lery of the mound-building Natchez in their less weight and their more acuminated form. A sketch from Squier's 'Monuments of the Mississippi Valley' indicates the size of the celts of the short-headed mound-builders. It was six by four inches, and weighed about two pounds. It is undoubtedly a finished celt. Upon a comparison of the Chiriquí celts with the obsidian knives from Mexico, no resemblance exists. Their closest analogy is with the hatchets from the stone mounds of Denmark. Dr. Troyon has observed that "man, placed under analogous circumstances, acts in an analogous manner, irrespective of time or place." We thus have analogous flints from wholly distinct parts of the world.* Whether these evidences indicate the once almost universal dispersion, antecedent to the historical epoch of whole nations of men, little elevated above the animals, whose remains have been preserved to us in strata often containing the débris of extinct mammalia, I must leave to this Society to determine. The antiquity of the human race in America, inferred from the existence of so many native traditions of the *rapports* which early man once bore to the extinct animals, is thus rendered more probable by the antiquarian evidences now afforded us.

I cannot close this paper without expressing my sincere regret that no osseous or cranial remains have been afforded us of the aborigines of Chiriquí and Panamá. Such proof can alone conclusively demonstrate the true affinities of nations, or the probable era when they existed. Mere archæological evidence is an uncertain guide.

In conclusion, I beg to remark, that at first sight the mere degree of chipping which a flint might have undergone at human hands might seem a trivial subject of discourse; but when we reflect upon the aphorism of Sir Thomas Browne, that "Time conferreth a dignity upon the most trifling thing that resisteth his power," the study of these carved stones from Chiriquí becomes fraught with considerations of the highest mental value.

REPORT OF A SUCCESSFUL SEARCH FOR FLINT-IMPLEMENTS IN A CAVE CALLED "THE OYLE," NEAR TENBY, SOUTH WALES, IN JUNE AND JULY, 1862.

By Gilbert N. Smith, Rector of Gumfreston.

(*Read at the Cambridge Meeting of the British Association*, 1862.)

This is a cave in the Mountain Limestone, with a wide entrance looking to the north-east at about 70 feet above the level of the valley beneath, up which the tide has recently flowed. The cave extends tortuously for 30 or 40 yards into the axis of a ridge which is a spur of the "Ridgeway," extending from Pembroke to Tenby, composed of the Old Red, the strike of which is east and west.

* Boucher de Perthes (*Antiquités Celtiques et Antédiluviennes*, 8vo, ii. 232) describes a series of analogous half-polished hatchets, as appertaining to the "transition"

Within, the cave is distinguished by chambers, alternating with narrow passages. The floor is generally not more than three feet deep, at which depth the limestone is met with as at the roof and sides. The entrance being conspicuous, it is often visited from curiosity, but has never before been carefully explored for the definite purpose of discovering works of ancient art. This search was prompted by the recent discoveries in France and at Hoxne, strongly seconded by the fact that above, on the Ridgeway, some six or seven barrows exist, which yielded to the reporter and others a few years since, not only cinerary urns, but also well-shaped flint arrow-heads.

So much by way of introduction.

The Section will be glad to learn that the search in this cave for flint weapons has been successful, and that the number found is seventy-three, including the identical lumps of flint which remained after the chips had been struck off, when from their reduced size they were no longer capable of yielding flakes sufficiently large to answer the destined purpose, whatever that might be.

Some of these specimens are of ordinary flint, but a good many are of a dull-green opaque chert. In size they vary from about four inches in length, downward. In general form they are almost identical with the flakes found at Red Hill. They were disseminated through the soil, but much the most thickly scattered at the mouth of a recess near the entrance, where the fabricator might be supposed to have seated himself to take advantage of the light.

Interspersed also through the soil, which in some places is almost black, were a great many bones; most of them those of ruminants, such as are now domesticated; some of them fish-bones, with the shells of edible mollusks; and some few unmistakably the remains of cave-mammals, such as *Ursus spelæus*, *Equus caballus*, *Hyæna spelæa*, and the teeth of some species of deer. Of this last animal, though apparently of a later age, there is one very fine front prong of an antler, which measures 11 inches, and the circumference $4\frac{1}{2}$ inches at the base, where there are long marks across as if done with some tool. To these works of ancient art and animal remains must be added some very modern articles; one of them the half of a Sheffield penknife, which, however, seemed to have been buried some years.

The conclusions and inferences which the author of this report has come to will be comprehended in replies to the following questions:—1st. What was the use of these flakes? 2. By what race of men were they fabricated? 3. Whence was the material derived?

First, the use of these flint, and chert flakes. The conviction ar-

period between the pre-historical and the Celtic nations. He describes one of these "celts" as "*une hache à gaîne ou demi-polie. Le tranchant l'est entièrement. La partie destinée à entrer dans la gaîne ne l'est pas.*"

In the British Museum collection of antiquities, an object, termed by Mr. Bollaert a "stone club," is preserved from Cocina, in Peru, near Noria. Mr. Gilbert Brandon has also preserved a "stone hatchet-blade used in the time of the Incas," from Cuzco; whilst amongst the Mexican antiquities presented by Lady Webster, is to be found a "*cincel de los Indios, encontrado en una sepultura,*"—where, is not stated.

rived at from a general view of them scattered upon the table, whether found in "the Oyle," at Red Hill, or elsewhere, is that these chips are the rejected refuse of the workshop. "On this spot," the thoughtful observer is disposed to say, "some weapons or implements were fabricated on some one or more occasions; and while the perfected ones were carried away, these inartistic though somewhat shapely fragments were left on the floor where they fell, and at length became buried, partly by the tramp of animals, and partly by accidents of daily human life." I feel sure of this conclusion, not only because most of the flint chips which we have in collections (as that handful, for instance, in the British Museum, which are said to have come from Arabia) are in reality nothing but primary splinters, which have never received a second perfecting stroke or trimming from the hand, but also from the following argument:—

Assuming these to be mis-shapen chips struck off on the spot, would there not be found among so many one or two perfected specimens of the tools or weapons assigned? This is very probable—almost certain; but not so probable as that some broken specimen of the tools, broken in the process of completion, would occur here and there. And so it proves in this case; for among these seventy-three specimens, there are eight broken pieces which have received much manipulation, and have heads elaborately rounded off, by removing small conchoidal scales. And further, the lumps of flint which have been split up as long as they would yield flakes strengthen the argument; for they, too, are left behind commingled with the rest of the abandoned fragments.

Secondly, by what race of men were these implements fabricated? The reporter, supposing these chips to be ancient, has no hesitation in ascribing them to the same natives of Britain by whom the tumuli on the Ridgeway above were raised, and who buried with their dead *the flint arrow-heads found within those mounds. No other supposition* obviously needs to be entertained.

But who were this race of men? The world say, "Britons, to be sure; these are British barrows, and those vases on your shelf are British urns that you obtained from them."

Well, let us suppose so for a while. But surely, if such is the case, these descendants of the British who live around "the Oyle" and the barrows here in Wales, and who certainly are in possession of much ancient literature, while the Saxons brought us next to none, would be able to inform us whether their ancestors ever used flint tools or weapons in early days, especially as the records relate to the very first possession of the island by the race of Adam. Led by this thought, I have corresponded with the ablest Welsh archæologists, and have been favoured with full replies; but all deny that their forefathers ever used anything but bronze and iron for war or in the chase, but say that there is a notice or two in their very early documents of the use of flint knives for sacrificial purposes only. This admission, however, proves nothing; for other races of men,—the Jews, for instance,—while they certainly had tools of metal, uni-

formly employed flint knives in sacrificing animals, and for circumcision. From this absence of all reference to flint or stone weapons in the earliest writings of the Welsh, it seems to follow, either that the writings cannot be depended upon to supply precise information, or that the men who made the flint weapons were of another race, possibly much earlier inhabitants of the island.

Thirdly, whence was the material obtained? There are no flints in the formations and strata of the vicinity,—that is certain. But then they may be picked up any day by a careful search on the shore; and so may granite boulders and worn fragments of igneous rocks.

The chert of these implements is peculiar. It is of a dull, opaque green colour, full of minute grey spots. I do not at present know of any like it in these parts; but one lump, tide-borne to the coast, would have supplied all required for the sixteen fragments of this kind found.

CORRESPONDENCE.

Age of the Blackdown Greensand.

Sir,—The question as to the true position in the Greensand series of the "Whetstone" deposits of Blackdown, in Devonshire, is one which, so long as it remains uncertain, must naturally force itself upon every geologist who either studies or collects the fossils of the Greensand formation; and, therefore, although this question is neither new nor of universal importance, I trust that I may be permitted to refer to it in the present instance.

The question is simply this—Are these (Blackdown) deposits equivalent to the Upper Greensand, to the Gault, or to a portion of the Lower Greensand? or do they represent the whole of these in an exceptional form?

In parts of Kent or Surrey, where the Lower Greensand strata rest upon Weald clay, and are everywhere separated from those of the Upper Greensand by an intervening bed of Gault, such a question would be readily determined. But at Blackdown the case is different, the Greensand being there found to rest upon red marl, and the Gault either absent or imperfectly developed; so that, in default of the usual direct evidence, the geologist must be content with such indirect conclusions as can be drawn either from the general appearance of the deposits or from a comparison of the organic remains with those contained in other portions of the Cretaceous series. Whether or not this last method has been carried out by those who consider the Blackdown deposits to be of Upper Greensand age, I have not hitherto been able to ascertain.

In the British Museum all the Blackdown fossils are marked as Upper Greensand, in the Museum of Practical Geology, more cautiously, as Greensand; while in both they are ranged side by side with fossils from Warminster,—a locality where the Upper Greensand is well defined by the presence of the Gault. Now, supposing Upper Greensand deposits to prevail equally at Blackdown and Warminster, one might expect to find a considerable resemblance between the fossils from these two localities; yet, on comparing the specimens, the fact proves itself to be quite the reverse; for, at a rough computation, I find that out of 156* Blackdown

* These and the following numbers refer to Mollusca only.