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JOURNAL OF
THE TRANSACTIONS
OF
The Victoria Institute,
OR
Philosophical Society of Great Britain.

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JOURNAL OF THE TRANSACTIONS

OF THE

VICTORIA INSTITUTE,

OR

PHILOSOPHICAL SOCIETY OF GREAT BRITAIN.

ORDINARY MEETING, MARCH 20, 1876.

VICE-ADMIRAL E. G. FISHBOURNE, C.B., R.N., IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed, and the following elections were announced :—

MEMBERS :—Captain C. E. Foot, R.N. ; Mrs. Corsbie, London.

ASSOCIATES :—Rev. J. Dawson, B.A., Cantab., Darley Abbey ; Rev. R. Green, Liverpool ; Rev. N. K. McLeod, L. Th., Ellon, Aberdeen.

Also the presentation of the following Works to the Library :—

“American Philosophical Society’s Journal,” Part 95. *From the Society.*

“Philosophy of Art.” By Professor Morris. *The Author.*

Two smaller works, presented by Rev. R. Gordon and W. H. Ince, Esq.

The following paper was then read by HENRY MICHELL WHITLEY, F.G.S.

*A CRITICAL EXAMINATION OF THE FLINTS FROM
BRIXHAM CAVERN, SAID TO BE “KNIVES” *
AND “HUMAN IMPLEMENTS.” †* By N. WHITLEY,
C.E., Honorary Secretary of the Royal Institution of
Cornwall.

SO far back as July, 1858, the exploration of Brixham Cavern was commenced by a committee, under the auspices of the Royal and Geological Societies of London, of which

* *Antiquity of Man*, 1st ed., pp. 100, 101.

† *Transactions of Devon Association*, vol. vi. p. 828.

Dr. Falconer, F.R.S., was the Chairman and Secretary, and Mr. Prestwich, F.R.S., the Treasurer. A local sub-committee was "deputed by the London Committee to co-operate with them, and superintend the actual working of the cave. It is, however, to Mr. Pengelly that the Committee are indebted for the active and constant superintendence of the work, and for the record of each day's proceedings. This gentleman, in fact, saw personally to the execution of the whole work, noted all the physical features, and arranged and tabulated all the specimens found in the cave, devoting to the investigation an amount of care and time without which it would have been impossible for the London Committee to have obtained the exact record which is now submitted to the Society."* The work proceeded with such celerity that it was completed within twelve months, and Mr. Pengelly then "forwarded to the Geological Society of London all the flint implements and the remains of animals which had been found, together with a considerable number of typical specimens of the stalagmite, as well as samples of the beds of mechanical origin, and a register briefly descriptive of the whole."† It was not, however, until May 16th, 1872, that the report of the Committee was presented to the Royal Society; nor until the latter part of 1874 that the exhumed flints were deposited for public inspection at the Christy Museum, London, in accordance with the stipulation on which £200 of the Royal donation was given by the Society towards the expense of the exploration.

Thus for fifteen years the relics from the cavern were not accessible to outsiders, and during that long period these rubble pieces of shattered flint were persistently described as flint knives, relics of man, and manufactured tools. The haste with which this opinion had been adopted, and the zeal by which it was propagated, presents a remarkable contrast to the long delay in the issue of the final report.

On the 9th of September, 1858, a preliminary report was sent to the London Committee, signed by "H. Falconer, M.D., Andrew Ramsay, and Wm. Pengelly"; in which they state that "one result of great interest has already been brought out, namely, the superposition of undoubted remains of the reindeer above the so-called 'flint knives'; from which the inference arises that the reindeer continued to be an inhabitant of Britain after the appearance of man in this island."‡

* *Transactions of Royal Society*, vol. clxii. p. 475.

† *Transactions of Devon Association*, vol. vi. p. 776.

‡ *Transactions of Royal Society*, vol. clxiii. p. 478.

In the same September, at the Leeds meeting of the British Association, Mr. Pengelly, F.R.S., read a paper on the results which had been obtained, and stated, "that in the new cavern flint implements had been found under an unbroken floor of stalagmite, deep in the cave-earth, and mingled with the remains of the ordinary extinct cave-mammals."*

Again, in the following year, Sir Charles Lyell brought the evidence obtained from this cavern before the meeting of the British Association at Aberdeen, in reference to its bearing on the high antiquity of man; and from that early date, down to the issue of the final report of the Royal Society in 1874, the flints from Brixham Cavern have been constantly referred to, as furnishing incontestable evidence of the contemporaneous existence of man with the extinct mammalia of the Drift period; but let it be observed that during these fifteen years the flints themselves were never produced, never even described in detail, or the nature of the evidence of their human manufacture made known; and if the exploration of Brixham Cavern (as it has been said) "produced an entire revolution of opinions on the antiquity of man"; † such opinion was founded on faith, and not on sight.

On the 2nd of October, 1874, I visited the cavern and found a glass case within the entrance, in which some relics from the cave were placed, and shown to visitors by the proprietor; among other things were some plaster casts of a very perfect and large flint flake, $3\frac{3}{4}$ inches long, and well adapted to be used as a knife. I was told by the proprietor that these casts were models of one of the "flint-knives" found in the cavern, and deposited with the Geological Society of London. The case also contained the cast of a stone axe of a neolithic form. I purchased three of the casts of the knife, and one of the axe. My suspicions of the genuineness of these things were aroused, and afterwards confirmed, by comparing the cast of the flake with the description of the flints given in the report of the Royal Society. On the 21st of November, 1874, I forwarded one of the casts, and the model of the axe, to the Secretaries of the Royal Society, and ventured in a letter to entreat the Council to put an end to this deception of the public, by depositing the real flints in the British Museum, as stipulated by the engagement entered into so far back as 1858. The casts were laid before the Council, and Professor Huxley was directed

* *Quarterly Journal of Science*, April, 1874, p. 144.

† *Journal of the London Institution*, January, 1873, p. 5. See also Lyell's *Antiquity of Man*, p. 96, 1st ed.

to inform me that the relics had been deposited in the Christy Museum. I lost no time in going to inspect them, and in order to give a more perfect knowledge of these famous flints; and having obtained permission to have a photograph of them taken, I requested Messrs. Mansell & Co. (who had before produced such perfect photographs of the antiquities in the British Museum) to do this for me. Three negatives were taken, one as near as could be to the natural size of the flints, the others of a size suited to the page of the journal of this Society, a photograph from which forms the frontispiece to this paper. A scale of inches was photographed with the flints, in order that they might be accurately measured; and with the aid of a lens their most minute features and fractures can be examined. The flints now speak for themselves.*

In a former paper on this subject I described the cavern and its geological surroundings, and showed that similar shattered flints and gravel to those within the cave were found in the adjoining soil of Windmill Hill above it; and I inferred, that the so-called flint-knives were only subsoil flakes, washed into the cavern with the gravel and loam in which they were found.†

In this supplemental paper I purpose to examine the claim of the flints to be implements made and used by man, and critically to investigate the evidence which has been brought forward in support of such claim.

An inspection of the photograph will show that fully one-half of the flints are undefinable pieces of broken flint, no larger than the tip of a man's finger; they are neither flakes, nor cores, nor scrapers—they are without any regularity of form, and show no evidence of design, and are unlike any implements known to have been made by man. To call these bits of rubble flint implements, undistinguishable as they are from the gravel which we tread on in a footpath, seems to be an abandonment of common sense; and without any confirmatory evidence to rely on, the judgment revolts from the inference that they are manufactured tools.

There are, indeed, some very minute perfect flakes, which, notwithstanding their minuteness, are still said to be implements, and so small that Mr. Evans considers that they must have been severed from the core by the use of a punch, yet he

* The full-size photograph may be inspected at the rooms of the Victoria Institute, or obtained from Messrs. Mansell & Co., Oxford Street.

† *Journal of Victoria Institute*, vol. viii. p. 217.

finds it difficult to suggest to what use they could have been applied.* The imagination of Professor Nilsson, however, masters this difficulty; he says: "The very small specimens which are sometimes to be met with, resembling the large ones in everything but their size, and which have likewise been regarded as symbols, if they were not ornaments, were perhaps made for boys, to give them an early training in the use of arms."† Mr. Evans adopts the same opinion; of the American stone implements he says: "They were made of various sizes, the smaller for boys, and those for men varying in accordance with the purpose to which they were to be applied."‡ And these bald assertions, these childish trivialities, are now received as the deductions of high science in support of high antiquity.

But, again; some four or five of the other flints are simply pebbles, or water-worn pieces of broken flint, such as might be picked up on a beach, or from the newly-spread metalling of a road; and most men of intelligence who (to use the words of Dr. Carpenter) "have that trained and organized common sense which we call scientific method," would reject the conclusion that they are human implements.

The remainder of these cavern flints are flakes and splinters of flint; the flakes are few, fragmentary, and most imperfect in size and form, and as knives far inferior to some of the sub-soil flakes, the natural origin of which I have shown in a former paper, where I have adduced good evidence to prove that such flakes have had a geological and not an antiquarian origin—that a flake is the result of the natural fracture of the flint, and that a nodule of flint mechanically crushed by a stone-breaker produces as perfect flakes as are now referred to human workmanship.

In addition to this evidence before produced, of the natural formation of the flakes, I am now enabled to show that change of temperature will split flints, and other silicious minerals having a similar fracture, into flakes, knives, and scrapers.

The black slag from the tin and iron smelting-works of Cornwall is a coarse kind of obsidian; rejected from the works at a high temperature, it breaks with a decided conchoidal fracture in the act of cooling into fragments, from which flakes and spear-points may be selected, in every respect resembling the so-called flint implements of the caverns; and the perfec-

* *Ancient Stone Implements*, p. 249.

† *Nilsson on the Stone Age*, p. 99. 1868.

‡ *Ancient Stone Implements*, p. 362. 1872.

tion of the fracture and form of the flake is proportionate to the silicious purity of the slag.

It is most convincing to observe the whole process of the formation of such flakes at Seend, near Devizes. Here the iron is smelted out of the native rock in blast-furnaces by intense heat, and the molten slag is poured into iron caldrons, and tipped from the tram-waggon to the refuse-heaps; the external surface of the mass is first cooled by contact with the caldron, and converted into a kind of artificial obsidian; and, during the further act of cooling, most delicate, semi-transparent films are formed on the surface of the slag, and fall from its sides or come down in a shower by the slightest touch of a walking-stick; and from these most beautifully tinted and delicate flakes of knife-like forms and sharp cutting edges may be picked out.

It is further satisfactory to learn from a late number of the *Journal of the Geological Society*, that Mr. John Milne, F.G.S., is of opinion that the shattered flints on the surface of the desert of the Tih have been split by change of temperature. Describing his journey from Akaba to Suez over the plateau of the Tih, he says: "After passing Jebel Duppa the ranges on the right, growing higher, show a more definite character as compared with those upon the left. Whilst the latter remain horizontal, the former are almost turned on end, dipping at an angle of 45° to the north. They consist of limestones, which are whitish at their base and yellowish near their summit. With them there are bands of flint, which, being tilted up with the rock in which they are stratified, stand up along the ridges of the hills, forming low parallel walls to hollow troughs. Numerous angular and apparently freshly-broken fragments of these flints are strewn over the plain below, apparently broken by the more or less sudden expansion and contraction occasioned by the great variations in temperature, this action being probably aided by a jointed structure in the flint at the time of its removal from the limestone. That there are such variations in temperature may be inferred from the fact that many nights when we were in the desert the thermometer sank below zero, and shrubs and other objects were in the morning covered with a thick coating of hoar-frost; this low temperature being invariably followed shortly after sunrise by a heat that readily scorched and peeled the skin from the face.

"In addition to this it may be mentioned that several rounded and apparently whole flakes were seen, which, on being touched, fell to pieces, showing them to have been broken by

some force that had not been violent in its action, but had simply divided them and not scattered the fragments.

“Materials being in this way continually supplied from a mountain, then being broken by the sun and afterwards buried in the sand, may perhaps give a clue to the origin of certain breccias.”*

These suggestive observations lead us to notice the instructive fact, that these sharp splinters of flint are found in great abundance on the surface of uninhabited and uninhabitable deserts, and are but rarely found in the rich alluvial valleys which have been the birthplace of ancient nations. They occur on the Great Sahara,† on the Libyan desert,‡ on the sterile terraces and slopes which border the Nile, but not on its rich alluvial soil;§ they are most abundant in the stony valleys of the Sinaitic peninsula,|| and on the desert of the Tih;¶ they are embedded in cliff breccias on the death-stricken shores of the Dead Sea,** and scattered over the central ridge of Syria, and they so abound on the surface of that great and terrible desert between the Jordan and the Euphrates as to have given it the name of the “Desert of Flints.”††

Tradition, history, and the necessities of the case all agree in their testimony that the rich alluvial valleys of the Euphrates and the Nile were the cradle in which the human family was nursed in its infancy; but on their fertile soils no relics of palæolithic man have been found. According to modern theories of his origin, he came to the very verge of fertility, and beheld a Paradise before him replete with all the necessaries and luxuries of savage life, and then turned back into the desert to manufacture flint implements, where there was no soil to cultivate, and no animal food to sustain life. That these sterile deserts could have supported a population sufficiently large to have made the innumerable so-called implements is as false in fact as it is wild in theory.

With all this mass of evidence in support of the natural formation of the flakes, to persist in calling these pieces of rubble flint and fragmentary flakes from Brixham Cavern, “thirty-six rude flint implements of indisputable human workmanship,” and that not only without evidence, but against evidence, is a delusion, a deception, and a snare.

* *Journal of the Geological Society*, vol. xxxi. p. 26. † Canon Tristram.

‡ *Journal of the Anthropological Institute*, vol. iv. p. 360.

§ *Ibid.*, vol. iv. p. 215.

|| See specimens in the Museum of Practical Geology.

¶ *Journal of the Geological Society*, vol. xxxi. p. 26.

** Lynch's *Survey*, p. 274, and Tristram's *Travels in Palestine*, p. 253.

†† *Bible Atlas*, plate 2. Society for Promoting Christian Knowledge.

The “*round-pointed lanceolate implement*” (so named by Mr. Evans) found in the cavern has a curious history. It is formed of two pieces of flint, discovered some distance apart, and fitting so completely together as to show that they are parts of the same stone; it is, however, yet incomplete as an implement, and the part required to perfect the form is assumed to be lost. The butt end appears to have been, in the first place, described by Sir C. Lyell as a “core from which flint flakes had been struck off on every side”;* leading to the inference that the flake knives had been made in the cavern. But this flint does not appear in the report as a rejected core, but as the most important part of a lance-head; the metamorphose being in this manner completed, it is now said to “resemble one type of the pointed instruments from the valley gravels.”† The claim of such rough flints to be implements I have examined in a former paper.‡

The “*remarkably symmetrical scraper*.” This flint is figured by Mr. Evans, said to have been found in the cavern, and described as having been “dexterously trimmed into a horseshoe form,” and “well adapted to have been held in the hand.”§ It has, however, one blot on its evidence as a witness in this case,—*it was not found in the cavern*;|| nor is it now with the flints placed in the Museum. Of this flint Mr. Pengelly says: “The following is the history, or rather so much of it as is known to me, of the specimen in question:—After finding flint tools in the cavern, search was made from time to time, on various parts of the hill, especially when and where the surface was in progress of being broken up, for the purpose of ascertaining whether any such specimens were to be met with there as well as within the cavern. This search being by no means fruitless, I sent one of the specimens thus met with to the Cavern Committee, and with it the following statement:—No. 134, June 3rd, 1859, found on Windmill Hill, about 44 feet above the cavern level, in a thin layer of gravel lying beneath the soil and on the limestone rock, one flint. A sample of the gravel in which it was found was also forwarded.”¶

This important statement, first made public in July, 1874, excludes this symmetrical flint from the cavern specimens. It also confirms the statement which I had previously made, that

* *Antiquity of Man*, 1st ed., p. 100.

† *Ancient Stone Implements*, p. 469.

‡ “The Palæolithic Age Examined.” *Transactions of Victoria Institute*, vol. viii. p. 14.

§ *Ancient Stone Implements*, p. 470.

|| *Transactions of Royal Society*, vol. clxiii. p. 551. See foot-note.

¶ *Transactions of Devon Association*, vol. vi. p. 835.

shattered flints were found in the soil outside and above the cavern, as well as within it; and it justified my complaint, that this significant fact, indicative of the geological origin of the flints, had "been either overlooked or ignored,"*—and it further tends greatly to confirm the opinion which I had expressed, that the cavern flints were subsoil flakes washed into the fissure with the gravel and loam in which they were embedded.

The *evidence of work and use on the cavern flints*. Mr. Prestwich, in the report to the Royal Society, expresses his opinion that fifteen of the flints show unmistakable evidence of having been artificially worked; that on nine others the workmanship is very rude or doubtful; while there are seven which he thinks show no trace of having been worked at all.†

Mr. Pengelly, in his early, more cautious, and most valuable report, appears not to have been aware that any such evidence of use had then been found on the flints. He says, indeed, "that one of the ends of the solitary bone (No. 59), found on the surface in the west chamber, had been cut off, apparently, with some sharp instrument"; ‡ but Mr. Busk has identified this relic as being the rib of a sheep (a neolithic animal) sawn across—and a recent bone.§

Mr. Evans, however, concludes his account of the cavern with this remarkable statement:—"Most of the implements prove not only to have been made by man, but to have been actually in use before becoming embedded in the cave-loam; while, from *the whole of the flints discovered* presenting these signs of human workmanship or use upon them, it is evident that their presence in the cave must in some measure be due to human agency, though they were probably deposited by means of water in the position in which they were found."|| Agreeing with the latter clause, and accepting the acknowledgment that the flints were probably washed into the cavern, which is a part of my case, I utterly deny that any such marks of workmanship or use can be shown to exist on the cavern flints.

It is true that many pages descriptive of Brixham and Kent's Caverns in *Ancient Stone Implements* are loaded with language indicating workmanship or marks of use on the flints; but then these reiterated and constantly recurring phrases, so confidently asserted, are only words, which require not assertion, but proof;

* *Transactions of Victoria Institute*, vol. viii. p. 216.

† *Report*, pp. 561-2.

‡ *Transactions of Devon Association*, vol. vi. p. 818.

§ *Transactions of Royal Society*, vol. clxiii. p. 502.

|| *viz: Stone Implements*, p. 471.

and that clearly is a point which can only be decided by a minute and careful inspection of the flints themselves. Now that Mr. Evans has given us engraved representations of these marks of use, we are for the first time in a position to apply this crucial test, by which the evidence of these flints to the antiquity of man must either be confirmed or rejected.

Figure No. 410 in *Ancient Stone Implements* has these marks of use the most pronounced, and they appear at the first glance very indicative of human workmanship; by the aid of a lens it will be seen that a succession of regular and minute scallops, with sharp points at their junctions, are shown on both sides of the *engraving* of this flint, and they are more distinctly exhibited in the side view of the same. They are throughout similar in size and form, and are so regular that they look like the links of a delicate chain traced along the edge of the flint; and most persons, from this pictorial representation, would be inclined to accept the statement that this flint at least had been trimmed by secondary chipping on its edges. On examining the photograph in a strong light and in the same manner, we are surprised to find that no such minute trimming or secondary chipping as that shown in the drawing can be found on the edges of this flint. The rough fractures on the surface run boldly out to the edges, the minute chipping shown on the edges of the flint in the engraving wholly disappears, the sharp angular points of the scallops cannot be found; and we must come to the conclusion that while the drawing in general outline and artistic merit is admirably done, and fully justifies the compliment paid to the skill of the engraver in the preface, yet, in the vital point of secondary trimming indicative of workmanship, it is wholly and entirely untrue.* It is worthy of remark, also, that it is said of this flint, that "some parts" only of the cutting edge "present appearances of wear by use,"† while of others, which are not figured, it is said, "most of them bear *decided marks* either on their sides or ends of having been in use as scraping tools";‡ leading to the inference that this evidence of use or secondary

* In the cause of truth it is much to be regretted that the woodcut of this flint has been reproduced in the *Transactions of the Royal Society* (see the *Report*, p. 551, at foot). The electrotype was also lent to Mr. Pengelly, to illustrate his report on Brixham Cavern in the *Transactions of the Devon Association for the Advancement of Science*, vol. vi. p. 832. Thus, a large number of scientific men, members of these societies, who probably have not seen the original flints, will see this representation of evidence, which has no existence in fact.

† *Ancient Stone Implements*, p. 469.

‡ *Ibid.*, p. 471.

chipping is more full developed on the other flints found in the Cavern. Clearly this is not so; examine the most typical flake of the few on the board, that at the extreme left corner of the second row from the top, and it will be seen that the three facets on its right side run completely out to the edge of the flake, and are untouched by secondary chipping. The edges of this flake must have been very delicate and sharp when it was first severed from the natural nodule; they are in a few places slightly indented and jagged, but this must have occurred if it had been carried onward with other stones, and battered in a mountain stream; yet these minute notches, and the slightly water-worn butt end, are said to be indications of use and wear. I have fully met and examined this kind of evidence in my former paper.*

I may, however, observe here that the effect of cutting or scraping ordinary substances with a sharp stone would obviously be to round and smooth the edge rather than to jag it; and, in fact, Mr. Evans gives us numerous instances of this undoubted evidence of wear by use: he says: "Among some hundreds of scrapers, principally from the Yorkshire Wolds, I have met with between twenty and thirty which show decided marks of being worn away along the circular edge by friction. In some, the edge is only worn away sufficiently to remove all keenness or asperity, and to make it feel smooth to the touch, and this perhaps along one part only of the arc; in others the whole edge is completely rounded, and many of the small facets by which it was originally surrounded entirely effaced."†

With regard to the evidence of human manufacture which flint-knives should present, Sir Charles Lyell quotes Mr. Evans, who says "that there is a uniformity of shape, a correctness of outline, and a sharpness about the cutting edges and points, which cannot be due to anything but design."‡ We desire no better rule than this by which to test the claims of the whole of these Brixham flints to be implements and knives. It is obvious from the general view which the photograph gives, that the flints present no such uniformity of shape, no such correctness of outline, or sharpness about the cutting edges and points, as would, in accordance with this test, justify the inference that fifteen flints selected from the whole can be said to be manufactured knives.

* *Transactions Victoria Institute*, vol. viii. p. 220.

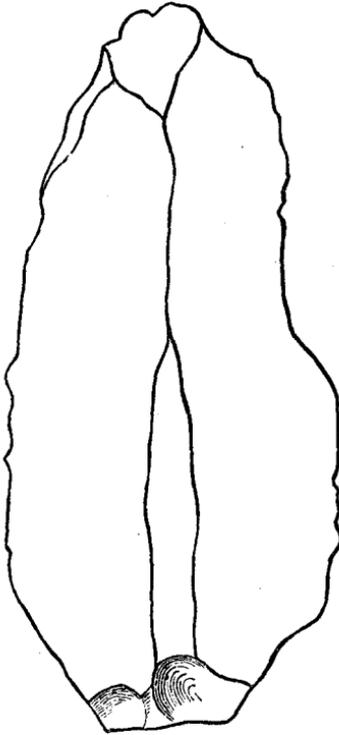
† *Ancient Stone Implements*, pp. 279, 280.

‡ *Antiquity of Man*, 1st ed., p. 117.

Mistaken Identity.—One of the so-called thirty-six implements—No. 3 in Table IV. of the Report—has since been

found to be “merely a fragment of slate, nearly covered on one side with stalagmite.”* But this slight mistake of a piece of slate for a flint implement is happily balanced by an opposite error, by which a piece of flint has been mistaken for a bone, and described as “a fine small tibia”;† and the care with which the examination had been made is indicated by the animal to which it belonged not being determined, a note of interrogation being put to show that there was doubt on that point.

The Plaster Cast of a Flint-knife.—I have before stated that I purchased in the cavern, in 1874, three casts of a very perfect flint-knife, said to have been moulded from one of the knives found in the cavern. That such spurious articles had before been so represented, and sold to visitors, is now confirmed by the testimony of Mr. T. K. Callard, F.G.S., who purchased one of the casts several years ago, believing it to be, as he was informed, a model of one of the knives found in the cavern.‡ The subject was brought before the British Association for the Advancement of Science at Bristol, in 1875, and the whole



Outline and Cross Section of the Plaster Cast. — Natural Size.

history of these spurious casts made known. It is sufficient for my present purpose that it was then acknowledged that the

* The *Report*, p. 562—a foot-note.

† *Ibid.*, p. 506, No. cxvi. in table.

‡ See p. 35 of a most valuable essay by Mr. Callard, *The Geological Evidences of the Antiquity of Man Reconsidered*. (E. Stock, 62, Paternoster-row).

flint from which the casts were taken *was not found in Brixham Cavern*, but in a barrow in the north of Ireland, and was lent to the owner of the cavern in 1860, with a stipulation that he would engage to state, whenever the cast was exhibited, that it was not a cast of one of the flints found in the cavern.* Thus for the past fifteen years this cast of what was probably a Celtic flake-knife of most perfect form and size, has been placed amongst some of the bones of the extinct mammals and other relics exhibited in the cavern, and no doubt has been seen by numerous visitors without any account of its origin being given, and most probably also sold to a considerable number without the stipulated explanation. It is therefore not surprising that the evidence of the "flint-knives" should have been so generally received as a satisfactory proof of the co-existence of man with the extinct mammalia.

The Duke of Argyll having expressed the opinion "that a whole group or fauna of great quadrupeds have utterly perished since man appeared," adds, "I know no better example of the evidence to this effect than one which is very easily accessible in our own country. We have only to go down to the pleasant shores of Devon, and in one of the pleasantest spots upon those shores, the south-western promontory of Torbay, overhanging the little harbour of Brixham, where two hundred years ago William of Orange landed, there is a steep limestone hill, at the foot and on the face of which the houses of the town are built. Close to the summit, a few years ago, a cavernous hollow was discovered. . . . in this cave the works of man, flint arrow-heads and knives, were found, along with the bones of the elephant, the rhinoceros, the bear, the hyæna, and the reindeer."† If the Duke is correct in this, that no better evidence than that of Brixham Cavern can be adduced to prove the antiquity of man, then Palæolithic man is doomed—

"And, like a demon of the night,
Will pass and vanish from our sight."

Thus much for the flints themselves. I proceed to examine the additional evidence which has been put forward of the indications of man's presence in the cave, by which the claim of the flints to be implements has been bolstered up.

The Ivory Rod.—We are informed by Mr. Evans, "that a portion of a cylindrical pin or rod of ivory was found in the cave, being the only object wrought from an animal sub-

* *Western Daily Press*, August 28, 1875. † *Primæval Man*, pp. 116-8.

stance.”* An ivory rod was found with the “red lady” in Paviland’s cave by Dr. Buckland, and “a cylindrical piece of ivory about $\frac{3}{8}$ inch in diameter was found in a cavern in the south of France, and is now in the Christy Collection.”† In former days a rod was an emblem of authority and power; therefore, we are led to infer, without much effort of the imagination, that the ivory rod of Brixham might have been the sceptre of a Palæolithic prince, or the “baton of command” of an ancient chieftain; and as no doubt can be cast on the human origin of such a relic, it must, if verified, be the most important piece of evidence produced from the cavern. We are, however, left in complete ignorance of all the vital points of the case; we are not told by whom it was found, or when, or where. Mr. Prestwich mentions it in the report to the Royal Society, and dismisses it with one sentence: “the position of this is not certain.”‡ Mr. Pengelly says: “I have no recollection of this specimen. . . . I am inclined to suspect that it does not belong to the cavern series of specimens. It may, I believe, be safely stated that every object forwarded to the Committee was numbered by myself, and that its position was duly recorded in the register.”§ It is not placed amongst the relics in the Christy Museum; and Mr. Philp, the proprietor of the cavern, writes to me: “As to the ivory rod you ask me about, I am sure I never saw it, neither do I know anything about it.” In this matter, Mr. Evans has probably been imposed on, but he should either confirm or withdraw this mythic wand.

A Cut Bone.—We are informed in the Report to the Royal Society, that “Dr. Falconer alludes to part of a reindeer’s horn which has an apparently artificial incision”;|| but we are told in a foot-note “that Mr. Busk sees reason to question this conclusion (see page 537).” On referring to that part of the Report prepared by Mr. Busk, we find that this scratch was not on the horn of a reindeer, but on the rib of a bear; and is thus described: “On one of the ribs is a small notch, which Dr. Falconer observes might have been made by means of a flint or stone implement. Of course this may be so; but upon close inspection I am inclined to think that it is not an incision or scratch at all, but a mere indentation by some blunt edge, which has simply depressed the soft texture of the bone without breaking the surface. The bottom and sides, therefore, of this very trifling mark appear rounded, smooth, and under a magni-

* *Ancient Stone Implements*, p. 471.

† *Ibid.*

‡ *Transactions of the Royal Society*, vol. clxiii. p. 564.

§ *Transactions of the Devon Association*, vol. vi. p. 636. || *Report*, p. 564.

fyng glass, exactly like the surrounding surface; but the appearance of antiquity which would thence attach to the indentation, were it really an incision, may, as it seems to me, be readily explained on the presumption of its being merely an accidental impression.* Thus the artificial incision on the horn of a reindeer turns out to be an accidental impression on the rib of a bear.

A nearly round pebble of silicious sandstone about the size of a cricket-ball was found in the gravel-bed below the bone-earth. It is said to bear distinct marks of having been used as a hammer-stone. Mr. Prestwich considers that it is a Budleigh-Salterton pebble, that "it seems to have been brought from a distance, and could not have been introduced by natural causes into the cave." † Mr. Pengelly describes it as "composed of very compact grit, approaching to quartzite," ‡ and adds, "that a drab pebble of fine-grained grit or quartzite was found in Kent's Cavern, and bore no indications of having been used as a hammer-stone, and that such stones are somewhat common on all the raised beaches of Devonshire." † That Budleigh-Salterton pebbles are found in raised beaches, and have been drifted great distances, we learn from Mr. Prestwich himself in his excellent paper on the *Quaternary Phenomena in the Isle of Portland*. § And when we consider that these pebbles are derived from Silurian strata, and must have been drifted eastward from the ancient rocks of South Devon or Cornwall; || that they are found in the drift gravels of South-eastern Devonshire, scattered over the surface of the land from the bottoms of the valleys, up the slopes to the summits of the hills; ¶ and that in this case the pebble is actually embedded in drifted gravel, precisely similar to that of the neighbouring raised beaches; ** it is difficult to come to any other conclusion than that it had been introduced into the cavern by natural causes, and battered, no doubt, by a thousand storms.

"*The Charcoal Bed*."—Mr. Bristow, in his notes on his survey of the cavern, tells us that "for some distance from the entrance (33 to 34 feet) a dark-coloured deposit rests upon the bed just noticed (the cave-earth); it is composed of small angular fragments of limestone, with a white powder embedded in a brown, loamy base. From the circumstance of its being

* *Report*, p. 537.

† *Ibid.*, p. 564.

‡ *Devon Association Transactions*, vol. vi. p. 803.

§ *Journal of Geological Society*, No. cxxi. p. 44.

¶ *Ibid.*

** *Denudation of Rocks in Devonshire*, by W. Pengelly, F.R.S., p. 19.

** *Report on Briham Cavern*. Notes by Mr. Bristow, p. 496.

darkly stained with carbonaceous matter (apparently), the name 'charcoal bed' has been conferred upon it; its thickness is very variable.* Dr. Percy, however, who saw it *in situ*, stated "that it did not contain anything entitling it to this appellation." †

I have now noticed all "the slight indications of man's presence" ‡ mentioned in the Report, in addition to the so-called flint implements; and there is none of them which can be relied on as witnesses to give any support to the evidence of the flints; these stand alone, and in the expressive language of Mr. Prestwich are "without any corroborative adjuncts." §

Yet the language of the Report still shows a desire to lean on these miscalled "slight indications of man's presence," where it is said, "But although the evidence, taken altogether, sufficiently indicates the existence of man at the Cave period, we doubt whether Brixham Cave was at any time inhabited by man." ||

It is often insisted on by our law judges in summing-up cases of doubtful evidence, that however minute and apparently inconclusive detached facts may be in themselves, if they dovetail into each other as to time and place, and thus tend to form one harmonious and complete whole, then they greatly strengthen any hypothetical case. But if they are found to be irreconcilable with each other, and most of them false, in fact, then the aggregate adds no strength whatever to the cause which they are adduced to support; but that this casting about for additional and defective evidence is rather an indication of the inherent weakness which requires such support.

The Animal Remains.—The large number of bones of all kinds found in the cavern were very unequally distributed in the different beds. The remains also of the extinct and recent animals were often mingled together in the greatest confusion, and comparatively modern bones were mixed with others, presenting all the characters of the most remote antiquity. ¶ The whole group of animals also appear to belong to one geological period, as the remains of the mammoth, the bear, and the horse were found both in the lower gravel-bed and in the modern stalagmite.

The distribution of the bones and the flints in the various beds of the cavern is as follows:—

* *Philosophical Transactions*, vol. clxiii. p. 496.

† *Ibid.*, p. 486.

‡ *Ibid.*, p. 564.

§ *Ibid.*, p. 565.

|| *Ibid.*, p. 564.

¶ *Ibid.*, vol. lxiii., p. 493.

	Bones.	Flints.
In the stalagmite	25 ..	none
In the "charcoal beds" ..	52 ..	none
In the cave-earth.....	1,537 ..	20
In the gravel-bed.....	7 ..	16
	<hr/>	<hr/>
Total	1,621	36

Thus, 95 per cent. of all the bones were found in the cave-earth, and of these more than one-half lay on its surface.*

"In relation to its area the west chamber was the richest part of the cavern in the "flint implements," as well as in bones.†

"Excluding the more doubtful smaller animals, the list, as determined by Dr. Falconer and by Mr. Busk, of animal remains found in the Brixham Cave consists of: ‡—

		Number of determined specimens.
1. <i>Elephas primigenius</i> ...	Mammoth	11
2. <i>Rhinoceros tichorhinus</i>	Tichorine Rhinoceros	67
3. <i>Equus caballus</i>	Horse	30
4. <i>Bos primigenius?</i>	Great Fossil Ox } Small Fossil Ox }	28
5. — <i>longifrons?</i>		
6. <i>Cervus elaphus</i>	Great Red Deer ...	12
7. — <i>tarandus</i>	Reindeer	72
8. <i>Capreolus capreolus</i> ...	Roebuck	13
9. <i>Felis spelæa</i>	Cave-Lion or Tiger	9
10. <i>Hyæna spelæa</i>	Cave-Hyæna	57
11. <i>Ursus spelæus?</i>	Cave-Bear	354
12. — <i>arctos</i>	Brown Bear	
13. — <i>priscus s. frox</i>	Grisly Bear } }	
14. <i>Canis Vulpes</i>	Fox	15
15. <i>Lepus cuniculus</i>	Hare	2
16. <i>Lagomys spelæus</i>	Lemming	1

Some four or five of the animals in the above list are said to be extinct, the most important of which, indicative of antiquity, are the mammoth, the tichorine rhinoceros, and the cave-bear.

The bones of the bear exceed in number those of all the other mammals together,§ and they are found in all the beds of the

* *Philosophical Transactions*, vol. clxiii. p. 493.

† *Ibid.*, p. 495.

‡ *Ibid.*, p. 556.

§ *Ibid.*, p. 557.

cavern, from the surface of the stalagmite to and inclusive of the gravel-bed.* Mr. Busk appears not to have obtained any satisfactory evidence of the presence of the cave-bear; but, after an elaborate examination and measurement of the fossil molar teeth of the bear found in the cavern, he comes to the conclusion "that most of the Brixham teeth have altogether the facies of *U. priscus* (the grisly bear), and there is certainly none that can be referred to the cave-bear."† This decision is important, as two bones of bear were found two feet deep in the most ancient stratum, the gravel-bed of the cavern, leading to the inference that it was deposited during the geological age of the grisly bear, now living in North America, or of that of the common brown bear, which was abundant in England at the time of the Roman occupation, and is now an inhabitant of large districts in Europe.‡

It may, however, be readily admitted that there appears to be conclusive evidence that the large and fierce animals mentioned in the above table, at some distant period frequented the neighbourhood of the cave; but their existence, so far from indicating the presence of man, tends to show that it is improbable he could have lived surrounded with such companions. There is one famous specimen, that of the entire left hind-leg of a bear, which it is imperative to notice. It was first described by Dr. Falconer as "a superb specimen of the left hind-leg of the cave-bear, comprising the femur, tibia, and fibula folded together, with the patella and astragalus *in situ*." This description is embodied in the preliminary Report of the 9th of September, 1858, to the Royal Society; it has been adopted and amplified by Sir Charles Lyell in his *Antiquity of Man*, and is adduced by him to give a value to the evidence, and to stamp an antiquity on the "flint-knives" which it is admitted they do not in themselves possess. Sir Charles says of the flint-knives: "Neglecting the less perfect specimens, some of which were met with even in the lowest gravel, about fifteen knives recognised as artificially formed by the most experienced antiquaries, were taken from the bone-earth, and usually from near the bottom. Such knives, considered apart from the associated mammalia, afford in themselves no safe criterion of antiquity, as they might belong to any part of the age of stone, similar tools being sometimes met with in tumuli, posterior in date to the era of the introduction of

* *Transactions of the Devon Association*, vol. vi. p. 813.

† *Philosophical Transactions*, vol. clxiii. p. 546.

‡ *Popular Science Review*, vol. x. pp. 246-7, 8.

bronze. But the anteriority of those at Brixham to the extinct animals is demonstrated not only by the occurrence at one point in overlying stalagmite of the bone of a cave-bear, but also by the discovery at the same level in the bone-earth, and in close proximity to a very perfect flint tool, of the entire left hind-leg of a cave-bear." "Every bone was in its natural place; the femur, tibia, fibula, ankle-bone, or astragalus, all in juxtaposition. Even the patella, or detached bone of the knee-pan, was searched for, and not in vain." "If they were not all of contemporary date, it is clear from this case, and from the humerus of the *Ursus spelæus* (cave-bear) before cited as found in a floor of stalagmite, that the bear lived after the flint tools were manufactured, or, in other words, that man in this district preceded the cave-bear."*

The whole of this evidence in support of the high antiquity of man is destroyed by the single fact that neither the humerus in the stalagmite, nor the leg of the bear in the bone-earth, can be identified as belonging to the extinct cave-bear. The latter famous specimen, we are now told by Mr. Pengelly, is "probably that of *Ursus arctos*,"† the common brown bear which lived in England in post-Roman times, and still inhabits central Europe.

But, further, this whole statement, so fully set out and insisted on by Sir C. Lyell in the first edition of his *Antiquity of Man*, is now found to be loaded with erroneous and mistaken facts. Thus, the bone described as the fibula proves to be the radius; and that said to be the patella is, in reality, the detached end of the radius above noticed; the "flint tool" was not in close proximity to the bear's leg, but twelve feet from it; the tool was not at the same level in the bone-earth as the leg, but fifteen inches above it;‡ and if the age of the so-called knives must be inferred from the associated mammalia, then (on the assumption that they are knives) they may have belonged to neolithic or even to historic times.

It is curious that this hind-leg of the bear, the most famous specimen of the cavern, does not appear to have been recorded in the register;§ and the flint so prominently associated with it, and said to be the best-formed implement in the series, we are now told was accidentally broken after its exhumation; and has, "unfortunately, been mislaid."||

* *Antiquity of Man*, 1st ed., pp. 100, 101.

† *Transactions of the Devon Association*, vol. vi. p. 826.

‡ *Philosophical Transactions*, vol. clxiii., p. 534.

§ *The Report*, p. 533.

|| *Transactions of the Devon Association*, vol. vi. pp. 830, 831.

Considering the large number of errors which thus cluster round this once-important specimen, it is not surprising to find that, in the fourth edition of the *Antiquity of Man*, the whole of the evidence founded on it, and indeed on the *very presence of the cave-bear*, is wholly omitted; the antler of the reindeer found on the surface of the stalagmite taking the vacant place; and the result of the exploration of this famous cavern, which Mr. Pengelly more than once has told us, "revolutionized the scientific world on the question of human antiquity,"* has now been toned down by Sir Charles Lyell to the more moderate conclusion that man in Devon preceded the reindeer.†

In conclusion, I may be permitted to say that I have undertaken the examination of such of the relics from this cavern as are said to indicate the presence of man, with a strong desire to ascertain the facts of the case, and to understand and test the evidence which they are said to furnish in support of the high antiquity of man. To this end I have explored and mapped the cavern, examined the remaining portions of its beds, surveyed the geological structure of the land around, and inspected the materials contained in the so-called raised beaches of the neighbourhood, and the character of the pebbles of the present shore-line; and I have further carefully studied the somewhat voluminous literature of the cavern evidence. I therefore vouch for the substantial accuracy of the facts put forward in this paper, which, if they cannot be met and rebutted, reduce the evidence in support of the presence of man in this cavern to a minimum of contention; that is, Do the flints show secondary chippings indicative of design, or evidence of use on their edges, so confidently contended for by Mr. Evans, and shown on the engraved flint, No. 410 in *Ancient Stone Implements*? I am content to rest my whole case on this one point; and it may now be determined by any one who will examine the flints in the Christy Museum or their photograph contained in this paper.

I am aware of the weight of authority which must be attached to the high names whose opinions I have here combated, but I have at least this vantage-ground, that I stand on well-ascertained facts, and on these alone; and dogmatic assertions can no longer be considered a reply to the inexorable logic of facts, the only certain foundation on which to build scientific truth.

I have now shown that the so-called "thirty-six rude flint

* *Transactions of the Devon Association*, vol. iv. p. 73; and *Journal of the London Institution*, Jan. 1873, p. 5.

† *Antiquity of Man*, 4th ed., p. 102.

implements, of indisputable human workmanship,** are, for the greatest part, small undefinable pieces of rubble flint, mixed with a few imperfect subsoil flakes.

That the marks of use, on secondary chipping, so strongly asserted to be found on the edges of the flints, and so clearly shown on the woodcut, fig. 410 in *Ancient Stone Implements*,† are not to be found on the flint itself.

That the flint described in *Ancient Stone Implements* as a remarkably symmetrical scraper, and said to be found in the cavern,‡ was not found there, but in the soil without and above it.

That the cast of a very perfect flint-knife exhibited among other relics in the cavern, and sold to visitors as a cast of a cavern specimen, is a deception.

That the portion of a cylindrical pin or rod of ivory, said to be found in the cave,§ was not found by the committee of exploration, is not now with the flints in the museum, and that there is no evidence to show that it is a cavern specimen.

That the "charcoal bed" contains no charcoal.|| That slate has been mistaken for flint, and flint for bone; and that the description given of the "whole hind-leg of a cave-bear," the most famous specimen of the cavern, has been found to be so loaded with erroneous facts and false conclusions, that its evidence has been withdrawn and abandoned.

The carefully-prepared report of the Royal Society¶ does, indeed, correct many of the mistakes which had been made; and we are indebted to Mr. Pengelly for further corrections and admissions, by the publication of his original report, drawn up in 1862 for the Cavern Committee,** with some recent additions. But these statements, buried in the transactions of learned societies, are not accessible to the great mass of people who receive their information from popular lectures and cheap publications; and thus Brixham Cavern is still referred to as furnishing the best evidence of the high antiquity of man.

If the facts which I have brought forward in this paper are true and undeniable, as I believe them to be, then we have a right to ask those by whom we have been misled to reconsider the evidence in this case; and either openly and honestly to

* *Cave Hunting*, p. 320.

† *Ancient Stone Implements*, p. 469. ‡ *Ibid.*, p. 470. § *Ibid.*, p. 471.

|| *Transactions of the Devon Association for the Advancement of Science*, vol. vi., p. 800.

¶ *Philosophical Transactions*, vol. clxiii. for 1873.

** *Transactions of the Devon Association for the Advancement of Science*, vol. vi. p. 779.

retreat from a false position, or to fortify and hold it by such additional evidence as they can produce; and if this be not done, we may safely infer that the conclusion of my former paper is established, "that this cavern furnishes no satisfactory evidence of the existence of palæolithic man, no chronological scale by which to estimate the date of his early appearance."* "He (says Locke) whose assent goes beyond his evidence, owes this assent of his only to prejudice, and does in effect own it, when he refuses to hear what is offered against it; declaring thereby that it is not evidence he seeks, but the quiet enjoyment of the opinion he is fond of, with a forward condemnation of all that may stand in opposition to it, unheard and unexamined."

The CHAIRMAN (Vice-Admiral E. G. Fishbourne, C.B.), after conveying a vote of thanks to Mr. Whitley for his paper,† read the following passage from a work called "The Childhood of the World," by Mr. E. Clodd, F.A.R.S.:—

"There is a large cavern at Brixham, on the south coast of Devonshire, which was discovered fourteen years ago through the falling in of a part of the roof. The floor is of stalagmite, or particles of lime, which have been brought down from the roof by the dropping of water, and become hardened into stone again. In this floor, which is about one foot in thickness, were found bones of the reindeer and cave-bear, while below it was a red loamy mass, fifteen feet thick in some parts, in which were buried flint flakes, or knives, and bones of the mammoth. Beneath this was a bed of gravel, more than twenty feet thick, in which flint flakes and some small bones were found. Altogether, more than thirty flints were found in the same cave with the bones of bears and woolly elephants; and as they are known to have been chipped by the hand of man, it is not hard to prove that he lived in this country when those creatures roamed over it."—p. 29.

He added, that when statements such as this were published, it was high time that the facts should be brought to light, as done in Mr. Whitley's paper.

Rev. Prebendary Row asked if Mr. Whitley's attention had been drawn

* *Transactions of the Victoria Institute*, vol. viii. p. 223.

† Mr. J. Evans, F.R.S., President of the Geological Society, and author of the work on "Ancient Stone Implements," referred to by Mr. Whitley, was invited to be present at the reading of this paper. A correspondence ensued, in which the honorary secretary mentioned that he was aware that Mr. Whitley intended to refer to several parts of Mr. Evans's work, amongst others, to the "remarkably symmetrical scraper," figured and described on page 470; the history of which he submitted to Mr. Evans, who at once saw the mistake into which he had fallen, and wrote, "March 17, 1876. I shall, of course, alter the passage, or rather suppress it, should I ever print second edition."—Ed.

to the current number of the *Westminster Review*, in which there was a notice of the Brixham Cavern, containing several statements strongly opposed to what he (Mr. Whitley) had now advanced. The controversy seemed to him (Mr. Row) to rest on this: did these flints contain evidence of being made by man? a question rendered more easy of solution by the fact of the vast amount of flint flakes that were scattered over these islands. He had picked up a great quantity at Newhaven and it might be said that they were surface flints, the peculiar forms of which might have been occasioned by the processes of agricultural cultivation; but he dug up one specimen from a depth of five or six feet in the chalk, and it was a far more perfect specimen than any to be found on the surface; it was so sharp that it would inflict a considerable wound. Now, did that particular flint flake bear marks of human manufacture, or was it a natural production? On the Sussex Downs a very large quantity of flint flakes were to be found extending over a great area; and near Portsmouth there were whole fields covered with shattered flints. The existence of such immense quantities must disprove the idea that they were manufactured articles. He very much doubted whether all the savages who ever lived could have manufactured all the flints which he had himself seen.

Rev. W. B. GALLOWAY said he had brought with him one or two flints, which were simply the result of natural fractures, and not intended to show any design. They were picked up at Eastbourne from a crushing-machine, which crushed flints for road "metal"; and no savage could manufacture arrow-heads better adapted for his purpose than those which the crushing-machine supplied. One of these flints had the edge bevelled, and, as a secondary chipping of the flint with a view to bevelling was mentioned by Mr. Evans as an evidence of human manufacture, it was most important to find that bevelling existed in an accidental form of flint.

Mr. JORDAN thought that the reasons advanced by Mr. Row for the natural rather than the artificial formation of the flints were scarcely sufficient, for it might be urged that the manufacture of such flints would extend over a long period of time, and hence that many would be made. The question was, did such flints show signs of natural cleavage? If a flint would not naturally cleave into such forms, it was reasonable to suppose that they were of human make. If, on the contrary, the cleavage was such as would be naturally produced by blows or crushing, then we ought to look with great suspicion upon such flints as were found in association with the extinct animals. If the cleavage was natural, it would be reasonable to suppose that the flints would be found of all sizes; but if the flints were of human manufacture only, such sizes would be formed as were suitable for the purposes for which they were made. It was unquestionable that, in Nature's own laboratory, they were found of all sizes.

Rev. A. J. HARRISON, Ph.D., remarked on the extraordinary amount

of flint flakes that were to be found in the Yorkshire Wolds, and in the Staffordshire Potteries, where flints were imported from all parts, the diversity of shape among the unworked flints was most remarkable.

Mr. CALLARD said he had purchased, in 1871, one of the casts which had been referred to in the paper, as from an original found in the Brixham Cavern, and when he was in the cavern in 1875 he saw similar casts still being sold. Of course he knew that Mr. Pengelly had no wish to impose upon the public*—but had only been rather injudicious in these scientific matters, in which the greatest amount of care was necessary; and even with all the care that could possibly be taken, mistakes would continue to be made. It certainly was a very dangerous experiment for a gentleman like Mr. Pengelly to lend the person who was going to exhibit the cave, a well-formed flint, to show visitors what a flint-knife was like. Just what might be expected from such a circumstance, was what had really taken place. As to the production of flint flakes, change of temperature would do that. On one occasion he (Mr. Callard) ^{he cast} ~~received~~ a piece of flint, and then ran a stream of iced water over it, and the most perfect little specimens were produced, without the application of any blow or crushing power whatever.

Mr. S. R. PATTISON said he had not had the advantage of seeing the Brixham Cavern, but he had seen some of the specimens taken from it, and the whole question really amounted to this, whether the fifteen selected flints gave evidence of human manufacture or not, and whether any that did afford such evidence were found in the right cave, lying with the bones of the mammoth. Some of the specimens certainly had impressed him with the belief that they were produced by man, but others were of a contrary opinion; and who was to decide?

The Bishop of MELBOURNE thought the Institute was greatly indebted to Mr. Whitley for his paper, for it was very important that scientific men should examine these things before they questioned the Word of God. His own conviction was, that when the facts which were alleged were inquired into, they would not be found to lead to the conclusions which were founded upon them. He had been waiting for some time and with some degree of anxiety, to learn what conclusion scientific men would come to with regard to these flints, and he confessed that he was glad to find that the evidence of human workmanship could not satisfactorily be made out. Mr. Whitley had shown that at least a very great degree of doubt existed, as to whether the flints were of human manufacture or not, and his arguments were such as, at any rate, to prevent many people from adopting the conclusions which some scientific men of the present day had arrived at.

* For Mr. Pengelly's report on the Brixham Cavern and the mistakes that have been made, see the 1874 *Report of the Devon Association for the Advancement of Science*, especially pages 793-5, 800, 826, 829, 832, 835 836.—N.W.

Mr. E. CLODD thanked the Council of the Institute for having invited him to be present, and though he differed much from Mr. Whitley's conclusions, he also cordially thanked him for investigating this subject so thoroughly, for what was really wanted was, that the most arrant scepticism should be directed to every specimen which was reputed to be the handiwork of man. It was impossible to discuss such a question satisfactorily except in the presence of experts. It was, he thought, to be regretted that the discoveries made in other caves had been received with silent scepticism on the part of the Royal and other Societies, while the discoveries made in the Brixham Cavern had had an undue measure of importance given to them. So far as he was able to judge from comparing the Brixham Cave specimens exhibited in Somerset House, and the flints in the Christie Collection, he had no hesitation in pronouncing these so-called knives—but that was too strong a term for them—these flint flakes, to be the handiwork of man. After making every allowance for changes and differences of temperature and for the vast number of flint flakes found in certain localities, there was abundant evidence left to show the existence of a stone period in the past, which extended even down to the present time. No one could look at the carefully arranged collection of Col. Lane Fox in the Bethnal Green Museum, or at the collection in the Christie Museum, without feeling that there was strong evidence of a stone age before an age of metal, when man was content, in a state of savagery, to make use of the handiest materials he could find for his weapons. If Brixham Cavern were gone altogether, there would still be sufficient evidence to be drawn from the remarkable flints found in the valley of the Somme,* in the Thames Valley, and elsewhere; and that evidence no theory of attrition and no theory of change of temperature would upset.

Professor TENNANT pointed out that silicate in any form would never break in a straight line, but always conchoidally. If two flints were struck against each other, many flint flakes would be produced. Not very many years ago, before the percussion cap came into use, extensive flint manufactories were kept up for our old muskets. With regard to the flints that had come from the diamond fields in South Africa, the greater part of the diamonds were not found upon the surface, but were dug up from a depth of 200 feet, and at that depth there were no flints. Out of £15,000,000 worth of diamonds that had been found, not £1,000 worth had been found upon the surface. He could not reconcile his own opinion with the idea that all the flints which had been found were of human manufacture, but he certainly thought that some of them were.

Mr. WHITLEY, in replying upon the discussion, said.—I will, in the

* See Vol. VIII., page 51, where Mr. James Parker deals with the question. He urges that from the position of the flints of the Somme Valley, and the geological changes that have taken place there, it may not be at all necessary to claim the very great age that Professor Lyell and some others have done, for their formation by man.—ED.

first place, say a few words on what has been said in opposition to the opinions which I have brought before the meeting this evening. I heard with very great pleasure—because I am simply desirous of ascertaining the actual truth—that one gentleman on my left rose to take the opposite view to that which I hold, but the meeting will have observed that not one word was said in contradiction of the facts contained in my paper. The facts there set down remain untouched and unanswered. That gentleman said that I had made an attack on the honesty of gentlemen who are opposed to me, in reference to the question of these so-called implements. Now, I should exceedingly regret it if I had done any such thing; but I have looked into my paper again and I find that I have in the plainest language simply stated the facts, and made no imputations whatever. The facts may be, as they are, strong ones, but I could not have expressed them in more moderate language. One other speaker—Mr. Clodd—is the author of a clever book entitled “The Childhood of the World,” in which he has relied wholly and entirely on the Brixham Cavern evidence. Not a word was written by him, not a piece of evidence was adduced by him, from any other cavern. He said not a single word about the gravel-beds of the Somme, of which he has spoken so strongly to-night, to show that they bear testimony to the great antiquity of man. Now, I have been to the Somme three times to examine those beds, and I hold a contrary opinion to his, and probably Mr. Clodd has not given that personal attention to these gravel-beds which I have done. In the *Langham Review* there is a paper by Mr. Clodd on “The Antiquity of Man in Western Europe,” and in that paper Mr. Clodd has abandoned the whole of the Brixham evidence—he has not said one word about it. That magazine was issued in March—this month—and in it the whole of the evidence of the antiquity of man is drawn from other sources. I do not think it is quite fair when, after great care and investigation, I have produced the evidence and examined the whole literature of a special subject, that an opponent should not say one word as to the truth of my evidence, but bring forward evidence which I may not have had an opportunity of investigating. However, I have been to the Somme three times, and I have seen the whole of M. Boucher de Perthes’ collection, and that at Salisbury, and I have been to Pressigny le Grand and to Belgium, and I would not take up the position which I have taken up without having carefully and thoroughly convinced myself that I am right in this matter.*

* Mr. Whitley writes as follows:—“The Woodwardian Professor, Mr. M’Kenny Hughes, read before the *Cambridge Philosophical Society* (in November, 1876) an important paper ‘on The Evidence of Man’s Existence before the Glacial Period,’ and showed the weakness of that evidence in many cases, including the Settle Caves, and the Brandon ‘scare.’ This paper will be published in the ‘Proceedings’ of that society. *Nature*, for November 30th, 1876, contains a paragraph, showing that the drawings on bone—said to have been found in the Thayngen cave near Schaffhausen—

I, however, quite agree with Mr. Clodd that the question of the antiquity of man cannot be judged from Brixham Cavern alone, for that is an isolated case, and the only way by which we can arrive at satisfactory results, is to judge all the cases as they arise. Mr. Row has spoken of the immense number of flints found in the South Downs, and I can fully confirm his statements. On Cissbury Hill, north of Worthing, you may shovel up the split flints and flakes by cart-loads; and from thence to Eastbourne they are abundant everywhere on the surface, but more especially on the high ground; and where the down land has recently been brought into cultivation, they are turned up from the subsoil to the surface by the plough. On the chalk high lands of Central France, the flakes and the so-called tools are even more numerous, especially in the provinces of Poitou and Perigord; and what is still more remarkable, they occur in similar quantities in wide-spread deserts, where man, savage or civilized, never could have made his permanent home. Canon Tristram found them on the northern part of the Great Sahara. Eastward they occur in vast numbers on the Libyan Desert, and close up to the rich alluvial deposits of the Nile; but on the productive soil of the Egyptian Valley, which at all times supplied the means of life to a large population, they are not found; and the antiquaries who have observed and described them, mainly favour the opinion of their natural formation. M. Chabas says that the Egyptian stone implements are comparatively of modern date, and asks with surprise what could have been the use of the small flakes found in Egypt. Dr. Lepsius considers that most of them have been naturally formed, and has expressed his opinion that the flint flakes found in such abundance are natural flint fragments, splintered by the alternation of temperature; and M. Pruner-Bey considered that the

‘are pure inventions, and intentional deceptions.’” I may add that it was announced, some little time ago, that the skeleton of a man had been found “600 feet below the surface of the earth at the delta of the Mississippi,” and Sir C. Lyell calculated therefrom, that man had existed there 57,000 years ago. On inquiry, it transpired that, in excavating for the New Orleans gasworks, some burnt wood and the skeleton of a man, the cranium in good preservation, had been found at the depth of *sixteen* feet. To the foregoing I would add an extract from No. 323 (November, 1876) of the *Abstracts of the Proceedings of the Geological Society of London*:—

“Professor RAMSAY said that there was a growing opinion that the forest-beds were interglacial, and remarked that traces of man had been found in interglacial deposits in Switzerland.”

“Professor HUGHES, referring to the statement of Professor Ramsay, thought that the discovery referred to was probably that of Dr. Scheuermann, recorded by Professor Rüttimeyer, of sticks apparently artificially pointed, which had been found in lignite, and were considered to be of the age of the Dürnten Coal. He thought, however, that there were many sources of error in the observations, and was not inclined to accept the facts as recorded until further evidence was produced.”—Ed.

evidence of their human manufacture was doubtful. Sir John Lubbock, however, who appears to have especially visited Egypt for the purpose of inspecting these so-called implements, comes to the conclusion that they have been artificially formed, and in this opinion he is supported by M. de Mortillet and M. Broca. Again, on the sterile ground between Cairo and the Red Sea they occur in great numbers; and they also abound in the wadies of the Sinaitic Peninsula. Mr. J. Milne found angular and apparently freshly-broken fragments of flints, which he considers to have been broken by variation of temperature, strewn over the desert of the Tih, and thence over the high ground of Syria to Lebanon shattered flints may be found on the surface; and again, over the great and terrible desert between Syria and the Euphrates, the flints are so numerous on the surface as to have given it the name of the Desert of Flints. A knowledge of these facts, and a careful investigation of the sites of the so-called Palæolithic manufactories, within my reach during the past twelve years, have so impressed my mind with the certainty of the natural production of these imaginary flint implements, that I should be untrue to my convictions if I did not firmly hold this opinion; and unfaithful to myself if I did not express it through evil or good report. My views on this question have lately been strengthened by the opinion, now generally held by the American antiquaries, that they fail to find any line of demarcation between the implements of the Palæolithic and Neolithic ages; and such appears also to be the opinion of Mr. William Gray, from an extensive examination of the shattered flints in the north of Ireland. The inference being, that there is, in fact, no Palæolithic age.

The meeting was then adjourned.

NOTE.—Mr. Whitley could scarce desire a better justification for some of the statements in his paper than is afforded by the following:—"A Conference on the question of the Antiquity of Man was held on May 22, 1877. The President, Mr. J. Evans, F.R.S. (President of the Geological Society), in opening the conference, alluded to the altered position of the question since it was first brought before the British public in 1859, and pointed out the extreme caution which was necessary in dealing with the subject, as it lay within the domain of the archaeologist, the anthropologist, and the geologist; neither of whom was sufficient, alone by himself, to offer a very strong opinion on the subject. Great care was also necessary with regard to the facts of the discoveries themselves, as the objects discovered were liable to get mixed with other objects below them; and this was important in the case of cave-deposits, in which there might be interments of a later date than the human skeletons deposited in the caves. The question was now very much within the province of the geologist, whose business it was to determine the antiquity of the deposits in which the discoveries may have been made. After alluding to several recent discoveries in France, Spain, and Switzerland, the President remarked that each successive discovery, or presumed discovery, must be received in a cautious but candid spirit; and, looking to the many sources of doubt and error which attached to isolated discoveries, their watchword must for the present be 'caution, caution, caution'."—*Nature*.