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Contributors

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THE

"FLINT IMPLEMENTS"

FROM DRIFT,

NOT AUTHENTIC.

BEING A REPLY TO THE GEOLOGICAL EVIDENCES OF THE

ANTIQUITY OF MAN.

By NICHOLAS WHITLEY,

One of the Honorary Secretaries of the Royal Institution of Cornwall.

London:
LONGMAN, GREEN, LONGMAN, ROBERTS, AND GREEN.

Truro:
JAMES R. NETHERTON.

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Jon. Rashleigh

Oct. 11. 1876

from the author.

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PREFACE.

THIS Paper was prepared for, and inserted in, the 2nd Number of the Journal of the Royal Institution of Cornwall; and is now reprinted in a separate form by permission of the Council. I have therefore been enabled to recast and revise the original materials,—to embody such additional facts as have since come to my knowledge,—and to enlarge on some of the topics with greater freedom of thought than would be considered suitable to a scientific Journal.

The subject discussed in these pages is one which pressed itself on my notice in the ordinary pursuit of my duties as a Surveyor. I observed that the patches of Drift so abundant in the sheltered bays of the coast-line of Cornwall and Devon, generally contained fractured flints, and long thin angular flakes of flint, similar in every respect to those which have been called arrow-heads, and flint-flake knives; and which have been assumed to be the work of savage man; and as my duties took me constantly into the field, over a wide area, I was enabled to examine the scattered beds of flint gravel, from the Isles of Scilly to the coast of Sussex, and in various parts of the valley of the Thames; and wherever the detritus from the chalk or the flint-gravel existed, there, at the base of the superficial stratum (the "warp-drift" of Trimmer) the same split and angular flints were found.

The evidence presented by the natural sections of

these beds appeared to prove so conclusively that the flint-flakes geologically belonged to the stratum in which they were embedded, that I extended my survey to the gravel beds of the Somme, where "flint-implements" of another type were said to have been found. In the following pages I have embodied the facts thus obtained, and the inferences which appear to be fairly deducible from them; and I have endeavoured to show that these fractured flints have been formed by natural causes, and not by the hand of Man, and therefore afford no proof whatever of that remote antiquity now claimed for the human race.

The believers in the authenticity of the "Flint Implements" have brought forward a large amount of evidence to show that the chipped flints have been found *in situ*, deeply buried in flint gravel. On this point there can be no doubt whatever; but to the more important question, Are these fractured flints manufactured tools? no satisfactory answer has been given, and the affirmative has been rather assumed than proved. Sir Charles Lyell, in his work on the "Antiquity of Man," advances no evidence whatever that the flints are sculptured tools, but relies solely on an authoritative *ex cathedra* utterance of Professor Ramsay; and in this respect he is followed by Dr. McCausland, in his "Adam and the Adamite"; and also by the author of "The Stream of Life on our Globe." Emboldened by the reliance placed on his opinion, the learned Professor reiterates his opinion in more imperative language in his "Physical Geography," and adds, "*I say this with authority.*" * I have not relied in these pages on that Authority which is above every other, and to which it

* Page 151, 2nd edition.

is our highest wisdom reverently to bow; and certainly we cannot submit to the unreasoning dictation of one learned Professor, however high his attainments, in a question of pure science, on which his compeers are still divided in judgment.

It cannot be said that the discoveries on the banks of the Somme have tended to advance our knowledge of Geology; on the contrary, they have for the present involved the study of the Quaternary deposits in great difficulties. The division of angular and tumultuously gathered gravel, into *High level* and *Low level beds*, introduced the element of enormous time, and, contrasted with former deductions, threw the study into inextricable confusion. And when, from the assumed marks of chipping on the fractured flints, there followed the introduction of man,—living in large communities, half buried by mighty glaciers, or drowned by mightier debacles, and surrounded by herds of huge and ferocious beasts, without having any adequate weapons of defence,—the former chaos became a confusion worse confounded; and we are now looking, with a feeling between hope and despair, to the promised Paper of Mr. Prestwich, "On the Quaternary beds of the Thames Valley," to throw a gleam of light on the darkening shades of this gloomy picture.

Under these circumstances, the obvious course is to fall back on former labours and deductions; and the object of this Paper is to examine the geological and antiquarian evidence on which the "*First Stone Period*" of Lyell is founded, and to endeavour to dispel the false glare with which an enthusiastic antiquary has invested the subject; and further, to show that the gravel beds of St. Acheul and Menchecourt are portions of a wide-spread superficial deposit, the study

of which has been ably commenced by Sir Roderick Murchison, in his Paper "On the distribution of the Flint Drift of the South East of England;" * and his theoretical inferences have been confirmed by Mr. Prestwich, in his account of the Sangatte Drift.†

We have been lured from the good work already done, by the false find on the Somme; and in the excitement of the hunt we have overrun the scent,—the dogs are at fault,—and I venture to suggest that the only proper course is to—"try back."

Penarth, Truro, January 23, 1865.

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* Quarterly Journal of Geological Society, No. 29, p. 349.

† Ibid, p. 274.

THE "FLINT IMPLEMENTS"

FROM DRIFT,

NOT AUTHENTIC.

RECORDS of the earliest races of men must be sought for, not in the pages of the historian, but in the relics which they have left of their habits and pursuits, in their domestic and war implements, in their rude drawings, their sculpture, and the remains of their habitations.

The Bayeux tapestry sets before us a more vivid conception of the life and employments of our Saxon and Norman forefathers than history furnishes; the drawings on the Egyptian tombs, and the sculptured slabs of the Assyrian palaces, show the details of daily life, of organized warfare, of victory and captivity; and we are mainly indebted to the researches of antiquarians for the knowledge we possess of the men who, in præ-historic times, inhabited western Europe; and this knowledge has been obtained by a patient investigation of the peat-mosses and shell-mounds of Denmark; the numerous lake settlements of Switzerland; the artificial islands of Ireland: from the alluvium of the valleys, and the stone monuments and hut-circles of the hills. And these memorials of a perished race have so multiplied in our museums, and bear such obvious evidence of human workmanship, that we can

now draw a tolerably faithful picture of the pursuits and the dwellings of the ancient Celtic tribes, who, in early ages, dwelt on the western borders of Europe.

The ages of *Stone*, of *Bronze*, and of *Iron*, have become recognized periods of human suffering and enjoyment; and it had generally been concluded, that human degradation reached its lowest point, when the savage, who lived by the chase, chipped and ground and polished his flint chisel or axe, to kill and flay the animals he hunted. This duration of savage life has been generally considered to be within the limits of the chronology of the Hebrew scriptures as defined by Archbishop Usher; or, at least, within the more extended period deduced from the Septuagint version. Such was the conclusion which geologists, archæologists, and divines, had tacitly adopted as to the duration of man's rule upon earth.

But we are now told by many *savants* that there is geological evidence of the existence of a race of men who lived so far back in a remote antiquity, that no scale of time can be correctly applied to measure the distance,—that it may have been from 50,000 to 100,000 years ago; and that so savage and untutored were these ignoble præ-adamite men, that flint arrow-heads, flint-flake knives, and flint axes, were the implements they used; and these so rough in their construction, that they were only *chipped* into form, and in no single case *ground* or rubbed to a point.

These flint implements have been mainly found in the gravel beds of the valley of the Somme in Picardy, especially near Abbeville and Amiens; and upwards of 1000 flint axes have been collected and lodged in the museum of M. Boucher de Perthes at Abbeville. In England similar fractured flints have been found at

Hoxne in Suffolk, Gray's Inn Lane, Ilford, Maidstone, Bedford, and many other places ; and, being found in beds of flint gravel associated with the bones of mammalia, most of which are of extinct species, these remains are supposed to be indicative of a geological age bordering on the closing period of the Northern Drift. If, therefore, these fractured flints are really of human workmanship, man must have existed at the time when the majestic mammoth trod the plains of France and England ; when the rhinoceros crunched in the forests, and the hippopotamus wallowed in the rivers ; and with a few flint-flakes for arrow-heads, and some chipped flints for weapons, man held his own, not only against these, the most massive, but also against the most ferocious of animals,—the hyæna, the cave lion, and the cave bear.

A careful inspection of the chipped flints, and of the gravel beds from which they have been extracted, has induced our leading geologists and antiquaries to pronounce decidedly in favour of the human workmanship of the flints, and of the remote antiquity of the beds in which they are found.

Mr. Prestwich has maintained these opinions in papers read before the Royal Society.* Mr. John Evans, of the Society of Antiquaries, has advanced the same views in two papers in the Archæologia. And Sir C. Lyell, in an octavo volume of 506 pages, has gathered the geological evidences of the antiquity of man,† and infers that the chipped flints are the work of savage man, and that the geological age of the gravel

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* Proceedings of the Royal Society, 1859, and Phil: Trans: 1860 and 1861.

† The Geological Evidences of the Antiquity of Man.

beds and the contained mammalian remains, carry back his existence to a very remote period. Sir Charles, indeed, appears to go much further, and to advance a speculative opinion on the origin of man, which is contrary to our most cherished belief. He says:

"But had the original stock of mankind been really endowed with such superior intellectual powers, and with inspired knowledge, and had possessed the same improvable nature as their posterity, the point of advancement which they would have reached ere this would have been immeasurably higher. We cannot ascertain at present the limits, whether of the beginning or the end, of the first stone period, when Man coexisted with the extinct mammalia, but that it was of great duration we cannot doubt. During those ages there would have been time for progress of which we can scarcely form a conception, and very different would have been the character of the works of art which we should now be endeavouring to interpret,—those relics which we are now disinterring from the old gravel-pits of St. Acheul, or from the Liége caves. In them, or in the upraised bed of the Mediterranean, on the south coast of Sardinia, instead of the rudest pottery or flint tools, so irregular in form as to cause the unpractised eye to doubt whether they afford unmistakeable evidence of design, we should now be finding sculptured forms, surpassing in beauty the master-pieces of Phidias or Praxiteles; lines of buried railways or electric telegraphs, from which the best engineers of our day might gain invaluable hints; astronomical instruments and microscopes of more advanced construction than any known in Europe, and other indications of perfection in the arts and sciences, such as the nineteenth century has not yet witnessed. Still farther would the triumphs of inventive genius be found to have been carried, when the later deposits, now assigned to the ages of bronze and iron, were formed. Vainly should we be straining our imaginations to guess the possible uses and meaning of such relics—machines, perhaps, for navigating the air or exploring the depths of the ocean, or for calculating arithmetical problems, beyond the wants or even the conceptions of living mathematicians.

The opinion entertained generally by the classical writers of Greece and Rome, that man in the first stage of his existence was but just removed from the brutes, is faithfully expressed by Horace in his celebrated lines, which begin—

Quum prorepserunt primis animalia terris.—Sat., lib. i., 3, 99.

The picture of transmutation given in these verses, however severe and contemptuous the strictures lavishly bestowed on it by Christian commentators, accords singularly with the train of thought which the modern doctrine of progressive development has encouraged.

'When animals,' he says, 'first crept forth from the newly formed earth, a dumb and filthy herd, they fought for acorns and lurking-places with their nails and fists, then with clubs, and at last with arms, which, taught by experience, they had forged. They then invented names for things, and words to express their thoughts, after which they began to desist from war, to fortify cities, and enact laws.' They who in later times have embraced a similar theory, have been led to it by no deference to the opinions of their pagan predecessors, but rather in spite of very strong prepossessions in favour of an opposite hypothesis, namely, that of the superiority of their original progenitors, of whom they believe themselves to be the corrupt and degenerate descendants." *

It must be admitted that the mind revolts at such deductions of science as these ;—instinct, reason, cherished thoughts of early greatness, start up in alarm and disgust to protest against such an origin of our race. Can it be that the Creator, who made every beast of the field perfect of its kind, and endowed it with instinct and faculties to enable it to reap all the enjoyment of which its nature was capable, left in man alone His work unfinished ; placed him a dumb and filthy beast on the earth, to grope his way through innumerable ages of darkness to that intellectually high position which he was destined to attain ? thus placing him, who was made "a little lower than the angels" in rank, beneath the brutes in privilege.

The elephant *(primigenius)* was created a noble brute, with magnificent curved tusks for ornament and defence, long soft shaggy hair to protect him from the cold, and with an instinct so perfect, that it ministered

* Antiquity of Man, p. 378.

to all his wants and enjoyments, and almost bordered on reason, but to him far better than reason,—"What can choose can err." He walked the earth the monarch of all he surveyed; and with his cool aristocratic eye, must have looked down with ineffable contempt on the dumb and filthy herd of men by whom he was surrounded, and must have felt the full force of that embodiment of Byronic pride, which says,

> "For not being altogether of such clay,
> As rots into the souls of them that I survey."

Could this have been so? It is no answer to say, our pride or our prejudice starts up in alarm to protest against it. It is worse than useless to array a theological dogma, or a well-formed syllogism, against a geological fact. It will not be considered a sufficient answer to say that the whole analogy of nature is against such a supposition,—from the antelope which bounds over the plains to the gnat which dances in the evening sunshine, ten thousand witnesses might be called to show that all and each were fitted from the first for their sphere of existence, and had their fill of enjoyment in the exercise of all their faculties. But we are now told that the analogy fails in man—every link of the long chain of animated nature was made perfect, except the last and the best. But the proofs of the great antiquity now claimed for man have been drawn from geological and archæological evidence, and its truth must be determined by a more searching investigation of the gravel beds, and a more minute study of the supposed marks of workmanship on the fractured flints. I purpose, therefore, in this paper, to examine the geological evidences on which the *First*, or *early Stone period*, of Sir C. Lyell is founded, and to discuss

the marks of design which the flint "implements" are said to bear; and I shall endeavour to shew :—

1st.—That some of the so-called flint implements have been undoubtedly formed by natural causes, and not by the hand of man.

2nd.—That there is not sufficient evidence to prove that even the most perfect flint "implements" are manufactured tools, but that the contrary opinion is the more probable.

And I shall add some new facts which may help to elucidate this last, and as yet ill understood chapter of the great stone book of nature.

The "implements" are conveniently classified by Mr. Evans as follows :—

1.—Flint-flakes, apparently intended for arrow-heads or knives.

2.—Pointed weapons, some probably lance or spear-heads.

3.—Oval or almond-shaped implements, presenting a cutting edge all round.

1ST.—THE FLINT-FLAKES.—It is important, first, to observe that the undoubted flint arrow-heads of the recognized Stone age, which preceded that of Bronze, are very carefully chipped into form, barbed and pointed, of uniform workmanship, and of a size adapted to the purpose for which they were designed. An inspection of the large collection in the British Museum convinces the mind at a glance, that they were made by man. But the rough flint-flakes, called arrow-heads, of the *First stone age* of Lyell, are of all sizes, seldom pointed, never barbed, having a conchoidal fracture on one side, and an angular one on the other; and they are so rude in form, and so deficient in the evidences of design, that the judgment at once

hesitates to pronounce them of human workmanship.

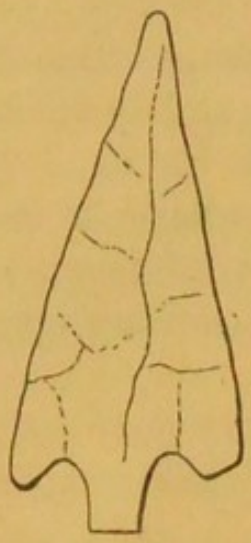

Fig. 1.

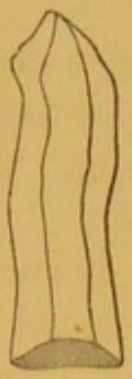

Fig. 2.

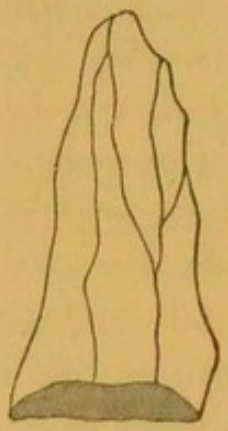

Fig. 3.

Fig. No. 1, is a drawing of a flint arrow-head of the *Second stone age*, from Ireland, in the British Museum ; Nos. 2 and 3 are flint-flakes, natural size, called arrow-heads, from Redhill, in the collection of the Society of Antiquaries, and of the *First stone age* of Lyell.

During the past few years I have obtained a large number of these flint-flakes from the upper part of the drift beds around the coasts of the West of England, and which beds have been known to geologists hitherto by the name of "*Raised Beaches.*"

From the drift on the shore of Croyde Bay, North Devon, I have, at various times, collected a large quantity of these flakes ; and on a further examination of the bed last summer, I obtained as many flakes and split flints as weighed 21 lbs. Along the coast section, these beds are found to extend many miles on both sides of the estuary of the Taw, and the shattered flints are found sparingly in them ; but in that part of Croyde Bay, midway between the Limekiln and Baggy Point, they are found most abundantly ; and at a distance of seventy miles from the nearest chalk hills.

At Stepper Point, on the western side of Padstow Harbour, I discovered similar flakes, in the same geological position. In other "Raised Beaches" these flints occur, and they are even found at the Scilly Isles and Guernsey. Sir Henry De la Beche, in his Report, writing on these Raised Beaches, remarks that the appearance of these flints is not of easy explanation on the Raised Beach theory,* but supposes they might have been brought there by people who employed shaped flints in their weapons. Gravel, with chalk flints, also occurs in patches of drift along the south coast of Wales, and on the Silurian rocks on the western coast of the Principality.

These Raised Beaches have formed the subject of several papers in the Transactions of the Royal Geological Society of Cornwall, and are recognized as ancient beaches by Sir H. De la Beche in his Report, by Sir John Herschel in his Physical Geography, and by Professor Ramsay in his lately published Lectures on the Physical Geography of Great Britain. But a minute examination of these deposits has led me to the conclusion that they are rather portions of sea bottoms than beaches,—that in fact they are the remnants of the unexcavated patches of Northern drift, which once choked up the western bays.

I advanced this opinion more than ten years back, in a paper read before the Geological Society of Cornwall, and printed in their Report; and in 1856 I wrote in reference to the oscillation of the western land: "These (submarine) forests appear to have grown on the beds of gravel, clay, and silt, with which the coast was encumbered, and the bays choked up at the close

* Geological Report on Cornwall, &c., p. 429.

of the drift period. Judging from the height at which beds of drift gravel are found on hill ranges inland, most parts, if not the whole, of Great Britain must have been submerged at that time at least 1000 feet below its present level, the sea covering the greater portion of the country, when the higher parts of Wales, and the Tors of Dartmoor, would form islands in this then arctic ocean. On the re-elevation of the land, the whole coast line appears to have been covered with beds of drift, which was more especially lodged in the shallow bays, forming plains, which became covered with lakes and forests, much like the present surface of the drift-beds of northern Europe ; and after the elevatory force was expended, a collapse took place, by which the upraised land gradually subsided from 12 to 20 feet, when these forest plains were again submerged, and the bays were re-excavated by the heavy Atlantic breakers, and the drift-beds swept from the coast by the tides ; except that here and there, in the more sheltered nooks, patches of drift were left clinging to the rocks, which have been often described under the dubious name of 'Raised Beaches.'" *

I am therefore advancing no new opinion of mine to support my present enquiry, but one which I had arrived at before the fractured flints were recognized as ancient tools ; and I now proceed to adduce the evidence I have obtained, to show that these "Raised Beaches" are portions of Northern Drift.

1.—The fine red sand of which these beds are mainly composed is siliceous, whilst the present beaches on the north coast of Cornwall and Devon are formed of calcareous sand,—comminuted sea shells.

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* The Physical Geography of the south-western counties of England, Bath and West of England Agricultural Journal, Vol. 4.

2.—The water-worn pebbles and boulders in the lower portions of these beds have been washed from the back country, and may be traced to their parent beds, and were not cast up by the sea. Thus, at Par the boulders are of granite, derived from the granite boss, inland. At Newquay, and on the Wadebridge river, the boulders are of elvan, and can be traced to the elvan courses on the higher ground. At the embouchure of the Taw, the boulders are carbonaceous grits, the ruin of the beds through which the river flows in the higher part of its course. And at Plymouth, the pebbles of the "Raised Beach" are derived from the altered rocks which border Dartmoor, and from the granite of the moor.

3.—Some of the boulders, particularly at the mouth of the Taw, are composed of granite, porphyry, and trap, and are of foreign origin. Near Saunton, at the base of these beds, is a large egg-shaped polished boulder of granite, with rose-colour crystals of felspar, weighing many tons. Thus the materials of these beds agree with the description of the Northern Drift by Sir C. Lyell, who says :—"the bulk of the mass in each locality consists of the ruin of subjacent rocks, with fragments brought from a distance." *

4.—Stream tin has been found in some of these beds, similar to that in the inland valleys.

5.—The bones of extinct mammalia have been found in the often described Plymouth "raised beach," † similar to those in the once called "raised beach at Brighton."

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* Manual of Geology, p. 121, Ed. 4. † Trans. of Brit. Association, 1841, p. 62.

6.—The boulder clay underlies the drift-beds at the mouth of the Taw. The section of it under Heanton Court, was described by me to the Cornwall Institution some years back; and I particularly noticed that the egg-shaped boulders with which it is loaded, are pitched upright in the clay, with their small ends downwards, as if they had descended like a parachute through deep water into the soft recently deposited clay. On further examining the coast line last summer, I found at low water, pitched in the clay, extending far seaward of the Northam pebble-ridge, long slender boulders of blue carbonaceous grit which may be seen standing upright through the thin superficial covering of shell sand, like the naked ribs of a wrecked vessel which is imbedded near.

I have thus good grounds for stating that these "Raised Beaches" have been misnamed, and hitherto misunderstood,—that they are, in fact, patches of Northern Drift, and bear all the legitimate marks of their origin.

It has been said that the drift-beds are not found in the south-west of England. But can it be, that the ancient schistose rocks of Devon and Cornwall, intimately related as they are in origin, structure, and strike, with similar deposits in Wales, Brittany, and on the Rhine, did not partake of that depression of the segment of the earth's crust, which sank Wales full 1500 feet in the glacial sea? The ancient rocks of Devon and Cornwall must have sunk with their deep-seated relatives of Wales; and during their submergence, the currents of the glacial sea brought the granite of Scotland or Scandinavia, and the flints of the east of England, to mingle with the gravel beds and local detritus which constitute these sea-bottoms.

The *Flint-flakes* of Croyde Bay have a flat or slightly conchoidal fracture on one side, and an angular one on the other, on which, at least two, and often more, facets appear; there is also, in most of the specimens, a bulbous or conical projection at the flat side of the largest end, and which Mr. Evans considers a mark of human workmanship.* The Fig. No. 4 shows the general section of these beds.

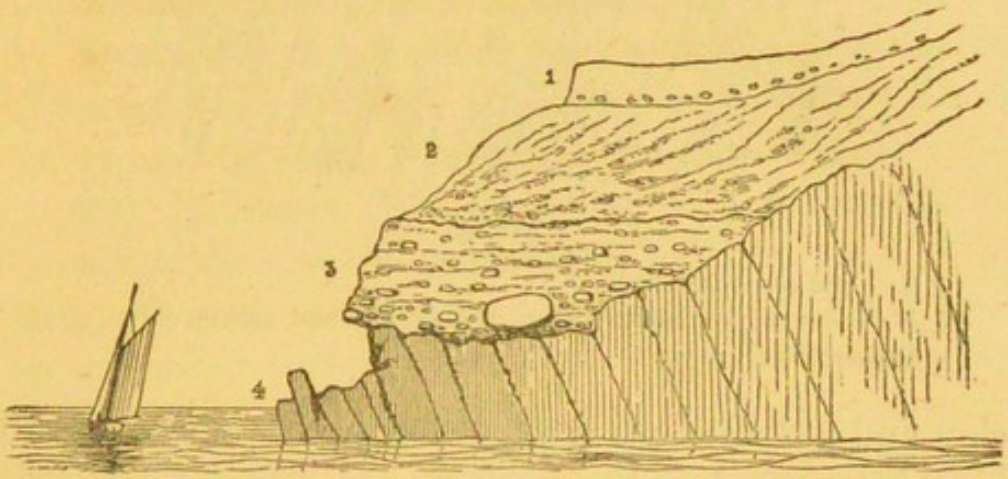

Fig. 4.

1 Soil with flint-flakes at base. 2 Head of local rubble.
3 Raised beach. 4 Devonian rocks upturned.

Near Appledore the surface of the upturned contorted shale is very irregular, and the hollows are filled with drift, composed of brown siliceous sand and loam, in which pebbles of sandstone and quartz are distributed, having their longest axes parallel to the irregularities of the surface of the underlying shale, Fig. 5; and in this respect precisely similar to the section which the upper part of the gravel bed presents at St. Acheul, see Fig. 11, p. 25.

Further west, beyond the "Westward-ho" Hotel,

* Archæologia, Vol. 39, p. 76.

in the cliff, are large masses of boulders mixed with

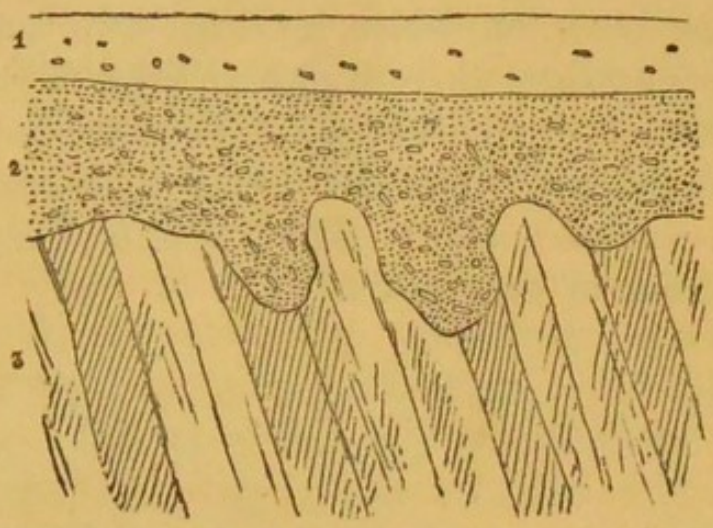

Fig. 5.

1 Soil and some few flints.
2 Fine brown river sand, with pebbles of grit and quartz.
3 Carbonaceous shale.

clay and red siliceous sand, covered with a head of rubble, above which is the ordinary soil, where a few shattered flints are found.

It has been said that the flint-flakes of Croyde are probably the refuse chips of an ancient manufactory of flint arrow-heads and knives. I can discover no evidence to support such an opinion ; but, on the other hand, the evidence that these fractured flints are formed by natural causes, appears abundant and conclusive. I will produce my witnesses and their evidence in detail.

1.—*In Plan* these flakes are most numerous opposite the mouth of a small transverse valley, through which they appear to have been washed at the drift period, and they thin out in numbers along the coast section on each side of this opening in the hills.

2.—*In Section* the flakes are found about 18 inches

below the surface, in a regular stratum, and bear every mark of having been deposited there with the bed in which they are found.

3.—There is a *gradation in form*, from the very rough fracture of the flint, so imperfect that it cannot be ascribed to human hands, up to the most perfect "arrow-head."

4.—There is in the best formed "arrow-heads" a *gradation in size*, from one so minute that it could not possibly have been used as a weapon, up to the full sized "arrow-head," which again (in other places) passes into the "javelin-head" and "spear-head." Fig. 6 shows this gradation, and represents the actual size of the flakes from Croyde.

In a drawing, we are so accustomed to view objects on a smaller scale than nature, that these outlines of the flakes do not impress the mind so forcibly as a sight of the originals. It is utterly impossible for any sane man to ponder over the actual flakes, and to come to the conclusion, that such minute fragments were ever made by man to be used as arrow-heads.

5.—*The good and the bad are all mingled together.* Some are very perfect, and bear all the marks of chipping said to be indicative of human skill; my best specimens being superior to those figured from Redhill, in the Museum of the Society of Antiquaries; others are much rougher in form and often curved; and the whole are intermixed with ordinary flakes and angular split flints. But the marks of chipping are often most perfect on those broad flakes not adapted for arrow-heads. The more these are chipped, the less they indicate design. This pell-mell mixture of all kinds of flakes is perfectly consistent with their being formed by natural

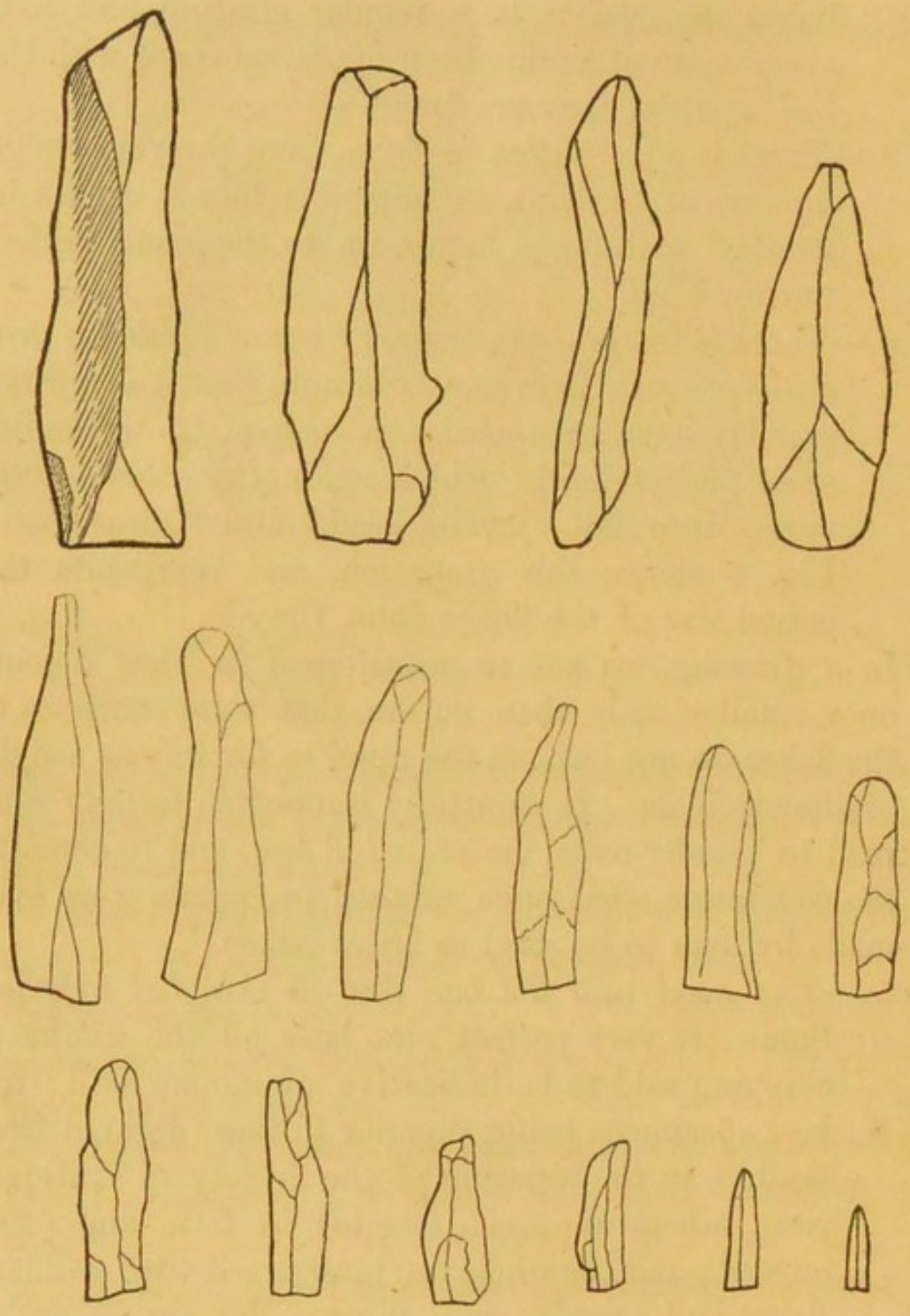

Fig. 6.

causes ; but utterly incompatible with their manufacture by man. The most degraded savage would not cast away his perfectly-formed implements with the refuse chips.

6.—*The flakes are in form not adapted for arrow-heads.* The point is often the most defective part; the conical bulb at the lower end, instead of being an evidence of design, would be an impediment in fastening the flake to the shaft, and the curved form of many of them would divert the arrow in its flight. As arrow-heads, there is rather evidence of misdesign than otherwise.

7.—The flat sunny terrace on the shore of Croyde bay, might be a convenient place for a savage to select for his manufactory (!) except for the important consideration that the raw material is at least seventy miles away; but I have found these same "arrow-heads" on the slope of the bold headland of Trap rock at Stepper Point, near Padstow, where the ground is so steep that you hold on to tufts of grass to prevent your slipping into the sea. No savage would ever sit there, amid the spray of the heavy surf of the Atlantic, to chip his flint tools into form; unless indeed he had his imagination fired by some primitive Walter Scott, and felt that

> "If a path be dangerous known,
> The danger's self is lure alone."

8.—*These Flint-flakes are the result of the natural fracture of the flint nodule.* It has been said, that in a flint, "there is no tendency to break in one direction rather than in another." * My observation leads me to quite a contrary opinion. The first fracture of a flint nodule is generally in the direction of its longest axis, and the flake comes off with a sharp cutting edge on all sides. I have a

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* Geologist, Vol. 4, p. 322.

collection of split flints, many of which, by one longitudinal fracture, assume the form of arrow-heads and almond-shaped flint tools, with a cutting edge all round. I gathered from a heap of flints broken for the roads of Menchecourt, most perfect flint-flake knives, and small delicately-formed "arrow-heads," with a flat and an angular side, and a curved form, which appeared to have come off parallel to the outer surface of the nodule, from which they were undesignedly struck—of the most convincing forms. I have flint nodules branching in all directions ; and all the fractures are longitudinal, and all the points run into the arrow-head form. I have placed flints into the fire and suddenly cooled them, and many of the flakes thrown off were sharp well-formed arrow-heads.

Wherever angular flint gravel is found, there the tendency of the flake to assume the arrow-headed form is most obvious. I have examined and studied the Drift-beds of the West of England, the gravels of the valley of the Thames, the flints of the Dorset chalk and of the South Downs, the chalk cliffs and shingle from Brighton to Folkstone, and the gravel-pits and surface flints around Abbeville and Amiens ; and I find the split and shattered flints with a tendency to run to the arrow-headed form and with a sharp-cutting edge, everywhere. Even those who advocate the manufactured character of the flakes, are constrained to confess their doubts on this point. Mr. Evans, with great fairness, says, "as they (the flakes) are produced most frequently by a single blow, it is at all times difficult, among a mass of flints, to distinguish those flakes formed accidentally by natural causes, from those which have been made by the hand of man ; an experienced eye will indeed arrive at

an approximately correct judgment; but from the causes I have mentioned, mere flakes of flint, however analogous to what we know to have been made by human art, can never be accepted as conclusive evidence of the work of man, unless found in sufficient quantities, or under such circumstances, as to prove design in their formation by their number or position."*

That some of these flint-flakes were used by savage men can now be neither affirmed nor denied; it is a matter of conjecture only. But the fact of their being sometimes found in barrows near sepulchral urns, and in the kist-vaen, leads to the inference that they were so used by the Celtic men who raised the monumental heap, or preserved the bones of their friends in stone chests; and thus this class of fractured flints is rather connected with the Celtic tribes than with "præ-adamite" man. "In the tumuli in Wiltshire, the stone arrow-heads are usually found with bronze daggers. In Derbyshire, stone implements are found not only with bronze, but with iron. Thus in a barrow opened at Minninglowe by Mr. Bateman, an upper deposit of two skeletons was accompanied with an urn, a flint arrow-head, a small piece of iron, and part of a horse's bit."†

I should here state that some traces of man's presence were found with the flints at Croyde. In the same stratum with the flakes, there protruded a bone from the cliff, which, on examination, appeared to be the arm bone of a man; and nearer to the site of the flakes, I found a piece of very rough pottery, evidently part of a British cinerary urn. And on carefully search-

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* Geologist, Vol. 4, p. 360.

† The Celt, the Roman, and the Saxon, p. 70.

ing the excavated loam, I discovered a beautifully-formed flake of rock crystal, or coarse glass, with sharp cutting lancet edges and bulbous lower end, and with curved lines of fracture on its surface, very similar to the surface markings on the flint-flakes. It was not *in situ*, and might have been part of a champagne bottle broken by pleasure parties who frequent the spot; but it is at least valuable, as showing that silica in its more pure state, has the same fracture, and assumes the same form, as in its more imperfect state of flint.

But if these faint traces of man's presence had any connection with the flakes of flint, and even assuming that they were manufactured arrow-heads, the cinerary urn would limit their antiquity to the Ancient British period. Or taking another view, that the flakes were formed by nature, and afterwards used by man: it affords no more evidence of the existence of præ-adamite man, than if a peasant girl of Picardy were to adorn herself at the present day with a necklace made with the globular fossilized sponges from the gravel pits of St. Acheul.

The other flint implements are classed and described by Mr. Evans, as

2.—Pointed weapons, some probably lance or spear heads.

The figures 7 and 8 are illustrated specimens obtained by me from St. Acheul.

3.—Oval, or almond-shaped implements, presenting a cutting edge all round, from St. Acheul.

But this distinction of two classes is rather arbitrary than real, and Mr. Evans truly observes that "there is so much variety in their forms, that they

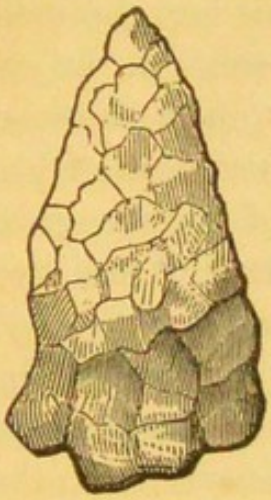

Fig. 7.

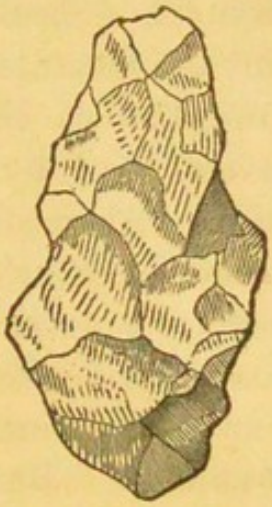

Fig. 8.

Pointed weapons of Class 2; scale one-fourth—a good and a bad specimen.

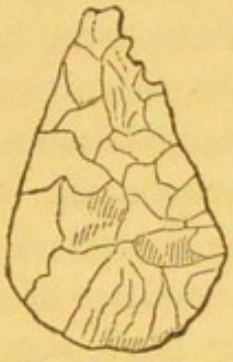

Fig. 9.

Fig. 10.

Oval or almond-shaped weapons, Class 3; scale one-fourth—a good and a bad specimen.

might be said to blend or run the one into the other." * I shall therefore consider them together.

The chief sources whence these implements have been obtained, are the gravel beds of the valley of the Somme in Picardy, especially the pits at Menchecourt, and Moulin-Quignon, near Abbeville; and St. Acheul near Amiens. It is from these gravel beds, principally the first, that M. de Perthes has furnished his Museum,

* Archæologia, Vol. 39, p. 75.

and from St. Acheul Sir C. Lyell has obtained most of the flint implements which he relies on as evidence of the Antiquity of Man. I examined the stone implements collected by M. Boucher de Perthes in the Museum at Abbeville. Those of the recognized Stone Age, from Denmark and Switzerland, are ground and polished to a cutting chisel edge; and they bear so obviously the marks of human workmanship, that the mind at once assents, without any misgivings, to their origin and use. But it is far otherwise with the chipped flints from the Somme gravel beds, the great mass of which are so rough in fracture, and so rude of form, that the judgment, unbiassed by the new theory, refuses to pronounce them "Manufactured Tools;" and well may Sir C. Lyell say of these flint tools, that "they are so irregular in form as to cause the unpractised eye to doubt whether they afford unmistakable evidence of design;" * and again:—"Between the spear-head and oval-shapes, there are various intermediate gradations, and there are also a vast variety of very rude implements, many of which may have been rejected as failures, and others struck off as chips in the course of manufacturing the more perfect ones. Some of these chips can only be recognised by an experienced eye as bearing marks of human workmanship." †

It cannot therefore be wondered at, that when the Antiquity of Man, founded on these dubious fractured flints, was first proclaimed by M. de Perthes, the mass of Geologists and Antiquaries, French and English, refused to believe in such "manufactured tools." The evidence was before them in two large octavo volumes, illustrated with numerous drawings, but none were then

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* Antiquity of Man, p. 379. † Ibid., p. 118.

convinced; all turned away in doubt and distrust. Nor can it be said that the discovery was overlooked and not investigated. Rigollot's account of the "*Instruments en Silex trouvés à St. Acheul*" was discussed by the Geological Society of France, in January, 1855, and discredited. Yet, within the past three years, many of the leading men of science have read their recantation, and avowed their belief that the implements are man-made. But we look in vain for the evidence which would justify such a reversal of opinion.

The validity of this evidence is, in fact, the turning-point of the whole question—the issue of the whole debate; and it is curious to see how little has been said on the evidence of design—on the marks of manufacture on the flints. Sir C. Lyell, indeed, says, "as much doubt has been cast on the question, whether the so-called flint hatchets have really been shaped by the hands of man, it will be desirable to begin by satisfying the reader's mind on that point." * But in a volume of 506 pages, this vital point is neither discussed nor proved. Sir Charles ransacks the delta of the Nile for evidence of Man's Antiquity in vain, searches deep into the beds of the Ganges, explores the banks of the Mississippi, and gives twelve pages on the "Parallel Roads of Glen Roy;" but the thing which he had undertaken to prove, is left destitute of proof, and the mind of the reader cannot be satisfied by the quotation of an off-hand authoritative utterance of Professor Ramsay, who says: "For more than twenty years, like others of my craft, I have daily handled stones, whether fashioned by nature or art; and the flint hatchets of Amiens and

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* Antiquity of Man, p. 112.

Abbeville seem to me as clearly works of art as any Sheffield whittle." * It is well said by the Editor of the Geologist, that "science wants no man's assertions: she requires all the evidence on this topic to be well substantiated, and to be supported by abundant testimony." †

A marked characteristic of the flint "tools" from the Somme gravel is, that they are only *chipped* into form, and in no single instance rubbed or *ground* to a point or cutting edge; and, on this mark of distinction, Sir Charles apportions the chipped tools to the "*First stone period*," and the ground Celts to the *Second stone period;* he says: "the edge in the (present) Australian weapons (as in the case of those called Celts in Europe), has been produced by *friction*, whereas the cutting edge in the old tools of the Valley of the Somme, was always gained by the simple fracture of the flint." ‡ — "No intermixture has been observed in those ancient river beds of any polished Celtic weapons, or other relics of the more modern times, or of the *Second* or '*Recent*' stone period." ‖

I obtained, last summer, from the gravel pits of St. Acheul and Menchecourt, thirty "implements"; and in no case were the edges ground or polished, or indeed bore any mark of having been used for any purpose whatever; where the "working" point was sharp from fracture, the edges at the sides were equally sharp from the same cause; and some of the older-looking specimens, partly rounded by being rolled in water, had their edges worn precisely to the same extent as the points—there is no evidence of *use;* and yet Sir Charles's language points to this inference, while his

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* Ibid, p. 117. † Geologist, Vol. 5, p. 344.
‡ Antiquity of Man, p. 113. ‖ Ibid., p. 373.

judgment demurs to ratify what his pen writes; he says, "Out of more than a hundred flint implements which I obtained at St. Acheul, not a few had their edges more or less fractured or worn, either by use as instruments before they were buried in the gravel, *or by being rolled in the river's bed.*" *

On searching carefully the surface of a ploughed field near a brick-kiln on the west of Menchecourt Village, I found a flint Celt of the true Stone period; its point was ground, and bore evident marks of use, presenting in this respect a great contrast to the unused "tools" of the gravel beds.

The section of the gravel pit at St. Acheul is shown in Fig. 11.

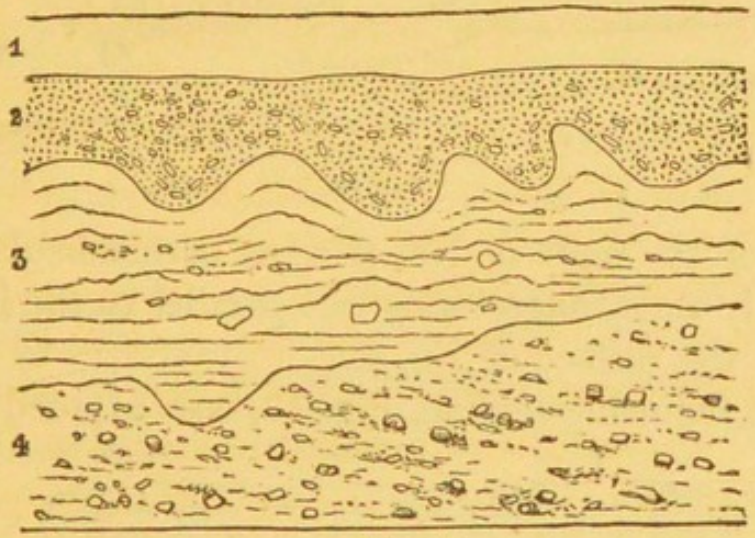

FIG. 11.

1 Rich loamy soil, 3 to 4 feet.

2 Brown loam mixed with flint gravel, the flints shattered and most abundant in the lower part, their longest axis being mostly parallel to the inequality of the top of the bed below, and often on edge.—2 to 5 feet.

3 Light coloured sandy loam at the top, passing into fine white siliceous sand at the bottom, with some water-worn pieces of chalk, and some false or cross bedding.

4 Flint gravel mixed with brown loam, probably stained with iron, with layers of white siliceous sand irregularly mixed, the whole much contorted.—4 to 12 feet.

The entire section about 24 feet deep.

* Antiquity of Man, p. 113.

The lower part of No. 2 is often deeply indented into the bed below, as shown in Fig. 12, which also shows the manner in which the flint nodules are imbedded.

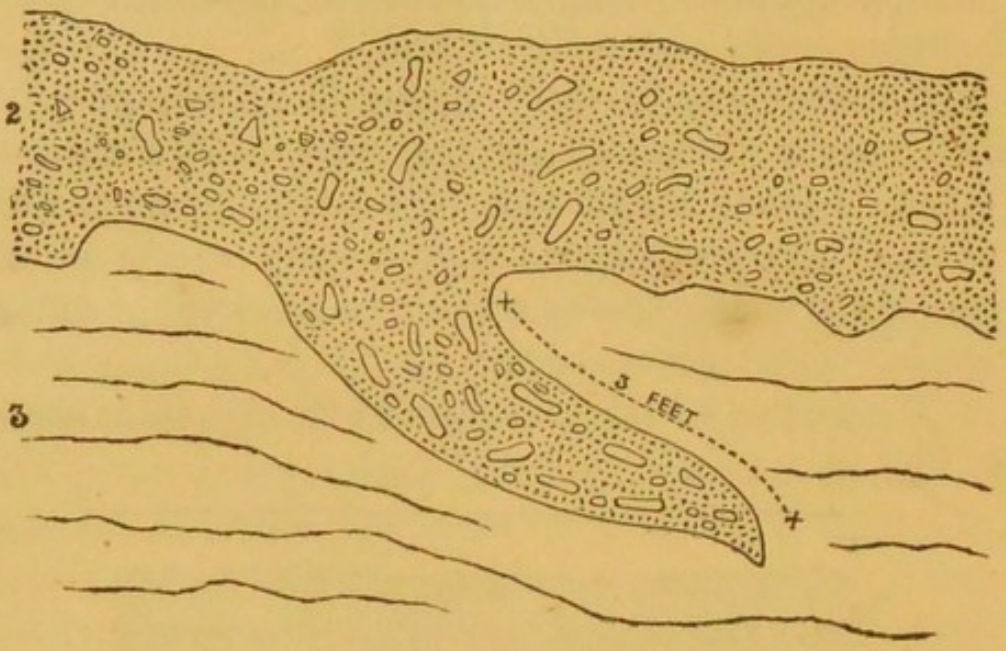

Fig. 12.

Many of the flints in No. 2 were perpendicular; but generally their longest axis was parallel to the inequalities of the surface of No. 3.

The following section, Fig. 13, was exposed by the

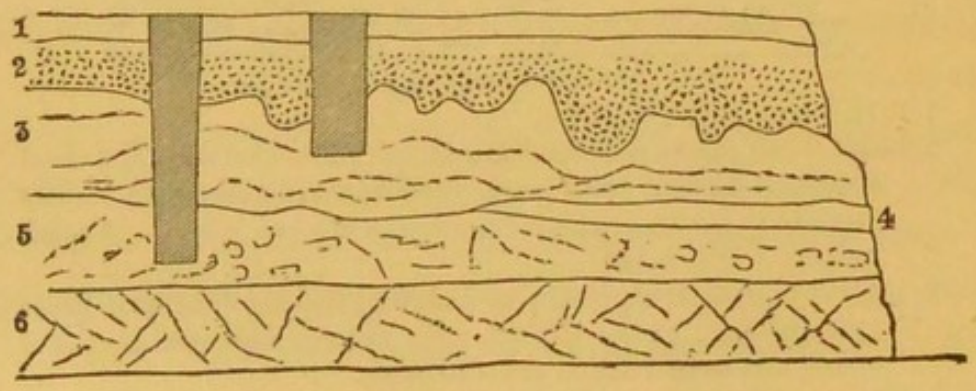

Fig. 13.

1 Brown soil with shattered flints, 3 to 4 feet.
2 Bright brown loam, with patches of siliceous sand and brown clay at bottom; the whole intermixed with angular flints, gene-

rally on end,—often parallel to the curved top of the bed below.
3 Dark yellow chalky loam.
4 White siliceous sand, water-worn pebbles of flint, and rounded fragments of chalk.
5 Head of angular chalk rubble.
6 Firm chalk.
The parts shaded show drains.

cutting for a new street in the Faubourg Beauvais, Amiens.

The pit at Menchecourt presented the following section :

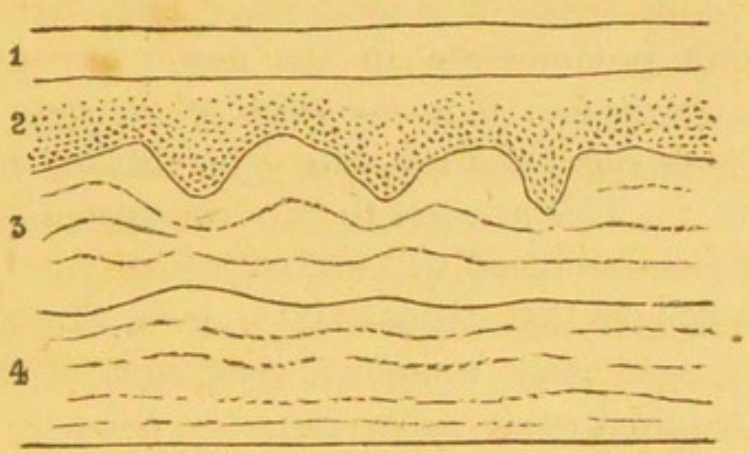

Fig. 14.

1 Brown loamy chalk soil with shattered flints, 3 to 4 feet.
2 Bright brown loam with flints.
3 Yellow chalk loam with flints, some split and on edge.
4 Fine white and yellow siliceous sand, the bottom not seen.
The whole section about 20 feet deep.

The gravel beds of the Somme have been divided into *high level gravel*, namely, that of St. Acheul, which is about 100 feet above the river there ; and *low level gravel*, which flanks the river and dips under its bed ; and in order to apply a scale of time to determine the antiquity of the high level gravel, it has been assumed that the river once flowed at a higher level, filling up the whole of the then wider and shallower valley, and depositing the "high level gravel," and that it has since, through innumerable ages, excavated the valley

to its present depth, and deposited the "low level gravel." Sir Charles says: "Some of those gravels were accumulated in the channels of rivers which flowed at higher levels, by a hundred feet, than the present streams, and before the valley had attained its present depth and form." * The inference from this assumption is thus drawn: "The vast distance of time which separated the origin of the higher and lower level gravels of the valley of the Somme, both of them rich in flint implements of similar shape (although those of oval form predominate in the newer gravels), leads to the conclusion, *that the state of the arts in those early times remained stationary for almost indefinite periods.*" † This appears to be a conclusion which the slender facts adduced will scarcely justify. Is it possible to believe that thousands of men, through thousands of ages, made unknown thousands of flint tools which required great care to form to a point by fracture, and yet not one ever thought of rubbing a flint tool on a rough stone to sharpen it? Yet it is admitted that these men were "intellectual," though "inexperienced and untutored beings." ‡ And is it not more difficult still to believe that, when the *Second stone period* dawned on the world, a time came when all men, in all parts of the earth, with little means of communication on land, and none at all with severed islands and continents, gave up the old mode of forming the tools by fracture, and universally ground and polished them?

But this anti-progressive theory through innumerable ages, founded on the distinction between *High* and *Low* level river gravel beds, cannot be maintained;

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* Antiquity of Man, p. 373. † Ibid., p. 376.

‡ Geologist, Vol. 6, p. 228.

for the sections which I have given demonstrate that the gravels of St. Acheul are not fluviatile, and were never formed in an ancient river bed; this appears:—

1.—From the contorted state of the materials; while a river bed shows a rough stratification: the long-shaped flints at St. Acheul are mostly pitched in the loam and sand on their ends, agreeing in this feature with the recognized deposits of Northern Drift, but quite at variance with the position of the materials of every river bed which I have examined.

2.—The loam, sand, and gravel, are often mixed pell-mell together; but a river in its course and its windings sorts its materials.

3.—The flints of the St. Acheul gravel are mostly split and fractured, and their angles but slightly water-worn, and are often stuck upright in the surrounding sand; a river, on the contrary, grinds the materials of its bed into round pebbles; and those which are flat or cake-like, lie invariably on their sides—never stand on their ends. The water-worn flint shingle from Brighton to Hastings is wholly composed of rounded flints, and it is difficult to find even one of them broken.

4.—At the site of the new docks now constructing in the river at Boulogne, there is a section of the river bed exposed 25 feet in depth, presenting the following strata in descending order:—Siliceous sand, in which, two feet below the surface, is a layer of gravel and pebbles, all of which lie on their flat sides in the bed; below which is more than 20 feet of siliceous river sand, in well-defined uncontorted layers, with some false bedding, indicating a change of the current: and, more indicative still, single bivalve shells

lie universally with their concave side downwards, and their convex side somewhat inclined up or down the valley in the position in which they would be least disturbed by the current at the ebb and flow of the tide. Nothing can present a greater contrast than the section of this known river bed to that of the assumed one at St. Acheul, although both rivers flow through the same geological formations, and must have formed similar deposits.

It is also a well-known fact, that the Somme, like most other rivers, is at the present time silting up its bed; and there is no element now at work which could have excavated the valley and given it its present form.

It is highly probable that the *High* and *Low* level gravel belong to the same geological period, and were formed by the operation of the same causes. There are at Amiens patches of gravel at intermediate levels between the two beds; and in some places the gravel follows the slope of the hill so as to indicate a connection between the beds. Mr. Prestwich, in his Paper of 1859, appears to favour this view; he says:—

"The gravels of Moulin Quignon and St. Acheul are placed respectively eighty-eight and eighty-nine feet above the valley of the Somme, are not commanded by any higher ground immediately adjacent, and are out of reach of all running water, or of any possible interference from agents at present in action. At Menchecourt and St. Roche, on the contrary, the beds are placed *against the side* of the chalk hills, and slope from a height of about sixty feet down to the valley. Still these lower-level deposits are, although not to the same degree, quite beyond the agency of present river action, and are independent of recent changes.

"It is probable that the various beds, although on these different levels, *belong to the same general period, and may be nearly synchronous*. Had I, however, been asked to decide upon physical evidence alone, I might have been disposed to consider the gravels

on the low hills of Moulin Quignon and St. Acheul as a stage anterior to those of Menchecourt and St. Roche; but although I throw out the suggestion for the purpose of directing attention to the point, as one not to be overlooked, it is one which could not be decided without further evidence, and which I should hesitate at present to adopt."

But in his further communication to the Royal Society in 1862, he gives as his matured opinion, that the elevated river terraces of gravel in England and France are portions of former valleys, wider and shallower than the present ones, scooped out by other and different causes than mere ordinary river action, and that since the formation of the High-level gravels, an elevation of the land had taken place, and the present valleys had been excavated, and the Lower gravels deposited: thus confirming the opinion which he had expressed in his published Lectures, in 1857, on "The Geology of Clapham." These Lectures give an admirable history of the geological mutations of the neighbourhood of London; but the work contains a section illustrating the relative positions of the High-level and Low-level gravels, which appears to me to lead to very erroneous inferences. This section shows the High-level gravel of three hill-tops on *one inclined plane*, and *disconnected* on the hill sides with the Low-level gravel of the valley. It may be unreasonable to assume that a private gentleman should draw a section with the precision of an Engineer; but everything in this case hinges on accuracy; and, in parliamentary language, certainly this section would never pass the ordeal of "the Standing Orders' Committee." We are enabled to test it by the Geological Map of London and its environs (by R. W. Mylne, F.G.S.), showing contour lines of levels. From which, the heights across the gravel beds on the

hill tops from Wimbledon Common, through Clapham Common, to Champion Hill, are consecutively as follows:—Wimbledon Common 163 feet, River Wandle 10 feet, Wandsworth Common 93 feet, Clapham Common 93 feet, Brixton 40 feet, and Champion Hill 130 feet. Thus the gravel is found at very unequal elevations, and is *not on the same plane.* But, what is still more important and conclusive, while the gravel is truly shown as cut off abruptly on the slopes of the hills along the line of this section, other lines of section show the *geological continuation* of the High-level gravel *down the slope of the hill* to join the Low-level gravel; for instance:—From Clapham Common, 93 feet high, the gravel bed slopes uninterruptedly down to the level of the Thames at Lambeth. And again, on the other side of the valley, the gravel is continuous on the surface from Maida hill, 110 feet high, to the river. There can therefore be no doubt that this Drift gravel is spread over the spurs of the low hills adjoining the valley of the Thames around London, like a mantle of snow. And as Mr. Prestwich admits a strong similitude between the gravels of the Somme and of the Thames, both producing the same mammalian remains, and chipped flints, it is more than probable that the same cause produced the same effects in both valleys. I am justified therefore in inferring that the distinction between High and Low-level gravels cannot be maintained in respect of the Amiens beds, and that the scale of time, as applied by Sir C. Lyell to the excavation of the valley of the Somme, has no geological basis to rest on, and therefore it affords no proof whatever that the arts were stationary for almost indefinite periods.

I proceed to examine the evidence which the frac-

tured flints are said to bear of human workmanship. Are they manufactured tools?

The evidence which I have adduced as to the flint-flakes called arrow-heads, will perhaps be considered sufficient to justify the conclusion that they have resulted from natural causes. Indeed, Mr. Evans gives up half the battle when he says, "mere flakes of flint, however analogous to what we know to have been made by human art, can never be accepted as concluclusive evidence of the work of man." And Sir Charles, in his 506 pages, scarcely gives the arrow-heads a paragraph, none of them are figured, and when he estimates the probable number of the most perfect tools from the valley of the Somme, he does so, "rejecting all the knives." * But when we turn from the consideration of these simple flakes, to the "spear-heads" and almond-shaped "tools" of St. Acheul, the evidence is of another character, and some of the most perfect of the almond-shaped flints (if viewed apart from others), certainly, at the first glance, from their regular shape, appear to evince design; yet I think it more probable that even these, as well as the others, were formed by natural causes; and I will adduce the evidence to justify this opinion:—

1.—*The "implements" are all of Flint.* Mr. Evans says: "The materials from which all the implements hitherto discovered in the drift of this Country and of the North of France have been formed, is the flint derived from the chalk." †

The tools made by man of the recognized Stone Age are not only made of flint, but of "serpentine, greenstone, granular greenstone, indurated claystone, trap

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* Antiquity of Man, p. 18.

† Archæologia, Vol. 39, p. 64.

greenstone, claystone, quartz, syenite, schistus, chert, granular porphyry, siliceous schist, and jade;" * and being fashioned on the same model, and ground to a cutting edge, there is not only evidence of design, but, as different rocks present different forms of fracture, the implements could not have been the result of the natural fracture of the stone. It is far otherwise with the "tools" of the "First Stone Period;" they are all of flint; and where there is no chalk or flint gravel, there no "tools" are found. The instructive Geological Map of Europe, by Sir Roderick Murchison, shows us, that Amiens is the centre of a large cretaceous district; —that Hoxne and Bury St. Edmunds are on a chalk plateau; that the beach at Herne Bay and the Reculvers is bounded by a chalk cliff; that Fimber is in the middle of the chalk district of Yorkshire; that Fisherton is at the foot of the chalk plain at Salisbury; and it is well known that all the valley gravels in which the "Implements" have been found, are mainly composed of flint detritus. Nor can we stop here; the caverns of Sicily, of the South of France, and the Dordogne, with the site of the flint-flakes from Syria and Arabia Petræa, are all intimately connected with cretaceous formations. Did præ-historic man in England live only in the chalk valleys, and despise the hills of Dartmoor, where the Celtic tribes loved to dwell? Were the chalk valleys of the Somme and the Dordogne the only places in France where the ignoble savages roamed? And were the hills of Bretagne and the rocky peninsula of Quimper unblest by their presence, though now rich with the traces and works of

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* The Celt, the Roman, and the Saxon, p. 69.

forgotten men? These flint-folk, we are told, were men of war; the bow and the spear were in their hands; but they knew nothing of mountain fastnesses which their warlike developed descendants have since loved so well, and held so tenaciously!

2.—*The "implements" are all of one class*—axes. Were they then a race of carpenters only? Man is a "cooking-animal;" and, if ten thousand axes have been found, surely one seething-pot or drinking-cup ought to have turned up. He needs shelter; but no remnant of his clothing or of his hut has been found. Almost in every place where there are chalk flints, there are axes, and nothing but axes. But from whence did these ancient carpenters obtain their timber? The climate of the Somme at the Glacial period must have been as cold as Iceland, where the trees are not larger than bushes, a few feet high. The number of axes is vastly disproportionate to the use to which they could have been applied.

3.—*There is a gradation in form*, from the very rough fracture of the flint to the perfect almond-shaped implement. Let the most enthusiastic believer in their authenticity examine carefully the one thousand implements in the Abbeville Museum, and he would probably reject two-thirds as bearing no evidence of the work of man; but it would be impossible for him to determine from the separate specimens where nature ended, and where man began. Sir Charles admits that "there is a *vast variety of very rude* implements, and that two well formed tools in the gravel, near Paris, were accompanied by a *great number of ruder tools or*

attempts at tools." * In size also they vary from two to eleven inches in length.

4.—Some of the flints are most perfectly *half-formed* almond-shaped tools. I found one at Menchecourt, of which the point and more than half the circumference presented the same marks of chipping and regularity of form as the most symmetrical almond-shaped tool; but the other half showed only a very rough fracture of the flint (see Fig. 15).

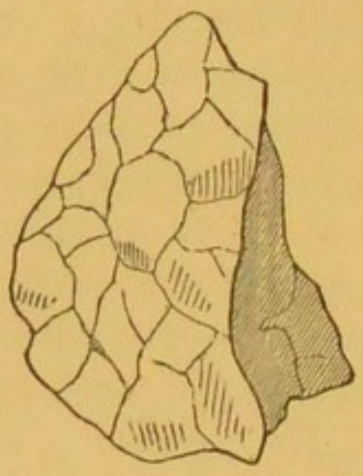

Fig. 15.
Scale one half.

It is, of course, easy to say that it is a half-made tool; but it is rather a good illustration of the form produced by the natural fracture of the egg-shaped flint nodule.

5.—*Their use.* Sir Charles says: "Some of these tools were probably used as weapons, both of war and the chase, others to grub up roots, cut down trees, and scoop out canoes. Some of them may have served, as Mr. Prestwich has suggested, for cutting holes in the ice, both for fishing and for obtaining water;" † and, as others have supposed, as wedges for splitting wood, and for grubbing and tilling the ground.

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* Antiquity of Man, pages 118, 151. † Antiquity of Man, p. 115.

These gravels were formed during a severe arctic climate, when immense glaciers (as in Greenland) descended to the sea shore, and ploughed up and contorted the gravels of the Somme. In such a climate no tree but a stunted birch could have grown, certainly none large enough to form a canoe; or, supposing it did, these fractured flints could never have felled it. In such a severe climate, when the coast was loaded with field-ice, or crushed by glaciers, the massive arctic ice which coated the imaginary river, could not have been broken by a stone no bigger than a man's hand; when our heavily-cased surveying ships are shaken as they enter the pack, and can, by their weight, make no impression on the solid ice-field.

Indeed, M. de Perthes appears to find such difficulty in determining the use to which the implements could have been applied, that the enthusiastic antiquary is driven to say that they are, "*a sign materializing a thought*," a kind of Chupattie, such as preceded the Indian mutiny: his words are "now if it were neither as trinket or utensil, it follows that it was a means of being understood,—as an intellectual, or a religious representative, or commemorative sign; a sign materializing a thought, rendering it palpable, in short representing a divinity like our idols, a value like our money, or a perpetuation like our writing." * I will not follow the ardent Frenchman in his imaginative reverie; it needs no refutation; and indeed it is difficult to discuss the use to which these "implements" may have been applied, when they bear no marks of having being applied to any use whatever. I have examined their points and edges with a microscope, and the fracture

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+ Geologist, Vol. 3, p. 374.

is often as sharp, and the curved surface markings on the flint as obvious, as when the flake was first severed. And when the edges of the "tool" are partly worn by being rolled in water, the edges of all the split contiguous flints are worn to the same extent.

It has been assumed that the freshness of the fracture, the sharpness of the edges, and the non-evidence of wear, indicated modern fabrication. When the authenticity of the human jaw was debated at Abbeville, Dr. Falconer says: "two *practised experts*, Mr. John Evans and Mr. Prestwich, pronounced the flint implements to be modern fabrications;" * and at the "Congress" at Paris, the English deputies presented about twenty flint *haches*, from the gravel pit of Moulin-Quignon, the whole of which, they insisted, bore the characters of comparatively modern manufacture, so great was their freshness and sharpness. But when these English deputies were taken to the gravel-bed of Moulin-Quignon, they saw five *haches* dug from the undisturbed gravel, "and only one presented the characters which they held to, as distinctive of genuine specimens of great antiquity." † Thus, twenty-four *haches*, pronounced by the most accomplished Geologists (the "experts" of Dr. Falconer, and having the "practised eye" so much relied on by Sir C. Lyell,) to be unauthentic, from the sharpness of the fracture, and bearing no evidence of having been used, were afterwards admitted by them to be genuine. ‡ Where then is the evidence of use? Sir Charles says of the implements from Hoxne, that "they are so much more perfect, and have their

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* Geologist, Vol. 6, p. 190. † Ibid., Vol. 6, p. 223.

‡ Mr. Prestwich, on "further and more deliberate enquiry," now holds by his first opinion. Journal of Geo. Soc., Nov., 1863.

cutting edges so much sharper, than those from the valley of the Somme, that they seem neither to have been *used by man*, nor to have been rolled in the bed of a river. The opinion of Mr. Frere, therefore, that there may have been a manufactory of weapons on the spot, appears probable." *

7.—*Their number.* M. Boucher de Perthes says: "Any one visiting me may count them by thousands, and yet I have kept only those which presented some interest. From those beds which I have called 'Celtic,' I have seen them drawn in barrows to metal the neighbouring roads; one would have thought a shower of them had fallen from the sky." † M. Rigollot obtained 400 from the gravel-beds near Amiens. Sir C. Lyell says: "The first time I entered the pits of St. Acheul, I obtained seventy flint implements." ‡ And in the same pits I purchased thirty from the workmen. In about three acres of land, certainly more than three thousand "tools" have been exhumed: which is equal to 640,000 in a square mile, and as these beds are proved to extend more than twenty miles along the valley of the Somme, if equally productive, there must be 12,800,000 in this small area. The present population of France is less than 200 to a square mile; and these "flint implements" are assumed to have been lost by a race of hunters—when, from the nature of their pursuits, the country could have sustained only a very sparse population. "It has been calculated that eight hundred acres of hunting ground produce only as much food as half-an-acre

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* Antiquity of Man, p. 169. † Geologist, Vol. 3, p. 376.
‡ Geologist, Vol. 3, p. 370.

of arable land ;" * and on this basis the ratio of the lost axes to the savage population would be as *six millions to one.*

Mr. Frere says of the flint tools at Hoxne : "the number of them was so great, that the man who carried on the brick-field told me, that before he was aware of their being objects of curiosity, he had emptied baskets full of them into the ruts of the adjoining road ;" † and in Yorkshire they are said to be so numerous that one gentleman has collected a thousand. But while I write, the discovery of more implements goes on in geometrical ratio.

"The Abbè C. Chevalier announced last autumn, that he had explored several spots in the environs of Pressigny, in the Department of the Indre-et-Loire, in France, where the manufacture of the tools and instruments of a far-off age had been carried on to a large extent. The Abbè has just written to M. Elie de Beaumont, informing him that Dr. Leveille, of Grand Pressigny, has recently discovered on a spot near that town, on lands known as La Claisière and La Douchetterie, indications of a similar place of manufacture, which surpasses greatly in importance all that has heretofore been discovered of the same kind. The quantity of worked flints of all kinds, including hammers, hatchets, knives from 6 to 8 inches long, scrapers, lance-heads, is said to be prodigious. They are described as being found at every step. Large pieces of worked flints, roughed out apparently for making articles similar to those above-mentioned, and generally 8 inches long, are so plentiful, that the ploughmen who turn them up in the fields, heap them up at the sides; these prismatic pieces with taper ends have attracted their attention, and have received from their form, the designation of pounds of butter.

"They are not found singly, but by hundreds and thousands, over an extent of fifteen or sixteen acres." ‡

The *flint-flakes* are even more numerous than the axes ; at Croyde I dug up hundreds within a perch of

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* Lyell's Principles, p. 634. † Geologist, Vol. 4, p. 20.

‡ Civil Engineer and Architect's Journal, Oct., 1864.

land. At Greenhithe, thousands may be seen stuck into the top of the walls, with their sharp edges upwards, to prevent intruders, and doing duty as broken glass bottles.

At the British Museum there is a piece of the stalagmitic floor from a cave at Les Eyzies, France, about two feet square and eight inches deep, in which I estimated there were 400 flint-flakes of most imposing form ; and I was informed that this cavern had furnished at least 5,000 to the Museum.

At the Jermyn-street Museum there are some well-formed flint-flake knives from Arabia Petræa, no doubt the pick of the mass, where they are so abundant, that "buckets full" may be had, and they are commonly said to have been the knives used by the Israelites during their sojourn in the desert. Flakes so numerous, and so widely disseminated, and all of the same form and fracture, can only result from some natural cause producing similar effects.

There are, at the present time, thousands of axes made in this country, more than the fabulous flint-folk could ever have required ; but where can we find a thousand lost axes in an acre ? nay, where ten in a river bed, even though it passes through a populous town ?

As to the imaginary trade in flint implements suggested to account for their number ; can it be that in a country like France, in which chalk, with flint, occupies an area of 40,000 square miles, and where the raw material for such an important manufacture (!) was everywhere abundant and redundant, any local trade without a circulating medium could have existed ? or was theirs a foreign commerce, carried on by ships made with chipped-flint implements, made without planks, without iron, without cordage ; and navigated without

sails or compass? But in what country, geologically, could such manufactured articles find a market? In the countries occupied by the Secondary and the Tertiary formations, and the Drift-beds, there could have been no buyers; the article was everywhere under their feet; it would have been, in common parlance, "sending coals to Newcastle." And in the lands of the older rocks, stone tools, of a superior form, are ready-made by nature. The carbonaceous grits of North Devon are split by divisional planes and cleavage into more effective arrow-heads and chisel points; and the pebble ridge of Northam would supply an unlimited amount of magnificent stone hammers. There could have been no demand for such manufactured tools; and we can only infer that the commercial and speculative savages embarked in a trade which proved a perfect failure; and, in their disgust, cast away innumerable specimens of beautifully-made tools, which, therefore, bear no marks of having been used, and with others so utterly rude and unformed, that it requires the "practised eye" to discover the marks of human workmanship; and thus the good and the bad, the raw material and the manufactured article, are mingled in one chaotic mass, a record of disappointed hope, mortified ambition, and speculative commercial despair. Surely this is philosophy in sport, or science run mad. Was this the commerce,—those the ships whose flag braved for unknown years the battle and the breeze, when "the arts remained stationary for almost indefinite periods"? This is more like an Oriental romance, more akin to the history of a præ-adamite Robinson Crusoe, than the deductions of legitimate science. It is a resuscitated Daniel Defoe who writes, and not the author of the Principles and the Manual of Geology.

Let us now consider what was the nature of the climate on the banks of the Somme, when these savage tribes are supposed to have lived there. We are told that the "climate of those post-pliocene ages, when man was a denizen of the south-west of France, and of southern and central England, appears to have been much more severe in winter than it is now in the same region, though far less cold than in the glacial period which immediately preceded"—"for the winters of the period of the higher level gravels of the valley of the Somme were intensely cold."* The degree of this intensity we are fortunately enabled to measure by the very exact statement of Mr. Prestwich, that the winters of the drift period were colder than the present by from 20° to 25°; and that the British Channel, being then a narrower sea, was frozen over every winter, permitting the passage of men and animals.† Here then we have not only the elements of the climate, but the effects produced. Turning to the charts of the Monthly Isothermal lines of Professor Dove, we find that the mean January temperature of the Somme is about 40° F., and that 22° of greater cold shows an Isothermal line much north of Iceland, and passing along the S.E. coast of Greenland. And, therefore, in the stream of field ice and icebergs, 200 miles in width, with which this coast is cumbered, we have a picture of our British Channel in past ages; and in its desolate land we may, at the present day, view the landscape of the ancient Somme. And what does it exhibit? A land covered with perpetual snow, except some sheltered nooks near the coast, where a few plants and stunted

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* Antiquity of Man, p. 374-376. † Geologist, Vol. 5, p. 190.

birch and willow trees grow, no larger than hedge-row bushes. Immense glaciers, 1000 feet thick, groaning their tortuous way through the valleys to the sea. The white bear, the dog, and the Arctic fox the only animals, and here and there a few wretched human beings, eking out a miserable existence by feeding on blubber and fish. I will not venture to say that this picture did not at some distant period represent a fruitful province of *La belle France;* but this appears to be certain, that if such was its desolate condition, it could have sustained no population sufficiently numerous to have been the manufacturers of the innumerable flint tools of the Somme. No tree was there large enough to form a canoe, or to require stone wedges to split it; and no harvest would ripen requiring stone implements to prepare the ground for tillage.

But it is asked,—If these flint "implements" are not made by the hands of man, whence came the regularity of form in the most perfect of them, and the marks of chipping which they all bear? Perhaps this question does not admit at present of a satisfactory answer; and it is not necessary to the proof of my case that it should be answered. I might, without weakening an argument adduced against their authenticity, say—I do not know: and thus follow the dictum of a President of the Geological Society, who, in his anniversary address, advised his hearers "to learn a little more carefully that scientific '*ars artium*,' the art of saying, I don't know." * But in order that I may avoid no difficulty, nor shirk any statement which has been advanced in proof of the authenticity of the implements, I will give in full the nature and value of

* Anniversary Address, 1862.

the evidence in their favour as stated by Mr. Prestwich. He says :

"It is essential, as a preliminary step, to recollect that the argument does not rest upon the evidence of skill, but upon the evidence of design. The skill being rude (for the flints are only chipped into form and in no degree ground down) is not always evident at first sight, and hence the existence of design has been sometimes denied. Flints from the chalk hills of the district itself readily supplied the material of which the flint implements are formed. The exterior of all chalk-flints invariably presents a white earthy crust, from which small fossils frequently project, while the interior of the flint is black or dusky, but clear or semi-transparent. The fracture is conchoidal or splintery, and there is no tendency to break in one direction rather than in another. It may happen that a shattered flint (by whatever natural cause produced) should give flakes or splinters closely resembling simple forms produced by one or two blows applied artificially. But here the coincidence must cease ; for it is obvious that blows applied by hazard and resulting from natural causes, as in a *mêlée* of gravel, would necessarily multiply their direction of strike in proportion as the blows themselves were multiplied, and consequently the shape of the flint would tend, up to a certain point, to become more and more irregular ; whereas, on the contrary, blows applied by design, and with a given object in view, would tend to give to the flint more and more finish, form, and evident art. So with respect to the flints in the gravel the more broken the more irregular; whereas, on the contrary, with the flint implements the more they are chipped and broken the clearer is the design.

" With regard to the possibility of the flint-implements resulting from natural wear, I have already mentioned that in many of the specimens the outer coat of the flint is frequently adapted and left, when possible or convenient, in the finished instrument, and such original surfaces show so little trace of wear that small delicate fossils, so often found projecting on them, still remain untouched. If the flint had been so extensively fashioned by wear, how could one portion and always a prominent part, have remained unworn, while other portions have been so largely abraded? Besides, the tendency of wear, if sufficiently long continued, is ultimately to reduce the flints to the rounded form of pebbles, a condition of things incompatible with the retention of the sharp points and cutting edges of these implements.

"Finally, we have to consider whether it is possible for the flint implements to have been introduced into their present position within some comparatively recent period, or whether they are contemporaneous with the accumulation of the gravel; and further, whether the remains of the large extinct mammals could have been derived from some older beds, and therefore be of anterior date to the flint implements." *

The defect which runs through this statement and renders it inconclusive, is a very simple and common one. It assumes that what is true of *some* of the chipped flints, is true of the *whole*. "The more they are chipped, the clearer is the design." An inspection of the implements will show that this inference is inapplicable to the whole class of arrow-heads and flake-knives; and it can only apply to a very limited number indeed, of the "tools" of the St. Acheul type.

The arrow-heads have universally *one* clean conchoidal fracture on one side, and they are most perfect in form when there are only two, or at most three, facets on the other side; and when the marks of chipping amount to six or eight, the so-called evidence of design becomes obscured, and passes into the characters impressed on the ordinary angular flint gravel.

I have already said that the most perfect of the almond-shaped flints of St. Acheul, from their regularity of outline and marks of fine chipping on the surface, if viewed apart from others, appear to evince design; but the great mass of the flints of this type, are also chipped all over; and the work is so rude, and the fracture so rough, that the indication of design is lost in the overwhelming evidence of the imperfect specimens. These roughly fractured flints could have been applied to no use whatever; and if they were of no use to

* Geologist, Vol. 4, p. 322.

man, he could have no object in designing them. Yet, further, some of the most highly chipped tools are *curved* in form somewhat like the screw propeller of a ship, and to such an extent as to render their use as sling-stones impossible, and as implements, inconvenient; the *more* these are chipped into this shape, the *less* obvious is the evidence of design.

But it is further said, that the large end of the flint implements is often adapted and left, while the other is chipped to a working point. This is correct only of a very few specimens; for the larger end is generally partly or wholly chipped, even when it would have been more convenient as a handle if this chipping had been omitted; this so obviously militates against the evidence of design, that to meet the difficulty, Sir C. Lyell most illogically assumes, "that as the larger end presented a suitable handle, the chipping from it had been done by river-action before the other end was chipped artificially;" * but later discoveries show, that if this proves anything, it proves too much, as both ends are in some flints equally chipped to sharp points, producing a spindle-shaped form. Mr. Prestwich says, that "the lately discovered specimens are generally *rounded* at one end, and with a sharp point at the other; there is another elongated form of a similar character; a third form is *spindle-shaped, with sharp points at both ends.*" † Will Sir Charles venture authoritatively to determine in this latter case, which end was formed by river-action, and which by the hand of man?

Having now discussed the evidence of design which has been put forth by one of the most accomplished

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* Antiquity of Man, p. 116.

† Journal of Geo: Soc: Vol. 19, p. 499.

and cautious of the believers in the authenticity of the implements, I return to the inquiry, Whence came the regularity of form and marks of chipping which they bear? I have partly anticipated this speculation, for it can be nothing more, at page 17; and I will now venture on a further explanation. Most minerals, from their crystalline structure, assume, when fractured, a definite form. The regular divisional planes in Cornish granite give it often the appearance of hewn blocks of masonry, heaped in massive castellated battlements. The vertical columns of basalt at Fingal's Cave, almost rival the imposing portico of an Indian Cave Temple. The decomposed portions of our trap dykes present spherical concretions which might be taken for cannon balls; and the Cornish diamond (quartz) is composed of a six-sided prism, with a pyramid formed by all its terminal planes. The nodules of flint do not certainly possess such well-defined lines of fracture, but there is in them a strong tendency to split in a longitudinal direction: and all the flakes which come off have a conchoidal fracture, and run to a sharp-cutting edge.

A very common form of a flint nodule is egg-shaped, or rather more pointed at one end; and when such a flint is split through its longest axis, the conchoidal fracture gives to one half the perfect outline of an almond-shaped "tool," with sharp edges all round. I have several flints so split. The real difficulty is to account for the minor chippings.

The appearance of this rude chipping is not confined to the assumed implements: the angular flint-gravel is a wide spread superficial deposit, in which all the flints are fractured, and many of the flakes have edges as sharp as a knife, and the great mass of these split flints have the marks of chipping on their surfaces

as perfect as on the supposed tools. From the soil of the South Downs, I have picked up many flints covered with these marks of small surface chipping, and also long nodules, which show the loss of flakes from their sides; the cores, so often spoken of, from whence the flakes were supposed to be struck. Many of these innumerably fractured flints have the minor marks of "chipping" on their surface, though they do not assume the definite form of almond-shaped tools. This chipping is therefore natural on some flints, and may also be so on others.

On examining a cutting for a new road near Greenhithe, the flints on the outside of an almost vertical section of chalk were nearly all much fractured; and it is well known to Geologists, that flints, which appear to be whole in the face of our chalk cliffs, are yet in a very shattered condition. Sir H. Englefield pointed out this in 1820; and Dr. Mantell attributed it to the disturbing forces which disrupted the chalk strata.* Other Geologists have ascribed it to lightning. I think it more probable that it is the result of unequal expansion from change of temperature.

A flint exposed in a vertical section, and half buried in the chalk, would, under hot sunshine, have a vast difference in the temperature of its sides, and the line of greatest tension would be parallel to the heated surface; hence the flakes and the minor chippings. This effect of change of temperature on flint has been noticed by independent observers. Thus, Mr. Rose, F.G.S., has pointed out that the flints in the old buildings at Yarmouth, which had been long exposed to the action of the weather, had, on their surfaces, a number

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* Geological Excursions round the Isle of Wight, p. 48.

of cup-like cavities, which he attributes to the effects of frost.*

In passing from England to the Continent by way of Folkestone, every Geological observer should examine the bed of mammaliferous gravel and the overlying drift, on the top of the Greensand cliff behind the Pavilion Hotel there, described by Mr. Mackie ; † and if he had previously inspected the many gravel pits on both sides of the valley of the Thames, and the good sections now exposed at Temple Farm, near Rochester ; and if with this knowledge fresh in his mind, he passes on to view the sections presented in the gravel pits of St. Acheul, he will have the strongest assurance that physical facts can furnish, that he is inspecting a similar deposit formed by the operation of the same causes ; and he will conclude that the gravels of the Somme do not furnish a new and exceptional case, but form part of an extensive system of superficial beds, the history and elucidation of which can be as effectively studied among the gravels of Kent and Essex as in Picardy.

The foundation of this enquiry has been already well and judiciously laid, and it is refreshing to turn from the bewilderments of the Somme, to the study of the admirable paper of Sir Roderick Murchison, "On the distribution of the Flint Drift of the South-east of England." ‡ Sir Roderick shows (by the sections) that the angular flint gravel lies at all altitudes from the sea, clothing the slope of the hill to 566 feet above it ; and the fractured flints are shown upright in the loam and

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* Proceedings of Geologists' Association, No. 5.

† Journal of Geological Society, Vol. 7, p. 257.

‡ Journal of Geological Society, Vol. 7, p. 349.

sand; he describes the beds as tumultuous and unstratified, and lying at all sorts of altitudes, from the banks of the Thames to the heights around Farnham;—he adds,—"in short, from Petersfield to Eastbourn, where the drift becomes for the most part an accumulation of clay and loam. I have nowhere seen it exhibit signs of successive bedding, but everywhere proofs of its having been accumulated suddenly and tumultuously, whether it be lodged on the Lower Greensand, or on the Weald clay." * Here we have no imaginary river, of a width ten times greater than the area of its water-shed requires, with deposits, contrary to all our knowledge of the effects of river action; no distinction of *High* and *Low* level gravel, but on the contrary, the distinct assertion, that "it slopes up from the sea-board to a height of 222 feet inland." †

These well-considered opinions of our highest Geological authority, have been assented to and confirmed by Mr. Prestwich: in his paper "On the drift at Sangatte, near Calais," ‡ he says: "In a paper on the Brighton Drift, read before the Society on the 14th of last May, Sir Roderick Murchison expressed an opinion that the accumulation of the mammalian chalk and flint-rubble was sudden and tumultuous. In this view I quite agree, and also conclude that the same rapid mode of accumulation is to be attributed to the Sangatte Drift. For if the action had been slow and gradual, the rolling to which the broken flints would have been subjected, must have inevitably blunted their edges; and further, any rounded flint-pebbles from the Tertiary strata could only have been more

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* Journal of Geological Society, Vol. 7, p. 355. † Ibid., p. 386.
‡ Ibid., p. 274.

rolled and rounded. But on the contrary, we find in this chalk-rubble broken angular flints with edges as sharp as a knife, and with fractures as clean as though they were just broken with a hammer, whilst the small, hard, *round* flint-pebbles from the Tertiary strata, are often broken into two or more pieces, and these pieces neither rolled nor worn. Some which are entire, and likewise many of the lumps of iron-sandstone, are also found, as it were, standing on end—the longest axis perpendicular to the lower surface of the deposit. . . . The whole mass seems to have been checked and thrown down, after but very little wear, and in a manner comparatively independent of the specific gravity of its component parts; whereas, if the action which accumulated these materials had been slow, gradual, and long-continued, they would most likely have been sorted according to their specific gravities."

It is impossible to read this description without feeling that it applies also both to the drift of Kent, and the gravel of St. Acheul; and whatever deductions are drawn from the one, arise also from the other; indeed this is so evident that Mr. Prestwich compares the Sangatte drift to what he calls "the somewhat similar flint-gravel in the Department of the Somme": and Mr. Duckworth, the President of the Liverpool Geological Society, said of the St. Acheul gravel beds, "There was no evidence whatever, as far as he could judge, of any very slow or gradual formation; and the impression left upon his mind was, that they had been produced by some sharp and sudden catastrophe." *

But since the fractured flints of the Somme have been recognized as ancient "tools," the former inferences

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* Geologist, Vol. 5, p. 186.

of our best Geologists, arrived at without any disturbing element, have been abandoned by many, and the geological history of the gravel beds had been re-written to meet the supposed introduction of man on the scene. Now we have a right to enquire for and to sift the evidence on which this change of opinion is founded, before we can admit its soundness,—before we can believe in a large imaginary river, without a corresponding gathering area ;—in a river deposit unlike that of any other river gravel in the world ;—in naked savages, living in large communities amidst perpetual ice and snow, breaking holes in arctic ice with a stone only a few ounces in weight, making canoes in a climate which could produce no timber, and living on terms of companionship with ferocious beasts often ravening among the snows with hunger like "the wolves of Apennine." And all this revulsion of opinion, this almost impossible condition of human existence, rests on the very dubious evidence of supposed marks of chipping on some fractured flints, which it often requires the practised eye to detect ; and which pass by such insensible gradations into other forms of fractured flints obviously chipped by natural causes, that the assumed evidence of design becomes obscured and obliterated.

In the whole history of the inductive sciences, it would be difficult to find a case in which so large a superstructure was attempted to be raised on so slender a foundation.

The "Beads."—The fossilized globular sponges, having generally a hole through their centre, found in the gravel pits of St. Acheul, are supposed, by Dr. Rigollot, to have been used as neck-laces ; and Sir Charles Lyell considers this opinion a sound one.* Professor

* Antiquity of Man, p. 119.

Rupert Jones has, however, clearly shown that they are fossils of the chalk *(orbitolina globularis)*, and that the perforation of the non-drifted specimens in the chalk is often just as smooth and straight as if artificial.* He adds: "the interior surface is not worn, however, but consists of the *natural structure* of the organism."

I obtained seventy-two specimens from St. Acheul, of which twenty had the hole through the centre slightly curved; these, therefore, could not have been artifically drilled. Sir Charles admits the organic structure of the "beads," and that the hole passing through them is a natural cavity; but he says: "others *may* have been artificially bored through;"† and on this groundless supposition, he places at the head of two pages of his book, the misleading words, "GLOBULAR SPONGES ARTIFICIALLY PERFORATED."

The Human Jaw from the gravel of Moulin-Quignon.—The value of the evidence derived from this relic may be estimated by Dr. Falconer's Letter to the *Times*, April 23, 1863, in which he says:

1.—"The flint-hatchets were pronounced by highly-competent experts to be spurious.

2.—"The reputed fossil molar was proved to be recent.

3.—"The reputed fossil jaw showed no character different from those of a London church-yard."

It is true that the Doctor afterwards, in another Letter to the *Times*, withdrew this opinion, and joined with the other members of the "Paris Congress," in admitting the jaw to be "authentic"; but in the following letter he recorded a very qualified opinion, which cuts the very root of the evidence on which the great antiquity of man is sought to be established.

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* Geologist, Vol. 5, p. 235. † Antiquity of Man, pp. 119, 120.

"I am of opinion that the finding of the human jaw at Moulin-
"Quignon is authentic; but that the characters which it presents,
"taken in connection with the conditions under which it lay, *are*
"*not consistent with the said jaw being of very great antiquity.*"

H. Falconer.

"Abbeville, May 13."

The evidence from the Bone Caves I have designedly left untouched. It is at present a geological riddle, difficult to solve. The bones of the extinct animals are found in them mixed with the bones of man, and side by side with flint-flakes, combs, pins, armlets, rings of bronze and iron, and coins of the Roman Emperors, from Nero to Constantine.* Mr. Evans, therefore, truly says: "It was always felt that there was a degree of uncertainty attaching to the evidence derived from the deposits in caverns, owing to the possibility of the relics of two or more entirely distinct periods becoming intermixed in such localities, either by the action of water, or by the operations of the primitive human occupants of the caves, which prevented any judgment being firmly founded upon it." † We must therefore wait to hear the evidence from these Bone Caverns, until they utter a language which we can understand.

I have now imperfectly stated the facts, and the conclusions to which I have been led in this enquiry. The facts will at least add somewhat to the stock of information on this subject; and of the correctness of the deductions the reader must judge. I may have been presumptuous in combating the opinions of those, whose attainments in science claim our admiration, and to whose judgment on most points we have bowed with submission; but in the imaginary manufacture of flint-

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* Geologist, Vol. 4, pp. 539 and 295. † Geologist, Vol. 4, p. 358.

flake knives and arrow-heads, I have opposed fancies and not facts; and I trust that I have shown that a few scattered flint chips, and almond-shaped stones, are too slender a foundation on which to build a history of præ-adamite men, existing through a thousand centuries as a "dumb and filthy herd."

I have ventured on this controversy because it must be decided by evidence from the field. No one has more constant opportunities for gathering geological facts than the Land-surveyor, and these facts have pressed themselves on my observation in the daily pursuit of my vocation.

The father of English Geology was a laborious surveyor; it was William Smith who first discovered and pointed out the succession of the groups of rocks, identified them in the different localities by their organic remains, and published, in 1790, his Tabular View of the Strata; and in 1815, his Geological Map of England. And the man who laid the foundations of the science at an earlier day in France, was also a surveyor—Bernard Palissy; he mapped the marsh lands for the government, and laid out royal gardens for Catherine de' Medici; he was the first to establish in Paris a cabinet of natural history, and he taught, in his public lectures, the real origin of fossil shells, proving that they were true shells deposited by the sea. It was mainly the opportunities for observation which their profession gave them, which placed these men in the front rank of the geological army of discovery. And for more than twenty years I have worked, a humble follower, but a delighted observer, in the same field. In the pursuit of my daily duties, I have gathered and recorded the geological facts which came under my notice; and, in reference to the question be-

fore us, I have studied the drift-beds of the west; the flint-gravel and surface deposits of the south and east; and the terraces and river-bed of the valley of the Somme; and it is my opinion, that the existence of man during the First Stone Period of Sir C. Lyell, cannot be maintained by the evidence which he has adduced from the flint-flakes said to be "knives" and "arrow-heads," and the chipped flints dignified by the names of "axes" and "projectiles."

The witnesses break down under cross-examination; and the special jury, by whom this cause must be tried, can arrive at no other conclusion than that of—*not proven*. The whole case affords a good illustration of the notable saying of Locke, that "men see a little, presume a great deal, and so jump to the conclusion."

Note.

Flints at the Scilly Isles.—The discovery of fractured flints at the Scilly Isles was first made and mentioned to me by the President of the Royal Institution of Cornwall, Mr. Augustus Smith, M.P., of Tresco Abbey; and since this Paper was first in type, I have had an opportunity, through the courtesy of Mr. Smith, of examining the Islands, and tracing the course of the Flint Drift. These Islands are wholly composed of granite, being, in fact, the hill-tops of a large granitic boss, only the highest parts of which are above the level of the sea.

At the northern part of the Island of Tresco there is a valley running east and west across the Island, and in the lowest dip of this valley the fractured flints are very abundantly scattered over the surface of the ground, but they gradually become fewer on ascending the slopes of the hills; and on the highest part of the Island, about 140 feet above the sea, only a few single pieces of scattered flint are found.

The cross section of this valley, exposed in the cliff, presents the usual appearance of a "Raised Beach," where flint-flakes are embedded in the soil from one to two feet deep; and some as deep as eight feet, where a few large flints, with water-worn boulders of trap, hornblende-rock, slate, and grit (all rocks foreign to the Islands), are mixed with the local detritus of the granite.

Westward, in the Island of Bryer, and in the line of strike of this valley, the fractured flints were also found to be very numerous. I also discovered similar flint-flakes in the Islands of St. Helens, Tean, and St. Agnes.

These flints are too widely scattered, and too rude in form, to be considered the refuse chips of a manufactory; and though they bear all the assumed marks of chipping, having a conchoidal fracture on one side, and numerous facets on the other, they do not really exhibit any evidence of design.

They could not have been brought where they are found with chalk ballast, and spread over the land for manure, as Sir Henry De la Beche had suggested of flints in Cornwall, for they are seen imbedded in contorted strata of drift in the section of the cliffs, and spread from shore to shore, over infertile crofts, which, most probably, have never been cultivated or manured. They could not have been formed by such men as the flint-folk of the Somme are assumed to have been;

for these Islets, before the introduction of agriculture and commerce, would have been incapable of supporting a human population. In the hunter state of society they must have been uninhabitable.

The facts are only consistent with the supposition, that at the period of the Northern Drift, these Islands, (thirty miles beyond the Land's End) were deeply submerged, and flints and other foreign rocks were conveyed thither by currents, and mixed with the water-worn granite detritus of the Islands.

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