Shells of different species, that such defined Species, as certainly began to exist, or *were created* at that particular era, when the lowest bed in which they are seen, began to be deposited, (and at which period, *the matter of the Stratum itself* imbedding them, also *received its first existence* from the Creator, as I conclude, see *Min. Conch.* I. 128): from whence it will follow, that the almost innumerable Species of Organic Beings which existed, prior to the Earth receiving *the same*

116 *Fossil Shells and their Strata, were created nearly together!*

dimensions and external form, which it now exhibits; or in other words, all those Species which *were contemporary with the deposition* (and creation) *of the Strata*, were only of a comparatively limited period of existence, and entirely differed from the subsequent Organic Creation (on the present surface, of which Moses treats), in these remarkable particulars, viz. that very commonly *only one Species was in existence at the same time*; at other times two Species existed, but neither the beginning nor the end of their existences were cotemporaneous, in many instances; during other periods of this series of Creations and vital Extinctions, three, four, five, and frequently greater numbers of Species existed at the same time (as is evinced by their Remains occupying the very same Bed or lamina of the Strata) but often, with different eras, of beginning and ceasing to exist, for almost every particular Species.

Whereas on the contrary, the present series of Organic Beings, or the present Creation as it is commonly called, is extremely diversified, as to *the very great number of Species now existing together*; each one propagating its like!; And experience, history and tradition, concur with just reasoning on the subject, in assuring us, that this always has unvaryingly been the case, ever since Man first began to exist; and that although some few organic Species may have since become extinct, in the progress of bringing whole Districts under the dominion of civilized Man, yet in this latter period, *no new Species have begun to exist*, much less *has any addition been made to the Matter of the Globe*, except perhaps the inconsiderable ones arising from the fall of Masses (containing Iron and Nickel in probably every instance,) which prior to such falls, formed parts of separate and independent *Satellitula*, which from the period of the general Creation had continued to revolve around our planet, with the immense velocity requisite for maintaining such small orbits as *the shooting stars* move in*.

These views on the subject of Organic Remains, which I have long, almost in vain attempted to press on the consideration of observers and writers on Natural History, are nevertheless capable of such abundant proofs, that however long we may have been in arriving at them, they cannot fail I think, of sooner or later, gaining universal assent: but previous to which, a great deal more of research, and of precision and care must be bestowed, *on the discrimination of the extinct organic Species*, than they have yet received, in doubtful cases, even from Mr. Sowerby, who unquestionably takes the lead in this interesting inquiry, in our country, wherein the same originated.

When Naturalists first began to turn their attention to the Or-

* See the Papers of mine on this subject in Nicholson's Journal, vol. 30. p. 285, and vol. 32. p. 269.

ganic Remains, and while the idea yet almost universally prevailed, that they were but those of individuals, from amongst *the early progenitors of the same stock which yet exists alive*, it was natural enough, that the artificial arrangement of Classes, Genera and Species, into which the followers of Linnæus had divided all the known living Organized Beings, would prove alike sufficient, for comprehending all such Organic Remains: it is however well observed by Dr. Fleming in his Article to which I have referred, that the reluctance felt by the writers who preceded M. Lamarck, to the forming of new Genera, has rendered the descriptions of these writers nearly unintelligible, unless when accurate *figures* accompanied their descriptions. I cannot however think, that the Doctor has displayed equal sagacity, in censuring Mr. Sowerby, in the same paragraph, for a "too great anxiety to constitute Species;" unless indeed, he meant to allude to the giving of personal and arbitrary names, rather than local or descriptive ones, to those individuals which his comparisons shew, to be distinctly different from all the species already named, and from each other.

Notwithstanding the *real differences*, which from my experience I believe that there exists, between the Species of the several successive and distinct Creations above mentioned, reason teaches us, that we are not to expect these differences to be in all cases so great and striking, as at first sight to present themselves; because if this had been the case, the idea could not so long have prevailed, that there were no differences between great numbers of the Fossil and the recent Species: and it will I believe turn out, that as great a further latitude remains to be taken, beyond what Mr. Sowerby has yet done in the constituting and naming of new fossil Species, as Lamarck has so praiseworthy set the example of taking, with regard to the Linnean Genera.

In order to proceed safely, in thus extending the number of Species to an accordance with nature, it will not be right to rely, in doubtful cases, on a single Specimen, even of the most perfect fossil kind, for furnishing the description and selecting the essential characters of the Species; but it will be desirable, that *as many Individuals as possible*, and from as many and as distant Places in the range of the individual Bed to which they belong, should be brought together and compared; carefully excluding from such comparison, all Individuals which belong to higher or to lower Beds, than that particular one, whose organized Remains are under review.

In the present state, of the only general Map of the English Strata which we have published, where, in all instances, a great number of Beds, and often several hundreds of such, are included under one coloured strip across the map, indicating the range of such *assemblages of Strata*, it may to some seem impracticable,

to select many individual Shells from *the very same Bed*, in different Places, as I have recommended above: and if reliance could alone be had on Maps for identifying the Beds, this certainly would at present be a fatal objection to my proposal; but the case is otherwise, because in most instances, the number of organic Species is so considerable, in each of the assemblages of Strata to which Mr. Smith has given Names and Colours on his Map, and amongst these numbers of Species, there are mostly, so many which possess such strikingly distinct characters, as to place them beyond all manner of doubt: and *these characteristic Species*, being first sought for, in the Beds of every Quarry or Cliff which is examined for collecting Specimens for description, the *relative situation* above or below, and often both above and below the Beds, of some of these characteristic Species, may be ascertained, and used as the means of identifying the Bed of an ambiguous or doubtful Species: first through the whole circuit or length of the Quarry or Cliff under examination, next of the nearest adjacent Quarries or Cliffs, wherein the same characteristic and doubtful Species can be traced, and then progressively, to other more distant Quarries or Cliffs, until at length, the greatest range of observation is obtained, which our Island admits.

And besides which, important helps may often be obtained, from *the mineral characters* and qualities of the Beds containing doubtful Species, or from those characters in other Beds, which underlie or overlie them: but until such time as the present fashionable notions of the existence of *universal Formations* or strata composed throughout of *the same precise Mineral Species*, have subsided, I would, from my experience, beg to recommend considerable caution, in making these appeals to the Mineral characters of the Beds, in the consideration of their Organized Remains. Because I mean to maintain, that *the Mineral characters cannot safely be relied on*, without the concurrent support, of *tracing the same individual Bed or Mass*, as has been done in the gross by Mr. Smith in his Map of England, as has more perfectly been done in my large Manuscript Map of Derbyshire, and in others of smaller extent, and as may with ease and certainty be done, through the extent of most Quarries or Cliffs*; or by the concurrence of

* In the doing of which, it will often be perceived, that very great and complete mineral changes take place, in the same bed or mass, within a very small distance: sometimes these changes appear to be abrupt, and at others gradual: for instance, I have lately seen in this town, a moderate sized cabinet specimen, brought from the SSW. side of Shap in Westmoreland, one end of which is Basalt, and the other such highly crystalline and large grained Granite, as if shown detached, could not fail to be pronounced by any Geognost, as part of a *primitive* mass; and such, indeed, the mass whence this specimen was broken, has often been pronounced, yet without this opinion gaining universal assent. See your 50th volume, pp. 361, 362.

the alternations of Beds possessing very different Mineral Qualities (rather than by those qualities themselves); and above all, without the concurrence of such *characteristic organic Remains*, as great numbers of Beds contain, and a still greater number, have such in their vicinity, of which practical Geologists and Naturalists may avail themselves.

I am not sanguine enough to expect to see in my time carried into effect, all which I have been speaking of and recommending, as to the examination and description of the species of Organic Remains, which at present but doubtfully characterize their Beds, owing to the number of other Beds in the English Series, in which *very nearly similar Remains are deposited*; so nearly similar, indeed, that no writer has yet attempted the investigation and mention of their specific differences, in several instances: yet as Mr. Smith has uniformly been heard to declare, that he always could, with regard to Specimens of Organic Remains which he had examined *in situ*, and brought together, perceive differences which directed him in arranging them afterwards on his Stratigraphical Shelves, independent of the name of the Place whence they were brought, which was marked on each; (he has spoken to this purpose in several parts of his works; and I am myself of the same opinion as Mr. Smith on this point) I have been anxious to present to your readers, and to those of Mr. Sowerby and Mr. Smith, as complete a List as I am able, of all the Shells which at the time of compiling it, had been referred to more than one Stratum in the English Series, in the writings of Mr. Sowerby and Mr. Smith, as is mentioned p. 550 (of the last volume).

I am aware that this List, in all probability, contains errors, which I have not had the means of detecting, regarding the localities of some of the Shells, and regarding the Strata from which others of them were obtained by Mr. Sowerby, through the medium of his Friends and Correspondents; Mr. Sowerby as well as myself, will be thankful, that all such errors may be pointed out to Mr. S., in order that they may be corrected in the future Numbers and Indexes of his work.

I beg, in conclusion, to take this opportunity of earnestly soliciting *the co-operation of the Collectors of Fossil Shells* throughout England, with my friend Mr. Sowerby, by the gift or the loan to him of any Shells, *of which they know the precise localities*, which appear to be of any of the Species enumerated in the List which follows: in order, that more extended comparisons may be made, and that distinct Names may be given, in the future numbers of Mineral Conchology, to all such Shells in this List, as shew real marks of distinction, however unusual or minute they may be, provided only, that they are unvaryingly found in the Individuals of the same Bed.

I am, yours, &c.

Howland-street, Dec. 21, 1818.

JOHN FAREY Sen.

— β , in under Oolite, Lansdown, SS 100.

which occupy more than one Stratum in Britain.

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- Ammonites Nutfieldensis* α , in Green Sand, Hythe, Nutfield and Stourhead, MC t. 108, SS 27.
 ——— β , in Portland Rock, Fonthill, and Swindon, SS 39.
 ——— *planicosta* β , in Green Sand, Evershot, and near Exmouth, MC t. 73.
 ——— α , in Marston Marble or Marlstone, Craigmouth, Marston-magna, and Yeovil NE, MC t. 73.
 ——— γ , in under Oolite, Sherborn, E in Park Well, MC 73.
 ——— *splendens* α , in Chalk Marl, Folkstone NE, MC t. 103.
 ——— β , in Coral Rag, Westbrook, MC t. 103.
 ——— *striatus* α , in 4th Derbyshire-peak L, Buxton; Castleton, and Pools-Hole, MC t. 53, f. 1.
 ——— β , in Coarse Slate or Killas, Fillingh, MC t. 53.
 ——— *tuberculatus* α , in lower Chalk (Plate, f. 4), Norton, SS 16.
 ——— β , in Green Sand, Chute-Farm, and Rundaway-Hill, SS 27.
 ——— *Walcotii* β , in Alum Shale, Whitby, MC t. 106, SS 56.
 ——— α , in Marlstone (Plate, f. 6), near Bath, and Mitford, SW in Canal, MC t. 106, SS 117.
 ——— γ , in under Oolite, Mitford, and White Lackington Park, MC t. 106.
 ——— δ , in Coal-measures, Colebrook-Dale, and Trent-River, upper part?, MC 106.
 ——— ϵ , in Derbyshire-peak L, Devonshire, and Llantrissant, MC t. 106.
 ——— α , in Clunch Clay, Holt, SS 56, sp. 2.
 ——— β , in Kelloway Stone, Christian-Malford, SS 59, sp. 3.
 ——— α , in Sand, &c. under the Oolites, Enstone, SS 111, sp. 1.
 ——— β , in Marlstone (Plate, f. 4), Churchill, Coal-canal, Tucking-mill, and Yeovil, SS 115, sp. 4.
 ——— α , in Sand, &c. under the Oolites, Liliput, and Tucking-mill, SS 111, sp. 3.
 ——— β , in Marlstone, Penard-Hill, and Stone-Farm near Yeovil, SS 116, sp. 8.
Astarte ovata α , in Oak-tree Clay, (Plate, f. 8), in North-Wilts Canal, SS 44.
 ——— β , in Coral Rag, Bayford S, Kennington, and Swindon Canal Well, SS 51.
 ——— γ , in Fullers' Earth R, Grip Wood, SS 89.

Astarte

- Astarte ovata* δ , in under Oolite (2d Plate, f. 4), Bath, Coal-canal, Fullbrook, Mitford Inn, Northampton NW, Petty-France SSW, Sherborn W. and Tucking-mill, SS 105.
- Avicula costata* α , in Clunch Clay, Dudgrove-Farm, SS 57.
 — β , in Kelloway Stone, at Kelloway's Bridge, SS 6.
 — γ , in Cornbrash L., Stoney-Stratford, SS 67.
 — δ , in Clay on Oolite (Plate, f. 8), Bradford (Wilts), Hinton, and Winsley, SS 81.
 — ϵ , in under Oolite, Petty-France SSW, and Tucking-mill, SS 107.
 — ζ , in Ditto, Sherborn W, SS 107.
 — η , in Sand, &c. under the Oolites, Enstone, SS 112.
- Cardita?* *deltoidea* β , in Kelloway Stone, Kelloway's Bridge, MC t. 197, f. 4.
 — α , in Cornbrash L., Lechlade N, and Peterborough, MC t. 197, f. 4.
 — *lirata* β , in Cornbrash L., near Peterborough, Sleaford, Wick-Farm, and Woodford, MC t. 197, f. 3, SS 65 (c).
 — α , in blue Lias, near Bath W, MC t. 197, f. 3.
 — *obtusa* β , in Cornbrash L., (Plate, f. 6), Elm-cross, and Road, MC t. 197, f. 2, SS 65.
 — α , in under Oolite, Bath, Chipping Norton, Churchill, Dundry, Northampton NW, Sherborn W, and Writhlington, MC t. 197, f. 2, SS 104.
- *producta* β , in Cornbrash L., Peterborough, MC t. 197, f. 1.
 — γ , in Fullers' Earth R (Plate, f. 5), Charlton-Horethorn, near Gagenwell, and near Redlynch, SS 90.
 — α , in under Oolite, Bath, near Bayeux, and Chapel-House, MC t. 197, f. 1.
- Cerithium cornucopiae* α , in London Clay upper part, Subbington beach, MC t. 138, f. 1.
 — β , in Limestone, with quartz grains, St. Colomby in the Cotentin, MC t. 188, f. 3 & 4.
 — *melanioides* α , in London Clay, lower part (2d Plate, f. 7), Brackelsham-Bay, Charlton, New-cross, Newhaven Castle-hill, Southfleet, and Woolwich, MC t. 147, f. 6 and 7, SS 1.
- β , Chalk Marl, Hamsey, MC t. 147.
- Chama digitata* α , in Green Sand, Long-comb Girts, MC t. 174.

- Chama digitata* β , in Kelloway-Stone ?, Huntcliffe, MC t. 174. [SS 45, sp. 1.
 α , in Oak-tree Clay (Plate, f. 5), Bagley-wood Pit, North-Wilts Canal, and Swindon Canal Well,
 β , in Coral Rag, Banner's-Ash, Bayford S, Derry-hill ?, Kennington, Longleat-Park ?, Sandford
 Church-yard, Stilton-Farm, Sunning-well, and Westbrook, SS 52.
Cidaritis diadema (*Lin.*) α , in Green Sand (2d Plate, f. 11), Chute-Farm, and near Warminster, SS 33.
 β , in Coral Rag, Calve, and Hilmarton, SS 53.
 α , in Chalk, Northfleet, SS 19, sp. 1.
 β , in Green Sand, Chute-Farm, SS 33, sp. 1.
 α , in Green Sand, near Warminster, SS 33, sp. 2; Strat. Tab. Ech.
 β , in Clay on Oolite, Broadfield-Farm, SS 83, sp. 1; Strat. Tab. Ech.
 γ , in under Oolite, Tucking-mill, SS 109, sp. 1; Strat. Syst. Ech.
 α , in Coral Rag (Plate, f. 5), Hilmarton, and Swindon Canal Well, SS 53, sp. 3.
 β , in under Oolite, Tucking-mill, SS 109, sp. 3.
 α , in Coral Rag, ; Strat. Tab. Ech.
 β , in Cornbrash L, Melbury, Norton, and Sheldon, SS 69.
 γ , in Clay on Oolite, Farley, and Pickwick, SS 83, sp. 2.
Clavícula cucumerina α , in Chalk, Surrey, SS 23.
 β , in Coral Rag, SS 54 and 123.
Clypeus sinuatus (*Lesk*) α , in Coral Rag,
 β , in under Oolite (2d Plate, f. 8), Chipping-Norton, Churchill, Fullbrook, Monkton-Combe, near
 Naughton, Northampton NW, Stow on the Wold, and Stunsfield, SS 109.
 α , in Coral Rag (Plate, f. 6), Hinton-Waldrish, Longleat-Park, and Meggots-Mill, SS 54; Strat. Tab. Ech.
 β , in Cornbrash L, Bruham, Sleaford, Trowley, Tellisford SW, Wick-Farm, Wincauton SW, and
 Wraxhall, SS 69; Strat. Tab. Ech.
 γ , in Clay on Oolite, Broadfield-Farm, SS 83; Strat. Tab. Ech. Clypeus

- Clypeus δ , in upper Oolite, Hinton, and Hogwood-Corner, SS 86 ; Strat. Tab. Ech.
 ——— ε , in under Oolite, Churchill, SS 110, sp. 2 ; Strat. Tab. Ech.
 Conulus α , in Cornbrash L., Wincanton SW, and Wolverton, SS 70 ; Strat. Tab. Ech.
 ——— β , in Fullers' Earth R., Bradford in Canal, SS 94 ; Strat. Tab. Ech.
 ——— γ , in under Oolite, Tucking-mill, SS 110 ; Strat. Tab. Ech.
 Ellipsolites funatus β , in Chalk Marl, St. Catharine's Mount, and Steyning, MC t. 32.
 ——— α , in Derbyshire-peak L., Black Rock SE of Cork, MC t. 32.
 Euomphalus catillus β , in Limestone Shale (Derb. Rep. I. 227), Buxton N, MC t. 45, f. 3 and 4.
 ——— α , in 1st Derbyshire-peak L., Scalebar, Tideswell NE, and Winstar, MC t. 45, f. 3 and 4.
 *Gryphæa dilatata ε , in Alluvial Limestone, Pakefield, MC t. 149, f. 1.
 ——— α , in London Clay, lower part, Bennington, Coney-Weston, and Suffolk, MC t. 149, f. 1.
 ——— β , in Portland Rock, Adlington-Hills?, Bromham (Wilts), Portland Isle, Radipole, and Rude-cliff, MC t. 149, f. 1 and 2.
 ——— γ , in Clunch Clay (Plate, f. 2 and 3), Bourn, Calne W, Derry-hill, Dudgrove-Farm, Ilminster S, Meggot's-Mill, Sandfoot-Castle, Tytherton-Lucas, Weymouth NNE, and Woburn N, MC t. 149, f. 1, SS 36.
 ——— δ , in Kelloway Stone (not in the Plate), Bruham-pit, Kelloway's Bridge, Lady-down, Wilts and
 ——— ζ , in under Oolite, Carrington, and Farley-Gate, MC t. 149, f. 1. [Berks Canal, MC t. 149, f. SS 61.
 ——— η , in Derbyshire-peak L., Bramberry-Hill, in Sutherland, MC t. 149, f. 1.
 incurva β , in Crag Marl, Birdbrook, MC t. 112, f. 2.
 ——— γ , in Kelloway-Stone (Plate, f. 5), Bruham-pit, Chatley, near Chippenham in Canal, Kelloway's Bridge, and Lady-down, MC t. 112, f. 2, SI 24.
 ——— α , in blue Lias, Bath W, Framilode, and Frethern, MC t. 112, f. 1.

* Many localities of Gryphæa, are mentioned in Min. Con. II. p. 22.

- Gryphaea* α , in Marlstone, Newark NE, SS 117.
 β , in blue Lias, ; SS 117, sp. 1.
Helix α , in Coral Rag, Longleat-Park, SS 49.
 β , in Marlstone, Wootton-under-edge, SS 113.
Lima gibbosa β , in Cornbrash L, Wincanton N, SS 62.
 α , in under Oolite, near Bath, Churchill, Cotswold-Hills, and Taunton, MC t. 152, SS 106.
Maestra gibbosa α , in Fullers' Earth R, near Bath, and Mitford, MC t. 42, SS 91.
 β , in under Oolite, Mitford, and Tucking-mill, SS 105.
 α , in Fuller's Earth R, Cotswold-Hills, SS 91, sp. 2.
 β , in under Oolite, Churchill, and Crewkerne, SS 104, sp. 1.
Madrepora flexuosa α , in Coral Rag, Heddington-Common, and Wooton Basset, SS 48.
 β , in upper Oolite, Castle-Combe, SS 84.
 γ , in Marlstone, Tucking-mill, SS 113.
 porpites (*Lin.*) α , in Clay on Oolite, Broadfield-Farm, SS 77.
 β , in under Oolite, Bath, and Churchill, SS 95.
 γ , in Marlstone, Tucking-mill, SS 113.
Melania Heddingtonensis β , in Oak-tree Clay (Plate, f. 1), North-Wilts Canal, SS 41.
 α , in Coral Rag, Bayford S, Heddington (Wilts), Heddington-Common, Shotover, Silton-Farm, Steeple-Ashton, and Swindon Canal Well, MC t. 39, SS 48.
 α , in Coral Rag, Bayford S, Calne, Goat-Acre, Silton-Farm, Steeple-Ash-ton, and Swindon Canal Well, MC t. 47, lo. SS 48.
 striata , in Coral Rag (Plate, f. 3) Bauner's-Ash, Bayford S, Calne, and Swindon Canal Well, MC t. 47, lo. SS 48.
 γ , in under Oolite, Caissou, SS 96.
 β , in blue Lias, Limington (Somers.) MC t. 47. u.
Modiola bipartita α , in Brick-earth, Osmington, and Parham-Park, MC t. 210, f. 3 and 4.
 β , in Derbyshire-peak L, Llantrissant, MC t. 210.

- Modiola depressa* α , in London Clay, upper part, Bognor, and Highgate, MC t. 8, u; SS 2.
 ——— β , in Alum Shale?, near Whitby, MC t. 8 m.
 ——— α , in Cornbrash L. (Plate, f. 3) Clossworth, Holt, and Wick-Farm, SS 64.
 ——— β , in Clay on Oolite, Westwood, SS 79, sp. 3.
 ——— γ , in under Oolite, Churchill, and Northampton NW, SS 103, sp. 4.
Murex latus β , in Crag Marl, Bramerton, Thorpe-Common, and Trimingsby, SS 6.
 ——— α , in London Clay, lower part, Plumstead, MC 35, le. lo.
 ——— rugosus α & β , in Crag Marl, Fox-hole, Harwich (Essex-cliff), Holywell, near Malden, and Walton-Nase, MC t. 34, u. and 199, f. 1: SS 7.
 ——— γ , in London Clay, lower part, Plumstead, MC 199, f. 2.
Mya α , in Fullers' Earth R, Dundry and Sherborn, SS 92, sp. 1.
 ——— β , in under Oolite, Dundry, SS 105.
 ——— γ , in Sand, &c. under the Oolites, Enstone, SS 112.
Natica glaucinoides α , in London Clay, upper part, Highgate, MC t. 5, u.
 ——— β , in Crag Marl, Trimingsby, SS 9.
Nautilus intermedius β , in Crag Marl (perhaps alluvial), Birdbrook and Culford-Hall, MC 125.
 ——— ——— α , blue Lias, Keynsham, MC t. 125.
 ——— lineatus α , in under Oolite, Bath W, and Comb Down, MC t. 41.
 ——— β , in Marlstone, Tucking-mill, SS 114.
Ostræa acuminata β , in Brick-earth, on Woburn Sand?, Withyam, MC t. 135.
 ——— α , in Clay on Oolite, near Bath E, and Bradford, MC t. 135, f. 2, SS 81.
 ——— γ , in Fullers' Earth R, Aynhoe, MC t. 135, f. 3.
 ——— δ , in under Oolite, Churchill, SS 106.
 ——— *crista-galli* α , in Green Sand, Black Down, Chute-Farm, and Stour-head, SS 29.
 ——— β , in Oak-tree Clay, Bagley-wood Pit, and North-Wilts Canal, SS 46.

which occupy more than one Stratum in Britain. 127

- Ostræa crista-galli* γ , in Coral Rag (Plate 4), Bayford S, Derry-Hill, Longleat-Park, Shotover-Hill, Westbrook, Wilts,
 — δ , in Forest Marble, Stunsfield, SS 73.
 — ϵ , in Clay on Oolite, Combhay, Farley, and Hinton, SS 81.
 — ζ , in upper Oolite, Petty-France, SS 85.
deltoides β , in London Clay, lower part, Lopham, and near Paris, MC t. 148.
 — , in Oak-tree Clay (Plate, f. 6) Bagley-wood Pit, Cambridge N, Even-Swindon, Headington-Com-
 — mon (Shotover), North-Wilts Canal, Seend in Canal, Shrivenham in Canal, Swindon Canal Well,
 — and Wooton-Basset, MC t. 148, SS 45.
 — γ , in Clunch Clay, Sandfoot-Castle, MC t. 148.
 — *gregarea* α , in Green Sand, near Devizes, MC t. 111, f. 1.
 — β , in Coral Rag, Westbrook, MC t. 111, f. 3.
 — *Marshii* α , in Cornbrash L, Felmersham, Sleaford, and Woodford, MC t. 48, SS 66.
 — β , in Fullers' Earth R, (Plate, f. 8), Cotswold-Hills, and Monkton-Combe, SS 92.
 — *rugosa* α , in Fullers' Earth R, Frome W, and Monkton-Combe, SS 92.
 — β , in under Oolite, Sherborn W, and Tucking-mill, SS 106.
Patella latissima β , in alluvial Limestone, Pakefield Gravel-pit, MC t. 139, f. 5.
 — α , in Clunch Clay, Bolingbroke, MC t. 139, f. 1.
Pecten arcuata α , in Green Sand, Devizes N in Canal, t. 205, f. 7.
 — β , in Coral Rag?, Devizes W, t. 205, f. 5.
fibrosus δ , in Coral Rag, Hedington-Common, Kennington, and Longleat-Park, SS 52.
 — γ , in Kelloway Stone, Kelloway's Bridge, MC t. 13, f. 2.
 — α , in Cornbrash L, Chatley, Melbury, Sheldon, Wincanton N and SW, and Woodford, MC t. 136.
 — ϵ , in Forest-Marble, Stunsfield, SS 74.
 — ζ , in Clay on Oolite, Farley, SS 81.
 — β , in upper Oolite, Northleach, MC t. 136, f. 2. Pecten

- Pecten fibrosus* γ , in under Oolite, Carrington, and Churchill, MC t. 136, f. 2, SS 107.
quinquecostata β , in upper Chalk, Emsworth N (perhaps Alluvial?), and Lewes E, MC t. 56, f. 4 and 5.
 ————— α , in Green Sand, Black Down, Chute-Farm, and Devizes, MC t. 56, f. 3? and 6 to 8, SS 30.
 ————— α , in Forest Marble (Plate, f. 5), Foss-Cross and Siddington, SS 73, sp. 1.
 ————— β , in upper Oolite, Cotswould-Hills, SS 85, sp. 2.
Perna aviculoides α , in Brick-earth, or blue Marl on Portland Rock, Filley-Bridge, Godstone, Osmington, Shotover-Hill, and White-nab, MC t. 66, SS 37.
 ————— β , in Alum Shale, near Bedford SE, MC t. 66.
Plagiostoma gigantea β , in Coral Rag, Banners-Ash, Calne W, Swindon Canal Well, and Westbrock, SS 51.
 ————— γ , in under Oolite, Tucking-mill, SS 105.
 ————— α , in blue Lias, (and White?) near Bath, Cardiff-Castle, and Fickeridge-Hill MC t. 77.
 ————— *spinosa* α , in upper Chalk Brighton, Northfleet, and Rickmansworth, MC t. 78, f. 1 and 2.
 ————— β , in lower Chalk, Guildford, Heytsbury, Lewes N, near Norton-Bavant NE, and near Warminster, MC t. 78, f. 3, SS 16.
 ————— γ , in Green Sand, Sidmouth, MC t. 78.
 ————— α , in Clay on Oolite, Farley, SS 80, sp. 2.
 ————— β , in upper Oolite, Bradford? SS 85.
Planorbis euomphalus α , in Cowes Rock, Cowes, MC t. 140, f. 7.
 ————— γ , in Green Sand, Haldon-Hills, MC t. 140, f. 8.
 ————— β , in under Oolite? near Bath, MC t. 140, f. 8 and 9.
Pleurotoma rostrata α , in London Clay, upper part, Barton, MC t. 146, f. 3.
 ————— β , in Green Sand, Devizes in Canal, MC t. 146, f. 3.
Productus aculeatus α , in 1st Derbyshire-peak L., Bakewell, MC t. 68, f. 4.
 ————— β , in 2d Ditto, Bakewell, and Buxton, MC t. 68, f. 4.
Rostellaria α , in Kelloway Stone (Plate, f. 1), near Chippenham, in Canal, and Kelloway's Bridge, SS 58, [SI 24.
 ————— β , in Cornbrash L., Melbury, SS 62.

- Scaphites obliquus* β , in upper Chalk, Brighton, and E of Warminster, MC t. 18, f. 4 to 7.
 ——— α , in Chalk Marl, Hamsey, MC t. 18, f. 4 to 7.
Serpula crassa α , in Landon Clay, upper part, Barton, Highgate, MC t. 30.
 ——— β , in Crag Marl, Aldborough, SS 9.
 ——— γ , in Fullers' Earth R., Charlton-Horethorn, SS 67.
Serpula α , in Oak-tree Clay, Bagley-wood Pit, Brinksworth-Common, Hinton Waldrish, North-Wilts Canal, [and Portland Isle, SS 41, sp. 2.
 ——— β , in Clunch Clay, Steeple-Ashton, SS 55. Chalk, Chittern, and Upton, SS 20, sp. 5; Strat. Tab. Ech.
Spatangus subglobosus ? (*Lesk*) α , in Chalk, Chittern, and Upton, SS 20, sp. 5; Strat. Tab. Ech.
 ——— β , in Green Sand, (2d Plate, f. 14), Chute-Farm, Rundaway, and near Warminster, SI 12, SS 34, sp. 3; Strat. Tab. Ech.
 ——— α , in Chalk, Bubdown, Chesterford, Chittern, Great-Ridge, Guildford, Lexham, near May-Place, Norwich, Pewsey, Smitham-Bottom, Surrey, and Wilts, SS 20, sp. 3; Strat. Tab.
 ——— β , in Green Sand, Charmouth, and Melbury, SS 34, sp. 1: Strat. Tab. Ech. [Ech.
Terebratula biplicata α and β , in Green Sand, Cambridge Castle-Hill, Chute-Farm, Hunstanton-Cliff, Longleat, Rundaway-Hill, and near Warminster, MC t. 90.
 ——— γ , in Derbyshire-peak L., Limerick Black Rock ? MC t. 90.
 ——— *carnea* α , in upper Chalk, Devizes, Mundesley, Norwich, Trowse, and NE of Warminster, MC t. 15, f. 5 [and 6, and II. 77, SS 17.
 ——— β , in upper Oolite, Cotswood-Hills, MC t. 15, f. 5 and 6.
 ——— *crumena* β , in blue Lias, Pickeridge-Hill, MC t. 83, f. 3.
 ——— γ , in 1st Coal Shale ? Tees River, upper part ?, MC t. 83, f. 2 and 2*.
 ——— α , in 1st Derbyshire peak L., Winstar, MC t. 83, f. 3.
 ——— *digona* α , in Cornbrash L (Plate, f. 9), Chatley, Clossworth, Felmersham, Latton, Redlinch, Sheldon, Trowlewick-Farm, and Woodford, MC t. 96, f. 4 and 5, SS 68.
 ——— β , in Clay on Oolite, (Plate, f. 9), Bradford (Wilts) Farley, Pickwick, Stoford, and Winsley, MC t. 96, f. 1 to 3, SS 82.

- Terebratula digona* γ , in upper Oolite, near Bath, Petty-France, and Togg-hill, MC t. 96, SS 86, sp. 1.
 ———— *intermedia* β , in Green Sand, Chute-Farm, Longleat, and Warminster, MC t. 15, f. 8, and p. 202.
 ———— α , in Cornbrash L., Bruham-Pit, Chatley, Felmersham, Holt, Lullington, Maisey-Hampton, Melbury, Road, and Trowfe, MC t. 15, f. 8, and p. 202, SS 68.
 ———— γ , in Fullers' Earth R, near Bath, SS 93.
 ———— δ , in under Oolite, Batheaston, Chipping-Norton, Churchhill, Fullbrook, near Lansdown, Sherborn W, and Tucking-mill, SS 108.
 ———— *lateralis* β , in Fullers' Earth R, Aynhoe, MC t. 83, f. 1.
 ———— α , in Derbyshire-peak L, near Dublin, and SE of Cork (Black Rock), MC t. 83, f. 1.
 ———— *obsoleta* β , in Crag Marl, Gunton, MC t. S3, f. 7.
 ———— γ , in Green Sand, near Warminster, SS 32.
 ———— α , in Clunch Clay, lower part, Dudgrove-Farm, Felmersham, and Wiltshire, MC t. 83, f. 7, [SS 57.
 ———— δ , in Cornbrash L, Closworth, Draycot, Wick-Farm, and Wincanton, SW and N, SS 69.
 ———— ϵ , in Clay on Oolite, Farley, Pickwick, Westwood, and Winsley, SS 82.
 ———— ζ , in upper Oolite, Petty-France, SS 86.
 ———— η , in under Oolite, Chipping-Norton, Churchhill, Fullbrook, and Tucking-mill, SS 108.
 ———— λ , in Marl Stone, Churchhill, and Wootton-under-edge, SS 118.
 ———— *ornithocephala* α , in Kelloway Stone, (Plate, f. 6), Chatley, near Chippenham in Canal, Dauntsey-House, Kelloways-Bridge, and Thames and Severn Canal, MC t. 101, f. 1 and 2, SS 61, [SI 24.
 ———— γ , in Fullers' Earth R, near Bath, and Bratton, near Toll-bar, SS 93.
 ———— δ , in under Oolite, Sherborn, and Tucking-mill, SS 108.
 ———— ϵ , in Sand, &c. under the Oolites, Enstone, SS 112.
 ———— β , in blue Lias Marl, Pickeridge-Hill, MC t. 101, f. 4.
 ———— *subrotunda* α , in lower Chalk, Horningsham SE, and Suffolk NW part, MC t. 15, f. 1.
 ———— γ , in Cornbrash L, Chatley, MC t. 15, f. 1 and 2.

- Terebratula subrotunda* β , in blue Lias, Hornton-Quarry, MC t. 15 f. 2. [MC t. 15, f. 7, SS 18.
 — subundata α , in upper Chalk (Plate, f. 9), Giles's Gate (Norwich), near Norwich, and Warminster NE,
 — β , in lower Chalk (Plate, f. 6 and 8), Guildford, Heytsbury, Mazen-Hill, and near Warminster,
Trigonia clavellata γ , in Crag Marl (Sandstone), Gunton, MC t. 87 u. [SS 17.
 — α , in Portland Rock, Boulogne, Portland Isle, and Radipole, MC t. 87 u.
 — ϵ , in Sand Stone, under Ditto (not Green Sand) near Danby-Beacon, SS 28.
 — β , in Oak-tree Clay, in North-Wilts Canal, and in Oxfordshire, MC t. 87, u. SS 43.
 — ζ , in Cornbrash L., Melbury, and Woodford, SS 65.
 — η , in Fullers' Earth R., Orchardleigh, SS 89.
 — δ , in under Oolite, Little-Sodbury, MC t. 87, lo.
 — costata β , in Oak-tree Clay (or blue Clay of Thame) North-Wilts Canal, and Oxfordshire (NE of Ox-
 — γ , in Coral Rag, Bayford S, and Silton-Farm, SS 51. [ford?], MC t. 85, SS 43.
 — δ , in Cornbrash L. (Plate, f. 4), Wick-Farm, and Wincanton N, SS 65.
 — ζ , in Forest Marble, Wincanton, SS 72.
 — ξ , in Clay on Oolite, Hinton, SS 79.
 — α , in under Oolite (2d Plate, f. 2 and 3), Coal-Canal, Cotswold-Hills, Cross-Hands, Little-
 — Sodbury, Mitford, Petty-France SSW, Tucking-mill, MC t. 85, SS 103.
 — ctvirostra, in Oak-tree Clay, in North-Wilts Canal, SS 44, sp. 3.
 — β , in Coral Rag, Longleat-Park, SS 51.
Trochus α , in Oak-tree Clay (Plate, f. 3), in North-Wilts Canal, SS 41.
 — β in Coral Rag, Bayford S, and Sandford Church-yard, SS 48, sp. 2.
 Anglicus α and β , omitted in the other Indexes, see MC II. 95.
Turbo α , in Oak-tree Clay (Plate, f. 2), North-Wilts Canal, SS 41.
 — β , in Coral Rag (Plate, f. 1), Bagley-wood Pit, Banner's-Ash, Derry-Hill, Longleat-Park, Steeple-
 Ashton, and Wootton-Basset, SS 49.

- Turritiles costata* α , in Chalk Marl, Hamsey, St. Catherine's Mount, Earl-Stoke, and near Rouen, MC t. 36.
 ——— β , in Green Sand, Clute-Farm, and Horningsham, MC t. 36, SS 27.
Turritella conoidea α , in London Clay, upper part, Barton-Cliff, Brackelsham-Bay, Highgate, and Stubbington,
 ——— β , in Crag Marl, Holywell, MC t. 51, f. 1 and 4. [MC t. 51, f. 1 and 4; and II. 239.
Unio acutus β , in Cornbrash L., Melbury, SS 64.
 ——— α , in 9th Coal Shale, near Bradford S (Yorks.), and in Derbyshire, MC t. 33, f. 5 to 7.
 ——— *Listeri* γ , in Crag Marl, Roydon-Green, and in Suffolk, MC t. 154, f. 1.
 ——— α , in Portland Rock, New-Malton, and Seamer, MC t. 154, f. 3 and 4.
 ——— β , in blue beds of the yellow Limestone R?, Durham, MC t. 154, f. 3 and 4.
 ——— . . . α , in Fullers' Earth R, Grip-wood?, SS 89, sp. 3.
 ——— β , in under Oolite, Northampton NW, SS 103, sp. 3. [and Woodbridge, MC t. 21, SS 10.
Venus equalis α , in Crag Marl, Elmsett, Foxhole, Holywell, Minsmere Iron-sluice, Newborn, Sydenham NW?,
 ——— β , in Green Sand, Black-Down, and Little Teignmouth NW, MC t. 21.
 ——— α , in Cornbrash L., (Plate, f. 5), Sheldon, Towle, and Wincanton SW, SS 66, sp. 1.
 ——— β , in Fullers' Earth R, near Gagenwell, SS 91, sp. 1.
Vivipara fluviatorum β , in London Clay, lower part (Plate, f. 1), Brixton-Causeway Well, Hordle-Cliff, and Wapping
 ——— α , in Oak-tree Clay (Sussex Marble), Bethersden, and Farnham SE, MC t. 31 f. 1. Docks, MC t. 31, f. 1, SS 2, SI 3.