The Study of Flint Flaking.

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I feel that it is only fair to preface my remarks on the Study of Flint Flaking by making it clear that I am presenting views which are by no means of universal acceptance.

The purpose of this communication is not so much adequately to present the facts, or even to weigh the conclusions which may be drawn from them; but, much more to try to point the way for others to find out the facts for themselves, to think independently, and not to leave it to someone else to supply an authoritative opinion.

In the first place, consider what the attitude should be towards flint experiments, and what they should mean.

You cannot find what nature may do in the flaking of flints by an attempted imitation of her processes. I would suggest that what you need to learn from flint experiment is an understanding of the flaking properties of flint. You cannot understand the flaking properties of flint except by first-hand experiment, and you cannot form a useful opinion about flaked flints of unknown origin until you know the flaking properties of the material concerned.

If you approach the subject from the other point of view—of the attempted imitation of natural processes—you will be engulfed in a quagmire of fallacies.

The first thing that the experimenter will find is this: that the results obtained are largely controlled by the size and form of the raw material which may be used.

Flint nodules, being more or less rounded in form, tend to give a considerable number of plano-convex pieces as they break up. That is to say, they supply pieces with a flattish fracture (cut through the nodule) upon one side, and a rounded portion of cortex on the other.

One of the simplest methods of studying the flaking properties of flint is by releasing pebbles of known weight from a measured height, so that they fall upon the flint being experimented upon by the acceleration of gravity. This enables the velocity, and the kinetic energy of the blow to be calculated.

With our plano-convex piece, we find that there is a strongly marked advantage, or facility of flaking, from the flat surface, up the side edges, as compared with other directions. This fact I have named the principle of the Planes of Least Resistance.

Tabular flints flake with equal facility from either side.

If the student will experiment on these lines,* he will find that his eyes will be opened to a real understanding of the subject in a manner that can be obtained in no other way.

The natural specimen from Niton, which will be illustrated and described later, supplies a good instance of selective flaking along the Planes of Least Resistance.

This special form of flaking is not of course seen universally, under all conditions, any more than the rock crystal is the universal form of quartz ; but in both cases there is a tendency towards the systematic repetition of certain definite forms, whenever circumstances permit.

On passing from experiment to the observation of natural processes at work we meet with serious difficulties.

No one doubts that wave action upon sea beaches does chip flints, although there may be no one who has ever seen it happen. But human implements are also found upon sea beaches, and it must be frankly admitted that the division between the human and the natural groups can never be a matter of observed fact, but one of inference upon which opinions differ.

There is, however, another source of information which is not open to the same uncertainty.

The friction of one stone against another during subsoil movements is a fertile source of natural flaking, and it is a process which is more widely operative than is generally imagined. Under favourable conditions it can be studied in open sections.

It is possible, occasionally, to find two stones in contact one with another, one of which has been systematically flaked along the Planes of Least Resistance, with all the chips removed from the edge still present.

Careful digging, with a small hook, a trowel, or a portable entrenching tool, is essential. Free digging with pick and shovel is useless, as it only destroys the evidence which needs to be observed.

One of the most favourable situations for this study of underground flaking is the Bullhead bed of flints which underlies the Tertiary formation. The best flaking is found where fresh flints have been brought in by the underground solution of the Chalk.

Many opportunities also occur in other situations. Although the quartzites of the Bunter have not the flaking quality of flint, and allowance must be made for that notable difference, yet precisely the same processes and results of underground flaking may be ob-

* There are, of course, many complications which modify the results, beyond the broad indication referred to here. See the published papers given in the References.

served in the cliffs of Budleigh Salterton. I have obtained there the most conspicuous and characteristic eolithic types, such as the single notch, the double-notch-with-point (or bow-scraper), and other associated flaking.

There is a wide and almost untouched field for extending these observations among the breccias and conglomerates of the earlier geological formations. But it needs time and careful work, and the earnest endeavour which springs from the desire to increase natural knowledge.

In rare cases, good evidence may be obtained under quite superficial conditions. I have found such myself, and a notable instance has recently been brought to my notice by Mr. G. C. Dunning, to whom I am greatly indebted for the information.

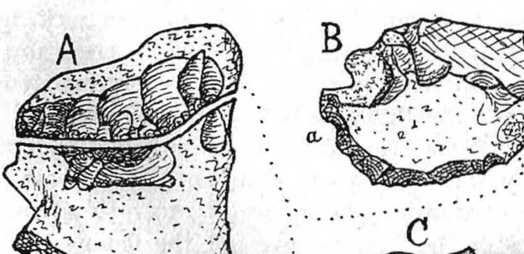
Mr. Dunning thus describes its discovery :—

"The specimen was found 2 feet 9 inches below the surface of the top of a round barrow on St. Catherine's Hill, Niton, Isle of Wight, in a lump of clayey soil.

The lump came out entire, and the flints were found inside on breaking up the clay with my hands, so that the flints were quite untouched by the pick.

The two flints were in their proper relative positions, separated by a thin layer—about 1 mm. thick—of clay."

The evidence of the specimen itself is really conclusive as to its origin, apart from the circumstances. Although the surface of the fractures is somewhat dull, and crude-looking, it is by no means new. Patination has distinctly commenced, in spite of the fact that the flint can never have been exposed to the atmosphere, or the two separate pieces would have parted. There is also calcareous incrustation along the main line of fracture.



The specimen is illustrated in the Figure. " A " shows a general view of the two pieces as found, with the pressure flake, which has been removed across the top, still in place. " B " is the upper view of the pressure flake, converted into an eolithic scraper by high angle secondary flaking along the edge. " C " is the side view of the same.

The secondary flaking along the scraper-like edge is admirable; there is some crushing along the extreme edge, but not more than might be seen from the use of a prehistoric scraper. The angle of the edge-flaking varies from 70° to 85°. There is one small notch at *a*; but as a whole the edge presents a fairly regular outward curve, which is somewhat scarcer in this class of flaking than the notches and points.

There is, however, a slightly larger and deeper notch, of more ordinary eolithic character, which is seen near the centre of the edge of the lower piece in " A." Further to the right may be seen a flake in the upper piece, and another flake in the lower piece, which spring from the same mutual pressure-point between the two pieces.

Although, as may be seen from " C," the basal fracture of this piece is not so very flat, and the rounded back is less rounded than one would consider ideal for the purpose, this specimen affords an admirable illustration of the Planes of Least Resistance flaking. It shows us the " blind " forces of Nature producing a selective result, as if under the guidance of intelligent design.

The side view " C " will also shew that a double curvature in the basal surface produces a turned-down edge. This feature is not infrequent (compare the " Eagle-beak " points from the Crag). Where such double curvature is present, a better grip is obtained between the two stones, and it consequently favours flaking.

I have already mentioned that careful examination of the Niton specimen indicates a very considerable antiquity for the flaking. As to when it took place, it would be rash to hazard a guess. I should not venture to conclude that it was necessarily flaked in the barrow in which it was found. As the flint was embedded in the middle of a hard lump of clay, which came out of the barrow as a whole, it seems to me quite possible that it was similarly dug up as a whole by prehistoric man, and thrown into the barrow.

However that may be, the mechanics of its flaking, which can be understood in the light of experimental evidence, is the same in either case.

I will not here enter into the details of the comparison between the known natural and the disputed eolithic flakings. But as I have specialized in this study, I will tabulate certain characters as a starting point, for the reader to follow out for himself, to test for himself, to correct, and to improve. Namely :—

A. The bulb characters :—
1. Short and sharp, and sub-conical.
2. Broad and depressed.
3. Extremely depressed and flattened ; wanting in any suggestion of the conical element.
4. Swelling low down the flake ; that is, far from the point of impact.

B. The éraillure :—
1. Whether present or absent.
2. Simple, and neatly sub-triangular.
3. Complicated ; consisting of several facets.
4. Erratic in position.

C. The surface ripplings :—
Whether stronger or weaker, noting details of their trend. Of minor importance only.

D. The outlines of the chipped edges :—
1. The single hollow notch.
2. The double-notch, or bow-scraper.
3. The points (with "one-way" chipping) in great variety of size and detail.
3*a*. The spur, or incipient point.
4. The triple notch.
5. The outward curve, or pseudo-scraper.
6. The straight edge.
7. The step outline.
8. The ogee curve.
9. The reversed notches, passing into
9*a*. The point with "two-way" chipping, or the pseudo-drill.
The varied combinations of the above.

E. The angles of the edge chipping : including the angles of of the successive stages in the progress of the work.

F. The blunting of the edge by continued friction.

G. Differences in date in the flaking as indicated by the patination.

H. The depth, or curvature of the facets.

Those who are really interested in the problems of this subject, will find it worth while to make a close comparative study of these details.

The above tabulation represents a very complicated group of characters, which vary according to the method by which the flaking is produced. To my mind, if one finds two groups of flakings which shew a similar association, one is justified in referring the two groups to a similar kind of origin.

One must not overlook one important difference between the natural and the disputed eolithic flakings. The proved underground flakings are necessarily crude looking, with dull surfaces which do not reflect the light. The facets of the patinated eoliths, on the other hand, reflect the light, and throw the flaking into relief.

By placing mechanical crushings, which have been artificially patinated and brightened, before experienced archæologists, I have proved that this optical illusion produced by the accident of surface condition does materially influence judgment.

Further, it is obvious that the number of natural flakings, which are good enough to be useful, and which have been found under the severe restriction of satisfactory evidence of natural origin, can never be very numerous.

The numerical comparison is so disproportionate that for myself I am not greatly impressed, even if there are a few eoliths which are better than their nearest analogue among the known natural flakings.

It is the unity of the underlying plan, and of the method by which they are made, and the common range in the grouping and association of the forms, which appears significant to myself.

At least, with all the time and study that I have devoted to the comparison between the Natural and the disputed flakings, I have failed to find any basis of difference between the one and the other, either on my own account, or arising out of anything that my opponents have said.

Whether my views may be right, or whether they may be wrong, is for you to find out for yourself. It would not be fitting to repeat much of the detail that is already published, but the summary of my conclusions is as follows :—

That certain natural agencies (particularly those which involve friction) when acting upon suitable flints (particularly those of plano-convex and tabular form) show a systematic tendency towards flaking along the Planes of Least Resistance, and consequently to the production of the associated groups of eolithic flakings.

The investigation of underground conditions is perhaps not altogether inappropriate to the members of a Spelæological Society. The subject needs keen and reliable observers: young men who have not yet forged an axe that they want to grind, as we older men have done.

As the two sides in this prolonged controversy hold views which are in such implacable opposition, the one to the other, my advice to you is: distrust both sides equally; ignore all opinions; and find the truth for yourself by the direct appeal to Nature.

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Fuller references to the literature may be found in the above.