THE FLAKING AND FLAKE CHARACTERISTICS
OF A PRE-RED CRAG ROSTRO-CARINATE
FLINT IMPLEMENT.

BY J. REID MOIR, F.R.A.I.

It is now some considerable time since the attention of the archæological world was directed to the discovery of a series of flint implements of a peculiar and novel type to which Sir Ray Lankester gave the descriptive name rostro-carinate. These particular implements, as their name implies, bear, in their anterior region, a marked resemblance to the beak of an accipitrine bird, and also to the prow of a boat, the boat being turned keel upwards. Both Sir Ray Lankester and the author have, from time to time, published papers on these specimens (1), and the latter has lately put forward reasons for believing that the rostro-carinate was the ancestral form of, and gradually developed into, the well-known Chellian palæolithic implements of rhomboidal section (2). Since the first discovery of these beak-like flaked flints, and the spreading abroad of a knowledge of their characteristics, a number of similar specimens have been found in parts of England other than Suffolk and Norfolk, where they were first discovered, and it may be said that the fact of their occurrence over a very wide area is established. The author has seen and examined rostro-carinate flint implements from Warren Hill, Suffolk; the Thames and Lea Valleys (3); Lakenheath, Suffolk (4); Savernake, Wiltshire (5); Selsey Bill, Sussex; Kent's Cavern; the North of Ireland; France and Egypt (6). Dr. Peake has also described and figured rostro-carinate implements found by him in Oxfordshire (7). It must not be imagined, however, that all the specimens from the aforementioned places are of the same age, for it is clear that the "fashion" of making rostro-carinates, though very much in vogue in Pliocene and early Pleistocene times, was not confined solely to these periods, but occurs sporadically in later cultures. And this is in accord with what we know of the occurrence of other types of flint implements.

Though, as has been mentioned, numerous accounts of the form and characteristics of rostro-carinates have already been published, no detailed analysis has yet been made of the flaking of any of these specimens, nor a description, based upon such an analysis, given of the actual manner in which the ancient workmen manipulated their nodules of flint. Sir Ray Lankester, however, in his model monograph on the remarkable rostro-carinate implement found beneath the Norwich Crag (8), has enumerated

the various flake-scars, and the direction of the majority of the blows responsible for their production.

It is the object of this communication to carry this descriptive process one step further, and to demonstrate not only the direction of the blows responsible for the flake-scars to be seen upon the rostro-carinate implement now to be described, but to show the probable order in which these blows were delivered, and the plan upon which the ancient workman proceeded. The specimen selected for description was found some years ago in the pre-Red Crag detritus-bed, in the upper or most easterly channel in the brickfield of Messrs. A. Bolton and Co., Ltd., Henley Road, Ipswich. It presents all the characteristics of the implements recovered from the detritus-bed, being of massive form and coloured a dark chestnut brown such as the older series of pre-Red Crag implements usually exhibit. The flaking is all of one period, no re-working being observable upon the specimen, some incipient cones of percussion, and small weathered-out striæ are to be seen upon some of the surfaces of the specimen, while the ridges between the flake-scars show a slight amount of attrition, and this is particularly marked on the anterior carinal edge. When regarded with the anterior portion turned towards the observer, the beak is seen to exhibit a marked asymmetry, being, as it were, twisted to the right.

The author has already published illustrated descriptions of the manner in which, in his opinion, the rostro-carinate implements were made (9), but it may be as well, in view of the purpose of this paper, to draw attention again to the scheme which he outlined, and which was based upon an examination of a number of pre-Red Crag and other specimens*.

For those who have experimented in flint flaking there is no need to emphasize the fact that the rounded sides of the ordinary flint nodule afford very unsatisfactory surfaces upon which to deliver flake-removing blows with precision.

It becomes necessary, therefore, to provide by flaking a more or less flat striking-platform, and this is the first step to take in proceeding to make a rostro-carinate flint implement.

A blow is delivered at the anterior end of the potato-shaped flint selected for manipulation, and a large flake detached (Fig. 123¹). The resulting flake-scar forms the ventral striking-platform upon each side of which flake-removing blows are delivered, and by the convergence of the flake-scars of either side the keel or carina is produced (Figs. 123² and 123³).

It is sometimes necessary to remove flakes by blows upon the upper dorsal surface in the production of the keel, and in the Norwich Test Specimen described by Sir Ray Lankester it is clear

* A series of flints flaked by the author showing the various stages in the manufacture of a rostro-carinate flint implement are exhibited in the Museum at Ipswich.

that the original nodule of flint was fractured by two great cleaving blows, so that both a ventral and dorsal striking-platform were formed. The production of a dorsal striking-platform was also needful when the flint nodule was too big to be handled easily, a condition necessitating modification of the posterior region of the implement by the removal of flakes. And the specimen now to be described possesses such a dorsal striking-platform and has evidently been modified at its posterior region for prehension.

Fig. 123. The making of a Rostro-Carinate Flint Implement.

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It is necessary when setting out to reconstruct, as it were, a flint implement and to ascertain the exact manner in which it was made, to be fully acquainted with the various characteristics of the flake-scars which indicate the direction of the blows responsible for them, and the order in which these blows were delivered on the flint nodule. The characteristics which demonstrate the direction

of the blows are three in number, viz., (a) conchoidal rippling, (b) fissures, and (c) negative cones of percussion (the positive cone is seldom seen upon the flaked surfaces of flint implements), and the author has already given details of these characteristics in two papers published some little time ago (10).

The order in which the various flake-removing blows were delivered can be ascertained by examination of the truncated flake-scars observable upon the implement. For instance, if two flake-scars are contiguous and the outline of one of them is seen to be complete, while the other has been encroached upon or truncated by the complete example, it is clear that the flake-scar which is entire was caused by a blow struck after that responsible for the incomplete example. When, as is often the case, a flake-scar has become greatly truncated, and only a small portion of it remains, it is necessary to examine this remaining portion with great care with a good lens so that the direction of the flake-removing blow

Fig. 124. The original Flint Nodule. View of left. lateral surface.

may be accurately determined. But a little experience in such matters will very soon remove any doubt or difficulty regarding such determination, and the author has confidence in stating that his conclusions regarding the specimen now to be described would not be challenged by anyone examining the implement and possessed of a knowledge of flint fracture.

The drawings which accompany this paper illustrate each stage in the manufacture of the implement. The flake-scars are marked alphabetically A to S and the size of the truncated examples has been carefully computed. The arrows indicate approximately the point where the blow fell, and its direction. The minute flake-scars due to attrition do not enter into the scheme of manufacture of the implement, and do not therefore appear in the drawings.

THE SHAPE OF THE ORIGINAL FLINT NODULE

from which the implement was made is shown in Fig. 124.

An examination of the remains of the cortex or outside crust still remaining upon various portions of the implement makes it clear that the shape of the original nodule was almost certainly as shown.

Fig. 125. First Stage in formation of ventral striking-platform.

The cortex is preserved over a considerable area of the ventral surface, and extends upwards in a narrow band over the right lateral to the middle of the dorsal surface. A similar extension of this ventral cortex is observable towards the posterior portion of the left lateral surface. * These indications, together with the downward curvature of the dorsal cortex towards the anterior region of the implement, make it possible to arrive at a very close

* In all the text figures the cortex is indicated by dotted areas, and the foregoing description can easily be followed by an examination of the illustrations.

approximation to the size and shape of the original flint nodule. The shape of the nodule is significant. It is clear that the ancient workman selected a mass of flint of a form suitable for making into a rostro-carinate implement. He no doubt realised that in producing the beak-like anterior region the narrower end of the nodule would be the best to operate upon, as such a plan of attack would not necessitate the removal of too much useless material, while the other bulky end of the flint would make it possible to produce

Fig. 126. Final Stage in production of ventral striking-platform.

the required massive hand grip with a minimum amount of trouble. The author has himself selected flint nodules for making into rostro-carinates, and found that specimens of the shape described above are, more than others, easily made into the particular type of implement under discussion in this paper. We thus see that the shape of the flint nodule itself from which this rostro-carinate was made seems to afford clear evidence of its careful selection by a reasoning being well acquainted with the art of flint flaking.

THE FORMATION OF THE VENTRAL STRIKING-PLATFORM.

1st Stage (Fig. 125) It is evident that the maker of this implement commenced his work by detaching a large flake from the ventral surface of the flint nodule by means of a blow delivered at its anterior end. This flake-scar is marked A. As has been pointed out, this flake is removed because it is necessary to produce a flat striking-platform upon which flake-removing blows may be delivered with precision, in the formation of the keel or carina.

2nd Stage (Fig. 126.) It appears that the ancient workman was not satisfied with the area of the flake-scar A, and so he delivered another blow (contiguous to that responsible for A) producing the flake-scar B, which, as will be noticed, slightly truncates A. As both these flake-scars A and B are cut into by the last blows delivered in the formation of the right and left surfaces of the keel, it becomes evident that the formation of the ventral striking-platform was prior to that of the keel,

Fig. 127. The production of the dorsal striking-platform. The material indicated with crosses is removed by a cleaving-blow.

THE PRODUCTION OF THE DORSAL STRIKING PLATFORM.

(Fig. 127.) The production of the ventral striking platform was followed by the formation of its dorsal equivalent. The cause of the production of this dorsal striking platform was no doubt governed by the necessity for modifying the posterior region of the nodule for prehension.

As will be noticed in Fig. 125, the cortex rises somewhat abruptly towards the posterior region, and it was on the more or less flat surface afforded by this

"escarpment" of cortex that a blow was delivered which removed a considerable amount of the posterior region and produced a well-marked hinge-fracture at the point of its emergence from the parent block. And it is to be remarked that the nature of the blow responsible for the production of this dorsal striking-platform is of quite a different order from any of the others which were delivered in the making of the implement. The maker of the specimen no doubt realised that the ordinary type of blow, giving rise to a flake-scar showing the usual hollow of the negative cone of percussion, and other marked conchoidal characteristics, would not produce the surface he required. So he had resort to what is known as a "cleaving blow," such as the Brandon flint knappers use in "quartering" their flint masses, and which very seldom gives rise to a cone of percussion and other inequalities in the fracture surface produced. The adoption on occasion of this method of flaking by the pre-Red Crag people has already been drawn attention to (11).

Fig. 128. First Stage in production of left lateral surface.

THE PRODUCTION OF THE LEFT LATERAL SURFACE.

1st Stage. The formation of the dorsal and ventral striking-platforms having been accomplished, it was possible for the ancient flint flaker to proceed further with his work. It is, of course, not possible to say definitely whether he commenced to form the left or right lateral surface of the implement first, because, except at the extreme anterior end of the implement where the keel or carina is situated, the flake-scars of these two surfaces do not meet, and determination of priority by observing the truncation of the flakes is impossible. In making a rostro-carinate the flint is turned about and

a flake removed from one side and then from the other. The two sides were thus formed *pari passu*, as it were. But one of the two lateral surfaces must be dealt with first, and the author selects that on the left hand for description. The first stage in the production of this surface is very simple. A blow was delivered upon the ventral striking-platform and the flake-scar D produced, and another blow delivered upon the dorsal striking platform gave rise to the flake-scar E.

2nd Stage. This stage is represented by the production of the flake-scars F, G, and H. A blow delivered upon the ventral striking platform gave rise to the flake-scar F which truncates D, while two more delivered upon the dorsal striking-platform resulted in the production of the flake-scars G and H, both of which encroach upon and truncate E.

Fig. 129. Second Stage in production of left lateral surface.

The flake-scar H exhibits a V-shaped hollow or "median chink" similar to that Sir Ray Lankester draws attention to in the posterior region of the Norwich Test Specimen, (8).

3rd Stage. This stage is represented by the production of the flake-scar J (by a blow delivered upon the ventral surface of the implement) which truncates H.

It is to be noticed that in the formation of the left lateral surface the flake-scars D and F were produced in forming the keel, while E, G, H, and J may be said to owe their formation to the necessity for a comfortable and firm hand grip of the implement.

THE PRODUCTION OF THE RIGHT LATERAL SURFACE.

1st Stage. In the production of the right lateral surface (Fig. 131.) a blow was first delivered upon the dorsal striking

platform and the flake-scar K produced. Another blow delivered upon the then flattish dorsal area in the region of the keel was responsible for the formation of the somewhat "hackly" flake-scar L. The production of the latter gave rise to a small ledge or platform and made it possible to deliver a flake-removing blow at the point marked with an arrow, and to form the flake-

Fig. 130. Final Stage in production of left lateral surface.

Fig. 131. First Stage in production of right lateral surface.

scar M, but the exact utility of this flake-scar (unless it was removed to "balance" the implement) is somewhat difficult to understand.

2nd Stage. This stage is represented by the flake-scar N, which (Fig. 132.) truncates L, and which was produced by a blow delivered upon the ventral striking-platform.

3rd. Stage This stage is represented by the flake-scar O (Fig. 133.) (the result of a blow delivered upon the ventral striking-platform) which truncates L and N.

As in the case of the left lateral surface, it is to be noted that the flake-scars L, N, and O, were produced in forming the keel, while K owes its existence to the necessity for a comfortable and firm hand-grip of the implement.

Fig. 132. Second Stage in production of right lateral surface.

Fig. 133. Final Stage in production of right lateral surface.

THE FINAL TRIMMING UP OF THE DORSAL SURFACE OF THE IMPLEMENT.

- 1st Stage. A blow was delivered upon the upper portion of (Fig. 134.) the right lateral surface and the flake-scar P produced.
- 2nd Stage. A second blow was delivered in close contiguity (Fig. 135.) to that responsible for P, and the flake-scar R formed, which truncates P. A final blow delivered upon the

upper portion of the left lateral surface gave rise to the flake-scar S which truncates C.

As in the case of the flake-scar M it is difficult to see what useful part these three flake-scars, P, R, and S, play in the formation of the implement. Their origin may perhaps be referred to a love of symmetry and "balance" on the part of the ancient flint flaker.

From the foregoing description of the manner in which this rostro-carinate flint implement was made, it is clear (a) that the ancient flint flaker followed almost precisely the same plan as that adopted by the author in making specimens of this character.

Fig. 134. First Stage in completion of dorsal surface.

This is regarded as inevitable, as the author knows of no other way in which a rostro-carinate can be formed from a potato-shaped nodule of flint. And (b) that from the initial selection of his raw material to the final blows when the implement was completed we see without question a reasoning human brain directing each stage of the work. The ancient craftsman knew, as all modern flint flakers know, that flat striking-platforms are a necessity in making an implement of any kind, and we have seen that this knowledge was put to good effect. We recognise also that in the production of the dorsal striking-platform this Pliocene individual was able to deliver what is known as a cleaving blow, being fully conscious, no doubt, that a flat surface would result. The whole object of

the production of this and other rostro-carinates was, in the author's opinion, the formation of an implement having a heavy butt or posterior region suitable for prehension, and a sharp well-supported cutting edge at the opposite anterior end. He does not regard the beak-like appearance of the anterior region as a functional character, but simply as an almost inevitable result of the manner in which these people fashioned the cutting-edges of their flint implements. This view is supported by the result of the experiments in flint fracture which he has conducted, and he thinks if other investigators conduct similar experiments they will find themselves in agreement with these conclusions. But whatever may be the

Fig. 135. Final Stage in final trimming up of dorsal surface.

exact significance of the curving keel or carina, it is established that the particular implement under discussion was fashioned on a definite and careful plan, and that the specimen would be very useful for cutting and hacking purposes. An examination, moreover, of the keel or cutting-edge shows considerably more battering than the other ridges of the implement, and this intensified battering the author would ascribe to use.

A close study of the actual flake-scars of this rostro-carinate specimen shows that blows were responsible for their formation. There is no evidence that any portion of the flint has been broken by pressure or thermal effects. The characteristics of the flake-

scars produced by these two last-named agents of fracture have been fully discussed by the author in former papers (12), and there is no need to describe them again here, but it may be mentioned that flake-scars which are "resolved" * and which exhibit hinge fractures, fissures, conchoidal rippling, negative cones of percussion, and an "intelligent" truncation, can be regarded with some amount of certainty as having had their origin in forceful human blows. The author has very carefully examined with a good lens the seventeen flake-scars observable upon the specimen under description, and has compiled the results of this examination in the form of a table (Fig. 136.)

FLAKES.	RESOLVED.	HINGE FRACTURE.	FISSURES.	CONCHOIDAL RIPPLING.	NEGATIVE CONE.	TRUNCATED.
A.	+	+	+	+		+
B.	+		+	+		+
C.		+	+			+
D.	+		+	+		+
E.	+		+	+		+
F.			+	+	+	
G.	+		+	+		
H.			+	+	+	+
J.			+			
K.			+	+		+
L.	+		+	+		+
M.	+		+	+		
N.				+		+
O.			+	+	+	
P.	+		+	+	+	+
R.	+		+	+		
S.	+		+	+		
TOTALS.	17	2	16	15	4	10

Fig. 136. Analysis of Flake Characteristics.

A glance at this table will show that ten of the flake-scars are "resolved," two show hinge-fractures, sixteen well-marked fissures, fifteen conchoidal rippling, four negative cones of percussion, and

* "Resolved" flakes. This name has been given to flakes which exhibit at the point of their final separation from the parent block of flint a small step or ledge, and this peculiarity may be regarded as being due to the manner in which the flake-removing blow was struck. The normally-struck flake does not "resolve" in the manner described, but pursues its line of fracture uninterruptedly, and exhibits, at the point of its final separation from the parent block of flint, a thin sharp edge. The presence of resolved flakes upon flints flaked by fortuitous means has been noted (J. Reid Moir, "Flint Fracture and Flint Implements," "Science Progress," No. 41, July, 1916, Fig. 6), but these flakes are of a different order from those removed from the flint implement under discussion.

ten truncations. Thus we see that not only the selection of the original flint nodule; the manner in which it was flaked; and its obvious usefulness as a hand implement, testify to human purpose and skill, but the details of the flake-scars of the specimen provide evidence of equal cogency in favour of the same conclusion. The method adopted in this paper of tracing every step in the production of a flint implement would seem to be the only reliable way of ascertaining what a flaked-flint really means. The old plan of regarding an implement as made by man, but without any real knowledge of how the manufacture was carried out, was a case of "seeing through a glass darkly" and highly unsatisfactory. It is to be hoped that archaeologists will in future be able to demonstrate with certainty to the incredulous that the flaked flints which they regard as of such importance are undeniable works of man.

NOTE.—The implement described in this paper is exhibited in the Museum at Ipswich, where it is available for examination.

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THE ICKNIELD WAY IN EAST ANGLIA.

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Though it is now impossible to trace a connected road from end to end, there is little doubt that a series of trackways between Norfolk and Wiltshire have from very early times been known as the Icknield Way, and it is highly probable that originally they provided through communication between the south-west of England and the Norfolk coast. These trackways appear to be prehistoric, to have been utilised but never re-made by the Romans, avoiding the upper levels of the hills and skirting the slopes where the forest presumably ended. The adjacent country is dotted with hill-forts, barrows, and remains of the Neolithic and Bronze Ages.

There is much uncertainty as to the exact course of the Way, and there will probably never be general agreement, but local knowledge is a necessity, and for that reason I desire to record various facts which seem to me to strengthen the arguments for considering a road north-east of Royston to be the continuation of the tracks to the south-west, generically known as the Icknield Way.

ROYSTON TO LACKFORD BRIDGE.

Almost in the centre of Royston the Icknield Way crosses the Ermine Street, and for many centuries, through the town and each side of it, marked the boundary between Hertfordshire and Cambridgeshire. Leaving Royston as the main road to Newmarket, two miles from the town the Icknield Way diverges to the right as a green lane, and for a little over a mile further continues as a county boundary, past Noon's Folly. It proceeds as a farm track through a sparsely-populated portion of Cambridgeshire, across the Bran Ditch by Ickleton Grange and Ickleton Abbey Farm, and across the Cam. It passes about a mile to the north of the important Roman station at Great Chesterford, and for a short distance again follows the boundary between Cambridgeshire and Essex. The Brent Ditch is crossed between Pampisford