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Mr. John Farey Sen.

To cite this article: Mr. John Farey Sen. (1819) XXII. Free remarks on the Geological Work of Mr. Greenough , Philosophical Magazine Series 1, 54:256, 127-140, DOI: [10.1080/14786441908652198](https://doi.org/10.1080/14786441908652198)

To link to this article: <http://dx.doi.org/10.1080/14786441908652198>



Published online: 29 Jul 2009.



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XXII. *Free Remarks on the Geological Work of Mr. GREENOUGH.* By Mr. JOHN FAREY, Sen. Mineral Surveyor.

To Mr. Tilloch.

SIR, — MR. GREENOUGH, who was the first President of the Geological Society of London, and now again fills that situation, has at length appeared before the public in the character of an Author: his Work, entitled, "A Critical Examination of the first Principles of *Geology*," follows very closely in the steps of that of Dr. Kidd*, in labouring excessively to show, that scarcely any thing of *real knowledge* yet exists, respecting the *composition*, the *structure*, and the past *history* of the crust of the *Earth*!! On scarcely any of the numerous points of Geological Theory or the general *Inferences* from Geological Facts, which Mr. Greenough's Work brings under review, does *he* seem able to have made up an opinion, and for want of which, his readers are throughout bewildered, by a mass of contradictory extracts from those Authors (certainly not a few) whom Mr. G. (in imitation of Dr. K.) in a somewhat arbitrary, and sometimes, as it appears to me, in an unfair manner, selects, *as authorities* in Geological matters: and too often also, the Author's own remarks are found at variance with each other.

In thus freely stating my opinion on the general character of Mr. G's Work, as appears to me after very carefully and repeatedly perusing it, I by no means wish or intend to deny it the merit, of containing a great many *original and useful local Observations*, and also several *Inferences and Remarks*, which had not previously been published, and for performing which service to Geology, no one in England, feels more grateful to Mr. G. than myself: although on the whole, I cannot consider his conduct fair, or his Work as likely to advance, but rather to retard, the march of Geological knowledge.

The subject of Organic Remains, and of *Fossil Shells* in particular, appearing to me of paramount importance, amongst Geological phænomena, I shall on the present occasion, principally confine my remarks to the manner in which Mr. G. has handled some of this part of his subject, which is found either incidentally or more formally introduced, at pages 27, 34, 179 to 184, 203, 207, 215, 220 to 225, 227, and 284 to 304.

In page 284 Mr. Greenough, in evident allusion to the question which has often been agitated in your pages, viz. how far Mr. *W. Smith* is to be considered *as a discoverer* of the connec-

* On this Work I offered some strictures, in your 45th vol. p. 338; see also vol. 52, p. 184 Note.

tion

tion now so well proved to exist, between *particular Beds* or *laminæ* of the *Strata*, and *particular Species* or varieties of *Shells* or other *Organic Remains*, which are found imbedded therein, and as the first who actually *used and taught* this mode of *identifying, mapping and tracing the Strata*, remarks as follows: viz. "An opinion has for some time past been entertained in this country, that *every Rock* has its own *Fossils*."

Before I proceed to remark on the *Extracts*, and mention of the *Writings* of former *English Naturalists*, which follow in *Mr. G's* work, and by which he wishes to appear to prove his position above quoted, I will remark on the loose manner in which the two material parts thereof are defined, that are marked with italics: leaving thus his proposition open to the showing, as in some of the following extracts is attempted to be done, viz. that each "different stone," that is each *mineral species* of *Stone* (without regard to its place in the series of *Strata*), "yield quite different sorts or *species of Shells*," and that the supposed relation subsists, between *mineral* and *animal* *Species*, instead of the relation which *Mr. Smith* and myself contend for, viz. between the successive periods or *eras of deposition* of the particular *Beds*, and the particular species or varieties of *Animals*, which, at or immediately prior thereto, existed in the water, on the bottom of which the *Beds* in question were formed.

Respecting *Mr. G's* *Extract* in page 284, from *Dr. Lister's* *Paper* in the *Philosophical Transactions*, No. 76 (or *Lowthorp's* *Abr.* II. 425) it is material to take into consideration, the connection of the same with the passage which immediately precedes it, as follows, viz. In "our *English inland Quarries*, I am apt to think, there is no such matter as *petrifying of Shells* in the business: But that these *Cockle-like Stones* ever were, as they are at present, *Lapides sui generis*, and never any part of an *Animal*. It is most certain that our *English Quarry-shells* (to continue that abusive name) have no parts of a different *Texture* from the *Rock* or *Quarry* where they are taken; that is, that there is no such thing as *Shell* in these *Resemblances of Shells*, but that *Ironstone Cockles* are all *Iron-stone*: *Lime* or *Marble*, all *Limestone* or *Marble*; *Sparre* or *Christalline-shells*, all *Sparre*, &c. and that they were never Part of an *Animal*. My reason is, that *Quarries* of different *Stone* yield us quite different sorts of *Species of Shell*," (not *Shells*) and so on, nearly as in the 9 following lines of *Mr. Greenough's* *Extract*, at top of page 285; which thus prefaced, as in literary justice they ought to have been, will not I think be judged by impartial persons, to amount to much, against *Mr. Smith's* claim, as above stated, and in your 51st vol. p. 177.

The next paragraph in *Mr. Greenough's* *Work*, still alluding to *Dr. Lister*, is as follows, viz. "The same *Writer* followed the course
of

of the *Chalk-marl* over an extensive tract of country, *by mere attention to its Fossils,*" but for reasons best known to himself, Mr. G. omits here, the reference, to the work to which he alludes, in making this important assertion. After reading through all Dr. Lister's Papers in the *Phil. Trans.*, without discovering any such thing, I was induced to look into his Work entitled "*Historiæ Animalium Angliæ,*" wherein, at p. 228, at the end of the description of the small Belemnite, engraven in his 32d title or figure, are these words, viz. "*Locus. Hunc lapidem plurimis in locis apud nos quàm copiosissimè inveni: at perpetuo in terrâ rubrâ ferreâ, sive ea mollior gleba, sive saxeâ sit. In all the Cliffs, as you ascend the Yorkshire and Lincolnshire Woldes for above 100 miles in compas: as at Spiton, Lawnsborough, Castour, Tedford, Calkwell:*" which doubtless is the passage, to which Mr. G. alludes, and the first part of which, a learned naturalist of my acquaintance*, renders thus, viz. "This stone is found very abundantly in many places amongst us, in a red ferruginous Earth, either in softer or in more stony masses. In all the Cliffs," &c. as above.

On which, I beg to ask Mr. Greenough, how he can make out, that the *red ferruginous Earth*, here alluded to by Dr. Lister, at Specton Cliff, Lonsborough, Caistor, Cawkwell, and Tetford (as the places are now called), is the *whitish, or blueish or greenish-gray* "Chalk-Marl" †, rather than the "Brick-earth?" or micaceous blue Marl (exposed and oxidated) p. 13, of Smith's "Strata Identified," wherein such small Belemnites, are found, and described. And next, I will take the liberty of saying, that Dr. Lister does not appear to me, either to have accomplished, or to have had in view, the tracing or following of any particular Stratum, by means of these small Belemnites, by reason that he never mentions the same, or speaks of its relation to the Chalk Strata near adjacent and above it in the Series; but intended merely to explain more particularly, by the mention of *Cliffs* at the edge of the Wold Hills, *the situations in which he had found these Belemnites.* It is however, a singular circumstance, that this passage, and this only, should be given in English, in Dr. Lister's Latin

* At my request, the same kind friend, looked carefully through all this work of Dr. Lister's, in order to inform me, whether there are any other passages therein, favourable in any way to the assertions Mr. Greenough has made, regarding Dr. Lister's knowledge and use of Fossil Shells, in tracing or following Strata, by their means? : and his answer is, "It does not appear that Dr. Lister, either traced the Strata by the Shells, or the Shells by the Strata; it also appears, that he often confounded several Species under one Title."

† Derbyshire Report, I. 112; a name, which since 1811, Mr. Smith appears to have dropped, and included this Stratum in the "Green Sand," of his Map and Publications.

Work, and further, that it should have been marked by italics! ; and in order to show my readiness, to the giving of every degree of publicity to what Dr. Lister did, with regard to Fossil Shells, I have been at the pains to make out, as I hope, with tolerable certainty, what are the Situations of all the *Places*, in modern Maps, to which Dr. Lister refers in this work; and by means of Smith's Map, joined with my own knowledge of the local situations and extents of the several Strata, to assign each Shell its place, in a Stratigraphical System: to which, I have added references to Mr. Sowerby's Mineral Conchology, wherever he appears to have described the same species of Fossil Shell, and I now send you the same, and shall be glad to see it inserted, following this, in your Philosophical Magazine.

Mr. Greenough's next passage, in page 285, is as follows, viz. "Mr. Strange traced the *Gryphus* from the lower part of Monmouthshire and Purton Passage, through Gloucestershire, Worcesterhire, Warwickshire, and Leicestershire, occupying in these counties, as in Northamptonshire, the lower parts under the hills," and by a Note on this passage, he refers to the "Archæologia," vol. vi. p. 36. I have from the volume last mentioned, carefully extracted all which Mr. Strange says, on the subject of Organic Remains, and have sent the same herewith, in hopes that it may be recorded in your Work, following my abstract of Mr. Lister's Work, above mentioned. Mr. Greenough, besides having introduced here, the mention of *Northamptonshire*, which Mr. Strange does not mention (and wherein there is no part of the range of the *Lias* Gryphites, *Gryphæa incurva* α , or *G. obliquata*, Min. Conch. t. 112), he omits Mr. Strange's mention of the *Gravel*, in which he found some, and perhaps several of his Gryphites; and, almost without doubt, these *Gravel* Gryphites belonged to some of the higher stratigraphical localities of this genus of Shells, which are mentioned, P.M. liii. p. 124, or to others, and not to the *Lias* Strata, whereon Mr. Strange's description sets out, in Glamorgan and Monmouth Shires: and hence I think it fair to conclude, that Mr. Strange, had not traced any Strata through distant places, "by mere attention to their Fossils."

Mr. Greenough's two following quotations, from the *Journal de Physique*, seem little to the purpose in question, because, appearing to me merely having in view, the supposed relation between mineral and animal Species, as before mentioned.

The Rev. A. Catcot, in page 161 of his "Treatise on the Deluge," having spoken of thick and massive Rocks, subjoins a Note which begins as follows, viz. A thick Rock or "single Stratum, is divided into a great number of lesser Strata or small Layers, which will be easily distinguishable from each other, either by their colour, depth, thickness, or more remarkably by their contents, or the Fossil bodies they contain, one layer abounding with one species

of Shells, another with a different," &c., as Mr. Greenough has the remainder of the passage, in p. 286; but who, by omitting this necessary introduction to his Extract, has contrived to keep it out of view of his Reader, that Mr. Catcot, instead of speaking of *the means of identifying the same Stratum or Bed in a different and distant part of its course* (which is the essence of Mr. Smith's claim on this head) was merely speaking of the means of separating a thick Rock, *in some one place*, into its component Strata or Beds.

The extract from the last scientific Letter or Paper which the late Mr. *William Martin* of Macclesfield wrote, before his death, (and which his friends afterwards sent to be inserted in your Magazine, vol. xxxix. p. 81) has very unfairly towards Mr. Smith, (before *he* had been mentioned, except on a different account in p. 150, as I shall further mention) been introduced, without the mention of the circumstance, which Mr. Martin candidly acknowledges, viz. of *his having omitted to mention in his printed Work*, the connection of *each species of Shell* that he had described, with the *particular Stratum* imbedding the same; Mr. G. well knowing, that Mr. Martin had been led to write the passage which he has transferred to his Book, *in consequence of a particular communication*, made by me to Mr. Martin, of *Mr. Smith's discoveries*, and of my applications of the same, to the Strata and places, from whence Mr. M's Specimens had been collected: after the last of his Works, except this Letter, had been printed off: see P.M. vol. liii. p. 113.

I come now to the short mention which Mr. G. has allowed himself to make of *Mr. Smith*, on the subject of *Fossil Shells*, in p. 287; where, apparently for no other reason than to avoid telling the world, *that Mr. Smith has published* (besides the quarto Memoir explaining his Map) the greater part of *two express works on Fossil Shells* (besides having deposited his original Specimens in the British Museum, which had been almost entirely collected in the last century)—I say, for avoiding saying so much, Mr. G. has descended so far as to say, that Mr. Smith's specification of "a variety of Fossils, by which the Strata of England may (in his opinion) be identified," was made, "in a table attached to his *Geological Map*."!!

I have already alluded, to the only other instance throughout Mr. G's Work, wherein *Mr. Smith* is mentioned, which relates, to his discovery, that *the known Alluvia*, that is, such water-moved masses of Strata, as, by containing *known species of Organic Remains* (and being frequently also, of a known substance) which can be matched to *the particular Strata*, from whence they were torn, *have all* (with the exception of some thin and light masses) *been moved in one direction*, that is, from the SE to the NW, or nearly so: and here again, Mr. G., as it appears to me, only

for the propose of *avoiding mentioning* Mr. Smith's "Strata Identified" (p. ii) or his "Stratigraphical System" (p. ix), professes, *not to know Mr. Smith's reasons*, for the opinion which he ascribes to him: notwithstanding, that I have myself, years ago, explained those reasons to him, and have repeatedly published the same in your Work, with confirmatory testimony from my own experience: see vol. xxxv. p. 135, vol. xlii. p. 253, vol. xliii. p. 125 Note, &c.

One thing has considerably surprised me, and all others with whom I have conversed, who had read Mr. Greenough's Book, viz. that not a word or allusion is found therein, to *the Map* ("begun and altogether made on *Wernerian principles*," see p. 337 of your xlvth volume, and vol. lii. pp. 184 and 185 Note), unfounded reports concerning which Geognostic Map, have so long, and so unjustly been played off, against the reputation and sale of Mr. Smith's original Map of the Strata.

I shall have already trespassed too much on your pages, to allow me to mention herein, more than one thing in Mr. G's Book which concerns myself, and that is, to point out, that the words marked with inverted commas in p. 156, and positively ascribed to Mr. Hutchinson, are not his words!, but my words, taken from page 123 (and its Note) of my Derbyshire Report: and further, that Mr. Greenough well knows, that in 1806, I made the important discovery (in Surrey and Sussex, regarding the *Denudation of the Weald District*) which is here alluded to, and gave him, soon after, a *manuscript Section of the Country between London and Brighton*, for explaining the same (P. M. vol. xliii. p. 120); and that my verification and extension of the same discovery, throughout the County and vicinity of Derby, was made, and the same published in Dr. Rees's *Cyclopædia*, and in my *Report*, two years before the time, that either he or myself heard, of the discovery or of the Work of Mr. Hutchinson, or, that of Mr. Catcot, which were brought from Oxford (as I understood) in order to dispute my claims to the first discovery of Denudation, and were lent to me by Mr. Greenough, in June 1813. Although until now, as Mr. G. has been silent to the discoveries of Mr. Hutchinson (who at the beginning of the 18th century was employed by Dr. Woodward in forming his Museum, see Dr. Rees's *Cyclopædia*), and those of his pupil the Rev. A. Catcot, I have let slip no opportunity, of referring to their Works, and doing my endeavours, towards making them more generally known (see vol. xliiii. p. 189, vol. xlii. p. 255, &c.); and, in case it would meet your approbation, to insert the same, I would send you the Extracts, which I made from these Authors' Works, in 1813, of all the Geological passages that they contain, which appeared to me new, or important.

I am, your obedient servant,

Howland-street, Aug. 1, 1819.

JOHN FAREY Sen.

A *Stratigraphical* or *Smithian* Arrangement of the Fossil Shells which were described (in Latin) by *Martin Lister*, in 1678, in the 3d Tract of his "Historiæ Animalium Angliæ," occupying there 78 pages of very small quarto, with 4 plates, containing 64 figures of Shells. By Mr. JOHN FARREY Sen., Mineral Surveyor.

ALLEVIA, or moved Rubble, and smaller ruins of Strata.

Grantham. } fig. 46, (Plott's Oxfordshire, tab. 4, fig. 8) *Conchites anomius*, &c. p. 240.
Gunnerby. }

Ditto. . . . f. 57, *Pectunculites anomius trilobus*, &c. p. 249.

Keighley. . . . f. 55, *Pectunculites subsphæricus*, &c. p. 247.

Upper, or flinty CHALK.

Newton-Grange. f. 26 (Plott, t. 2, f. 12), *Echinites è lapide Selenite*, &c. p. 223.

Norfolk County. f. 19, *Echinites orbiculatus, depressus*, &c. p. 220.

South of England. f. 18, (Plott, t. 2, f. 13) *Echinites, vertice fastigiato*, &c. p. 219.

Stonor House. { f. 22 (Plott, t. 5, f. 4) *Echinites albedo-cinereus*, &c. p. 221.

{ f. 25 (Plott, t. 5, f. 3) *Echinites velut laminis*, &c. p. 222.

Lower, or hard CHALK.

Ashton-Rowant. f. 28 (Plott, t. 2, f. 11, and t. 7, f. 9) *Echinites præter radios*, &c. p. 224.

Brightwell, S. } f. 29 (Plott, t. 2, f. 14) *Echinites radiorum punctis*, &c. p. 225,
Ewelme, N. }

Pirton. . . . f. 30 (Plott, t. 3, f. 1 and 2) *Echinites punctis prominentibus*, p. 225.

Royston. . . . f. 54, *Pectunculites albidus*, &c. p. 246.

BRICK-EARTH, or micaceous Blue-marl Clay.

Caistor. } f. 32, *Belemnites minimus*, &c. p. 227.
Cawkwell. }

Filley-Bridge. . . { f. 9 App. *Solenites, multi longitudine*, &c. p. 22 App.; this is *Perna aviculoides (var. α.)*
Sowerby's Min. Conch, t. 66, f. 3 and 4 : apt P.M. liii. p. 128.

- Lonsborough. } f. 32, *Belemnites minimus*, &c. p. 227.
 Specton, Cliff. }
 Tetford. }
- PORTLAND ROCK, or Aylesbury, &c. Limestone.
 Black-Hambleton Hill. f. 31, *Belemnites niger*, maximus, &c. p. 226.
 Brough. f. 37, *Conchites maximus*, margine lato, &c. p. 233.
 f. 3 (Plott, t. 5, f. 10 and 14) *Ammonis cornu*, spinâ &c. 207.
 f. 4, *Ammonis cornu*, striis lateralibus &c. p. 208.
 f. 8, *Ammonis cornu*, læve, &c. p. 211.
 f. 11, *Buccinites magnus*, ventricosus, &c. p. 214. This is *Trochus anglicus* β . Sower. Min. [Conch. t. 142.
 f. 12, *Buccinites exiguus*, &c. p. 215.
 Bugthorp*. } f. 31, *Belemnites niger*, maximus, &c. p. 226.
 f. 33, *Conchites major*, rugosus, &c. p. 229 †.
 f. 37, *Conchites maximus*, margine lato, &c. p. 233.
 f. 38, *Conchites rugosus*, &c. p. 234.
 f. 44, *Ostracites minor*, cardine &c. p. 238.
 f. 45 (Plott, t. 4, f. 18, *Gryphites*) *Conchites anomius rugosus*, &c. (*var. β*) p. 238 †.
 f. 52 (Plott, t. 4, f. 3 ?) *Pectunculites*, densissimis, &c. p. 245.
 Byland-Abbey. . . f. 3 (Plott, t. 5, f. 10 and 14) *Ammonis cornu*, spinâ, &c. p. 207.
 Crane. f. 37, *Conchites maximus*, margine lato, &c. p. 233.

* In Phil. Mag. vol. xxxix. p. 96 Note, I mentioned the reasons, which (with hesitation) induced me formerly to consider the Bugthorp Shells, as belonging to the *Lias* Strata: unfortunately, in vol. lii. p. 353, I had forgotten these proper doubts on the subject.

† This Shell resembles *Unio crassiusculus* (Sowerb. Min. Conch. t. 135) from the Crag Marl; but its place in the series of Strata being different, the differences that exist, should entitle this to a distinct name.

‡ This somewhat resembles *Gryphaea incurva* (Min. Conch. t. 112), but without doubt, I think, its different stratigraphical place, is accompanied by such specific differences, as should entitle it to a peculiar name.

- Elliker. } f. 43 (Plott, t. 4, f. 19) *Ostracites maximus*, rugosus &c. (*var. α*) pp. 236, and 21 app.
 Filley-Bridge. } f. 3 (Plott, t. 5, f. 10 and 14) *Ammonis cornu*, spinâ, &c. p. 207.
 { f. 14 (Plott, t. 4, f. 1?) *Buccinites lævis*, albidus, &c. (*var. α*) p. 216.
 { f. 21, *Echinites vertice pleniore*, &c. p. 221.
 Hinderskelfe. } f. 43 (Plott, t. 4, f. 19) *Ostracites maximus*, rugosus &c. (*var. α*) pp. 236, and 21 app.
 { f. 45 (Plott, t. 4, f. 18) *Gryphites* *Conchites anomius*, rugosus, &c. (*var. β*) p. 238: See Note †
 { f. 48 (Plott, t. 4, f. 10, 12 and 13?) *Pectinites rarioribus striis*, p. 242. [in last page.
 { f. 37, *Conchites maximus*, margine lato, &c. p. 233.
 Lonsborough, W. } f. 45 (Plott, t. 4, f. 18, *Gryphites*) *Conchites anomius*, rugosus, &c. (*var. β*) p. 238 : See
 Note † in last page.
 { f. 53 (Plott, t. 3, f. 14, 15 and 17?) *Pectunculites cinereus*, &c. p. 245.
 Newton. } f. 14 (Plott, t. 4, f. 1?) *Buccinites lævis*, albidus &c. (*var. α*) p. 216.
 { f. 36, *Conchites albidus*, oblongus, &c. p. 232.
 Nunnington. } f. 1 (Plott, t. 5, f. 15?) *Ammonis cornu maximum*, &c. pp. 205, and 21 app.
 { f. 3 (Plott, t. 5, f. 10 and 14) *Ammonis cornu*, spinâ, &c. p. 207.
 Pickering. } f. 14 (Plott, t. 4, f. 1?) *Buccinites lævis*, albidus, &c. (*var. α*) p. 216.
 { f. 48 (Plott, t. 4, f. 10, 12 and 13?) *Pectinites rarioribus striis*, p. 242.
 { f. 4, *Ammonis cornu striis lateralibus*, &c. p. 208.
 Scarborough, SW. } f. 33, *Conchites major*, rugosus, &c. p. 229 : See Note † in last page.
 { f. 56 (Plott, t. 3, f. 13 and t. 4, f. 6) *Pectunculites anomius*, &c. (*var. α*) p. 247.
 { f. 1 (Plott, t. 5, f. 15?) *Ammonis cornu maximum*, &c. pp. 205, and 21 app. [and 23 app.
 { f. 4, *Ammonis cornu striis lateralibus*, &c. p. 208.
 Specton, shore. } f. 5, and f. 11 app. (*Plott* t. 5, f. 12) *Ammonis cornu 5 anfractum*, &c. (*var. β*) pp. 209,
 { f. 57, *Pectunculites anomius*, trilobus, &c. (*var. α*) p. 249.*

* This resembles *Terebratula media* (Sow. Min. Conch. t. 85, f. 5.) but it doubtless is sufficiently different to deserve a distinct name.

- Thornton. f. 48 (Plott, t. 4, f. 10, 12 and 13 ?) Pectinites rarioribus striis, p. 242.
- Whitwell. { f. 16, Cochilites lævis, ore &c. p. 218.
f. 53 (Plott, t. 3, f. 14, 15 and 17 ?) Pectunculites cinereus, &c. p. 245.
- CORAL RAG, with Pisolite beneath it, sometimes.
- Heddington. { f. 13 (Plott, t. 4, f. 2) Strombites eleganter striatus, &c. p. 216.
f. 40 (Plott, t. 7, f. 2) Bucardites ex albido flavescens, &c. p. 235.
f. 51 (Plott, t. 4, f. 11) Pectinites striis duplicibus, &c. p. 244.*
f. 59 (Plott, t. 4, f. 5) Pectunculites striis densis, &c. p. 250.
- Shotover-Hill. f. 17 (Plott, t. 6, f. 11) Cochleomorphites sex spirarum, (var. α) p. 218.
- CLUNCH CLAY, with its Clunch or Dogger beds.
- Huntingdon. f. 43 (Plott, t. 4, f. 19) Ostracites maximus, rugosus, &c. (var. β) pp. 236, and 21 app.
- ALUM-SHALE, with Cement Balls, Jet, &c.
- Whitby. { f. 2, Ammonius cornu spinâ, &c. p. 206 : This is Ammonites Walcotii β , Sow. Min. Conch. t. 106.
f. 5 and f. 11 App. (Plott, t. 5, f. 12) Ammonis cornu 5 anfractum, &c. (var. α) pp. 209 and 23 app.
The largest of these figs. is Ammonites communis α , Sow. Min. Conch. t. 107, f. 2 and 3 ; and the smallest fig. is Amm. annulatus α , Sow. Min. Conch. t. 222, f. 2.
- Whitby. { f. 14 (Plott, t. 4, f. 1 ?) Buccinites lævis, albidus, &c. (var. β) p. 216.
f. 34, Conchites subdividus, &c. p. 230.
- CORNBRASH, or Bedford Limestone.
- Brise-Norton. } f. 41 (Plott, t. 7, f. 3) Bucardites costis donatus, p. 235.
North-Leigh. }
Tees River. } f. 5 and f. 11 app. (Plott, t. 5, f. 12) Ammonis cornu 5 anfractum, &c. (var. γ) pp. 209, and
Wansford. } 23 app.

* This shell somewhat resembles Pecten rigidus (Sow. Min. Conch. t. 205, f. 8) from the Forest Marble : but this shell should be differently named, as belonging to another stratum.

- Witney. f. 41 (Plott, t. 7, f. 3) *Bucardites costis donatus*, p. 235.
- UPPER OOLITE, Superior, or Bath Freestone.
- { f. 17 (Plott, t. 6, f. 11) *Cochleonorophites* *sex spirarum*, (*var.* β) p. 218.
 f. 20 (Plott, t. 8, f. 9) *Echinites parvulus striis*, &c. p. 220.
 f. 23 (Plott, t. 5, f. 5) *Echinites ovariis*, p. 222.
 f. 24 (Plott, t. 5, f. 6) *Echinites ovariis parvus*, p. 222.
- Taynton.
- FULLER'S EARTH Stratum, or Purple Clay.
- { f. 7 (Plott, t. 5, f. 13) *Ammonis cornu striis*, &c. p. 211.
 f. 58 (Plott, t. 4, f. 4) *Pectunculites striis latiusculis*, &c. p. 250.
- Great Rollright.
- UNDER OOLITE, Inferior.
- { f. 6 (Plott, t. 2, f. 9 and 10) *Echinites præter quinas strias*, &c. p. 224.
 f. 39 (Plott, t. 5, f. 1 &c.) *Conchites Mytuloïdes*, p. 235.
- Claydon.
- { f. 27 (Plott, t. 2, f. 9 and 10) *Echinites præter quinas strias*, &c. p. 224,
 f. 42, (Plott, t. 7, f. 4) *Bucardites reticulatus*, p. 236.
- Fullbrook.
- Shutford.
- Tangley. f. 27 (Plott, t. 2, f. 9 and 10) *Echinites præter quinas strias*, &c. p. 224.
- BLUE LIAS, or, Water-setting Lime Rock.
- { f. 45 (Plott, t. 4, f. 8, Gryphites) *Conchites anomius, rugosus* &c. (*var.* α) p. 238: This
 is *Gryphæa incurva* α , Sow. *Min. Conch.* t. 112, f. 1.
- Burton on Strather.
- IRONSTONE BALLS, Clay Iron nodules in 12th ? Coal Shale of the Derbyshire Coal-measures, Rep. I. p. 161.
- Adderton.
- { f. 35 (Muscle) *Conchites leviter rugosus*, &c. p. 231 : This is *Unio subconstrictus*, Sow.
Min. Conch. t. 83, f. 1 and 2.
- Bentley.
- Halifax, E.
- Leeds, S.
- Whitley-Hall.

- 3rd COAL SHALE, Slate-clay, Blac, Plate.
 Colne, } f. 10, Ammonis cornu vix duorum, &c. p. 213.
 Halifax, N.* }
 Ditto f. 49, Pectinites membranaceus, &c. p. 243.
 1st DERBYSHIRE-PEAK LIMESTONE, or Upper Mountain Limestone.
 Ashton-Tarne, S. f. 9 (Plott, t. 6, f. 12?) Ammonis cornu læve, &c. p. 212.
 Broughton. }
 Craven, Mine-field. } f. 47, Conchites anomius, tenuis, &c. p. 241.
 { f. 9 (Plott, t. 6, f. 12?) Ammonis cornu læve, &c. p. 212.
 { f. 15, Buccinites lævis, sublividus, &c. p. 217.
 Ditto { f. 50, Pectinites minor striis capillaribus, &c. (var. α) p. 243.
 { f. 55, Pectunculites subsphæricus, &c. p. 247.
 { f. 56 (Plott, t. 3, f. 13, and t. 4, f. 6) Pectunculites anomius, &c. (var. β) p. 247.
 Frier-head, N. f. 9 (Plott, t. 6, f. 12?) Ammonis cornu læve, &c. p. 212
 Stock. { f. 47, Conchites anomius tenuis, &c. p. 241
 { f. 50, Pectinites minor, striis, &c. (var. α) p. 243.
 { f. 56 (Plott, t. 3, f. 13, and t. 4, f. 6) Pectunculites anomius, &c. (var. β) p. 247.
 4th DERBYSHIRE-PEAK LIMESTONE.
 Beresford. f. 50, Pectinites minor, &c. (var. β) p. 243.
 Staffordshire-Moorlands. { f. 55, Pectunculites subsphæricus, &c. (var. β) p. 247.
 { f. 56 (Plott, t. 3, f. 13, and t. 4, f. 6) Pectunculites anomius, &c. (var. γ) p. 247.
 One of the DERBYSHIRE-PEAK LIMESTONES.
 Derbyshire Mine-field. f. 57, Pectunculites anomius trilobus, &c. (var. β) p. 249.

* At Cathrine Slack, (See Sow. Min. Conch. vol. I. p. 132, and P. M. vol. xlv. p. 218.)

An Extract of all such Matters concerning Fossil Shells and Plants, as are mentioned in the Remarks of JOHN STRANGE, Esq. read to the Society of Antiquaries, 28 Jan. 1779, and printed in the "Archæologia." Vol. vi. pp. 35 to 38.

After describing four different *Views*, which are engraven, of the promontory (of whitish Limestone) called *Wormshead*, running out W from the village of Rosilly, in Glamorganshire, Mr. Strange thus proceeds, (in p. 36,) viz. "Wormshead point also merits the attention of naturalists, for the extraneous and marine fossil bodies it contains, especially *Entrochi*, which remaining often prominent above the surface of the Limestone, on account of their resisting better the action of the air, make a singular appearance, and have been supposed to be the hardened excrement of sea Gulls."

"The *phytolypolithi*, or fossil impressions of plants, in the Strata about the coal-mines, are very curious. They are chiefly *Filices*; not of our common indigenous species, but exotics; and I remarked several that seemed to correspond exactly with some of the American *Filices* figured by Plumier in his celebrated *Herbal*.

(p. 37.) "I have since seen much the same impressions in the Strata of the coal-mines of St. Chaumont, in the province of Lionoise, in France: the origin of which, has been so very ably discussed by the late learned naturalist Monsieur de Jussieu (*Mem. de l'Acad.* 1718.) I also observed similar impressions in the coal Strata near Rive de Giez, in the same neighbourhood. Other impressions, nearly of the same kind, are likewise observable in the ironstone of Glamorganshire: particularly between Breton Ferry and Neath: and which appeared to me more curious than any I had ever seen before, or, indeed, since. A recent author, Mr. Beuth (*Julia est montem &c.* 1776, 8vo.) in his account of some extraneous fossil bodies of Lower Germany, has given the descriptions and figures of two curious phytolypolithi, greatly resembling some of those, which I remember to have particularly remarked in the said Ironstone. Mr. Beuth may well style these bodies, *rarissimi partus*.

"The hilly promontory a few miles to the west of Cardiff, as well as the blue limestone of the lower country, between Cardiff and Newport, also affords fossil marine bodies in plenty, especially the *Gryphites* oyster, which is not only found abundantly in the lower part of Monmouthshire, and about Purton Passage, but also extends, in considerable aggregates, along the neighbouring midland counties; having myself traced them, either in the *Gravel or Limestone*, through Gloucestershire, Worcester-shire, Warwickshire, and Leicestershire; occupying in like manner, the lower parts of those Counties, under the Hills.

"In

“In the high mountains on the confines of Glamorganshire and Brecknockshire, near Yneskedwyn (p. 38) I observed a rock of the same kind of black shelly Marble, that is found in such plenty near Kilkenny in Ireland; and which I afterwards saw in great abundance in Pembrokeshire, where it is also worked. The petrified shells contained in all these Marbles, are striated *conchæ anomiaæ*, which are not only exotics, but known to be extremely scarce.”

XXIII. *On the Effect of Vapour on Flame.* By J. F. DANA, *Chemical Assistant in Harvard University, and Lecturer on Chemistry and Pharmacy in Dartmouth College.**

To Professor Silliman.

Cambridge, Mass. February 5, 1819.

DEAR SIR, — ABOUT a year since I made some experiments on the effect of steam on ignited bodies, with a view to learn the theory of the action of the “American water-burner.” These experiments were published in an anonymous paper in the *North American Review*, and have been published in London, without an acknowledgement of their source.

The effect of them concerning bodies is peculiar, and it probably admits of more extensive application to the arts than in the above named instrument alone.

When a jet of steam, issuing from a small aperture, is thrown on burning charcoal, the brightness is increased if the coal be held at the distance of four or five inches from the pipe through which the steam passes; but if the coal be held nearer, it is extinguished, a circular black spot first appears where the steam is thrown on it. The steam in this case does not appear to be decomposed, and the increased brightness of the coal depends probably on a current of atmospheric air, occasioned by the steam. But when a jet of steam, instead of being thrown on a single coal, is made to pass into a charcoal fire, the vividness of the combustion is increased, and the low attenuated flame of coal is enlarged.

When the wick of a common oil lamp is raised, so as to give off large columns of smoke, and a jet of steam is thrown into it, the brightness of the flame is increased, and no smoke is thrown off.

When spirits of turpentine is made to burn on a wick, the light produced is dull and reddish, and a large quantity of thick smoke is given off; but when a jet of steam is thrown into this flame, its brightness is much increased; and when the experiment is carefully performed, the smoke entirely disappears.

* From Silliman's Journal, No. 4.