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

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EDITED BY THE HONORARY SECRETARY,  
CAPTAIN F. W. H. PETRIE, F.R.S.L. &c.

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VOL. XV.



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## ORDINARY MEETING, FEBRUARY 21, 1881.

H. CADMAN JONES, ESQ., IN THE CHAIR.

The minutes of the last meeting were read and confirmed, and the following elections were announced:—

MEMBERS:—H. J. Sanderson, Esq., M.D., London; Rev. T. Taylor, South Africa.

ASSOCIATES:—Rev. W. F. Edwin, King's Lynn; Rev. J. Fordyce, M.A., Great Grimsby.

Also the presentation of the following works for the library:

“Proceedings of the Royal Society.” *From the same.*

“Proceedings of the American Philosophical Society.” *Ditto.*

Also Pamphlets *from the Rev. J. H. Barker, M.A., and the Rev. C. B. Brigstocke, M.A.*

The following papers were then read:—

*WHAT ARE SCIENTIFIC FACTS?\** By J. E. HOWARD, Esq., F.R.S. F.L.S., &c. Being a Reply to W. PENGELLY, Esq., F.R.S., in a Paper read before the Institute, January 3rd, 1881.

**T**HIS question occurs as a suitable introduction to some observations to which I beg to call the attention of the Institute, in reference to my paper on “The Caves of Devon.” These Caverns have been claimed as furnishing proof of an antiquity of immense (and, I may add, incredible) length for the race of man on the earth. Such proof is supposed to be afforded by *Scientific Facts*; established *as such* by reiterated assertion on the part of some men of science—of course, all honourable men; and yet it appears desirable, in the interests of truth, that their statements should be subjected to a sifting process—such as might take place in our higher law courts—

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\* Remarks supplementary to a paper on the Caves of South Devon.

before they are handed down as facts to succeeding generations.

I am not aware how this can be accomplished, except through the medium of the Victoria Institute. In bringing my views on the subject before this body, it was, of course, open to Mr. Pengelly to have attended the meeting at which my paper was read, and to have challenged any of my statements. This was not done; but, instead of this, Mr. Pengelly occupies from p. 594 to p. 651 of the Report and "Transactions of the Devonshire Association for the Advancement of Science, Literature, and Art," in strictures on my pamphlet of not more than forty pages. I take this as an admission that my reasoning is not very easily disposed of.

Further, I may add, that it appears to me the criticisms of Mr. Pengelly tend very much to establish the main points of my argument. In the first place, it may be recollected that I contended that the stalagmite—on the rate of the accumulation of which by successive drops such vast theoretical deductions were made to rest—was to a large extent *not stalagmite at all*; that much of it could not have been formed by dropping from rock through which it had passed in a state of solution; and I showed before the Institute specimens to prove my assertion.

Now I find that Mr. Pengelly is forced to admit the truth of this, for he says (p. 614, as above) under head,

"Stalagmite versus Magma,"

"If the word Stalagmite is to be strictly confined to the meaning its etymology justifies, it must be admitted that it may have been applied to calcareous precipitates in Kent's Cavern, which have no literary claim to it,"—that is to say, have no *real* claim to it at all. This word "literary" (literal?) refers to a quotation from Page's Handbook of Geological Terms, in which this Author describes *Stalagmite* as derived from the Greek, *Stalagma*, a drop.

I trust that Mr. Pengelly will not dispute the accuracy of my quotation. I wish that many pages could be transcribed. In the meantime, it will be well to remark how this bears upon the whole case. This has been stated probably many hundred times; but I quote from a pamphlet, called "The Ancient Cavesmen of Devonshire," headed by an "Illustration of the Entrance to Kent's Cavern."

"The important point which we have established is, that relics of human art are found *beneath* the floor of Stalagmite. After taking every precaution, by sweeping the surface and examining most minutely whether there were any traces of

the floor having been previously disturbed, we broke through the solid *Stalagmite* in three different parts of the cavern, and in each instance found flint knives, closely resembling those in the most ancient barrows. The thickness of the *Stalagmite* is about two feet."

To this extract from the Report of a Committee of the Torquay Natural History Society, appointed to make an exploration of the Cavern, is added the following information.

"*Stalagmite*, it may be explained, is a deposit of limestone formed by the dropping of water from the roof, the water having dissolved the lime in sinking through the rocks above."

But what if the two feet of *Stalagmite* is not in a literal sense *Stalagmite* at all, but a mass of calcareous deposit formed in some other way than by dropping in a fluid state from the rocks above?

What proof remains that "the three feet of thickness to which the floor sometimes attains, or even the sixteen or twenty inches which it averages, must be of very good chronological value?"\*

Mr. Pengelly himself tells us (p. 602) that "Science, whose very essence is accuracy, cannot be advanced by gratuitous beliefs"!

In the next page of this work (which Mr. Pengelly acknowledges† (p. 615) (though it does not bear any signature), I read "that the time required for the formation of a sheet of stalagmite 2 feet thick, added to that which has elapsed since, falls short of his antiquity," i.e. of the Antiquity of Man.

But now a truer light seems to have dawned on the observers; for in their twelfth report (quoted from p. 617) the Committee of the British Association, describing the exploration of the portion of the cavern known as the Labyrinth, say, "It was necessary to break up all the bosses of stalagmite, with the exception of the largest of them, of which a portion has been left intact, it being believed that it shows strikingly the utter inadequacy of the data derived from a *boss* to solve the problem of the amount of time represented by a *floor*, and *vice versa*."

I have no doubt that this is a most formidable source of

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\* See the Ancient Cave Men of Devonshire, under the description of "The Crypt of Dates" (pp. wanting).

† Rep. Britt. Ass. 1876, p. 5 (quoted by Mr. Pengelly p. 617).

error; but how is any person reading the previous statement about the *two feet* of floor, and seeking to calculate the rate at which it might have been formed from the amount of concretion or inscriptions on the *bosses*, to be enabled to rectify his errors? When he enters the cave he will find that almost everything has been carried away,\* and that what is really important is *withheld from his examination* lest he should incur peril in climbing a ladder, or in otherwise penetrating into dangerous recesses! The important crypt of dates has, according to Mr. Pengelly, “been visited by *less than a dozen persons*”! (p. 599).

As it will be seen in my case, there are yet more formidable perils to be encountered. To drive a stick into *stalagmite* and find that it is nothing but *magma* (that is to say, a mass, as it were kneaded together, *μάσσω*) without arrangement or crystallisation, *this* is real treason, and absolutely forbidden by Mr. Pengelly. What, then, am I to expect when I avow that, in addition to my trespass, I brought away a handful of the said *magma*, and retain a portion of the same in my library for the inspection of all inquirers? Further, I obtained specimens from the outside showing the transition from pure crystalline substance, formed by percolation through the rock, to a mingled mass adherent, which never could have filtered through the stone, but must have drained through chinks and crevices in a much more rapid transit.

I am glad to find similar views expressed by Dr. Geikie (*Prehistoric Europe*, p. 84):—“Stalagmites, so far from being always comparatively pure, are often so highly impregnated with earthy ingredients as to assume the character of calcified earths. Such impurities may *have been introduced in various ways*. Most limestones, when they are dissolved in carbonic acid, leave a red residue behind, and there can be little doubt that much of the earthy matter in stalagmitic accretions is of this nature, and to *that we may add the red earth, mud, and silt introduced by rains and freshets through fissures in the roofs and sides of caves*, and even in many cases by their more open mouths.” (The italics are mine.)

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\* “How can Mr. Howard pretend to say what may have been found in the Cavern? From 28th March, 1865, when the committee began their exploration up to 11th June, 1878, when he made his last visit, upwards of thirteen years, during which the work had been carried on continuously from day to day, the workmen had destroyed vast specks and bosses of stalagmite, broken them into small pieces, and taken them out of the Cavern; and about their character Mr. Howard is necessarily and utterly ignorant.”

Mr. Pengelly's attention (on my last or third visit) was chiefly directed towards his more appreciative companions; though he was so far from neglecting me that he records the distance at which my eyes were situated from the inscription\* he was showing us as 7 feet; near enough, it would seem, for any purpose of information that could be gained from this particular case; for the whole profession of explanation resulted in our being elaborately shown an incision which Mr. Pengelly now tells us is of no importance whatever (p. 602), whilst the really important inscriptions are withheld from view! The *importance* of these inscriptions may be judged from the following quotation from p. 3 of my Paper.† So difficult is it to ascertain what are *scientific facts*, and what are those which, on the other hand, possess only an illusory character.

The result was that I was entirely led astray, and when I came to read up the literature of the cavern I supposed that what had been shown me was an inscription in the "*crypt of dates*"; and consequently confounded that recess with the "*Cave of Inscriptions*," which is in a distant part of the cavern. This error was pointed out by Mr. Pengelly, and corrected *before my paper was read*.

Mr. Pengelly thinks that I made both too little and too much of my opportunities of personal investigation of the cave, which "when with [him] me could not have exceeded (on my last visit) half an hour" (p. 596). I certainly should have given a different estimate of the time; but it shows, at all events, that Mr. Pengelly, when particularly invited to show the cave, does not take too much pains to unveil its secrets. This matters little; but I cannot say the same of his *apparent* insinuation that I (not mistook, but) made a gratuitously false assertion of my having first visited the place in 1869, under his guidance. He says that he has no recollection of it, and that my name does not occur in his journal, which may very well be; but it happens that I have a *very distinct recollection* of the circumstance, and that, moreover, I have an entry in my pocket-book for the year, which would be valid proof, in any court of justice, that I visited Kent Cavern on the 31st of August, 1869.

On my second visit (with the guide) I was stirred up to take

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\* Robert Hedges, of Ireland, February 20, 1688.

† "Taking the correct data (that of the Report of 1869) we have twelve feet of stalagmite formed, *let it be assumed, from the dates on its upper surface*, at the rate of .05 inch in 250 years, and thereby arrive at the *conclusion* that the accumulation of the whole required 720,000 years." (!)

more interest in the research. The results of my subsequent inquiries I have given in my Paper on the Caves. Although I "made no examination of anything," I must *somehow or other* have discovered some formidable faults and flaws in the Cave theories which have been so abundantly propagated.

The truth is that my "long investigation," *not* of the cave, but of the literature of the cave, brought me into acquaintance (through the kindness of a friend) with the results of the explorations of the Rev. Mr. McEnery, who, in the course of five years' investigation, seems to me to have anticipated, in his discoveries, all that has since been explored by Mr. Pengelly and others, to whom the merit has been assigned by the scientific world. I certainly appeal from Mr. Pengelly to this well-known authority; who was not led by his investigations to any such conclusions as to the antiquity of man, as have been so zealously propounded by his successors. Moreover, I thank Mr. Pengelly for reminding me that Mr. McEnery traced to the influx of waters from *the deluge of Noah* much that is otherwise sought to be explained by Mr. Pengelly and his friends. In this and in other respects, particularly that of his apparent want of fluency in English, he was placed at a disadvantage; and his papers were left in a very unfinished state. Such as they are, we have to thank Mr. Pengelly for rescuing them from entire oblivion. I know not how to procure a copy by purchase, and have not one at hand now to refer to. If the Rev. Mr. McEnery were still living, I think the *κῶδος* which rightly belongs to him would not be withheld.

As an illustration of what I have been saying, occurs the following. Mr. Pengelly (p. 612) calls in question my statement (p. 6, "Caves"), that no stalagmite had been formed over the band of black mould, on the ground that, *in one place*, "the overlying black mould was itself overlaid by a cake of stalagmite, which was attached to the wall of the cavern, from 1 to 2 inches thick, and which measured 7 feet from north to south by 6 from east to west. In many instances stalagmite, fully as thick, had been found on the large blocks of limestone lying on the black mould; but this was the first, and indeed is at present the only, example of such a cake immediately on the black deposit itself."

This may all be correct without impeaching the general accuracy of my statement. Indeed, when we look at the formations "fully as thick" which may be seen under the bridges of our railways in the limestone districts, it would be strange if no coating of real stalagmite should occur on stones lying on the surface in a cave such as Kent's Cavern, for one



or two thousand years, as in this instance. But what if this cake of "*stalagmite*" should prove not to be stalagmite at all?

On the page opposite to Mr. Pengelly's unceremonious denials I find the following quotation from Mr. McEnery:—

"Mr. McEnery says in other places the drop from the roof acted *concurrently* with the *oozings from the sides* in forming the floor, which consequently partakes of both manners."

May I not presume to think that a cake of calcareous limestone, *attached to the wall* of the cavern, was probably formed in the latter manner, and therefore not, in any proper sense, stalagmite at all?

If Mr. McEnery had been living, he would have been able to reply to Mr. Pengelly's strictures, and to relieve me of the difficulty of counter statements. As it is, Mr. Pengelly freely bestows his blows on the dead excavator, who had "neither science nor philosophy" at his command. This refers to some passage about a boar spear, which for the present I must let stand on Mr. McEnery's authority. Mr. Pengelly here accuses Mr. McEnery of writing "in a very speculative vein" "when he entered on his calculation," but I must say Mr. McEnery's speculations seem to me much better founded than Mr. Pengelly's theories. Mr. McEnery's calculations rest on something definite,\* Mr. Pengelly relies on non-literary scientific facts.

It was scarcely worth Mr. Pengelly's dignity to call in question Mr. McEnery's statement, that the animal remains during the early explorations emitted a fœtid odour, seeing that it is notorious that the remains of mammoths in Siberia are reported in one instance to have "smelt abominably," and in others were sufficiently fresh to have been devoured by dogs. As an advocate of the long chronology, he should first meet and dispose (if he can) of the Siberian accounts, before impeaching the credibility of his predecessor (see p. 638). He ought also to *explain* the consistency of the following "scientific fact" with his views:—It is reported in *Nature* (January 20, 1881) that the body of a colossal rhinoceros has been discovered in the Werchojanski district, Siberia. It was found on the bank of a small tributary to the Jana river, and was laid bare by the action of the water. Like the mammoth washed ashore by the Lena River in 1799, it is remarkably well preserved, the skin being unbroken and covered with long hair. Unfortunately only the skull of this rare fossil has reached St. Petersburg, and a foot is said to be at Irkutsk,

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\* *Transactions of the Victoria Institute*, Paper on Caves of South Devon, by J. E. Howard, Esq., F.R.S., vol. xiii., page 172 (p. 10 of "People's Edition.")

while the remainder was allowed to be washed away by the river soon after it had been discovered. The investigation of the skull gave the interesting result that this rhinoceros (*R. Merckii*) is a connecting form between the species now existing and the so-called *Rhinoceros tichorrhinus*, remains of which are not unfrequently found in the gravel strata of Eastern Prussia. It is supposed that *R. Merckii* is the now extinct inhabitant of the eastern part of Siberia.

I will now add a few words as to the Literature of the Cavern and my quotations. I know not what may be the experience of others, but to my mind the "investigation" of these was a work of labour and difficulty. The want of indexes, and in some cases of pages, and of the names of publishers, and the constant restatement in lectures of supposed facts and argument made the inquiry doubly difficult. The Notes, &c. (p. 1) noticed (p. 596) I purchased at Torquay, but do not remember that my attention was called to subsequent numbers. So in the case of the Annual Reports of the Committee of the British Association. I contented myself with the first three, which happened to be in my possession, out of fourteen that have been published; and, even if it had been possible to possess myself of all that has been published,\* I could but have touched the margin of that immense mass of confident assertion which has tended, the whole world over, greatly to encourage the enemies of revealed religion.

This is all *patent*, and my quotations do not in any way distort the opinions of the Examiners of the Cave. But that which was *hidden* is, the opposition to these (as to their most important aspects) in the views of the Rev. Mr. McEnery. I do not belong to his church, but shall not be deterred by this or any other consideration from doing justice to the memory of a real man of science. I admire his respect for the Scriptures, and am more than willing to share in the opprobrium thence arising. In considering the important results to the cause of religion to which I have referred, it is right that I should say further that I entirely disclaim any imputation of improper motives to my opponent; and that I regret the amount of personality which has unavoidably mixed itself up with the controversy. I accept without reserve his correction of mistakes in my quotations, which, however, are

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\* Page 609, Mr. Pengelly says "He has no means of knowing except by studying the reports published annually from 1865 to 1879 inclusive, or by reading the various papers which, in addition, I have printed during the same period."

for the most part too trivial to be introduced here; but I must say that I have not the materials at hand thoroughly to test these corrections. In page 603 Mr. Pengelly, says "Mr. Howard copies correctly my estimate of ".05 inches in 250 years," the estimate, when he subsequently refers it, is multiplied by ten and appears as 0.5 inch instead of .05 inch (see page 6). [This very obvious error should be corrected, though immaterial to the context.]

Page 605 Mr. Pengelly says that I have thought fit to change his words "Mr. James Farrar" into "James Farrar" and "deposits" into "deposit." Mr. Pengelly refers to the Trans. Devon Ass. vi. 665. These, in the original, I have never seen: and certainly disclaim all want of courtesy to the individual named! Though it might have been desirable to take the quotation from the original, I failed to do so in this and other instances. I am glad, however, to see Mr. Pengelly's admission that "the passage as rendered is essentially correct" (p. 606). As to the next quotation that strikes me (p. 615), Mr. Pengelly remarks "the words he professes to quote are *substantially the same*" (pp. 9 and 10 of my paper).

In p. 616, Mr. Pengelly detects a manifest blunder either mine or the printer's, 500 is put for 5,000. It is evident that my *calculation* is founded on the correct number.

P. 620. Mr. Pengelly corrects 350 flint implements into "upwards of 350." The exact number, he says, was 366. He says that I *suppressed* the first words. But what motive could I have for so doing?

P. 623. "*Inmates*" is misprinted for "*initiated*." This, as Pengelly observes, is "germane to nothing." P. 626. Mr. Pengelly discusses the tangled question of the number of entrances to the Cavern,\* and I have no hesitation in receiving from him the corrected account as follows:—

"I conclude, in almost the same words as in 1872, that, at least, the great bulk of the cave earth was washed in through the two long-known, high level, eastern entrances, because there were no other available channels of ingress, and also because its highest level is at these entrances, being nowhere higher than the entrances, and declining rapidly from them in all directions."

All this tells in favour of Rev. McEnery's view, that this torrent of liquid mud was poured in by the waters of the

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\* Page 622, Mr. Pengelly says: "It is now known, therefore, that the Cavern has seven distinct entrances of which two only are now open."

Deluge rising above the highest of these entrances. I cannot say that I find no difficulty in believing this; but it at all events gives us a *sufficient* explanation, if such a view of the Deluge is admitted.

Mr. Pengelly's hypothesis of the gradual admission of small portions of earth is, I confess, *inexplicable* to me, and *inconceivable* also.

Mr. Pengelly (p. 632) finds me "very troublesome in the matter of quotations;" but why should he bestow so much pains on me as to write pages in correcting the errors in the *early* proof of my paper (which had been sent in order to afford him as much time as possible to prepare any observations thereon) when the People's Edition, *already corrected*, had been sent a few days afterwards, and was, as he says, in his hands? This was surely a work of supererogation!

May I not hope that he sees some promise or potency of good in me after all? for he says (p. 651), "Mr. Howard \* admits the genuineness of the 'flint tools,' and the contemporaneity of the men who made them, with the extinct cave mammals, *I ask for no more from him.*"

This, then, I would hope is *the end of the lesson*, for all that I have omitted may be read in the report above alluded to, to which I direct my readers.

My conclusion is, that the calculations supposed to be founded on scientific facts, observed in the Caves of Devon, in favour of the vast antiquity of the human species are entirely illusory; and that, instead of refuting my paper, Mr. Pengelly has assisted my argument in several ways. I am satisfied that his theory is equally deceptive in other respects besides that part of it which concerns the stalagmite; but I rest here!

I find in Dr. Geikie's Prehistoric Europe (p. 83) the following passage, which, considering the strong *penchant* displayed by the writer for the long chronology of man's residence on the earth, is certainly remarkable.

"Thus, it is evident that the present scale of stalagmitic accretion in Kent's Caverns cannot be safely relied upon as a standpoint by which to judge of the time required for the formation of the old pavements underneath which the pleistocene cave-earths lie buried. The question of age, as we see, is not so easily settled, for we have to take into account the effect produced by previous climatic conditions; and, as we

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\* This I admitted *without examination* on the authority of Mr. Pengelly and his friends.

can form only a more or less uncertain estimate of these effects, it is impossible that our conclusions can be other than vaguely approximative. Even on the most extravagant assumption, however, as to the former rate of stalagmitic accretion, we shall be compelled to admit a period of many thousands of years for the formation of the stalagmitic pavements in Kent's Cavern."

In the previous pages (81-83) Dr. Geikie reduces the estimate of 240,000 years for the upper layer of stalagmite, and 576,000 years for the underlying layer (arising from "the rate at which the large boss in question has accreted") as "excessive" to 60,000 for the upper stalagmite, "and the lower bed 144,000 respectively for their growth." "In other parts of the cave, however, we have evidence to show that the stalagmite has accreted at a more rapid rate," but "we should still have a period of 20,000 years for the formation of the upper, and of 48,000 years for the lower. But on the supposition that, owing to an excessive rainfall, the stalagmites formerly increased four times more rapidly than they do now, the first period would be reduced to 5,000 years, and that of the lower stalagmite to 20,000 years." (!)

The "scientific fact," then, is reduced to the *probability* of "many thousand" years for the formation of the above pavements—which nobody can deny!

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The CHAIRMAN.—It is now my pleasing duty, on behalf of the meeting, to convey our thanks to Mr. Howard for his paper, and to invite discussion thereon.

Mr. T. K. CALLARD, F.G.S.—I have on two occasions very carefully examined Kent's Cavern, and after having done so, and having also heard Mr. Howard's former paper, I wondered what Mr. Pengelly would say in reply to that paper. And I wondered still more when I read the reply, for it scarcely referred to Mr. Howard's arguments. I certainly think it was unbecoming in a scientist to deal with a paper like that of Mr. Howard's as Mr. Pengelly has done. There could hardly be stronger evidence that he had nothing important to say in reply to Mr. Howard than that he felt it necessary to spend so many pages over the correction of such errors as "350 implements," for "upwards of 350," and which Mr. Pengelly tells us really was 366. If Mr. Pengelly thought it so important that the exact number of 366 should be given, why did he not himself give it as 366, and why did he himself say "upwards of 350"? It appeared to me to be mere trifling. Had Mr. Howard raised the question whether these things were implements or not, Mr. Pengelly should have met it; or if Mr. Howard had said there were no implements there at all, that would have affected the question; but whether the number was 350 or 450 did not matter a straw—

it had nothing to do with the argument ; and whether Mr. Howard calls a man "James Farrar," or Farrar, leaving out the "Mr.," in no way affects the question, and was not worthy of remark in a scientific paper. It certainly has struck me that if Mr. Howard, instead of writing another paper, had simply brought that of Mr. Pengelly here, and read it, we should have arrived at the conclusion that if that were all Mr. Pengelly had to say, Mr. Howard's former paper must have been one of considerable weight. (Hear.)

Mr. D. HOWARD, F.C.S.—I am glad that this question has again been brought before the Institute, because I think the admissions made by Mr. Pengelly are important to the issue. Surely the whole ground of the argument based on Kent's Cavern is this,—that there was a floor of stalagmite which was formed at a certain infinitesimal rate, and that, therefore, any human bones or implements, or the bones of any animals contemporaneous with those of human beings, found under that stalagmite, must put back the age of man for so many thousands of years. I confess it is a little bewildering to find that a supposed accurate estimate will bear dividing by ten without any serious interference with the result, as appears to be the case here. When we are told that the period may have comprised 250,000 years, or that it may have been only 25,000, one is apt to leave out one or more of the zeros that still remain, if one should be so inclined. I am certainly of opinion that scientific accuracy fails in this case. But of far more importance appears to be the question that now seems to be conceded, namely, that the so-called stalagmite floor is not a stalagmite floor at all. If this were a question of the construction of a wall of a certain thickness and height, and if the calculations as to how many bricks it contained, and the time it took to build, were made entirely on the basis that it was formed of bricks joined with cement, would not the result be very naturally affected if it were shown that the wall had been run up with thin outer lines of bricks and cement, and the intervals filled in with cartloads of concrete ? It appears to me that the stalagmite is in a similar position. There are shown to be traces of stalagmite, the age of which is very uncertain ; but the bulk of the floor is simply composed of *magma*. Under these circumstances, the argument seems to me to have failed, because the major and the minor premises having given way, the calculation naturally goes with them, and any argument in favour of excessive antiquity that might have been deduced from a stalagmite floor falls to the ground with the admission that the floor is not stalagmite, but *magma*. (Hear, hear.)

Captain F. PETRIE (*hon. sec.*).—I think that there is one part of the controversy which has taken place upon this subject that requires a little explanation. Early in 1879, when Mr. Howard read his first paper "On the Caves of South Devon" before this Institute, Mr. Pengelly was invited to be present, and with that invitation was forwarded an early and uncorrected printer's proof of Mr. Howard's paper. It was sent thus early, although uncorrected, in order that Mr. Pengelly might have time before the meeting to prepare any remarks that he might wish to make. His brief letter acknow-

ledging the invitation appears in the thirteenth volume of our *Journal*, published at the end of 1879. He was subsequently offered several weeks in which to write any comments he might desire to send for insertion in the *Journal*; but he stated that he would take another opportunity of replying. About four weeks after this a copy of the *People's Edition*, fully corrected, was placed in his hands, and he was informed that any printer's or other errors in the original proof sent to him, had been expunged from this issue. However, Mr. Pengelly, I think erroneously, preferred, in criticising Mr. Howard's paper fourteen months afterwards, to base his criticism on the early printer's proof, instead of the *People's Edition*. I may here mention that, when Mr. Pengelly expressed his intention of taking another opportunity of replying to the paper, I wrote to him as follows:—"I hope I may be permitted to see your reply when it is published, and if it be read at a meeting I hope for permission to be present." To this he replied three days afterwards:—"Your letter of the 30th of March [1879] is to hand. I shall have great pleasure in complying with your request relative to any reply to Mr. Howard's paper that I may read or publish."—Towards the end of November, 1880, I received a letter from a friend calling my attention to the fact that Mr. Howard had been taken to task by Mr. Pengelly in the "*Journal of the Devonshire Association for the Advancement of Science*," of which my friend (a Vice-President of that Association) sent me his own copy, and on looking into it I found that it contained Mr. Pengelly's "reply," which he had read at a meeting held during the summer of 1880, and by unfortunately forgetting to carry out his promise as to sending an invitation to the meeting in question (a proof copy of his paper would have been welcome), he had deprived Mr. Howard of that opportunity of replying in the journal of which he, Mr. Pengelly, is Editor, which we on our part had been so ready and anxious to accord to him in the *Journal of this Institute*. I venture to say what I have because I conceive that the whole of the *Victoria Institute's* proceedings in this matter exemplify the open and impartial way in which we conduct our discussions. There is one point in Mr. Howard's paper to which I would refer. Mr. Whitley has written in regard to what Mr. Howard says about the flint tools, and has sent these two specimens of flint implements [producing them]. One is termed "a neolithic arrow-head" and the other "a palæolithic implement." Mr. Whitley regards the first as having been chipped artificially, the last naturally. I should not, perhaps, have alluded to this, but for the fact that we have a visitor in this room who has been in South America, and has seen the savages forming their arrow-heads.

The CHAIRMAN.—If he would kindly oblige the meeting by offering a few remarks I am sure we shall all be pleased to hear him. (Hear.)

Mr. F. R. MACKENZIE.—I have been called on very unexpectedly; but shall be happy to relate a fact of which I was once witness. A good many years ago I happened to be in the Straits of Magellan for a period of seven or eight months, and during that time I saw a good deal of the Fuegian savages, a race of beings whom I should be inclined to put very low in

the scale of humanity, from what I observed amongst them. I was very much struck with one of the weapons which I saw in the possession of a native ; these people use bows and arrows, and the arrow-heads are shaped something like the one just produced, except that they have a longer stem for fitting into the shaft. [The stem of the arrow-head produced had been broken.] This [drawing a small arrow-head about the size of the section of a walnut shell] is the exact shape of the arrow-heads I saw, and these heads are inserted into a reed or stick, and then bound with a piece of sinew to complete the arrow. I never saw one so large as the specimen on the table. I was, on one occasion, very much astonished at finding in a man's sheath,—in which he was carrying half a dozen arrows,—one of the arrow-heads made of glass. I consequently got a broken bottle and took it to him. It was of the same sort of glass as that of which the arrow-head was made, not the dark description, but the light green, of which so many bottles are manufactured. I made the man understand by signs that I wanted to have some of the arrow-heads made. To my astonishment, after breaking the bottle into a number of pieces, he took a piece of glass that was nearest to the size he wanted, and having chipped it a little nearer to the right size with a stone, he began to bite it with his teeth, in order to form it into shape, after which he handed it to one of the women who were on board with the party, to be finished. He did the best part of the work himself, but it was finished off by a woman, and the entire arrow-head was thus bitten into shape while I was looking on. That savage had only one arrow-head of glass ; the others were of flint, and there is no doubt in my mind that they were made in the same manner. I brought some of those specimens home, and gave them to a gentleman who was greatly interested in such things, and whom, probably, some of those around me may recollect, though he has been dead for some years. His name was Saul, and he had a sort of museum of curious things. Among the bows and arrows I gave him was the particular arrow-head which I have mentioned as having seen made, and I have every reason to believe it may yet be found in his museum, if it still exists. Perhaps I should add that Mr. Saul was a wine-merchant, and had a place of business in Aldersgate-street, a good many years ago.

Rev. F. C. Cook, D.D.—It may not be a matter of much importance, but from my knowledge of the locality of Kent's Cavern, it has occurred to me to mention that any number of flints may be found on Hoxne Hill, which is within sight of the cavern. There are large beds there, where great numbers of shattered flints are to be found, from which one may pick out any number curiously edged and shaped by natural action. People wishing to make flint weapons could get flints at that spot already half made.

Mr. J. E. HOWARD, F.R.S.—I have nothing to reply to, and need therefore only thank you for your patient attention.

This discussion then terminated,

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\*.\* Since the foregoing paper was read I have received "a sample of deposit from clear running water," as likely to be of interest in reference to cave deposits. "It was formed in eight weeks to a thickness of one inch and a half; the water flowing behind an iron casing in a pit-shaft passed through a large quantity of lime, but flowed a perfectly clear water to the pump at the bottom. The deposit was formed uniformly over the surface of a four-inch pipe, reducing its diameter in eight weeks to less than one inch; but it has crystallised and grown in lines like the section of a tree, just as if it had taken a few thousand years to do it. No doubt a very few more weeks would have exhausted the supply of lime placed in the shaft or behind the casing, and it would have taken a great many thousand years to add as much again to the deposit in question."

A section of this deposit, from Hampton Colliery, near Wednesbury, I shall have the pleasure of depositing in the library of the Institute. It illustrates in a remarkable manner the formation of the "*old floor of crystalline stalagmite*" (see page 10, *ante*).

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The following paper was then read by Mr. T. K. CALLARD, F.G.S. :—

*IMPLEMENTS OF THE STONE AGE A PRIMITIVE  
DEMARCATIION BETWEEN MAN AND OTHER  
ANIMALS.* BY JOSEPH P. THOMPSON, D.D. LL.D.\*

WHEREVER on the face of the globe there is found an implement of any sort, we say, at once, Man has been here. It may be that, as in the caves in the Dordogne, there are rude sketches of art to associate the flint and bone implements with the handiwork of man; or, as in the lake findings in Switzerland, there may be traces of human habitations to identify the stone utensils with the building of the pile-dwellings; or, as in the shell-mounds (Kjokkenmøddings) of Denmark, a ruined hearth-stone and the bones of birds and animals of

\* The late.