XLIII. Notes and observations on the introduction and three first chapters, of Mr. Robert Bakewell's "Introduction to Geology;"—embracing incidentally, several new points of Geological investigation and theory

Mr. John Farey Sen.

To cite this article: Mr. John Farey Sen. (1813) XLIII. Notes and observations on the introduction and three first chapters, of Mr. Robert Bakewell's "Introduction to Geology;"—embracing incidentally, several new points of Geological investigation and theory , Philosophical Magazine Series 1, 42:186, 246-261, DOI: [10.1080/14786441308638327](https://doi.org/10.1080/14786441308638327)

To link to this article: <http://dx.doi.org/10.1080/14786441308638327>

Published online: 27 Jul 2009.

Submit your article to this journal [↗](#)

Article views: 4

View related articles [↗](#)

246 *Mr. Farey's Notes on Mr. Bakewell's Geology.*

accurate rate of a time-keeper may be always obtained by equal altitudes of the sun, with a sextant, by persons who have been properly instructed in the method of taking them; and as frequent opportunities occur for this purpose when a ship is lying at anchor, every endeavour should be used to put it in practice as often as possible.

XLIII. *Notes and Observations on the Introduction and three first Chapters, of Mr. ROBERT BAKEWELL'S "Introduction to Geology;"—embracing incidentally, several new Points of Geological Investigation and Theory. By Mr. JOHN FAREY Sen., Mineral Surveyor.*

To Mr. Tilloch.

SIR,—IT is a remark very commonly and truly made, that no department of science or literature is so overloaded with theoretical works as *Geology*: "Theories of the Earth, Geognosies and Elementary Treatises on this subject, increase so fast," exclaim some persons, that we ought to set our faces against their further multiplication. On due consideration however, this will be found a very injudicious view of the subject, and calculated only to perpetuate errors, and prevent the slow, but certain approaches, which this science in common with all others is making, towards truth and perfection.

On a subject, whose facts are so widely and so deeply spread, many of which are so very liable to be mistaken, and whose minute and sufficiently extended examination, is attended with such a great expense of labour, time, and money, and after all, whose *publication*, in this country in particular, is so little encouraged, and often so difficult to be procured, even when the observers are willing to give away all their previous labours, a more rapid progress must not be expected, than what is now making.

From two Letters, of the 16th and 21st instant, (pp. 53 and 103) which I have found it necessary to address to you, some persons will perhaps suppose me acting therein, contrary to the maxims above stated, and as being desirous of depreciating Mr. B's Work. I beg however distinctly to state, that this is far from my intentions or wishes, and that I have yet perused no systematic work on *Geology*, which I think entitled to a general and careful reading, in any degree compared with Mr. Robert Bakewell's

well's "Introduction to Geology," and which I sincerely wish may be read, and studied, by hundreds of persons, with no less care and attention than I have bestowed upon it. Because I can assure them, that it contains many more of the *facts* concerning our planet, and fewer of the absurd and whimsical *assertions* and theories concerning it, than any of the numerous systematic works which have preceded it in our language, or I believe in any other.

By producing a work, which on the one hand no where shocks us by its impiety, in setting up mistaken phenomena of the Earth and false hypotheses regarding it, against those Revelations which have obtained the assent of the largest portions of civilized men; and on the other hand, has excluded those futile and mischievous attempts at supporting Revelations and Miracles, by inapplicable natural phenomena, by supposed present evidences of the *Deluge* of Noah, in particular; on these grounds I consider Mr. Bakewell as having performed most important services, to *Science* and to *Religion*, at the same time. That he has done all that *might be done*, and that doubtless will be done by future Geologists, in the support of both or either of these, would perhaps be unreasonable to expect.

Mr. B. has unfortunately shrunk from the labour, of making a copious alphabetical *Index* to his volume, but which, nevertheless, is so essential to the *studying* of, and referring to any work containing numerous details, as this does, that I have been induced to make one (and which Mr. B. shall have the use of at any time, if he wishes to publish it). I lament also, that he has not followed the very excellent example set him by the late Dr. Richard Kirwan, in more generally and *expressly* quoting his authorities.

Kirwan's "Geological Essays," was the first professed work on Geology which fell into my hands; I found it then most importantly useful, by its very numerous *references* to the *volumes and pages* of previous writers, and still on that account, it ought to be recommended to the perusal and frequent reference, of every English student, as well as to future writers, although too many points of his theory and inferences, need now to be passed over or forgotten.

I have thought the pages of Mr. Bakewell's recent work, worth marginal References and Memorandums, in pretty considerable numbers; and thinking that many of these will prove useful to several others of your Geological Readers, and perhaps to future writers, when we shall be no more,

I intend making such *Notes* and observations of mine, the subject of the present and three future Letters.

Some persons, I am aware, will say, on their perusal, that these references are too much confined to my own writings: if this might be granted, my apologies would be—1st, that Mr. B. has in so very disproportionate a degree, adduced the facts of a certain district, that I had previously examined, and written upon, and has besides introduced a large portion of those inferences which I have drawn, from these and my other published Observations, and from reading, &c.: and 2d, that I am most acquainted with these facts, how far they are applicable to the points in question, and where to find the records of them:—and of such Objectors I would beg also to ask the favour, to *imitate my example*, and give us through the medium of your useful Work, other series of Notes and Observations on Mr. B's useful pages, as a kind of text, with references to their own or friends' or others' works, interspersed with as many original and precise facts as possible:—The Science will be benefited by this rivalry, at no very considerable cost.

Where our references and notes may be found to confirm Mr. B's statements or inferences, he might feel obliged to us, and if they should lessen his *apparent originality*, for that he would have himself only to blame. Where references or notes of this sort, contradict or correct statements or opinions in Mr. B's work, impartial men will be glad of the opportunity thus afforded, of weighing the opposing evidences, and in many instances, I hope, will make and communicate new and precise observations, calculated to set our disputes for ever at rest.

But I will proceed to my Notes, after mentioning, that I have fixed on those words in Mr. B's sentences, which appeared best calculated to show the reason and application of my Note, or to direct to the passage elsewhere, which is referred to; and have, after mentioning his *page* and *line* (always reckoned from the top line, omitting the running Title) repeated the words selected in his page, and added a Mark, as may be done, by any person, who may think it worth while to transfer the whole or any part of my references or Notes (or references thereto) into the pages of their Copy of Mr. B's Geology. For my Derbyshire *Report* I have used only the letters Rep., and only P. M. for your work. Mr. B's *Plates* shall in like manner be noticed, and where no work is quoted, by abbreviations of their titles, references to some others of Mr. B's pages are meant.

Notes,

Notes, &c.

- P. 1, Plate V. l. 2.—of Cader Idris*.—* See pages 112, 189, 297 and 317.
- vi. l. 13, Mr. Michell*.—* See P. M. vol. xxxvi. p. 102, vol. xxxvii. p. 175 Note, and vol. xxxix. p. 94 Note.
- vii. l. 5 and 6, general accuracy*.—* Some rather material objections have however been raised, to some particular statements by Mr. Whitehurst, P. M. vol. xxxi. p. 36, and Rep. i. 473 N and 490, pages 178, and 274, (and P. M. vol. xlii. p. 112 Note.)
- l. 18, in England†.—† Eleven years after Mr. Whitehurst wrote, Mr. John Williams published the results of his considerable experience as a Miner and Collier, and ten years later, Dr. Richard Kirwan published his Geological Essays, enriched by precise references to almost every preceding Writer on the subject.
- About the year 1794, Mr. William Smith, of Mitford near Bath, began his Geological Survey of England, see P. M. vol. xxxv. p. 114; in 1801, he instructed J. Farey, B. Bevan, Rev. J. Townsend ("Character of Moses," p. v.), &c.: previous to which, he had circulated Prospectus, for a similar work, only less extensive and complete than that which is now forthcoming, (p. 59.) He accurately defined the alluvium, discovered the extraneous fossils peculiar to most of the English strata, &c. &c. Rep. i. 108, and P. M. xxxviii. p. 131.
- x. l. 9 and 10, elevate the imagination*.—* P. M. xxxvii. p. 443.
- xi. l. 15, attendant science*.—* This is a more appropriate expression, of the relation that *Mineralogy* has to *Geology*, than Mr. Kirwan's, who says, that the former supplies the *alphabet* of the latter:—from technical and pedantic *Mineralogists*, Geological investigation has more to fear, than hope, in the present day, see p. xii. and Rep. I. viii. Note.
- 5, l. 6, as 230 to 229*.—* Probably, as 320 to 319, see P. M. xli. p. 100.
- 8, l. 21, foundation rock*.—* P. M. xl. p. 53, vol. xlii. p. 126, and my 3d Letter, in reply (p. 170.)

P. 9,

250 *Mr. Farey's Notes on Mr. Bakewell's Geology.*

- P. 9, l. 9, crystalline structure*.—* Phil. Trans. 1811, and P. M. xxxix. p. 29.
- 10, l. 25, alluvial ground*.—* Alderley-edge, see p. 343, and Rep. i. 252: and Stapleford Mine, P. M. xxxix. p. 478.
- 11, l. 10, workable coal*.—* See the articles *Coal* and *Colliery* in Dr. Rees's Cyclopædia, and Rep. i. 116.
- l. 15, subterranean forest †.—† See P. M. iv. p. 287. These, and Peat, are common around England, Wales and Scotland, &c. where flat Coast are not gaining or losing by the waves, see my 1st Letter, (p. 58); M. de Luc, Geo. Trav. in France, &c. vol. i. p. 275, ascribes this fact, in Holland, to the sinking of the alluvial lands, but the *rise of the Sea*, seems its true cause, I think, see p. 324 of his same volume.
- 12, l. 8, east of it*.—* Lead, Zinc, &c. near Broomhead Hall, Rep. i. 254, 270, and 407; Copper, Cobalt, &c. at Stapleford, P. M. xxxix. p. 478, and not 498, as printed at p. 58 herein.
- l. 12, metallic ores occur †.—† The Mendip Mines SW of Bath, seem to me to occur in *Lias* (as Mr. Smith originally concluded, although of late he has doubted this, and the Rev. Mr. Townsend has represented this Rock as identical with the Derbyshire Peak Limestone, &c.): the Nailsea Collieries and those N of them (P. M. xxxviii. p. 321), and others probably, S of Glastonbury, which Mr. Smith is now exploring, occur in this northern horn of the "Devonian range," in the Map, p. 255; (see pages 57 and 125 herein.)
- l. 24, to the south-east †.—† See the articles *Coal* and *Colliery* in Dr. Rees's Cyclopædia, and P. M. xxxix. p. 27.
- 13, l. 6, brine springs*.—* Many such (see p. 139) and some having *Salt-works* on them, occur out of the line EL, see Mr. Bailey's Durham Report, p. 48, &c.
- l. 9 and 10, before noticed †.—† Not by the names Alpine, Middle and Low Districts, but see Phil. Trans. 1811, p. 258, and P. M. xxxix. p. 27 and 426, &c.
- 16, l. 1, flat fish* —* In the *Lias* Limetone, see p. 237.
- l. 2 and 3, in and under †.—† It is *upon* all or most of the regular beds of Clay, covering Chalk, and
upon

- P. 16. upon Gravel, between this and Brick-Loam or alluvial Clay on the surface, (Mont. Mag. xxxiii. p. 514, and page 70 herein), that the Bones of large Quadrupeds have been found, in England, and in France, see Geol. Trans. i. and P. M. xxxviii. p. 143. At pages 60, 177, 181, 258, 263, and 336, other errors or omissions occur on this head, see my Notes on pp. 60 and 181.
- 17, l. 23, a cavern*.—* In Ball-eye Mine, Rep. i. 250 and 253.
- l. 24, Gibraltar Rock†.—† See page 184.
- 9, l. 1 and 2, ninety-seven yards*.—* It was in Meas- ham-fields Coal Pit (Rep. i. 204), near to the border of Swepston Parish, at twenty-seven yards below the surface, that the Skeleton of a Man was found, in driving an air-gate, a few years ago.
- l. 4, no appearance existed†.—† The old Shaft had so effectually been filled up, as to have escaped notice above ground; but before reaching the skeleton, the Coal had proved ochry and tender, as if a fault or old hollows were near at hand. The Coal in this part, is altogether 12 feet thick, the lower $7\frac{1}{2}$ feet of which is soft and of less value than that above, on which accounts the air and water gates, or adits, are usually driven in the soft coal; the ancient work in which the man was found, had perfect coal sufficient above it, to envelope or "imbed" the body, as it mouldered or fell in fleaks, before the Bind of the roof followed; and to Edward Mammatt, Esq. the Proprietor, who carefully examined the spot, when the head only of the skeleton had been disturbed, it appeared quite clear, that the Coal had been disturbed, and had thus fallen upon the Body; in working forwards a very short distance, under his inspection, red clay became mixed with the loose Coal, and the same increased to the foot of the shaft, that had been filled up therewith: no tools were found in the ancient working, from whence it was conjectured, that the unfortunate Man had fallen by accident into a disused pit. It was perhaps, fortunate for science, that Mr. M. so promptly attended, to ascertain the facts regarding this skeleton, and to prevent the workmen from spreading

- P. 19. spreading reports, without contradiction, of the skeleton being *imbedded in undisturbed coal*.
After Mr. B's just remark on this head in p. 18, I lament that in page 162, this supposed *complete consolidation* of loosened Coal, by "pressure and time alone," should, as I suppose, be alluded to, for supporting a Theory, to which this case appears to have no just relation.
- 26, l. 18, denominated a *bed**.—* An Anglo-Wernerian term this (used also at page 52), used in just *the reverse* of its meaning among the practical English Quarrymen and others; who describe the subdivisions of their Rocks or thick strata, by the term *beds*, Rep. i. 222, 271, &c.
1. 25, right angles to this †.—† And level or nearly, Rep. i. 120 Note.
- 27, l. 17, the *motion* of water*.—* It is probably only the Huttonians, who at this day, consider the *motion* of water, as concerned in the formation of strata, but such opinion seems devoid of probability.
- 28, l. 14, different direction*.—* Denominated *Stratula*, Rep. i. 155, see my Note on page 317.
1. 21 and 22, remove many difficulties†.—† See P. M. xxxviii. p. 357, and Mont. Mag. xxxiii. p. 517.
- 29, l. 1, with stratification*.—* By Mr. Edward Martin, at Cribbath, in Phil. Trans. 1806, and in Williams's Min. Kin. 2d Ed. ii. p. 296: and by others.
1. 10, mountain masses†.—† Rep. i. 153, Phil. Trans. 1811, and P. M. xxxvii. p. 441, and vol. xxxix. p. 29 and 426.
- 30, l. 8, clay*.—* *Alumina* ought now always to be used, in naming the simple Earth; *Clay* being a useful name, in very common use, for various *mixtures* of Alumina, Silix, Magnesia, &c. &c.
- 40, l. 22, of the science*.—* Read—of Geological Science.
- 43, l. 12, generally lie below*.—* Are not the bare or denudated tops of large *nodular*, or *imbedded masses*, often described as *foundation rocks*? P. M. xl. p. 53.
- 44, l. 13, contain *pebbles**.—* I believe Mr. W. Smith, as a Man practically acquainted with Coal-mines and other deep excavations in the Strata, as well as with the superficial Gravel and alluvial soils,
was

- P. 44. was perfectly right in concluding, 20 years ago, that *rounded pebbles* are never contained in regular strata or found under them, Rep. i. 109 and 134.

After thoroughly and repeatedly considering the nature of the *granular siliceous masses*, called Sandstones and Grit-stones, from the finest, most uniform and almost imperceptible grit, (or even fine *Sand* in a stratum), to the irregularly coarse Millstone Grit of Derbyshire (Rep. i. 179), the still more irregularly coarse grit or puddingstone strata of South Wales and the Forest of Dean (Rep. i. xiii. and P. M. xl. p. 51), and the vastly more compounded and irregular Conglomerate or Puddingstone, which forms such stupendous strata in the north of Scotland (Will. Min. King. 2d Ed. i. 488), and stretch to the Orkneys: I am perfectly satisfied, that all such *granular masses* in strata, are of *cotemporary formation with their paste or cement*, and are distinguishable (though with difficulty sometimes), from *rounded pebbles*, having no real marks of *attrition* on them, though they often show on their outsides the effects of decomposition, so as to assume very exactly *the appearance of worn stones*.

A Theorist, who sees in the same stratum or mass of conglomerate, distinct stones of all his different classes perhaps, Primitive, Transition, and Secondary and even of the Alluvial of some Schools perhaps, will stoutly deny, and even ridicule my position, quoting against me the authority of a List of great Names from Lehman to Werner, &c.—Be it so, such may continue to enjoy their theories, and form Societies for amusing one another therewith, and I will pursue my observations, until I meet with facts *not explainable but on their principles*, and then I will not be backward in announcing them, and owning it.

Opportunities more proper than this will doubtless occur, in going through Mr. B's volume, for these remarks, but I wished early to introduce them, and can refer back to them here, when necessary.

- 44, Plate I. fig. 1.—see pages 44, 47, 83, 165, and 257.—

Fig. 2, see page 45.

- 45, l. 14, unconformable and overlying*,—* It has been hinted

P. 45. hinted to me by a friend, that Mr. B. has something yet to learn, of his friends the "Anglo-Germans," respecting the orthodox interpretation of these terms. I have never yet found them necessary, in describing any appearances of Nature; Mr. B's 2d figure in plate I. has nothing represented in it, to me inconsistent, with regular stratification; which does not absolutely require parallel, but rather *continuous masses* (Rep. i. 105 and 117); what have we here, to prevent us supposing, that his upper or "superincumbent" masses are parts of a *stratum*, as uniformly thick, and as regularly applied upon No. 1, as that is upon No. 2? (and even had once others such upon it,) and that since, or even before a part of this mass was cracked into regular columns (see p. 314), the surface was *denudated*, as irregularly as at *dd*, and that in two other parts, the whole of the upper stratum (or strata) was stripped off, without any perceptible excavation into the next inferior stratum. Such cases are very familiar to me in nature. Not so I must confess, the *three strata*, No. 6, in fig. 1 in this plate, which abut or *end against another stratum*; or the two other *strata* at the top left-hand corner of fig. 3 in plate III.*

If in both these cases, *alluvial beds* (Rep. i. 142) are intended to be shown, covering *strata*, almost every Gravel Pit will prove the possibility and the frequency of such occurrences, and so will Gravel Rocks (Rep. i. 131 Note).

The different cases of *stratula*, curved or straight (which last are very common in the beds of numerous Coal-measure and other Rocks), appeared to me sufficient, to account for every case that I have yet seen, of unconformable stratification.

1. 17, any conformity †.—† In its top: see above.
 46, 1. 19, and structure*.—* Because compact, and not usually divided into beds and blocks, or posts, as is common with most other Rocks.
 1. 25, almost peculiar*.—* I have yet seen nothing so *peculiar* in the *stratification* of Basaltic Rocks, P. M. xxxiii. p. 257, and Rep. i. 279: their *sub-*

* My worthy Friend S. C. Pole, Esq. to whom this Quarry at Wild Park belonged, died lately: I shall therefore take it a favour of any one, to whom it may be convenient, to compare the view in this plate with the face of the Rock, if they will inform me particularly, as to the two horizontal strata at the top left-hand corner.

stance,

Interior of a Volcano, in Java.

Fig. 2. only

- P. 46. *stance*, in its various states, is far more singular.
- 47, l. 16 and 17, elevated them on one side*.—* The important Geological fact, that such elevations of piles of strata, by rents or *faults*, very rarely now form a cliff or sudden inequality of the surface (owing to the *subsequent* and general *denudation* thereof, Rep. i. 105, 123, and 124), has not been expressly pointed out in Mr. B's volume, although so important a feature of the earth's surface, see my 2d Letter, (p. 107), and 3d Letter, (p. 165.)
- 48, Plate II. fig. 1, see p. 48, 271 and 273.—fig. 2, see p. 145, 151, and 209.—fig. 3, see p. 146 and 209.—fig. 4, see p. 218.—fig. 5, see p. 226.
- 48, l. 7, is built*.—* On the 9th Grit Rock, Rep. i. 207, Ponds Colliery, whose workings undermine the Town and this Rock.
- l. 11 and 12, coarse gritstone †.—† 1st Grit, or Millstone Grit, Rep. i. 220.
- l. 17, stratified *sandstone* ‡.—‡ Limestone *Shale* (Rep. i. 227):—throughout his work, nearly, Mr. B. has altered the established and appropriate name of this stratum, and of others also very different from it, to "sandstone," see my 2d Letter, (p. 103.)
- 48, l. 19, a cap or covering **.—** On Whin Hill, Rep. i. 62 and 227, are *three* caps or Hummocks of 1st Grit, the largest being here intended by Mr. B., I suppose: and it is worthy of remark, that the great prevalence of this phenomenon, of *Hummocks*, throughout this district (Rep. i. 225 and 241) and others in England, Scotland and Ireland, is unnoticed in Mr. B's work; nor is their importance pointed out, as certain indications of the *denudation* of vast tracts of intervening strata, on *Hills as well as in Valleys*, see *Denudation* in Dr. Rees's Cyclopædia, P. M. xxxiii. p. 204 and 260, and xxxvii. p. 44, &c. The Rev. A. Calcott, in 1761, distinctly pointed out this *grand phenomenon* of the Earth's surface, see his "De-luge," p. 159, &c.; Mr. Williams also mentioned a particular case of Hummocks, Min. King. 2d Edit. i. p. 97. M. Hermelius's Maps of Kinne-cula and other Hills in Sweden, lately copied into Dr. Thomson's Travels, show them, &c.—yet, who of the modern *Theorists* has noticed, and
given

Acid River, & White River, in Java.

S. Porter, sculp.

- P. 48. given any consistent explanation of them?; Mr. Allan, in p. 92 of your present volume, ascribes the Cornish Hummocks, to decomposition!; see my 2d Letter, (p. 108.)
1. 24 and 25, compact limestone (7)††.—†† It has already been noticed in my 2d Letter (p. 112), that a great *fault* (Rep. i. 289) is omitted in plate II, fig. 1, through No. 7, near to the edge of the Shale (5); and that the part of the Limestone which underlies the Shale here is 1st Limestone (Rep. i. 238 and 271).
- 49 I. 2, the same limestone*.—* It is the 4th, and not the 1st Limestone, which forms mountains to the W and SW of Castleton, see Map at page 97 of *Derb. Rep. i.* and p. 280, and my 2d Letter, (p. 112.)
- I. 14, different rocks †.—† These effects of *Faults* are shown, *Rep. i.* 146, 165, 280 and 290 Note, &c. *Phil. Trans.* 1811, and *P. M.* xxxix. p. 26.
- I. 16, sinking down ‡.—‡ Mr. Whitehurst attempted to explain the formation of Valleys by fissures and subsidences, but his assumptions have been proved erroneous, *P. M.* xxxi. p. 36, and *Rep. i.* 473 and 490, and my 2d Letter, (p. 112 N). I have described all the principal Valleys in Derbyshire, and shown that they are *none of them*, owing to this cause, *Rep. i.* 469, *P. M.* xxxix. p. 192 and 253,) and *Mont. Mag.* xxxiii. p. 516. Mountain Torrents, mentioned here and in p. 189, seem perfectly inadequate to the widening of the upper parts of fissures, into valleys, *Rep. i.* 491, and xxxiv. p. 49.
- 50, I. 11, fragments of these mountains*.—* The conglomerates of the north of Scotland, mentioned in my note on p. 44, are not formed of fragments of the adjacent mountains, nor are perhaps any other such "pudding-stones," as they are here called, so formed.
- I. 19, by marine currents †.—† This cause assigned for the *excavation of Valleys*, appears rather more adequate to the effects, than "Rivers which flow through them," page 47; but neither are sufficient, to account for the very general denudation of the earth's surface, if they could be supposed to have formed the individual valleys. The same cause which *denudated*, (whatever it may have been)

P. 50. been) appears evidently to me, to have formed the valleys at the same time, but by no mechanical or natural law, that I can discover or devise, or have seen pointed out (Rep. i. 105, and Staffordshire Report, p. 200). Infinite wisdom seems so to have disposed the forces that operated, in tearing-off* hundreds of yards thick of Strata, that the parting or rupture at the bottoms of the removed solid masses, were in the complicated waving planes, which now form the surface; or rather, which did so, before any alluvium was lodged, or decomposition had happened, to form the superficial soil, and slightly round the asperities. The sudden removal of a large Seal from off its impression on wax, would give us an idea of this operation; if we could mentally separate it from the previous compression of the yielding wax, into the shape of the seal. Here seems to be an operation of *creative power* on the vast terrestrial globe, fully within our power to investigate, but which we cannot in any degree imitate, —which of them indeed can we imitate? or, indeed, fully comprehend?

51, l. 11, it would sink*. — Mr. B. might find himself puzzled, even with the assistance of the learned Illustrator of these Huttonian absurdities, to tell us, how a fluid mass, whether gaseous or of melted

* That the removed Masses from denudated tracts and Valleys have moved off upwards, and not horizontally, in the direction or by the action of currents of water, moving in any imaginable courses, will I think admit of the clearest proof, from an accurate and minute examination of the tops of beddy or thinly stratified Rocks, and of the rubble formed by their being torn up; —on the tops of Quarries and Cliffs, in many parts of our Island, and in most situations, as to hills and valleys, I have repeatedly and carefully studied this phenomenon, see my Note on p. 209.

Mr. L. Horner saw two cases of this kind in the Limestone Quarries on the W flank of the Malvern Hills, but on returning to view one of them again, the Quarrymen had removed these loosened and erected parts of the beds: and I cannot but suspect, that it was after this, and from recollection only, that Mr. L. drew the Section of these strata, which is published in the Geo. Trans. vol. i.

Ashover Valley in Derbyshire, has presented many facts of this nature, and even of more decisive kinds, as to a temporary lifting action on the surface of the strata, whose precise localities I have pointed out, for re-examination of the curious facts which they exhibit, and mentioned the Names of the parties present, when several excavations were made, on purpose to explore the rubble, and are since closed again, in my Paper mentioned in a Note in my first Letter (p. 55.) But alas, my unfortunate production had no sublime speculations on primitive transition or secondary formations, to recommend it, not even on "the independent Coal formation," (P. M. xli. p. 305), and seemed to be thought unworthy to appear in better company.

Vol. 42. No. 186. Oct. 1813.

R

lava,

P. 51. lava, *powerfully expanding itself*, could suffer, much less *cause* (as seems here insinuated) part of the surrounding masses, against which it acted (equally on all sides, by the known laws of fluidity), to sink, or approach towards the expanding mass! Perhaps Mr. B. will wish to amend his words, and say, "*after* the surface had risen in one part, it sunk in another;" but which even will no better avail him, unless he can show, why that part of the shell which had stood firm and unmoved by the expanding action, should immediately after (much less at the same time), give way and sink down, in preference to that which had just been heaved up by its action.—But it seems a loss of time, to notice such crude whims.

52, l. 3, defended from attrition*.—* The common appearance of extraneous fossils, and of known alluvium, which have suffered little or no attrition, by a distant removal, as on the Chellaston Gypsum, see my 2d Letter, (p. 105), compels us to seek a more general and adequate cause, than a coating of *ice*.—In the great alluvial Clays of Bedfordshire, very large ragged flints, with loops almost like the handles of pitchers, and more easily broken off, are commonly found in digging (with other not less fragile ruins of the distant chalk Hills), and are often used for weights to their roasting Jacks. Very large masses of laminated clay are also found lodged in the gravelly mixtures here. In Dorsetshire larger unbroken masses of the stratified Pipe Clay (of Purbeck, probably) are found lodged in gravel; at Hagworthingham in Lincolnshire, I have seen large masses of thinly stratified Clay, with their edges little worn, lodged in confusion, on the top of a Hill, among immense boulders and rounded stones. A multiplicity of similar facts show, that a great deal of the known alluvium must have been borne up above the surface and moved in mass (generally, if not always, from SE to NW or near it, as Mr. Smith long ago discovered, P. M. xxxv. p. 135) instead of being *rolled* along the surface; and the same remark will evidently apply to many self stones or moved Blocks, see *Ice borne*, in Dr. Rees's Cyclopædia, and Rep. i. 143.

P. 60,

P. 60, l. 3, Fresh-water fish*.—* Who has told us, any indubitable marks, by which *fresh* and *salt* water fish, or those of water of *any other* qualities can be discriminated?, among *the primitive races* whose remains we find in the strata. I believe no one has, or can, P. M. xxxv. p. 134. Some time ago I asked a celebrated Naturalist this question,—he said, he knew no other characteristic distinction between fresh and salt water shells, than the *thinness* of the former, but will this serve as any distinction among fossil species? are not very thick and stout shells often mixed in the same bed with very thin and tender ones?—I have often seen it. This being at present a favourite Geological bauble, in London as well as Paris, (Rep. i. and P. M. xxxv. p. 256) Mr. B. has in seven or more pages of his Book, contrived to introduce so fashionable a subject, combined as often with his mistake, about the remains of large Quadrupeds being found *in* the stratified Clay of London, instead of *upon* it, see my Notes on pages 16, 181, &c.—See Mr. James Sowerby's concluding remark in p. 76 of his "Mineral Conchology."

1. 6 and 7. 1 Clay. 2 Sand †.—† It is much to be lamented, that Mr. B. has so far suffered *Theory* to distort facts, as to deny the many important regular strata of *Clay* and of *Sand* in the south-eastern parts of England (Rep. i. 111 to 115), a place among his secondary strata; placing them here among *alluvial substances*, viz. with *Gravel*, and calcareous Tufa, and even with beds of *Peut*!

1. 22, some time established ‡.—‡ Mr. B's work was intended, we should hope, as "introductory" to the truths of Science, and not for detailing and giving further currency to established errors. If Mr. B. at all thought, with me, (as this passage intimates I think) that the boasted arrangements of Lehman (p. vi.) were useless, if not hurtful to the science, (see my Note on page 44) why have they formed so large a share of his work, with additional and speculative arrangements of his own, on the same doubtful principles?

61, l. 6, forced through*.—* It is more natural, and accordant with all the facts, to suppose the superior strata have been denudated off the mountain tops of Granite (such as *a* in fig. 1, plate I),

R 2

than

P. 61. than to suppose, with the Huttonians, that the Granite has been "forced through the more superficial covering of the Globe:" when after all, the Granite may perhaps be comparatively an inconsiderable nodule or crystallized mass (Rep. i. 153), *in a Stratum*, of far greater magnitude and extent, see my Note on page 43.

67, l. 10, over coal*.—* What reasons, except his new "Anglo-German" *theory* of formations, has Mr. B. adduced, to show, that the *Coal-measures* of the Ashby-de-la-Zouch Coal-field do not *pass under* his "primary" (or "Transition") tract called Charnwood Forest? see my note on page 285.—At page 286 Mr. B. admits that the Red Marl (under his new denomination of *Sandstone*), occupies a space, in horizontal strata between the *Coal-measures* and the coarse *Slate*, and says, the *Sandstone* is evidently of "posterior formation to the coal strata," or in plain English I should say, *lies upon them*; but which Mr. B. was not likely, to say, wishing for another purpose, to represent this same Red Marl (or *Sandstone*) as identical with 1st Grit and Limestone Shale (or *Sandstone*), and *underlying* all the great Derbyshire and Yorkshire Coal Series, see my 2d Letter (p. 103).

The coals rising up where they terminate against the horizontal Marl, as Mr. B. mentions, is consistent with the *Fault* which I have represented in my Map Rep. i. p. 97 and mentioned p. 174: and though Mr. B. may have attempted to invalidate this *Fault*, in another part of its course, at page 267, by saying, "on the south-west they (the *Coal-measures*) are covered by a thick bed of *coarse breccia and gravel*, which separates them from the coal-fields at Polesworth and Bedworth in Warwickshire:" his statement is clearly unfounded; for between these two *Coal-fields*, several miles wide of as perfect *Red Marl* occurs, in horizontal strata (with occasional grit-stone beds in them), as in any part of England, as my Map shows, Rep. i. 97, instead of *Breccia and Gravel*!. I have shown and mentioned a small tract of *Gravel Rock*? in Over Seal (Rep. i. 142), which Mr. B. may perhaps have seen, and thus been induced to make this general and very unfounded assertion.

P. 68, l. 17, in clay-pits *.—* These alluvial Marl-pits with Granite and other foreign Bolders, extend into the NW corner of Derbyshire, Rep. i. 456.

69, l. 22, denominated *rents* *.—* Mr. B. seems here alluding, to the nearly vertical *joints*, slines cutters, &c. between blocks of stone, or masses of Coal, &c. which are generally peculiar or confined to each bed; and should not therefore have been confounded by a common term, with the vastly different phænomenon of *Faults*, as is done in page 47, see my Note on page 162.

72, l. 3, to mica slate *.—* Did not Mr. B. note, in his Woburn observations, that the micaceous stones alluded to, were worn and decomposing pebbles among the Gravel?. I have found such, very plentifully, on the lower chalk hills NE of Dunstable, and they have also reached Derbyshire, with many of their travelled companions, see Rep. i. 466.

73, l. 10, of statuary marble *.—* Mr. John Lingard, the occupier of Lodge Farm in Great-rocks Dale in Derbyshire, showed me small specimens of white granular Marble, scarcely if at all distinguishable from foreign statuary, which came I believe from a Dyke or vein of this stone, which there intersects the 4th Limestone Rock, Rep. i. 414.

83, l. 9, secondary rocks (6)*.—* In a note on page 45, I have already expressed a doubt, on the reality of such *strata* as are represented, No. 6, in fig. 1, plate I. and shall feel obliged to Mr. B. if he will particularly point out as many undoubted cases of the kind, as he can.

My next communication commences Mr. B's 4th Chapter, and shall be sent in due time.

I am, sir,

Your obedient servant,

Upper Crown-street, Westminster,
26th July, 1813.

JOHN FAREY Sen.

XLIV. On Electricity. By Mr. GEORGE JOHN SINGER,
Lecturer on Chemical and Experimental Philosophy.

THE phænomena observed in an experiment detailed in the last number of this Magazine*, as indicative of a double

* Page 161.