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THE CLASSIFICATION OF THE PREHISTORIC REMAINS OF EASTERN ESSEX.

[WITH PLATES XI-XVIII.]

BY S. HAZZLEDINE WARREN, F.G.S.

INTRODUCTION.

THE prehistoric remains of East Essex were first brought to public notice by Dr. Henry Laver.¹ I have discovered that these belong to two distinct series, which are buried in different Recent deposits, the one overlying the other in stratigraphical succession. The two series of remains present certain differences, but both yield flint arrow-points of various types, together with implements of polished stone and primitive pottery. All these points will be discussed in detail in the sequel.

Having, thus, two series of different ages, I was particularly desirous of obtaining some trustworthy basis of comparison by which I could define either or both of these series as Early Neolithic, Late Neolithic, Early Bronze age, or whatever it might be.

Here I found myself confronted by very serious difficulties.

I hoped that the pottery might give the best chance of elucidating the problem. But primitive pottery, even of the same period, varies greatly; and further, in searching for comparative material in our large public collections it is not easy to find any which can be certainly defined as Neolithic. Even if the pottery from the Long Barrow of West Kennet² be itself Neolithic, its peculiar quality and ornamentation certainly cannot be taken as typical of, or confined to, that period. Pitt-Rivers, in the course of his excavations, found the same kind of pottery, with the same ornamentation, directly associated with Bronze age remains.³ This point will be mentioned again when considering the pottery of the later series of prehistoric remains from this district.

On turning our attention to the flint implements, we find that they do not give us evidence that is any more definite. Unless we take the indefinite quality

¹ *Essex Naturalist*, vol. iii, p. 159.

² This pottery has been many times figured. It is now preserved in the Greenwell collection in the British Museum.

³ Pitt-Rivers *Excavations in Cranborne Chase*, vol. iv, 1898, p. 100, and Pl. 261, fig. 17. It is here concluded that this type of pottery is exclusively of the Bronze age. Compare also Pl. 298, fig. 8, of the same volume.

of rudeness as a test of age, there are no post-Palæolithic types that can definitely be asserted to be earlier than the knowledge of metal. Not only barbed and leaf-shaped arrow-points and perforated stone axe-hammers, but flakes, scrapers, knives, and axes of stone are all found in direct contemporary association with Bronze age remains.

In view of these facts, I thought that it might not be without interest to review the whole position. So before entering into the local details of the discoveries in Eastern Essex, I propose to give some little consideration to the general principles involved in the classification of prehistoric remains.

If one is to begin at the beginning, the first point to be considered in this inquiry is the method of collection. As the whole superstructure of the science of prehistoric archæology is largely dependent upon the method of collection, its importance cannot well be over-estimated.

GENERAL REMARKS ON THE COLLECTION OF PREHISTORIC REMAINS.

May I, at the outset, put in a plea to all collectors of prehistoric remains, for the conscientious record of all details attaching to their discoveries, even although these may not appear to be important at the time? It is particularly desirable to investigate the association of various remains with each other. It is not enough to collect only the best and most skilfully wrought products, or those which look the most attractive in the cabinet, to the neglect of less symmetrical or less perfect objects which may be associated with them.

This is of peculiar importance in the study of prehistoric archæology. For while it is true that the collection of prehistoric objects in many cases saves them from destruction, yet it is none the less the fact that in the prosecution of prehistoric investigation, the accumulation of evidence necessarily involves the destruction of evidence. It should always be borne in mind in unearthing prehistoric remains that when once they have been removed from their original surroundings, they can never be put back into them. In other sciences the collection of evidence does not usually involve the destruction of evidence for future workers. For instance, the sun is not affected by the astronomer who photographs it through his telescope, and, from this point of view, it does not matter how badly he may do his work. The barrow that is excavated by the archæologist is destroyed for ever, and the quality of his work is of the utmost importance.

In dealing with surface finds, it is not enough to give the locality, but they should be collected in accordance with the way in which they are grouped in the field.

May I also put in a plea to the collector not to instigate a local trade in these remains? All may go well for a time, and the collector obtain more than he would by his own unaided work, but sooner or later the system nearly always leads to disaster. At first the arduous work of searching may only appeal to those

who have an instinctive interest in such things, but it soon gets into the hands of less satisfactory individuals, who have no interest beyond the money which their discoveries will command. The choicest specimens are purchased, often at high prices, by those who have only a temporary curiosity in such objects. The record of their locality disappears, and they become lost to science. As an instance of this, I was told some little time ago by one whom I chanced to meet that he formerly had many fine arrow-heads and other implements, but that he had lost interest in them, and in the course of various "spring-cleanings" and other domestic events they had disappeared. Another case came under my notice recently: two polished axe-heads were sent to the old clothes department of the Church Army among other superannuated lumber. Other similar cases have also come within my personal knowledge.

Such is the unfortunate result of trade in prehistoric remains. In addition to this, the circumstances of discovery are seldom obtainable in objects which are purchased: valuable scientific evidence is destroyed. And last, but not least, the locality becomes invaded by forgeries, which are occasionally even "salted" upon the ground, for the innocent collector to find for himself! the forger looking on from behind a hedge, and richly enjoying his nefarious joke!

The district here discussed is one in which stone implements were formerly very abundant. They were chiefly found upon the shore, where they had been washed out of the prehistoric deposits by the sea. It is now, unfortunately, a district over which one must inscribe *Ichabod*. To avoid possible disappointment one must say that the chances of a visitor finding anything to reward his search at the present time are very remote. I know of collectors who have heard of what has formerly been found, and have gone down to search, and found nothing. The black flint implements were easily seen on the white sand, and the whole place is now practically cleared.

I think that valuable scientific results might be obtained by organized spade work. If some necessary funds could be raised to start such an investigation, it would be well worth while to make the attempt.

There is one other general point on the collection of prehistoric remains to which I wish to refer. This is the extent to which collection, the primary source of our information, is coloured by theory. If, for instance, we find bronze in a round barrow we accept it as contemporary, as a matter of course. If we found the same thing, under the same circumstances, in a long barrow, we should say it had been subsequently introduced. It is an act of caution to require stronger evidence in the case of things which are not generally accepted than in the case of those things that are familiarly known. But it is a caution which may be pushed too far. Let us take the case of the West Kennet type of pottery, already mentioned. Now such a highly developed technique and ornamentation cannot possibly cover a prolonged period of time. Pitt-Rivers, trusting his own observation, concluded that it was a round barrow type, and that it had been subsequently introduced into the Long Barrow of West Kennet. But the view which may be considered to be the

orthodox one is that it is a long barrow type, and that Pitt-Rivers was mistaken. But suppose we take both observations as correct, and do not try to explain either of them away by pre-conceived theory? Then the Long Barrows and the Round Barrows are found to be, in some cases at least, contemporary with each other, as held by so high an authority as Mr. J. R. Mortimer.

To a large extent it is one theory hanging upon another, and it is difficult to know which to take as the more trustworthy. This is a point which I am bringing up for a special purpose, to which I shall refer later.

THE DIFFICULTY OF CLASSIFYING SURFACE FINDS.

In his work on *The Ancient Stone Implements of Great Britain*, Sir John Evans used the term Surface period as synonymous with the Neolithic age. I think that it would conduce to greater precision of thought if this term were used more generally, and in a somewhat wider sense.

There can be no doubt that the stone implements which we find upon the surface, and usually class together as Neolithic, cover a very considerable period of time. The barrows of the Bronze age yield stone implements in contemporary association with bronze. If these stone implements were found upon the surface we should, as a matter of course, consider them to be Neolithic. Indeed, there is little necessity to enlarge upon this fact, as it is fully admitted. No one will call in question the truth of the statement that large numbers of the Surface stone implements which we classify as Neolithic must in reality belong to the Bronze age. Further than this, it is equally certain, although perhaps not so generally insisted upon, that many waste chips and rudely worked flints are nothing more than the product of the flint knapping which has been carried on for various purposes during the progress of historical times. On the other hand, some of our surface stone implements belong, in all probability, to the Palæolithic age.

This being so, it would be more scientific to classify our surface finds together as a Surface series, which they are, rather than as Neolithic, which many of them are not. We do not yet know with any degree of certainty what the distinctive features belonging to the Neolithic series may be, nor do we really know if any such distinctive features exist. Various points have been noted in the investigation of the barrows, by which it has been concluded that the perforated stone axe-hammers, and possibly also the barbed arrow-points in flint, are exclusively of the Early Bronze age. But this, even if trustworthy, does not take us very far.

The widespread classing of objects as Neolithic, many of which are not Neolithic, is calculated to blind us to evidence which might otherwise be apparent. If we ruled out the surface finds from definitely taking their place in the Neolithic series, and classed them as Surface (which might or might not be Neolithic), it is true that there would not be much left which could claim the

more definite title. This, however, in showing us clearly how we stand in the matter, would not be any real loss to our science.

We are badly in need of some satisfactory method of defining the relative ages of our Surface series. Many workers class the ruder forms as earlier than those which are more symmetrical and better finished. But this method, especially where it entails the selection of the ruder individuals of the same local group, does not appeal to me as a satisfactory one. Even where the rude forms are distinctly grouped together, their rudeness may well be due to some other cause than age, as, for example, to the special abundance of raw material, or to the particular industry for which they were used not requiring anything better. Or if due to age, the rudeness may be due to the age being a late one, rather than an early one. In Egypt the finest flint-working is early; after the increased development of metal-working rendered the flint tools less important, their workmanship degenerated and became ruder. The same thing probably happened in Europe.

At the same time, I fully believe that much may be done by a careful comparison of the manner in which various types are grouped together in the field, and also by the study of reworked implements. I have myself been engaged for some years past in the investigation of the surface implements of a district which presents highly suggestive features in the manner in which they are grouped in the field, but it is not my purpose to bring this evidence forward here.

The late Mr. J. Allen Brown, in a paper brought before the Anthropological Institute in 1892,¹ endeavoured to maintain that the ruder forms of the South Downs were Mesolithic. More recently, Monsieur A. Rutot has defined as Flénusien a series of rude forms which he believes to be pre-Neolithic. Some examples of these may be seen in the British Museum. The forms are probably familiar to most field workers, and are found in this country as well as on the Continent.

In considering rude forms one must always remember that flint chipping, for various purposes, has been going on extensively throughout historic times, while besides this deliberate working of flint, flints have been broken on a large scale artificially, but accidentally, in the course of hoeing, ploughing, and other agricultural operations. There can scarcely be a doubt that we are accumulating large numbers of both of these groups in our cabinets under the label of Neolithic, and, if we take mere rudeness as a test of age, we may well be led into placing them still earlier in the prehistoric succession.

THE EVIDENCES OF BARROWS.

In the evidences obtained from barrows we are saved from much of the uncertainty which attaches to surface finds. At the same time it is always highly desirable to supplement this. It is a somewhat unknown quantity how far the funeral furniture may faithfully and adequately represent the common instruments

¹ J. A. Brown "On the Continuity of the Palæolithic and Neolithic Periods," *Journ. Anthropol. Inst.*, vol. xxii, 1892, p. 66.

of daily life. There is also the frequent poverty in funeral furniture which makes the comparison of one site with another a matter of great difficulty. It is very much to the credit of archaeology that in spite of these limitations and difficulties a large part of the solid information we now possess has been gleaned in this field.

THE VALUE OF GEOLOGICAL EVIDENCE.

In spite of all the work which has been done in the investigation of barrows and sepulchral antiquities: in spite of the useful and valuable results which are obtainable from the comparative study of the grouping and distribution of surface finds in the field, there is yet another sphere of research which has not hitherto, except in the case of the Palæolithic period, received the share of attention which it deserves. There is a simplicity and directness in the geological evidence of stratigraphical succession which is not shared by either of the methods previously referred to.

We have seen, in discussing methods of collection, how in the investigation of the barrows one theory hangs upon another, how observations even are coloured by the theory that may be favoured.

It was the stratigraphical evidence of the peat bogs which enabled the Danish and Swedish archaeologists first to establish a definite succession of prehistoric culture-stages based upon sound scientific principles. Yet, if we turn to-day to any general discussion upon the classification of the surface series, we seldom find that stratigraphical evidence takes a prominent place.

This class of evidence has, of course, its special limitations. It is only in favoured localities that it is available. Yet, in my opinion, it would be as well worth while to undertake systematic investigation by means of spade work upon these lines, as in the case of sepulchral antiquities or on the sites of camps.

THE CLASSIFICATION OF THE PREHISTORIC AGES.

On more than one previous occasion I have advocated the desirability of adapting the sequence date system, which has been used with such remarkable success by Professor Flinders Petrie in Egypt, to the prehistoric succession of Western Europe.¹

In making this suggestion it will be fully understood that it does not entail starting a revolutionary scheme of new periods with new names. The classifications used by different authorities at the present time vary slightly in nomenclature and in minor details, but in their broad outlines they are all essentially in agreement. I take these broad outlines as they stand, because I believe them to be as correct as the present state of our science can make them.

¹ S. H. Warren, *Geological Magazine*, 1902, p. 97; *Essex Naturalist*, vol. xvi, 1911, p. 279.

I simply advocate the adoption of the newer sequence date system as a subsidiary means of expressing the facts, and as a convenient and practical method of tabulating results.

But although, in this sense subsidiary, I believe that its adoption would result in important and rapid advances being made. It is a system which gives precision of definition where precision is obtainable, while, on the other hand, it can express with equal terseness and clearness the indefiniteness of our information where precision is unattainable. It expresses to a fine degree of exactitude the best result that the evidence enables us to obtain. It never misleads.

The conviction has been growing upon me that as we cannot in practice confine archæological discoveries within the limits of fixed periods, it is a mistake to attempt to do so in theory. An ever increasing volume of discoveries has to be referred to conveniently indefinite transition epochs. It has struck me, as I have no doubt that it has struck others, that the difficulties of classification increase with the richness of the material. An extensive series of remains covering a wide period of time cannot satisfactorily be grouped into fixed periods without greatly increasing the number of these periods and reducing the successive differences between them almost to vanishing point. It constantly happens that stations which have long been thought to belong to the pure Stone age, and are undoubtedly earlier than the true Bronze age, have sooner or later yielded bronze of local manufacture. Some class these in a transition epoch, but not infrequently they are transferred from the Stone age to the Bronze age, and thus the reality of the succession between earlier and later stations becomes confused.

The impossibility of fitting observed facts into the theoretically fixed culture-stages has led to the unhappy expression of "overlap" between the periods. If two successive culture stages really "overlap" each other, it is the apparent succession that is illusory; the two supposed stages must actually be contemporary in so far as they "overlap."

As a matter of fact our prehistoric remains do not belong to a succession of more or less fixed periods, with "overlaps" between them. Or, at least, this is a confusing and unscientific way of expressing their relations. That which we are dealing with is a developmental succession, and that which we want is a system which shall express this.

The sequence date system, as shown on the accompanying table, would take certain prominent phases in the prehistoric developmental succession. It would give to these a series of arbitrary numbers, at intervals of a decade apart, and these would form the outline of the sequence date scale. The successive decades would not profess to represent equal time values, but a certain approximation to equal advances in the development of culture.

This system can be followed out, if necessary, to decimal places, and is thus infinitely elastic at every point. It avoids the need of intermediate periods, which we shall otherwise see springing up, in ever increasing quantity as time goes on.

TABLE OF SEQUENCE DATES.

Periods.	Sequence Dates.	Proportion of Metallic to Stone Axes.	Range of Beaker.	Range of Cremation.	Range of Cinerary Urn.	Date of Earlier Series.	Date of Later Series.	Date of Tidal Silt.	Approximate Egyptian Dates.	Montelius.	
										Stages of La Tène, Hallstatt, and Bronze Age.	Dates B.C.
Roman occupation ...	[10]								B.C.		
Epoch of La Tène ...	[9] 90			---						L.T. III.	150
				---						L.T. II.	250
				---						L.T. I.	400
Hallstattien ...	[9] 80			---				---	600	Hal. II.	600
				---				---		Hal. I.	850
Larnaudien or Later Bronze age.	[9] 70	100:0		---	---			---		Br. V.	1150
				---	---			---		Br. IV.	1400
				---	---			---	1700	Br. III.	1500
Morgien or Early Bronze age.	[9] 60	50:100	62 55	57	62		58 50	60		Br. II.	2000
Robenhausien ...	[9] 50	1:100				50 40?	50		4500	Br. I.	+2500
Pre-Robenhausien ...	[9] 40								7000?		
	[9] 30										
? Azylien ...	[8]										
Magdalénien ... (Aurignacien of Girod)	[7] 90										
Solutréen ... (Aurignacien)	[7] 80										
Moustérien ...	[7] 70										
Acheuléen ...	[7] 60										
Chelléen] ...	[7] 50										
	[7] 40										
Early Palæolithic ...	[7] 30										

Its chief drawback is that the main outlines of a sequence date scale, when once defined, can never be altered. But as it is infinitely elastic at every point this is not likely to prove a very serious inconvenience. The scale given now is the same as that which I originally proposed in 1902. The only modification made here is the addition of integer numerals in brackets¹ to separate the larger groups of periods. These begin at the top of the scale at 10 for the commencement of historical times in this country, and work backwards through the Palæolithic period.

It may perhaps be thought that it would be simpler to eliminate the brackets and read simply 730 or 950, or whatever it might be, instead of [7]30, [9]50. But this would not correctly express the relations. The scales for the Palæolithic period, for the Recent Prehistoric group, and for anything that may be needed between these two, are respectively independent of each other. Each scale, when first established, begins conventionally at 30, in order to leave space for future discoveries. These future discoveries may fill up more decades in one scale than in another. One scale may need to be carried to 120 or 130, while another may stop at 80. The time, defined as [8], between the Palæolithic and Recent periods is still largely an unknown quantity—an hiatus in our knowledge. The whole scale must, therefore, be left elastic at its middle parts as well as at the beginning and the end. Further, many of the decades will probably always remain silent. Thus to read straight through from beginning to end in hundreds would not be correct.

In starting the Sequence Date scale I have not used the newer and more highly elaborated system of Dr. Montelius.² The same facts are represented, but for many reasons it seemed more convenient to retain the more time-honoured system as the essential basis of the scale. The equivalents in the system of Dr. Montelius are given in the last column.

For the sake of uniformity the Palæolithic scale is likewise given in the table, but, as this does not concern us here, it will not be considered in detail. The details of the later part of the scale are worked out solely with a view to elucidating the age of the prehistoric remains of Eastern Essex.

In fixing the principal "dates" of the scale the first archæological unit considered is the axe. In dealing with this part of the scale it is unnecessary to repeat the first numeral. It is understood that it is [9] in every instance. The definition of the main fixed points in this part of the scale is as follows:—

s.d. 50. Proportion of metal axes to those of stone, 1 : 100. The metal axes are all of the primitive flat type, usually of copper. The metal is shown to have been of local manufacture in Europe from the discovery at Robenhausen, which is, if anything, earlier than this (possibly s.d. 48 or 49), of the moulds for casting and the crucibles with the remains of the melted metal still in them.

¹ It is perhaps neater, and more convenient for some purposes, to separate the first integer numeral from those that succeed it, by a decimal point, rather than by brackets.

² O. Montelius, "The Chronology of the British Bronze Age," *Archæologia*, vol. lxi, 1908, p. 97.

- s.d. 60. Proportion of metal axes to those of stone, 50 : 100. The metal axes still continue to be of the primitive flat or flanged types, and some of them were probably still made of pure copper, although the majority are of bronze.
- s.d. 70. The central line of the Later Bronze age, with its axes of the winged and socketed types. Stone has now practically gone out of use for the purposes of the axe.¹

On reaching the stages of Hallstatt and La Tène the scale is of less practical value, as it is then possible to define actual dates with a fair approximation to accuracy. In fact, the progress of discovery relating to these periods upon the Continent has perhaps already outstripped the sequence date system. But the point s.d. 90 may be taken as approximately equivalent to about 200 B.C., and s.d. 80 to about 500 B.C. In the case of objects which cannot be more precisely dated, it may be useful to define their relative age on this basis.

With regard to the earlier part of the scale, it is scarcely possible as yet to give a precise definition to anything earlier than s.d. 50. In view of the fact, that in order to secure an efficient system, a precise definition, when once made, should never be altered, I feel it to be wiser to make no such definition at present. Further research in the Swiss lake dwellings which are considered to belong to the Tardenoisien stage, or a further examination of our own recent geological deposits, may elucidate the matter in the future.

There can be no doubt that metal axes, of copper at least, if not of bronze, were cast in Europe long before s.d. 50, while ornaments of copper would probably be cut and hammered very much earlier still. If one were to space out the decades upon a scale equivalent to that already fixed, I very much question if a pure Neolithic age can have existed after about s.d. 30. Whether such a strictly pure Neolithic culture stage has ever existed in Europe may indeed be open to some doubt. The fact that an occasional rare piece of metal is found at stations which would otherwise be considered pure Stone age, must shake our faith in negative evidence elsewhere. The absence of the discovery of metal from stations, which are otherwise similar to those that possess it, may be purely accidental.

In all this work we see the advantage of a sequence date scale over a fixed idea of metal or no-metal.

It may not be out of place here to consider briefly the comparative conditions in Egypt. No pure Neolithic culture has yet been discovered in that country. In the earliest prehistoric times yet defined, s.d. 31 of Flinders Petrie's Egyptian scale, copper ornaments were already in use. This may have been about 7000 B.C.,

¹ It appears to me that Dr. Montelius somewhat exaggerates the scarcity of stone implements from certain stages of the Bronze age (*Archæologia*, vol. lxi, p. 113). I believe that stone implements have been frequently overlooked in the digging of barrows, etc., where they were actually present.

or earlier. At the commencement of historic times, between 4000 and 5000 B.C., copper was in common use for the making of chisels and other implements. Bronze first came into general use in the XVIIIth dynasty, at about 1700 B.C., while iron in its turn superseded bronze in the XXVth dynasty at about 600 B.C.

We have, then, in Egypt an early culture period, stretching back to an indefinite and unknown antiquity from about 4500 or 5000 B.C. During this time stone was the material in common use for the making of implements and weapons. The use of copper was, however, gradually being developed throughout this period, even from its very beginning, so far as this has yet been traced. Most, if not all, of this early metal working was, however, done by cutting and hammering, and not by any process of true metallurgy. Thus, the state of metal working in Egypt in 5000 B.C. was actually less advanced than in the epoch of Robenhausen in west-central Europe. This is a fact of very great importance, for unless we assume that metallurgy was practised in Europe for many thousands of years before it was known in Egypt, it practically destroys all extravagant claims for the remoteness of the Neolithic age in Europe or in this country.

One cannot expect the corresponding archaeological stages in Europe and in Egypt to synchronize precisely. I am not straining the evidence so far as that. I merely mean that as the metallurgy of the epoch of Robenhausen is higher than in Egypt at the date 5000 B.C., it is unreasonable to put back the epoch of Robenhausen in Europe to an antiquity of 10,000 or 15,000 B.C.

If this be sound, it must undoubtedly reflect upon the Palæolithic age, which cannot be so remote as it is sometimes claimed to be.

That some approximation of the dates in Europe and in Egypt may reasonably be surmised is confirmed by the dates of the Bronze age in the two areas. In Egypt, the Bronze age (or the nearest equivalent to the Bronze age) commenced about 1700 B.C., and closed in 600 B.C. These dates agree fairly well with the corresponding stages in Europe. The dates suggested by Montelius for the earlier stages are probably, in my opinion, an underestimate for west-central Europe or Britain. I think they should come nearer to, or even slightly exceed, the corresponding stages in Egypt.

It is usual to compare the dates of the fully developed Bronze and Iron ages in Europe with the first rare pieces of bronze or iron known from Egypt. This is an unfair comparison. Bronze was certainly known in Europe, as it was in Egypt long before it came into general use. The same was probably the case with iron.¹

The earliest piece of bronze in Egypt is a rod found at Mêdûm, and believed to date from 3700 B.C. It is probable that the more advanced bronze workers of Robenhausen were earlier than this. So on this standard of the earliest use of the metal, it is possible that Europe may have the advantage.

¹ Since this paper was read an important discovery bearing on this point has been made in Egypt. Messrs. G. A. Wainwright and Bushe-Fox have found contemporary iron beads in the grave of a pre-dynastic Egyptian dated by the pottery to about s.d. 53-63. See a preliminary note by Mr. G. A. Wainwright in *Man*, 1911, 100.

The point that I want to make particularly clear is that although Europe may have some slight advantage, I do not think we can make the advantage an enormous one. I think we can take the Egyptian dates as a guide, to a certain degree, and as a check to speculation.

The epoch of Robenhausen is almost universally taken as typical of the "Neolithic" age. I must, therefore, take it as one of the principal points of departure in endeavouring to estimate the age of the prehistoric remains of Eastern Essex. These remains themselves are intimately associated with striking events in the recent geological history of our country. There is also the discovery, presently to be discussed, of a prehistoric skeleton in a remarkable state of preservation; so that anything like a reasonable approximation to their probable date is a matter which opens up many points of very great interest. It is for this reason that I have entered somewhat fully into the foregoing discussion.

It is customary to suppose that the Neolithic age was of very long duration. This idea is supported by the enormous numbers of surface stone implements which are strewn over the country. In deference to this view, a wide space is left below the first definitely fixed point taken nearly on a line with the station of Robenhausen. The sequence date system conventionally begins at 30, in order to leave room for future discoveries of earlier stages. In this case two more decades are allowed before fixing the line of "one per cent. of bronze axes" at s.d. 50.

I have taken this course, as it seemed to me the wisest one to adopt, in order to leave abundant space for future discoveries. At the same time I do not know that the inference regarding the length of the Neolithic age, founded upon the abundance of the surface stone implements, is of much value. It is hardly logical to infer the length of a period from the abundance of certain remains, when a great number at least of these remains do not belong to that period at all, but to earlier and later stages.

Upon the continent of Europe various stages, such as the Azylien, the Campignien, and the Tardenoisien, have been suggested by various authors to come in between the Magdalénien and the Robenhausien epochs. These suggested stages are scarcely above the sphere of controversy; this branch of the subject is at present very obscure.

Although (derived) Palæolithic implements come into close proximity with the Surface Series in the superficial deposits of Eastern Essex, I have not found any suggestion of a transition between them.

THE RECENT GEOLOGY OF EASTERN ESSEX.

In order to make clear the circumstances under which the prehistoric remains of Eastern Essex have been found, it will be well to give a brief description of the superficial geology of this part of England, and of other similar situations round our coasts. In several successive communications made to the Essex Field Club, I

have dealt with various local details of these superficial deposits.¹ In the present place I shall take a broader line, and endeavour to picture something of the more recent geographical changes of our country, as these particularly affected the conditions of life of prehistoric man.

In its physical features the district of Eastern Essex has been formed out of a slightly undulating plateau, which has a gentle inclination towards the sea. This area is occupied chiefly by London clay, although several outliers of the Crag formation are found upon its northern borders. Its average elevation is about one hundred feet above the sea level: being rather less near the coast and rising slightly inland.

Upon this plateau there are irregular patches and pockets of drift gravel, sometimes containing the remains of Pleistocene mammalia and Palæolithic implements. The surface of the plateau is deeply trenched by a series of river valleys, which are later than the Palæolithic gravels, and have no present connection with them.

These valleys, in conformity with the whole valley system of the south of England, were originally cut far below the present level of the sea. At the time of their excavation the land stood at least 100 feet higher than it stands to-day, and possibly much more than this. Indeed, it is not unlikely that the shore line, at this date, may have approximated to the 100-fathom contour beneath the sea. Upon the floor of these valleys there are a series of low-level marsh and other deposits, sometimes with associated peats and buried forest growths. The earliest of these low-level deposits date from the age of the mammoth² and belong to the closing phase of the Pleistocene period in this country. These deposits are traceable at a little above low-water mark on the shore near Walton-on-Naze and Clacton-on-Sea.³ The former exposure has not, I believe, been seen for many years. The latter is still to be seen and yields flint implements of somewhat uncertain age and affinities in association with *Elephas antiquus*.⁴ The stratigraphical position of these implements, however, fixes them in the scale between the broad limits of s.d. [7]90, and a theoretical value of [8]90.

The Late Pleistocene peats are of some importance in our present enquiry, as care must be exercised to separate them from those which are of a later age. It is, however, the later series which more immediately concerns us.

¹ "Notes on the Palæolithic and Neolithic Implements of East Essex." *Essex Naturalist*, vol. xvi, 1907, pp. 46-51, Pl. II-VII. "On the Correlation of the Prehistoric Floor at Hullbridge with Similar Beds Elsewhere," *ibid.*, vol. xvi, 1911, p. 265; compare also "Notes on the Palæolithic and Neolithic Implements of East Lincolnshire," *Man*, 1907, 89.

² S. H. Warren, *Essex Naturalist*, vol. xvi, 1911, p. 273. Remains of the Pleistocene mammalia have been recorded from below the prehistoric alluvial deposits in a great many localities, too numerous for separate mention.

³ A general account of these beds, with references, will be found in the memoirs of the Geological Survey on the Colchester District, and on the Eastern End of Essex. See also H. Slopes and W. H. Dalton, "Notes on the Geology and Archæology of the district of Walton-on-Naze and Clacton-on-Sea."

⁴ S. H. Warren, *Quart. Journ. Geol. Soc.*, vol. lxvii, 1911. *Proceedings*, p. xcix.

After this valley system was trenched, during an epoch of elevation, submergence set in, and the lower reaches of the valleys were invaded by the sea. This submergence did not take place suddenly to its full extent. There were intermittent pauses in its operation, sufficient to allow of the formation of a succession of peat beds, intercalated between the tidal silts. These earlier peats, representing a succession of buried surfaces, exist only below the present level of low water, and are consequently older than that which is commonly seen on the shore above that line. In consequence of their low position, they are only seen during the progress of deep artificial excavations (such as those of the Barry Docks in South Wales) which are carried down far below the level of low water.¹

We have no evidence to show at what period this submergence commenced, as the record now lies beneath perhaps 50 or 100 fathoms of water. But the date of its final stage can be approximately fixed by the prehistoric remains which are found upon the ancient surface which was then carried beneath the sea. In my opinion it is probable that this submergence is the foundation of the legends of the Fabled Land of Lyonesse.

It is upon the submerged surface, which I have proposed to name the "Lyonesse" surface that large numbers of prehistoric remains have been found. It is to this that the interment, to which reference has already been made, also belongs. The following table gives the full succession of the marsh deposits of Eastern Essex, so far as these have yet been worked out:—

- i. Present salting surface:—
- h. Tidal silt, or *Scrobicularia*-clay with briquetage of Red-Hill type.
- g. Peat.
- f. Buried prehistoric surface.
- e. { Grey marsh clay.
- d. { Rainwash.
- c. Pleistocene brick-earth, with occasional erratics and derived palæolithic implements [= the trail].
- b. Layer of shattered septaria.
- a. Grey marsh clay with *Elephas primigenius* (there are also peat beds on this horizon).²
- x. London clay.

It must, of course, be understood that these various deposits are never all present at any one spot. The buried prehistoric surface rests sometimes on pre-existing brick-earths or marsh deposits (*c*, *d*, *e*), sometimes on late pleistocene peats or other deposits with remains of the mammoth (*a*), and in certain localities upon lower tidal silts coming into the succession between *b* and *e*.

The buried prehistoric surface is intimately associated with the peat (*g*), but usually occurs distinctly beneath it.

¹ A. Strahan, *Quart. Journ. Geol. Soc.*, vol. lii, 1896, p. 474.

² The important series of pleistocene deposits at Clacton are excluded from consideration here. They come into the succession below the bed *a*.

That this surface was inhabited by prehistoric man, down to, and probably far below, low-water mark, is proved beyond a doubt by the prehistoric remains now found upon it. Stone implements are generally distributed over this surface. They are sometimes scarce, sometimes concentrated in considerable numbers upon small areas. Not infrequently the sites of hearths are found; sometimes there are small pits about three feet in diameter and about two feet in depth, the interior filled with wood charcoal, the edges showing much evidence of fire. I suggest that these may possibly have been used for burning pottery. I have found several such on the buried prehistoric surface of East Essex.

As I have previously pointed out, the archæological remains found upon this ancient surface possess a peculiar value for purposes of classification, because, in many situations, at least, they are confined within a comparatively narrow range of time. This surface being buried beneath thick accumulations of tidal silt, the remains upon it have been preserved from any subsequent disturbance, or from the admixture of later objects. The whole surface, which covers scores of miles beneath the salting areas, remains to-day just as it was when abandoned by prehistoric man. The flint implements upon this surface are peat-stained from the percolation of water passing through the superincumbent beds. But it is remarkable that very few of them show any sign of weathering upon their worked surfaces. They certainly have not lain for any considerable period of time in the then surface soil, but must have been buried under the overlying peat very soon after they were dropped by the men who used them. Gun flints which cannot be many centuries old, frequently show far more surface weathering than these prehistoric implements. If these implements covered a prolonged period of time, we should find that some would be greatly weathered, while those lost just before the submergence took place would be comparatively fresh.

There is also further evidence on this head. The buried surface very commonly lies upon rainwash or marsh clay belonging to an earlier part of the Recent period. And these earlier deposits themselves not infrequently contain implements of polished stone, forming an earlier series of prehistoric remains. Occasionally the surface lies upon the bare country rock, and then it may include remains belonging to an earlier stage. This is a possible source of error that needs to be discounted. But as a general rule the remains upon the buried prehistoric surface may be taken to be confined within narrow limits of time upon either side.

In the foregoing description I have endeavoured to show that there is one particular ancient surface, now buried beneath the tidal silts of the marshes, which is of very great importance from an archæological point of view. This is found not only in East Essex, but also in Lincolnshire, Devonshire, Somersetshire, and elsewhere.¹ It is most commonly seen exposed between tide marks on low-lying shores, where erosion of the mud flats is taking place.

¹ For a general account of those discoveries, with references to the literature of the subject, see S. H. Warren, *Essex Naturalist*, vol. xvi, 1911, p. 266.

Our prehistoric ancestors lived upon this surface at a time when the whole of the southern part of Britain stood at a higher level, relatively to the sea, than it stands to-day. As submergence set in, the first effect was that the rivers began to lose the freedom of their flow into the sea. Their waters were to some extent ponded back, and the result was the formation of wide-spread swamps. Upon these swampy surfaces the peat was formed which now immediately overlies the buried prehistoric surface. Occasionally prehistoric remains, similar to those upon the surface below, are found in the peat itself. This shows that the same men still continued to roam over the old surface, although it had now become too wet and swampy to afford a favourable situation for permanent abode. As submergence proceeded, these low-lying areas became invaded by the sea itself, the evidence of which we find in the tidal silts with their *Scrobicularia*, and other marine organisms. As I have already suggested, it seems to me not improbable that it was then that man saw his "Land of Lyonesse" overwhelmed by the hungry sea.

The geological conditions are, however, complicated by the fact that where artificial excavations are carried below low-water mark, lower surfaces (represented by peat beds) are encountered. These are undoubtedly older than the surface which, for the sake of distinction, I have ventured to name the Lyonesse surface. The conditions are further complicated by the fact that there are also other, older peats, dating from the age of the mammoth, which were underlying the "Lyonesse" surface when man was living upon it, but which might now be very easily confused with it. The diagram, page 122, will make the general relationship of these various deposits clear.

The next most valuable bed from an archæological point of view is the rainwash (*d* in the table of strata). This contains prehistoric remains which present some differences from those found upon the buried prehistoric surface which overlies it. The details of these differences will be dealt with in the next section of the paper.

This rainwash, as its name implies, has been brought down into the valleys by the wash of the rain, and the general surface drift of atmospheric agencies. It is spread out at the foot of the side-slopes of the valleys, and passes for some distance beneath the buried prehistoric surface, with its associated peat. As might be anticipated, it does not extend to the more central parts of the valleys, but seems to become replaced by the marsh clay (*e* of the table). As these two deposits appear to be in great part contemporary with each other they are bracketed together in the table of strata.

Some further geological details relating to these deposits have been given in the papers previously referred to, but these are not of any importance for the purposes of the present paper, so it is unnecessary to refer to them here.

THE EARLIER SERIES OF IMPLEMENTS OF EASTERN ESSEX.

These belong to the rainwash deposit marked *d* in the diagram and in the table of strata. It has already been remarked that while the implementiferous strata are often traceable over considerable areas, it is yet only at certain spots that the implements are found in any abundance. These abundant sites are dependent, not only upon the existence of the prehistoric remains in the deposits, but also very largely upon the accidents which chance to bring them to light at the present day.

Upon some sites one may find the Earlier Series to be exclusively represented, upon other sites there may be both deposits with both series of remains. Upon the latter sites, where the two series have been washed out of the deposits by natural causes, one has only their mineral condition as a guide in distinguishing the one from the other. This is, on the average, indeed in the vast majority of cases, a safe guide. There are occasional instances, however, in which it might lead one astray. Further than this, specimens are sometimes found which have been upon the present surface sufficiently long to become weathered. When this is the case, it is a little difficult to decide to which of the two series they should be referred. This is a possible source of error to which it is well to draw attention. It is an error which might affect individual specimens, but would become negligible when dealing with averages.

Material.—The flint of which the implements are made appears to be exclusively of local origin. Most of it is the stained and altered flint that can be obtained from the drift deposits of the district. Some of it was obtained from the beach of the sea, so it is probable that the sea-board, even at this time, was not many miles from its present position. Implements made of chert are occasionally found, but they are very rare. This also would be obtainable from the local drifts.

Mineral condition.—When found *in situ* in the rainwash, the implements are remarkably fresh, and but little altered in condition from what they were when originally made. They were certainly buried in the deposit while quite fresh. Upon exposure to atmospheric agencies they generally assume the familiar blue-and-white mottled patination. Gun flints found side by side with them under the same conditions assume much the same alteration of the surface.

Cores.—Small but rough flints, presenting a greater or lesser number of facets from which flakes have been removed in an irregular manner, are abundant. Occasionally parallel facets are seen from which flakes have been removed by a somewhat more regular method. I have not seen a long thin prismatic core, showing really good work, neither have I seen one worked from both ends. The scarcity of workable material is forcibly suggested. The cores have usually been worked down to the last possible point of usefulness, many of them being only 25 mm. in diameter, and but few of them being over 50 mm. Not improbably some may have been worked up to serve the purpose of rude implements, for some temporary or "make-shift" use.

Flakes.—In our just admiration of the beauty of form, and of the skill displayed in the elaboration of workmanship of the rarer forms of stone implements, we are a little apt to lose sight of the practical value of the simple flake in prehistoric times. The simple flake was the standard cutting instrument of prehistoric man. We are sometimes apt to think too much of secondary work. When the instrument was required for cutting, the secondary work, where this is present, not infrequently forms the back of the blade, not the cutting edge. If the worker was sufficiently skilful to obtain his edge at the primary blow, such an edge is far keener than anything that can be produced by secondary chipping. It therefore appears to me that the flakes, which were originally of such paramount importance, are always worth careful consideration. The flakes of the Earlier Series of East Essex are mostly small, few of them being more than 50 mm. in length, and many of them are less than half this amount. A considerable number are rather thick, and triangular in section, but "flat" flakes are also abundant. The flakes are distinctly better than one would have anticipated from an examination of the cores. Some of the best flakes may have been made elsewhere; but the feature cited may be due to the cores having been worked down very far, long after the best results could be obtained from them. Still, really good work is scarce; thin flakes with parallel facets on the outer face and keen straight side-edges being nearly or quite as rare as arrow-points. The cones of percussion are not generally very pronounced.

Flaking angle.—By the flaking angle I mean the angle at which the core was worked. That is to say, the angle made between the upper striking plane and the side face from which the flakes were being removed. This angle may be measured either on the cores, or on the flakes where these retain a portion of the striking plane. By far the greater number of the flakes that we are dealing with here do not present this feature, still there are some that do, so that taking the flakes and cores together, a considerable number of measurements have been taken. These angles vary considerably, the lowest being 58° , and the highest 90° , the average being about 74° . This is about the natural angle of flint flaking, which likewise varies considerably according to circumstances. By the natural angle in this sense I mean the angle at which flint will flake the most easily. It is always difficult to work at the higher angles, but undoubtedly it is only at the higher angles that the best work can be done. This matter will be further illustrated when describing the later series.

Scrapers.—These instruments also are small, the greater number being from 25 to 40 mm. in diameter. The familiar short horse-shoe type is abundant, although unusually small, but the scrapers of this series are chiefly characterized by the prevalence of small side scrapers. These are worked to a curved edge along one side of the flake, instead of round the end. There is no uniformity in the choice of the edge. Sometimes both edges are used, and occasionally both edges and the end, when they pass to a different type. There is a strong tendency to carry the chipping round to the end of the flake in an involute curve, when they approach

the oyster-shell type. They rarely measure more than 33×26 mm. Elliptical, straight-edged, and angular scrapers also occur. The latter have two edges bevelled by chipping (one, if not both, of which is usually a straight edge) meeting at a well-defined angle, or blunt point. Some of the scrapers are of truly pygmy dimensions. One beautiful little instrument in my collection measures only 18×16 mm., and is neatly worked to a bevelled edge all round its periphery. There are others more or less similar to this. (Plate XV, Figs. 23-26.)

Hollow scraper series.—There are few, if any, examples that can safely be classed as hollow-scrapers. Even flakes with small notches in their edges are very rare. It is always a matter of very great difficulty to distinguish genuine hollow-scrapers and notched flakes from those which have acquired these forms by accident.

Trimmed flake group.—Flakes with trimmed edges, or with their ends or edges worn away or smoothed by use, are found here, as on all prehistoric sites, but there is little that calls for special mention. One flake in my collection has a minutely serrated edge with about twenty-eight teeth to 25 mm. The chips producing these serrations are all removed from the inner face. It is a thick ridged flake, of triangular section, and measures $50 \times 24 \times 14$ mm. in length, breadth and thickness. It is far too thick to be of the slightest use as a saw.

Knife series.—In this series I include the Ulu form,¹ the long curved and lineate knives, the so-called dagger type, and the smaller ovate and lanceolate instruments which more or less resemble arrow-points. I have little information at present with regard to this series. One or two examples in my collection closely resemble the small rude rhomboidal form, to which reference will be made in dealing with the later series of implements.

Spear-points.—Judging by the analogy of modern savages, the typical spear-point is a pointed flake, either without secondary chipping or with only so much as may be needed to produce the required form. The greater the skill with which the flake is struck off, the less secondary working is necessary. It is impossible to draw a hard and fast line between flakes that were cutting instruments, and those that were spear-points. As a matter of fact, however, this is equally so in the case of the more elaborately wrought examples, many of which were used as knives in short handles, and not as spear- or arrow-points.²

All that one can do to arrive at a reasonable judgment in such cases is to get together as large a group of similar forms as possible, and endeavour to discover the central idea that the workers had in mind. I have some, but not very many, that could come into the class of flake spear-points among the remains we are now considering. There is one very typical example measuring $64 \times 18 \times 8$ mm. It is made from a ridged flake, slightly retouched on one side of the point, while the

¹ O. T. Mason, *Annual Report of the Smithsonian Institution for 1890*: Report of the U.S. National Museum, p. 411.

² C. C. Abbott, "Report of the United States Geographical Surveys west of the One Hundredth Meridian," vol. vii, *Archæology*, 1879, p. 59.

base is chipped into a pronounced tang. The edges of this are too obtuse to make a useful cutting instrument, but as a spear-point it is admirable. (Plate XIV, Fig. 9.)

Arrow points.—I think there is no doubt that a large number of simple flakes were used to serve the purpose of arrow-points. Such forms which appear suited to this purpose are not abundant in the Early Series of East Essex. Next to these come flakes with just sufficient modification of the edges to produce the required form, but without any surface flaking. These are fairly abundant. They are usually triangular in shape, about 30 mm. long, 20 mm. wide at the base, and 4 mm. or less in thickness. They of course vary in relative proportions and size, but the measurement given is a common average. The secondary work is often

confined to a few small chips on one side of the point. The diagram, Fig. 1, illustrates the idea of a thin splinter of flint brought to a point by chipping along the dotted line. Nearly associated with these are forms produced by the same technique, but having an oblique chisel edge in place of the point. (Plate XV, Figs. 16–20.)



Fig. 1.

The leaf-shaped arrow-heads with surface flaking are usually rather narrow and somewhat thick, one measuring $38 \times 15 \times 4.5$ mm. is very characteristic. Some are broader and thinner, as $31 \times 22 \times 3$ mm. Owing to the use of weathered material, the flaking is apt to be a little splintery. Indented and stemmed forms occur, but these appear to be scarce. I have one winged or uni-barbed specimen, and I have seen others in other collections. The stemmed-and-barbed type is more abundant than either of the last-named forms. The very best work seen in the series has been put into these forms. When found perfect they are beautifully symmetrical, although they are not as a rule particularly thin. The largest and best that I have measures $27 \times 25 \times 4$ mm., the stem being 8.2 mm. in length. (Plate XV.)

Pygmies.—I have not yet obtained a very extensive series of these forms. Most of them seem to come into the long narrow scalene group. In some the obtuse angle of the thicker side is reduced to a curve. (Plate XV, Figs. 27–28.)

Hammer-stones.—Small flints that have been used as hammers are not infrequent, but no definitely formed hammers or pounders have been found. I have one pebble of hard grit measuring $90 \times 75 \times 54$ mm., which is slightly abraded at both ends; it has evidently been used as a hammer-stone. I have also a good example of a fabricator measuring $72 \times 23 \times 10$ mm.

Axes.—The material that I have so far been able to obtain is not sufficient to enable any general conclusions to be drawn in reference to the usual forms of these implements. (Plate XVII, Fig. 7.)

The practice of re-working blunted or broken polished stone axe-blades for the production of flakes, scrapers, hammer-stones, and the like, was very extensively followed in prehistoric times.

Broken pieces of polished axes, or flakes made from them, are not uncommon in the early series of East Essex. This is important, so far as it goes, as it proves the common use of the polished axe blade at this time. In my own collection I

have only one perfect example¹ of the polished axe that even probably belongs to the Early Series. This was not found in place in the Rainwash, but on a mixed site where both series had been washed out together by the sea, and one only has the mineral condition to rely upon. The axe in question is formed from a tabular piece of flint, it has an expanded cutting edge, and slightly squared sides. (*Essex Naturalist*, vol. xvi, 1907, Plate VI, Fig. 4.) (Plate XVIII, Fig. 1.)

I have also a large rudely chipped adze-blade, of a form that is very familiar among the implements dredged from the bed of the River Thames. This I found on the surface at the top of the cliff at Frinton-on-Sea, associated with a group of prehistoric remains, including pottery, of the usual Early Series type. It may therefore be referred, with considerable show of probability, to this group. Certainly it is sharply distinguished from the Later Series, both in technique and in the material of which it is made. (Plate XIII, Fig. 1.)

Rude implements.—These are always small. They are very difficult to divide from the cores. Almost the only recognizable type among them is a small sub-triangular form. One of those in my collection measures 45 × 35 × 15 mm. This is a very typical example. I have found none of this form showing anything but rude work. None of this form have been found among the Later Series. (Plate XIII, Figs. 2–3.)

Pottery.—I have not yet succeeded in obtaining anything but small fragments. Of these pieces I have some sixty or eighty, none of which are sufficiently large to indicate the original form of the vessel. It is fairly uniform in texture, being coarse, rather soft, but not extremely so, and with much crushed flint in its composition. It is usually brown to red-brown in colour. I have found one or two pieces of the No. 2 quality,² which appeared to be in the Rainwash, although on this point I feel some doubt. The No. 2 quality is thicker and softer and without the crushed flint in its composition. I do not yet feel quite satisfied about this type of pottery belonging to the Early Series, as it is certainly exceptional.

Pot-boilers.—Stones calcined by the action of fire are extremely abundant. Many of these are of flint, but a quite considerable proportion of them are formed of various grits, or even of quartz. It is impossible that the comparatively large proportion of grits can be accidental. These stones, being locally rare, must have been collected purposely, and at considerable labour and trouble. No doubt it was found by experience that they stood the fire better. This is to my mind one of the strongest points in favour of these calcined stones being genuine pot-boilers.

I have recently made some experiments in boiling a pail of water by means of flints heated in a bonfire. I found that there was not the slightest difficulty in keeping the water boiling vigorously for any length of time, by occasionally dropping in a fresh hot stone, and removing one or two of those which had become cooled. Some of the stones I allowed to cool slowly, and did not drop them into

¹ I have recently obtained a second—this is shown in Pl. XVII, Fig. 7.

² The definition of these qualities will be given in the description of the pottery of the Later Series.

the water. These showed the same reticulated cracks, and the same calcination, as those which had been used as pot-boilers. Upon comparing the two together, I could not find any obvious difference between the genuine pot-boiler and the merely burnt flint. It is the fire, and not the water, that effects the calcination.

Thus the discovery of a calcined flint only proves the former presence of fire ; it does not necessarily indicate that the calcined flint was dropped into water while hot. This may have been so, but we cannot be certain that it was. In arriving at a reasonable judgment, we must be guided largely by the probabilities of the case.

THE LATER SERIES OF IMPLEMENTS OF EAST ESSEX.

Material.—Although some weathered local flint was brought into requisition, the greater number of the implements of this series were undoubtedly made from fresh flint, obtained straight from the chalk. The outer crust of the flints is frequently remarkably fresh, and has never been weathered at any time down to the present day. Not infrequently the flints, though scarcely weathered, bear unmistakable evidence of having been rolled on a sea beach before they were worked by man. They are just such as one may pick up to-day at the foot of the chalk cliffs of Kent. Occasionally the green-coated flints from the base of the Thanet Sand have been used. These assume a peculiar brown banding beneath the crust which is always recognizable. I have frequently found these same flints used on prehistoric sites in Kent.

Mineral condition.—When first obtained from the buried surface the implements have a dull surface and are remarkably fresh and keen-edged. In fact, as has already been said, they are precisely as they left the hands of their users. They are generally more or less peat-stained, and usually have a brownish or almost chocolate-coloured tinge. When they are washed out by the sea and exposed upon the present shore, they rapidly become lustrous, and appear to assume an increased blackness, almost the blackness of jet. Upon more prolonged exposure they may become mottled with white, especially upon their abraded edges.

Cores.—These are more shapely and show much more parallel work than the cores of the Earlier Series. A large number of them are worked systematically in two definite directions ; the first surface from which the flakes were removed generally forming the striking plane for the next flaking. Many of them are small, some being under 30 mm. in length. Double-ended cores are extremely rare. Many tend to be pyramidal in shape rather than prismatic.

Flakes.—These vary from pygmy dimensions to long broad blades. Many of these flakes are beautiful examples of the flint-worker's art. In spite of their simplicity they form the most perfect cutting instruments which could well be devised within the limitations of the material. The cone of percussion is not strong.

Flaking angle.—It is not, however, until the flaking angles of the cores and flakes are actually measured that the difference in technique between the Earlier and the Later Series is appreciated. Of the measurements that I have taken, the lowest

is 68° and the highest 106° , the greater majority falling between 84° and 90° . The average of all is about 87° . Many of the flakes are slightly incurved, so that they start at an angle of considerably over 90° . The diagram, Fig. 2, will make this clear. The striking plane is shown at AB, while the flaking surface is BCD. It will be seen that the angle ABC is greater than a right angle, while the average angle of the flake ABD is somewhat less than a right angle. It is not an easy operation to strike a flake such as this. There is a strong tendency merely to splinter off the corner, the fracture coming out at about the point C: it is very difficult to make the fracture follow the dotted line. In order not to exaggerate the flaking angle of this series I have measured the angle ABD, not the angle ABC. If the latter were taken, the above values would be slightly increased.

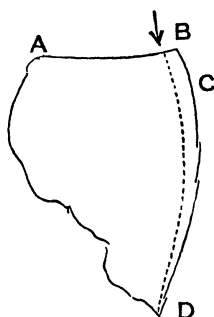


FIG. 2.

I am not suggesting that the flaking angle of local groups can be taken generally as an index of relative age. Some local groups belonging to the Late Palæolithic age show a higher skill than others which belong to the Surface Series. I am merely dealing with the facts of the case in this particular locality. How far the results may, or may not, be applicable elsewhere, must be left to future consideration.

Scrapers.—The usual horse-shoe forms are very abundant. They do not differ much from South Down work. Extremely well made examples are sometimes found, but these are rare: a large number of the scrapers are somewhat rough. Eliminating the few exceptionally good specimens, these instruments hardly compare favourably with the flakes. Other forms, such as the spoon-shaped, kite-shaped, double scrapers, and those with an elliptical curve, are occasionally found, but are comparatively rare. In this the site is quite a normal or average one. I have several examples of a type that is more unusual, and have seen others that are not in my collection. These have low-angle surface flaking on the inner face; this is often carried halfway across the instrument along one side. Some of this form are figured in the *Essex Naturalist*, vol. xvi, 1907, Plate V, Figs. 2 and 4 (Plate XIII, Figs. 6–10).

Hollow scrapers.—These are peculiarly scarce. I have no good example in my possession.

Drills.—These instruments are occasionally found, but there is nothing which calls for special remark.

Trimmed flake series.—I have found a few flakes with trimmed side-edges, but they are not abundant in individuals or notable in form. I have not found any examples of the semicircular or rectangular reaping-blades, that were set as an armature to the sickle. I have one flake with minutely serrated edges, to which reference will be made under the heading of "Special Sites." Rough flakes with a few large secondary chips boldly struck from them, such as are abundant on some sites, are not often found here.

Knives.—I have not yet seen any specimen of the Ulu or Picts' knife forms. I was, however, fortunate in discovering a very fine example of the long, curved

knife. There are also several fragments of the same type in my own and in other collections. Besides these, there are several large, leaf-shaped knives in the collection of Mr. J. Hassall. These are shown in Plate XIV which accompanies the present paper.

Many of the specimens belonging to this group form very beautiful illustrations of the flintworker's art. There are also small lancet-knives of about the size of arrow-points (Plate XVI, Fig. 16).

Spear-points.—There are a certain number of examples belonging to this group, but when compared with the number of axes and arrow-points they are comparatively scarce. There are, however, a good many pointed flakes with a tang at the butt-end. The tang being produced by longitudinal flaking from the butt end, probably before the flake was removed from the core, and not by the finer transverse secondary chipping executed from the edge. The specimen shown in Plate XVI, Fig. 17, is a case in point, but from their small size many of these may more probably be arrow- than spear-points.

Arrow-points.—These occur in considerable variety and are often of great beauty. The most delicate and regular work is generally found on the leaf-shaped forms, which are often very thin. The barbed forms are relatively less numerous than the leaf-shaped. In the Earlier Series, on the other hand, the reverse is the case, and the best work may generally be found on the barbed points. I have found no parallel in the Earlier Series to the exquisite work of the thin leaf-shaped arrow-points of the Later Series. Among the Later Series are occasional aberrant forms, such as the uni-barbed or the broad scalene, but triangular forms are very rare (Plate XVI).

Among specimens resembling arrow-points in shape, the rude rhomboidal forms shown in Figs. 22, 23, and 24 of Plate XVI are very interesting.

Reference must also be made to the types, found in both the Earlier and the Later Series, that are shown in Figs. 20, 21, and 22 of Plate XVI, and Fig. 21 of Plate XV. These are explained in the description of the plates.

Pygmy implements.—The most characteristic types among this group are the narrow scalene and the slender acicular forms. The use of these forms has given rise to much discussion, and is still far from clear. In my opinion the smaller pygmies were probably the barbs or armature of hunting and fishing implements. In the British Museum there are some harpoon-heads from Denmark made of antler and armed with a series of sharp splinters of flint. This, I think, gives some suggestion of the method in which such minute objects were used. The larger scalene forms may have been arrow-points: this view is held by Mr. F. N. Haward (Plate XVI, Figs. 26–32).

Hammer-stones.—These are usually made of flint. The most remarkable example that I have is made out of a beautifully polished axe-blade.

Axes.—These occur in considerable variety, both of igneous rock and of chipped and polished flint. Many typical examples are shown in the plates, so it is, perhaps, unnecessary to dwell further upon them here (Plates XI, XII, and XIII).

Perforated hammers.—These are most commonly, perhaps always, of the adze form like that illustrated in Fig. 122 of Evan's *Ancient Stone Implements*. That is to say, the shaft-hole is bored through the thinnest way of the blade, so that the cutting-edge comes at right angles to the shaft. The shaft-hole itself is also bored in the most primitive manner. That is to say, it is the intersection of two cones bored from either surface (Plate XI, Fig. 1).

This fact is of some importance, as the adze-hammer is, generally speaking, far more scarce than the axe-hammer. It therefore appears probable that the perforated adze-hammer, especially as it was the easier to make, is the earlier form, and is to be dated at about s.d. 50–58.

Rude implements.—As upon most prehistoric sites, rude wasters are frequently found among the more perfect specimens. The rude series of many sites, however, are obviously not mere wasters. When a number of these are placed together, it becomes apparent that their makers were working for the production of a certain series of forms, which, although rude, are yet perfectly definite. In the series with which we are dealing, there are a good many rude ovate or discoidal forms. Apart from these, I have not been able to trace any other definite idea upon which their makers were working. I think that the majority of these rude forms are nothing but mere wasters. Some examples of the ovate and discoidal forms are shown in Plate XII.

Nothing resembling the rude forms of Grime's Graves or of the South Downs is found in this series.

Pot-boilers.—Burnt natural flints and burnt flint implements are common, especially on the sites of hearths. Yet in all my years of searching I have never found a single specimen of calcined flint belonging to this series which I could, with any probability, consider to be a pot-boiler. In this it contrasts very remarkably with the Earlier Series.

Pottery.—So far as my experience goes at present—and I have now obtained a considerable amount of pottery material—the particular kind of ware which has been described as characteristic of the Earlier Series is absent from the Later. It will be remembered that Pitt-Rivers in 1898 divided early British pottery into several classes of which those that concern us here are¹:—

- “1. COARSE BRITISH.—This contains large fragments of flint, shell, or chalk in its composition, but no sand. Most of the cinerary urns are made of this quality. It is generally badly baked and hand-made; frequently ornamented.
- “2. SOFT BRITISH.—This much resembles No. 1, but has no grains in its composition. It is badly baked, and frequently red on the outside and black on the inside, or in the interior of the substance. It cannot always be distinguished from No. 1, as parts of the vessels of

¹ Pitt-Rivers, “Excavations in Cranborne Chase,” vol. iv, 1898, p. 13.

No. 1 quality have fewer grains than others. It is always hand-made.

“3. FINE BRITISH.—This is generally thinner than the preceding qualities; red, and without large grains of flint or quartz or sand. It is often ornamented with incised lines, and is the quality of which the so-called drinking vessels, found with crouched interments of the Bronze age, are composed. It is hand-made.”

I think, for distinction, the pottery of the Earlier Series, which has been described when treating of that group, might well be defined as quality No. 1*a*. A certain proportion of the pottery of the Later Series comes within the first class. But this differs considerably from the No. 1*a*, and might be defined as quality No. 1*b*. It is generally softer than the No. 1*a*, but differs chiefly in its colour. It is always dark-coloured, and usually black or nearly so, and it contains a very large proportion of coarsely crushed flint in its composition.

Most of the pottery of this series belongs to the No. 2 quality. It is, however, not black, but brown or even light brown in colour throughout. Its surface is very frequently covered with finger-nail impressions. No perfect vessel has yet been discovered, and in the pieces so far procured the finger-nail impressions do not appear to form any obvious pattern. Some examples are illustrated in Plate XVII.

Besides these, I have also obtained some pieces of the No. 3 quality, that is to say, of the drinking cup or beaker material. This has the usual elaborate system of ornamentation, formed of incised lines placed in horizontal zones. This pottery is particularly important as it gives a clue to the date of the series.¹ Some examples are illustrated in Plate XVII. There is also one fragment of the richly ornamented form of rim, like that of West Kennet, to which reference was made in the Introduction. As there stated, this form occurs with Bronze age remains. It has been found in direct association with the beaker at Mortlake, and elsewhere,² while it was also associated with beaker remains in the Long Barrow of West Kennet itself.³

CONCLUSIONS AS TO THE AGE OF THE TWO SERIES OF IMPLEMENTS OF EASTERN ESSEX.

If the Sequence Date scale be consulted, I think it will be found that the two series of remains of Eastern Essex fall inevitably into their place in the scale, so far as this can be defined. Whether either, or both, of these series should

¹ Hon. J. Abercromby, “The Oldest Bronze Age Ceramic Type in Britain,” *Journ. Anthropol. Inst.*, vol. xxxii, 1902, p. 375. “A Proposed Chronological Arrangement of the Drinking Cup,” etc., *Proc. Soc. Antiq., Scotland*, vol. xxxviii, 1904, p. 323.

² G. Wyman Abbott and Reginald A. Smith, “Prehistoric Pits at Peterborough and The Development of Neolithic Pottery,” *Archæologia*, vol. lxii, 1910, p. 333.

³ *Catalogue of the Museum of the Wiltshire Archæological Association at Devizes*, 1911, p. 23.

be named "Neolithic," or "Bronze age," is a question depending upon the system of classification or nomenclature which may be adopted. But if we take certain fixed lines, as reference "dates," and then place other archæological units, such as the "Beaker," the custom of cremation, and the like,¹ into their relative position with regard to these fixed lines. And if we then check one unit against another by the evidence of contemporary occurrence, it is possible to obtain a scale which represents more truly and adequately the actual course of events than is the case with a system of fixed periods.

With regard to the Later Series, that is to say, the remains found upon the "Lyonesse" surface, we have first of all advanced forms of flint working. This includes beautifully polished axe heads, barbed and leaf-shaped arrow-heads, the latter often very thin, and long, curved knives. Whatever may be thought of the ruder groups of the Surface Series, such as those of Cissbury, there can be no question that this industry is paralleled by the flint work found associated with bronze in the Round Barrows. This conclusion is fully borne out by the pottery, which includes fragments of the beaker, or drinking cup, a ceramic type belonging to the early part of the Bronze age, as usually understood in this country. Upon the Continent the beaker is classed as Neolithic, as the boundary between the two periods is there drawn at a higher level. No bronze has, however, been found upon the buried surface in Eastern Essex, so far as I am aware. Unless some chemical constituent in the soil has caused its destruction, the discovery of bronze may be anticipated.

In Torbay, in Devonshire, upon a site that I believe to belong to the same "Lyonesse" surface, the hearths where primitive bronze smelting has been carried on have been discovered.² This is a valuable piece of evidence.

Upon the ancient surface of Eastern Essex we have contracted burial by inhumation. I have also obtained evidence which seems to me to suggest that cremation was likewise practised. One must not omit the physical evidence of the geological position of the buried surface, as being indicative of considerable antiquity.

Although reasons have been given for concluding that the remains on the buried surface do not cover a very prolonged period, yet this may extend to six or eight points of the scale. It was abandoned as an inhabited site by the submergence of the area, so if the date of the latest of the remains upon the surface can be fixed, this will also show the date of the submergence.

Taking the data which have been detailed above, it appears that the time of the submergence must have been at, or about, s.d. 58. None of the remains being very early, we may take the range of the prehistoric remains upon the "Lyonesse" surface as between s.d. 50 and s.d. 58.

¹ I have not mentioned in the table all the units dealt with by the Hon. J. Abercromby (*Proc. Soc. Antiq., Scotland*, vol. xxxviii, 1904, p. 323), but have confined myself to those that are helpful in elucidating the immediate problem in hand.

² D. Pidgeon, *Quart. Journ. Geol. Soc.*, vol. xli, 1885, p. 9.

The place which the Earlier Series should occupy in the scale is more difficult to fix. Their geological position shows them to be earlier, the pottery is somewhat more primitive, but the flint industry, although it differs in some respects from that of the Later Series, is by no means crude. Barbed arrow-points, showing much skill in their fabrication, are by no means uncommon. They are thus probably somewhat earlier than s.d. 50, but how much earlier is uncertain. They may be placed provisionally as s.d. 40 to 50.

I now come to consider the question whether it is possible to give any reasonably approximate estimate of the actual date of the "Lyonesse" surface, and of the remains found upon it. Can we, from the foregoing definition of its "Sequence Date," make a useful estimate of its actual age?

The dating of prehistoric remains is always a matter of great difficulty and uncertainty. It can only be accomplished with any measure of probability by bringing the local scale, through the association of antiquities of known date, into line with the histories of the more advanced countries of the Mediterranean area.

There is, however, a possibility of error in this method. It is well known that the work of a more advanced civilization may remain in the possession of a barbarous race for centuries after the date of its manufacture. Obsolete European armour or weapons may be found in [apparent] contemporary association with modern barbarous productions. If, in the future, the latter were dated by the former, a considerable error would result.

However, even this evidence is not available to us in the problem that we have in hand. The most that we can do is to compare the corresponding lithic and metallic stages of culture in the two areas. Reasons have already been given for concluding that these corresponding stages, in, for instance, England and Egypt respectively, may not have differed greatly in age. It may even be that it is England rather than Egypt that has some slight advantage in the early working of bronze.

It is generally admitted that the Phœnician traders obtained tin from these Islands. But it is certain that they never colonized or settled in the country to work the tin for themselves. Therefore, it appears, from this consideration also, that the early inhabitants of Britain discovered and worked the tin for themselves. It was the unlikely thing, of the barbarous country supplying the civilized country, which really happened, and not, as we should have imagined, the reverse of this.

I venture to think, therefore, that it is not without a certain value, although exact synchronism is not to be expected, to take the date of the corresponding culture stage in Egypt (so far as the working of stone and metal defines "culture"), to give us some approximate clue to the age of our own prehistoric remains. If the table of Sequence Dates be again referred to, and the line of s.d. [9] 58 carried across to the column under the heading of Egypt, it will be seen that it there falls between the dates of B.C. 4000 and (possibly) of about B.C. 2500.

The age of our "Lyonesse" surface may extend over a period of one or two thousand years, although the absence of weathering upon the flint implements

suggests a shorter period. From this cause alone it is not possible to attempt to give an exact date to any remains found upon this surface. But I think we may fairly take it that its age falls somewhere near the limits suggested by a comparison with the Egyptian chronology.

SPECIAL SITES UPON THE BURIED PREHISTORIC SURFACE.

Chief among these are certain accumulations of waste material, of which I have found several presenting identical characters. These accumulations seem, so far as I have yet observed, to be about twenty yards, more or less, in diameter, and not usually more than six or nine inches in thickness. Wood charcoal is disseminated through the mass in considerable quantity. The material is also rich in the remains of broken pottery. It is upon these sites that a considerable part of the pottery, including the beaker material, has been obtained. Besides the well-formed pottery there is also a large quantity of burnt clay, bright red in colour, in rounded lumps. These are commonly about 40 or 50 mm. in diameter, but some are not more than 12 or 15 mm. Some of these are somewhat irregular in form, but many are so approximately spherical as to suggest that they may have been shaped designedly. They appear to be always present in great numbers, and to form an essential part of the accumulations. In addition to the foregoing, there is also a large amount of brown pottery, and red burnt clay, disseminated through the mass in smaller fragments

Worked flints are also very abundant. A large number of these are mere waste chips, or small pieces of flint with a few chips struck from them, probably to enable them to be used for some temporary purpose. Well-formed flakes are usually absent. Diminutive scraping tools occur in great numbers, and occasionally a small but well-formed horse-shoe scraper is found. The diminutive scraping tools owe their bevelled edge to the effects of scraping some hard (and probably rough) surface, rather than to designed secondary chipping. In size, some of them do not exceed 15×9 mm., while but few are larger than 37×26 mm., a frequent size is about 30×20 mm. I have not found these little tools anywhere but on these special sites, where they are extremely abundant. I have only found two other flint implements of interest upon these sites. One is a long flake measuring $79 \times 24 \times 19$ mm. This is greatly splintered and worn along both side edges and round its narrow end through scraping some hard substance. The primary surfaces of this flake are mottled, and show evidences of some weathering, but the splintered edges are entirely unweathered, like the rest of the flints on the site. The flake had not received any modern weathering, as I dug it out from undisturbed material. It thus appears that it was an older flake which these men found and used—a not uncommon occurrence on prehistoric sites.

The other interesting flake is smaller, being $43 \times 15 \times 4.6$ mm. It is a ridged flake, but not very thick, and has both its side edges minutely serrated. The teeth are less than one millimetre apart; there are about 30 teeth to 25 mm. It

is always difficult to be sure that serrations in flake-edges were originally designed as such. In this instance many of the teeth are broken, but in spite of this they seem too regular and too distinctly notched, to be due to accident.

There is thus much in these sites to suggest that they represent the waste product of some special industry.

Beneath one of these accumulations, and so far as I was able to judge (a considerable part of it having been washed away by the sea), approximately in its centre, was the contracted interment presently to be described. In a position that was almost certainly beneath another of these accumulations, although the immediately overlying portion had again been carried away by the sea, I also found what appeared to be the remains of a burial by cremation. This consisted of a number of pieces of pottery, buried beneath the prehistoric surface and carefully placed into the form of a perfect vessel. The bottom of this sham urn, if one may so describe it, was formed by a piece of the side, with the rim, of a large vessel. In the interior were burnt flints, and other evidences of fire. No remains of bone could be traced, but at the same time, it had certainly been buried at considerable trouble, and with much care in building up the form with broken pieces, and this would not have been done without some definite purpose. This specimen is illustrated in Plate XVII, Fig. 8.

PREHISTORIC INTERMENT NEAR WALTON-ON-NAZE.

In a communication made to the Essex Field Club, I have given an account of the circumstances that led to the discovery of this interment, of the difficulties encountered in unearthing the remains, and of the method of treatment adopted for the preservation of the bones. I need only give here the main facts of geological and archæological importance connected with it.

The position in which it was found is indicated in the diagrammatic section (page 122) at the point marked *s*. That is to say, it was found a little below the outcrop of the Buried Prehistoric Surface. The low cliff of tidal silt, about 8 to 10 feet in height, is being rapidly cut back by the erosion of the sea. These human remains have, therefore, until a few years ago, been preserved in soft clay at a depth of about 10 feet from the surface. In consequence of this fortunate circumstance their condition is remarkably good.

The grave was dug originally to a depth of about 2 feet or 2 feet 6 inches from the Prehistoric Surface. It was of only just sufficient size to contain the body in its contracted position. The skeleton lay upon its left side, with the head pointing towards the north and the face to the east. The arms were folded with the hands drawn up before the face. The right leg was flexed in the usual manner of contracted interments. The left leg, which was the under one as the body lay, was also folded to the body, but kept straight at the knee, so that the left foot was in front of the face. This leg was also inclined upwards as the body lay in the grave, so that at the time of its discovery the left tibia and fibula were standing obliquely out of the clay, considerably above the level of the skull. It was the fact of the

tibia and fibula thus standing out of the clay that led to the discovery of the skeleton. The left foot had been washed away by the sea, and no trace of it was found.

The anatomical examination undertaken by Professor Arthur Keith has not revealed any cause for the unusual straight position of this leg. The left knee-joint appears perfectly normal.

The body had been wrapped round with the tough roots of one of the sand-grasses, which had not improbably been used as a binding to keep the body in its contracted position.

The cavity of the stomach and intestines, that is to say, the position that they occupy in the body, contained a considerable quantity of seeds, amounting to at least a pint, or probably more. This was not actually measured, its quantity was only estimated. I merely brought samples away for examination. The peculiar difficulties encountered in the work prevented any attempt being made to recover it all.

These samples I submitted to Mr. Clement Reid, F.R.S., who pronounced the majority to belong to the blackberry, together with a smaller proportion of dog-rose and *Atriplex*. This was undoubtedly the remains of food which the man had eaten.

In the decayed grass which was found swathing the bones, I looked carefully for any evidence of this having been woven into any kind of fabric. But this did not appear to have been the case.

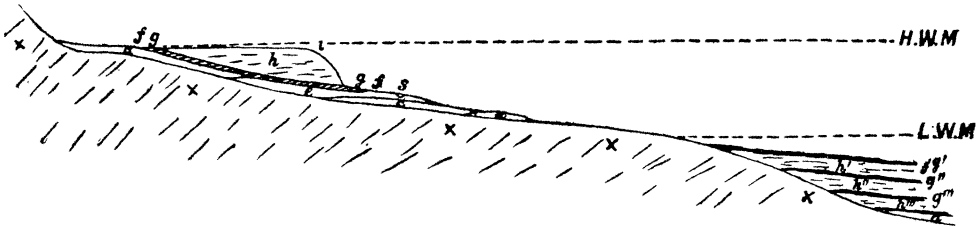
No archaeological relics were found within the grave. But it must be remembered that the grave was only just large enough to hold the body. If any funeral furniture had been placed above the body it would have been removed by the sea before its discovery.

The Prehistoric Surface above, within a radius of a few yards of the site of the interment, has yielded a considerable quantity of debris. I have been watching this for some years, as the sea has gradually cut back the outcrop of the ancient surface. It was in returning to this well-known site in September, 1910, that I discovered the interment. The remains found here consist of worked flints, broken pottery, and rounded lumps of burnt clay, the whole mixed with much wood charcoal.

The general character of these remains has already been described under the heading of *Special Sites*. This particular site, although full of crushed debris, has not yielded nearly so much in good condition as others which are precisely similar. The pottery from here does not include any remains of the "Beaker." This, however, considering the comparatively small amount of recognizable material which has been obtained, is only what might be expected. The remains are in every other respect identical, and their geological position proves all these sites to be of the same age.

The skeleton was disinterred entirely by myself, with the able assistance only of my friend, Mr. Miller Christy. We did not obtain any outside labour. We endeavoured to observe every point which seemed to be of any interest.

In conclusion, it only remains for me to express my thanks to many archæologists who have so generously placed their collections at my disposal. In particular, I would mention Dr. Henry Laver, F.S.A., Mr. F. N. Haward, and Mr. J. Hassall, many of whose specimens have been used in illustration of the present paper.



DIAGRAMMATIC SECTION SHOWING THE GENERAL RELATIONS OF THE RECENT DEPOSITS OF EAST ESSEX.

- (i) Present salting surface, terminating in a low cliff. The horizontal extent of this surface is much reduced in the diagram. The low cliff is being cut back by the sea. (h) Tidal silt. (g) Peat. (f) Buried Prehistoric surface beneath the peat. (e) Marsh clay. (d) Brickearth with implements of polished stone. (c) Pleistocene brickearth. (a) Marsh deposits with mammoth fauna. (s) Position of prehistoric grave beneath the buried surface; the tidal clay extended over this site until a few years since. (f') (g') Probable extension of buried Prehistoric surface, with associated peat, beneath low tide level. (g'') (g''') Probable position of lower peats, such as have been found at the Barry Docks and elsewhere. (h') (h'') (h''') Intercalated beds of tidal silt. (a') Probable position of Late Pleistocene marsh deposits or gravels. (x) London clay. H.W.M., L.W.M. = high and low water marks.

Description of the Plates.

The scale of the photographs of the stone implements and pottery varies slightly in different instances. In many cases the actual measurements are stated. These are of the greatest length, greatest breadth, and greatest thickness, and they are given in millimetres. The weight of the smaller specimens is given in grains. The lettering to the numbers of the figures is uniform, the reverse face of the specimen being marked *a*, the edge view *b*, and the cross-section *c*.

PLATE XI.

Approximate scale $\frac{1}{2}$ natural size.

Later Series.

Fig. 1.—Perforated adze-hammer. The shaft-hole, as is usual in this type, is formed by the intersection of two cones. Surface lightly picked. The hammer-end shows evidence of much use, the adze-end is also very blunt and rounded. Material, light grey-green igneous rock (diabase?). Size, 125 × 49 × 27 mm.; shaft hole 16 mm. in diameter in the middle, and 35 mm. at the outside. Laver collection.

Fig. 2.—Adze or axe. Surface picked all over (including the bevel of the edge), and slightly smoothed. Five slight ribbings on the thickest part of the blade. Cutting edge expanded and very slightly gouge-shaped, also much smoothed and rounded. This is a copy, made in stone, of a metallic form of axe-blade. It indicates the knowledge, and the scarcity, of the copper axe. Material, dark green igneous rock. Size 210 × 96 × 50 mm. Found by Mr. F. Spalding. Laver collection.

- Fig. 3.—Gouge? Surface as in fig. 2, but bevels of the edge more ground down. Edge distinctly gouge-shaped and moderately sharp. The average gouge curve of the edge has a radius of seven inches. Material, dark green igneous rock. Size, 125 × 67 × 28 mm. Found by Mr. F. Spalding. Laver collection.
- Fig. 4.—Axe. Surface and material similar to the above. Cross-section oval. This is the most usual form of (non-flint) stone axe-blade of the district. Size, 146 × 58 × 43 mm. Laver collection.

PLATE XII.

*Approximate scale $\frac{1}{2}$ natural size.**Later Series.*

- Fig. 1.—Axe-blade in beautifully polished flint, cutting-edge rather oblique and still keen. Deeply peat-stained. 109 × 47 × 24 mm. Warren collection.
- Fig. 2.—Adze? in polished flint. Condition, black mottled with (originally) white patches having an ochreous staining superimposed upon them. Edge slightly gouge-shaped; the average gouge curve having a radius of about eight inches; the striæ of grinding of the concave bevel pass obliquely across. 122 × 57 × 33 mm. Laver collection.
- Fig. 3.—Imperfect axe in polished flint, used as a core (flakes made from polished axes are not uncommon), and also subsequently for hammering. Laver collection.
- Fig. 4.—Chipped axe with polished edge and slight traces of grinding elsewhere. This flint is ochreous, and it may belong to the Earlier Series. The flints in the "Lyonesse" surface are never stained, but on the other hand they sometimes become stained after being washed out of their bed. 112 × 46 × 19 mm. Laver collection.
- Fig. 5.—Partially polished axe in grey flint: probably a polished axe re-chipped and then the edge re-ground. 144 × 52 × 29 mm. Found by Mr. F. Spalding. Laver collection. This specimen has almost the appearance of a forgery, but Dr. Laver assures me that it cannot be so.
- Fig. 6.—Boldly worked oval blade. This specimen is not unlike a Palæolith, but it is actually made from a large polished axe, part of the outline of which is shown by the dotted lines. 100 × 84 × 21 mm. Warren collection.
- Fig. 7.—Smaller oval blade, 52 × 49 × 18 mm. Warren collection.
- Fig. 8.—Fabricator (unused), slightly rubbed down along the side edges in order to protect the hand in use. 107 × 24 × 14 mm. Hassall collection.

Early Series.

- Fig. 9.—Fabricator, in weathered ochreous flint from the rainwash underlying the "Lyonesse" surface. 69 × 21 × 10 mm. Warren collection.

PLATE XIII.

*Approximate scale $\frac{1}{2}$ natural size.**Early Series.*

- Fig. 1. Chipped adze of very rude workmanship, similar to these from the bed of the River Thames. Made from a green-coated flint. Found on the top of the cliff at Frinton-on-Sea associated with a group of characteristic "Early Series" types of flint implements and pottery. 208 × 67 × 57 mm. Warren collection.
- Fig. 2. Rude sub-triangular form. 41 × 34 × 17 mm. Warren collection.
- Fig. 3. Another similar. 47 × 36 × 18 mm. Warren collection.

Later Series.

- Fig. 4. Double-ended pick (?) in black flint for binding round the middle. Rude forms such as this are rare among the Later Series. 174 × 40 × 37 mm. Laver collection.

- Fig. 5. Adze of triangular section in chipped flint, the cutting edge is formed by the intersection of two transverse facets, and is much polished and striated by use. 115 × 47 × 32 mm.
- Fig. 6. Scraper with notched side-edges.
- Fig. 7. Horse-shoe scraper, slightly worked on the inner face (a feature sometimes seen in this series, see also *Essex Naturalist*, vol. xvi, 1908, page 50, Plate V).
- Fig. 8. Horse-shoe scraper worked back along the side edges to the butt-end.
- Fig. 9. Horse-shoe scraper.
- Fig. 10. Horse-shoe scraper with the butt-end worked back to a point.
- Fig. 11. Conical scraper, very greatly worn on its scraping edges. Much resembling a core in general form. A similar specimen from the buried surface in Lincolnshire is figured in *Man*, 1907, 89, Fig. 1. This is of the "grattoir Tarté" form. It shows that this type is not an indication of the Aurignacien period. 38 × 34 × 24 mm.
- The originals of figures 5 to 11, Warren collection.

PLATE XIV.

*Approximate scale $\frac{1}{2}$ natural size.**Later Series.*

- Fig. 1. Flint knife, of leaf-shaped form. 117 × 47 × 11 mm. Hassall collection.
- Fig. 2. Flint knife, of the so-called "dagger" form, but less elaborately fashioned than most of this type. 106 × 42 × 10 mm. Warren collection.
- Fig. 3. Flint knife of leaf-shaped form. 144 × 42 × 11 mm. This specimen has been polished and smoothed by prolonged use on both faces along the lower half of the inside edges as shown in the two views 3 and 3a on the plate. Hassall collection.
- Fig. 4. Curved knife, of sickle-shaped form, the side edges are smoothed by grinding. 153 × 33 × 12 mm. Warren collection.
- Fig. 5. Small knife, made by low angle chipping on a naturally broken flint. 58 × 34 × 9 mm. Warren collection.
- Fig. 6. Broad leaf-shaped blade, not elaborately finished. 66 × 37 × 6.7 mm. Hassall collection.
- Fig. 7. "Spear-point" of similar work. 78 × 45 × 6.8 mm. This is very probably a knife, as it is "bevel-edged" near the point, that is to say, re-sharpened by higher angle chipping. This may be traced in the edge view, 7b. Hassall collection.
- Fig. 8. Flake with high angle splintering all round the edges; this is due to wear in the use of the implement and not to designed flaking. From one of the "special sites" described in the text. 77 × 23 × 10 mm. Warren collection.

Early Series.

- Fig. 9. Spear-point, made from a ridged flake with slight secondary chipping at the point, and at the butt-end to form a tang. 54 × 18 × 7 mm. Warren collection.

PLATE XV.

*Approximate scale $\frac{3}{4}$ natural size.**Early Series.*

- Fig. 1. Barbed arrow-point.
- Fig. 2. " " " 27 × 25 × 4 mm. Weight 29½ grs.
- Fig. 3. " " " 19 × 22 × 3.8 mm. Weight 21 grs.
- Fig. 4. " " " 19 × 22 × 3.8 mm. Weight 21 grs.
- Fig. 5. " " " 19 × 22 × 3.8 mm. Weight 21 grs.
- Fig. 6. Stemmed arrow-point.
- Fig. 7. Indented arrow-point, of unusual thinness. 24 × 18 × 2 mm. Weight 12 grs. (imperfect).
- Fig. 8. Unfinished barbed arrow-point, broken in manufacture, only one notch having been chipped out to form the stem.

- Fig. 9. Leaf-shaped arrow-point of fairly broad form, not elaborately finished. $32 \times 24 \times 3$ mm. Weight 31 grs.
- Fig. 10. Leaf-shaped arrow-point.
- Fig. 11. Leaf-shaped arrow-point, somewhat narrow and thick. This specimen was found washed out of its bed on a mixed site where both series occur; it may belong to the later series. $38 \times 15 \times 5$ mm. Weight 37 grs.
- Fig. 12. Triangular arrow-point, made from a curved flake with only partial secondary working.
- Fig. 13. Indented arrow-point of similar technique. $32 \times 22 \times 4.2$ mm.
- Fig. 14. Uni-barbed arrow-point.
- Fig. 15. Small knife of lancet form, very well worked and nearly flat on one face.
- Fig. 16. Transverse arrow-point.
- Fig. 17. Triangular arrow-point with a minimum of secondary flaking. $32 \times 20 \times 4.3$ mm.
- Fig. 18. Ditto. $27 \times 23 \times 3$ mm.
- Fig. 19. Ditto.
- Fig. 20. Transverse arrow-point.
- Fig. 21. The transverse arrow-points pass into forms that appear to be small tools rather than weapons: the hollow curves upon either side frequently show evidences of use. For the purpose of an arrow-point this specimen would be used the opposite way up to that in which it is shown, but in that position the butt end would be too thick to be inserted into the shaft. $29 \times 34 \times 6.5$ mm.
- Fig. 22. A less developed example of the same form; this could not be an arrow-point. The hollow curve in this series is quite different from that of the true hollow scrapers.
- Fig. 23. Small side scraper.
- Figs. 24 and 25. Two small side scrapers found *in situ* in the brick-earth below the "Lyonesse Surface" by Mr. F. N. Haward. These forms are characteristic of the Early Series, and it is gratifying to find that Mr. Haward has arrived independently at the same conclusion as myself.
- Fig. 26. Small horse-shoe scraper.
- Fig. 27. Part of a worked flake of a narrow scalene form, resembling a well-known type of pygmy implement but of exceptionally large size. Found near the axe shown in Plate XIII, Fig. 1.
- Fig. 28. Pygmy implement with delicate edge working.
- All except Fig. 27 (and possibly Fig. 11) are from the rainwash deposit; and all except Figs. 24 and 25 are in the author's collection.*

PLATE XVI.

*Approximate scale $\frac{3}{4}$ natural size.**Later Series.*

BARBED ARROW-POINTS.

- Fig. 1. Size $32 \times 24 \times 4.6$ mm. Weight $41\frac{1}{2}$ grs. Hassall collection.
- Fig. 2. Broken and re-worked with high angle chipping along one side. $17.5 \times 20 \times 3.7$ mm. Weight 16 grs. Hassall collection.
- Fig. 3. Size $47 \times 36 \times 5$ mm. Laver collection.
- Fig. 4. Size $44 \times 31 \times 5.5$ mm. Laver collection.
- Fig. 5. Size $38 \times 24 \times 4.5$ mm. Weight $48\frac{1}{2}$ grs. Hassall collection.
- Fig. 6. Size $23 \times 29 \times 4$ mm. Weight 28 grs. Hassall collection.

LEAF SHAPED ARROW-POINTS.

- Fig. 7. Size $23 \times 15 \times 2.5$. Weight $11\frac{3}{4}$ grs. Hassall collection.
- Fig. 8. Size $35.5 \times 20 \times 3$ mm. Weight $36\frac{1}{2}$ grs. Hassall collection.
- Fig. 9. Size $38.5 \times 23 \times 2$ mm. Weight 36 grs. Hassall collection.

- Fig. 10. Ruder leaf-shaped blade, $35 \times 27 \times 4.5$ mm. Weight 68 grs. It is remarkable that although the work on this is rude, it is not thicker than some of which the work is delicate and regular. Warren collection.
- Fig. 11. A narrower and thicker form, $49 \times 19 \times 5.8$ mm. Weight 80 grs. Hassall collection.
- Fig. 12. Size $33 \times 16 \times 3$ mm. Weight $24\frac{1}{2}$ grs. Hassall collection.
- Fig. 13. Broken in prehistoric times. Found *in situ* in the "Lyonesse" surface not far from one of the "special sites." $37 \times 24 \times 2.8$ mm. Warren collection.
- Fig. 14. Size $45 \times 22 \times 3$ mm. Weight $53\frac{1}{2}$ grs. Hassall collection.
- Fig. 15. The unsymmetrical shape of this suggests that it may be a lancet-knife rather than an arrow-point. $42 \times 19 \times 2.7$ mm. Weight 35 grs.

SMALL KNIVES AND RUDER FORMS.

- Fig. 16. Lancet-knife.
- Fig. 17. Flake arrow-point, with a tang at the base made by longitudinal flaking from the butt-end, and not by transverse flaking from the edges. Many of this type have been found.
- Fig. 18. Broad scalene arrow-point. Warren collection.
- Fig. 19. A similar form. Both of these have a minimum of secondary chipping. $39 \times 24 \times 5$ mm. Weight 58 grs. Warren collection.
- Fig. 20. Uni-barbed arrow-point. This, as is usual with this form, has a minimum of secondary flaking. $48 \times 25 \times 5.5$ mm. Weight 73 grs. (imperfect). Hassall collection.
- Fig. 21. A form similar to Fig. 21 of the previous plate. $35 \times 43 \times 5$ mm. Weight 100 grs. Hassall collection. (There are many of this form, and belonging to the same series, in the collection of Mr. Mothersole of Chelmsford.)
- Fig. 22. Rude rhomboidal form. $37 \times 33 \times 7$ mm. Warren collection (as also the remainder on this plate).
- Fig. 23. A similar form, imperfect.
- Fig. 24. Another example of the same form. These may have been intended to have been more elaborately finished, but the material being of insufficiently good quality the attempt was abandoned. On the other hand, these ruder and stronger objects would be more useful for many purposes than such delicate lancet-knives as are seen in Fig. 16. $42 \times 36 \times 10$ mm.
- Fig. 25. Broken triangular spear-point, or not improbably a barbed arrow-point in the first process of manufacture.

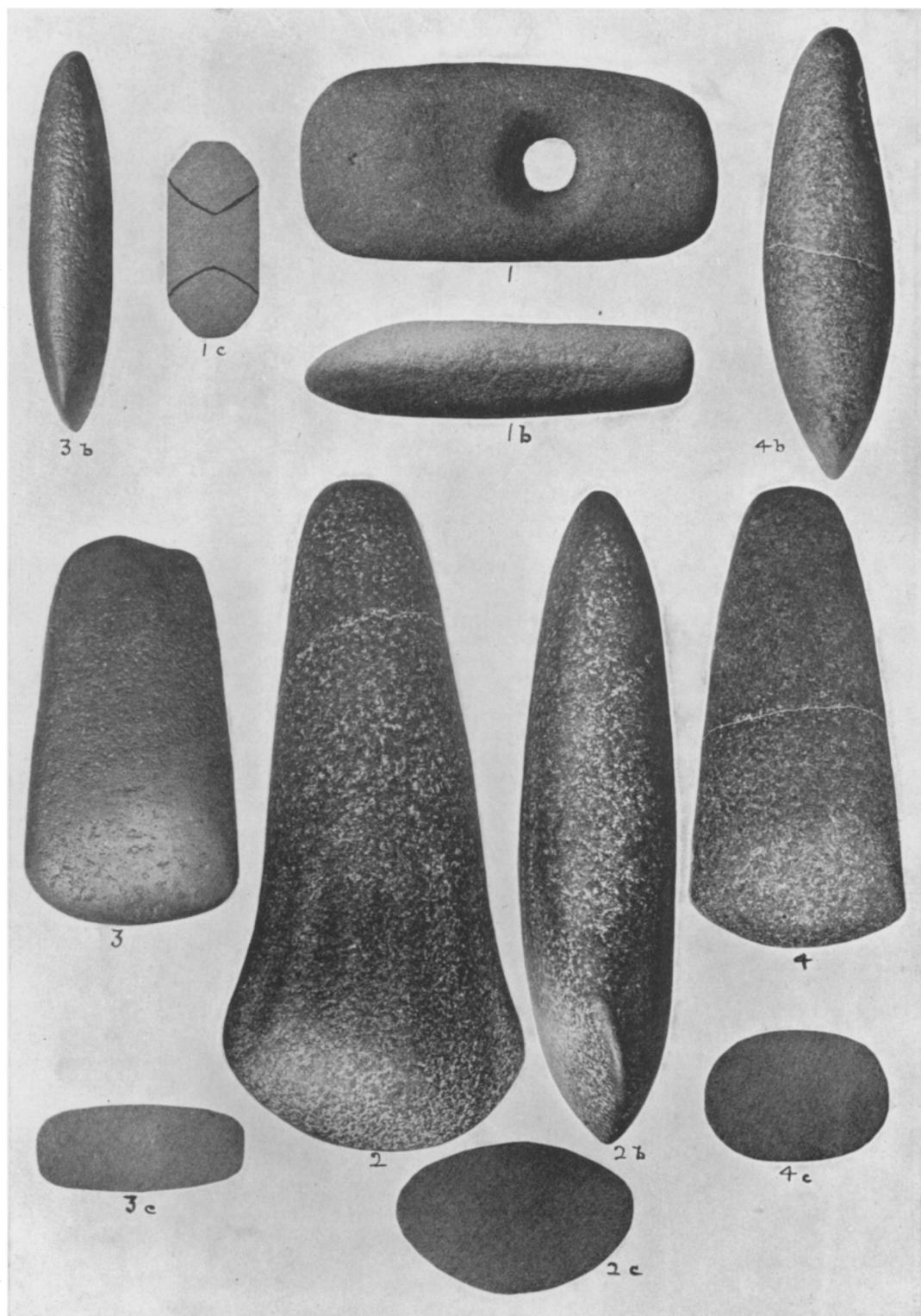
PYGMY IMPLEMENTS.

- Fig. 26. Rather large, narrow, scalene form.
- Fig. 27. Narrow scalene form.
- Fig. 28. " " "
- Fig. 29. A rather broader example of the same.
- Fig. 30. Delicate needle-like form.
- Fig. 31. Another rather similar.
- Fig. 32. Diminutive side-scraper.

PLATE XVII.

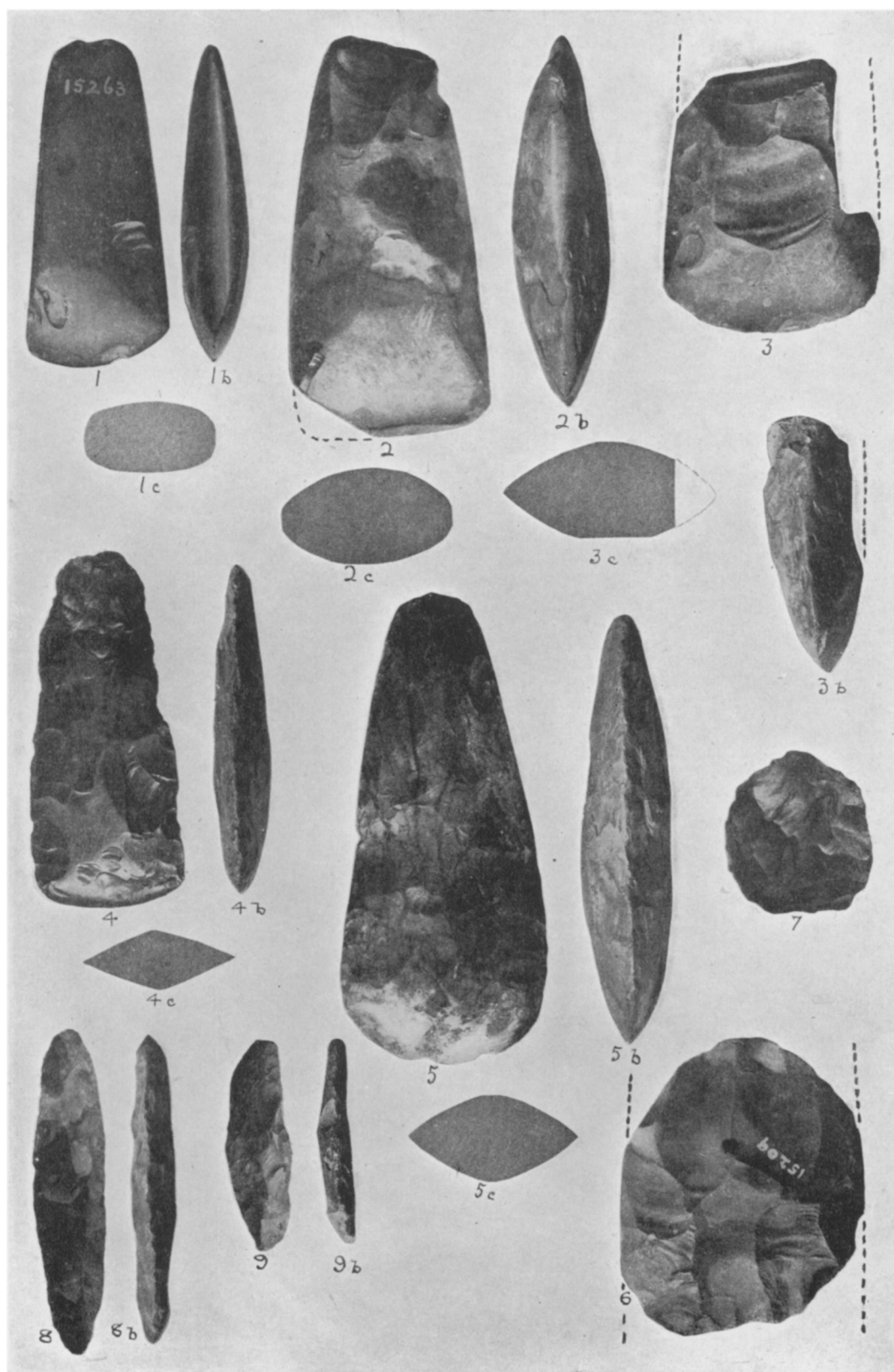
Later Series.

- Fig. 1. Portion of rim of vessel of No. 12 quality pottery, ornamented with finger-nail impressions. Thickness 11.5 mm. The diameter of the vessel at the rim was about 12 inches.
- Fig. 2. Another similar specimen but thinner and smaller, diameter at the rim about 7 inches.
- Fig. 3. Portion of a beaker or drinking-cup. The horizontal flutings are not formed by combing, but by the impression of series of rectangular "punch-marks." Diameter at the widest part of the vessel about $6\frac{1}{2}$ inches. The technique of this agrees with



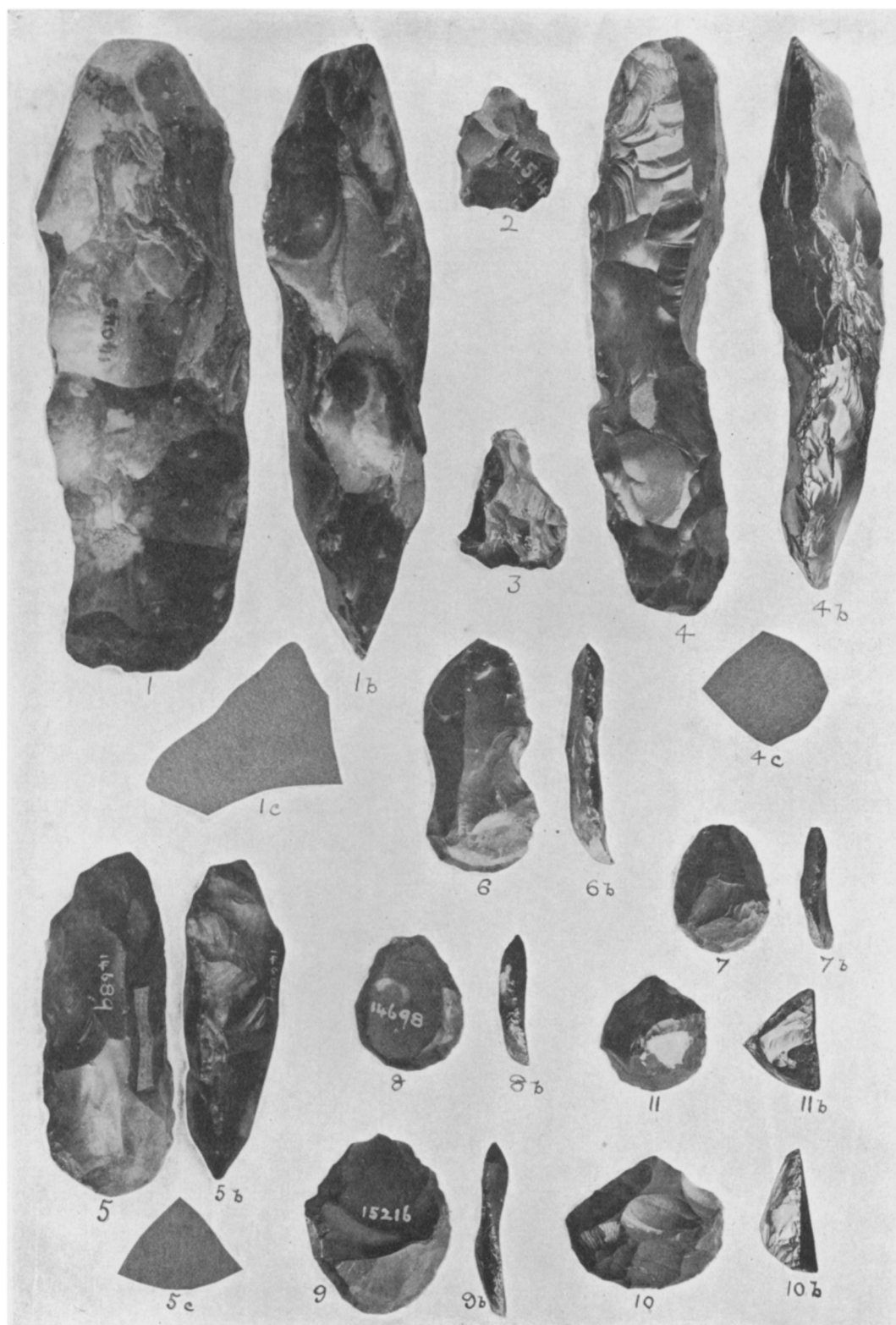
(S. H. W. Photo.)

PREHISTORIC REMAINS FROM EASTERN ESSEX.



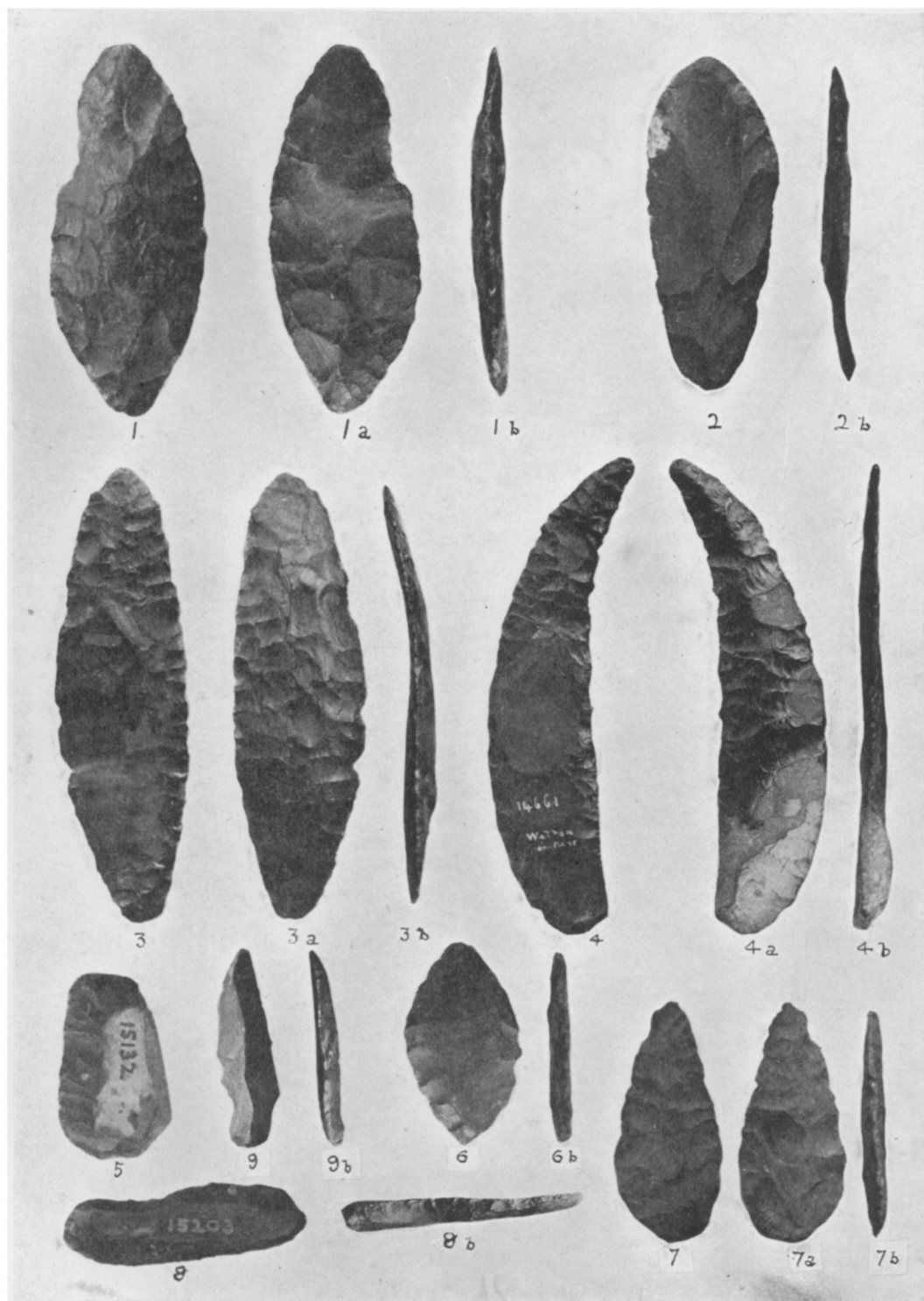
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PREHISTORIC REMAINS FROM EASTERN ESSEX.



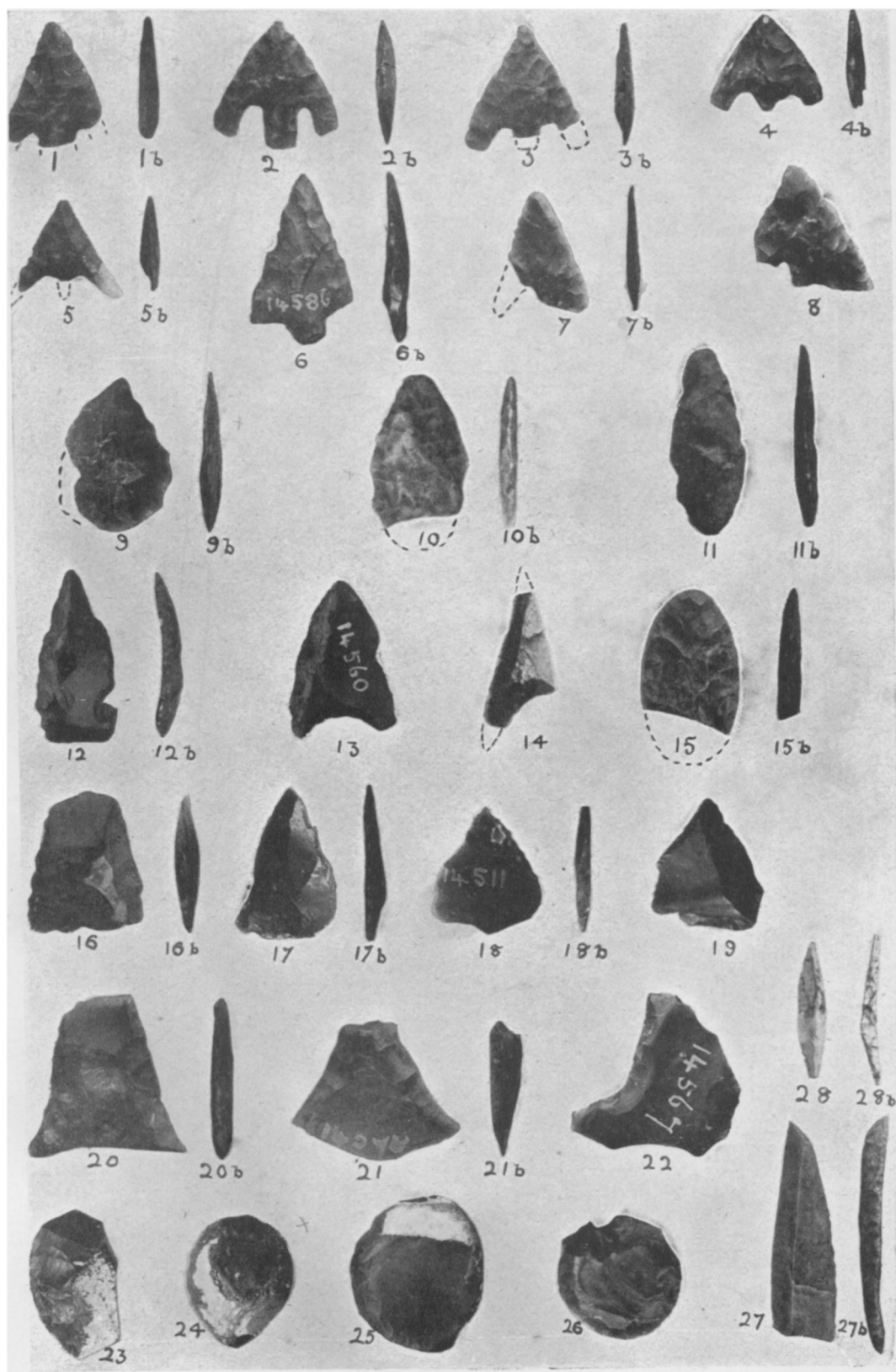
(S. H. W. Photo.)

PREHISTORIC REMAINS FROM EASTERN ESSEX.



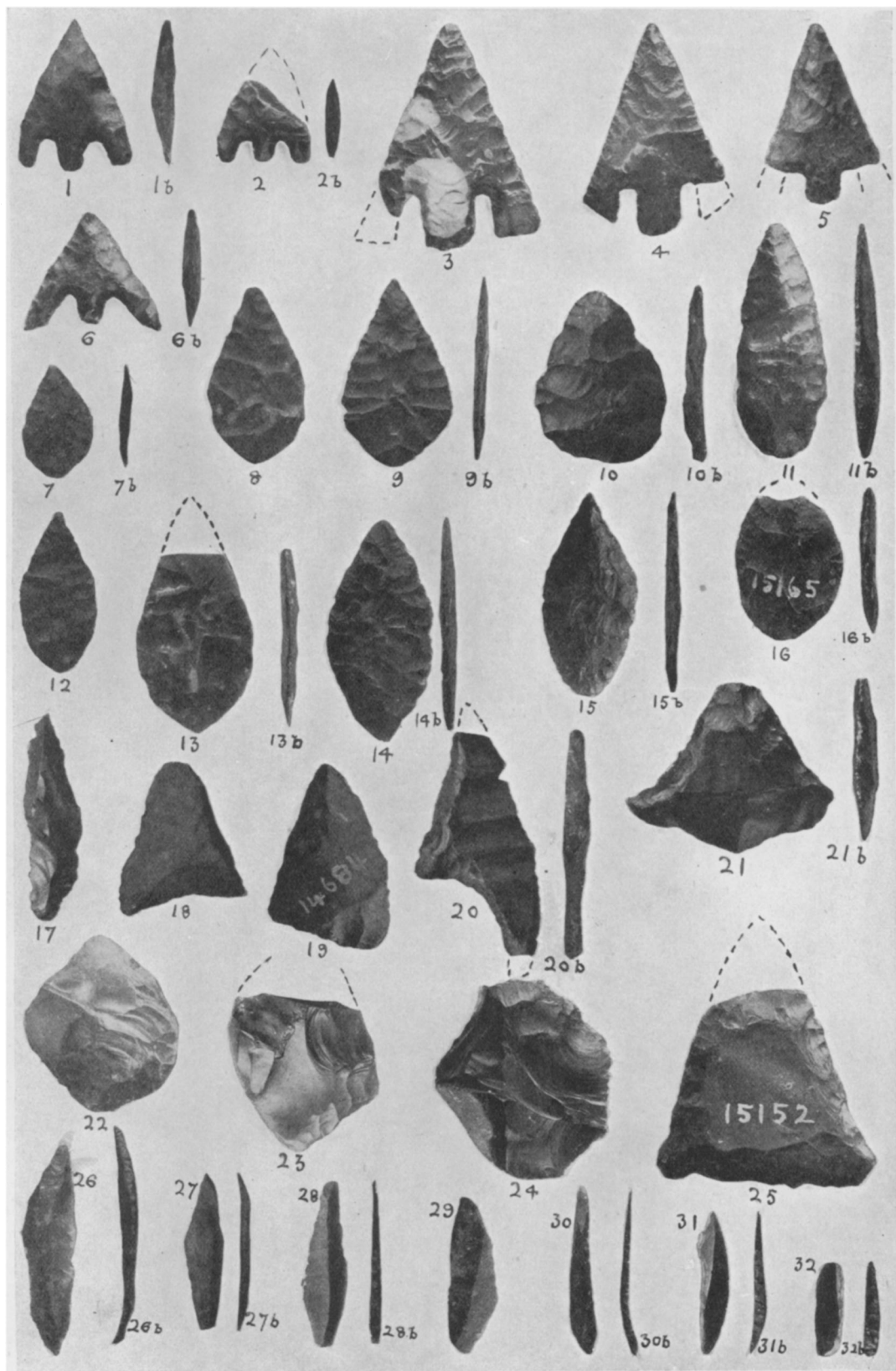
(S. H. W. Photo.)

PREHISTORIC REMAINS FROM EASTERN ESSEX.



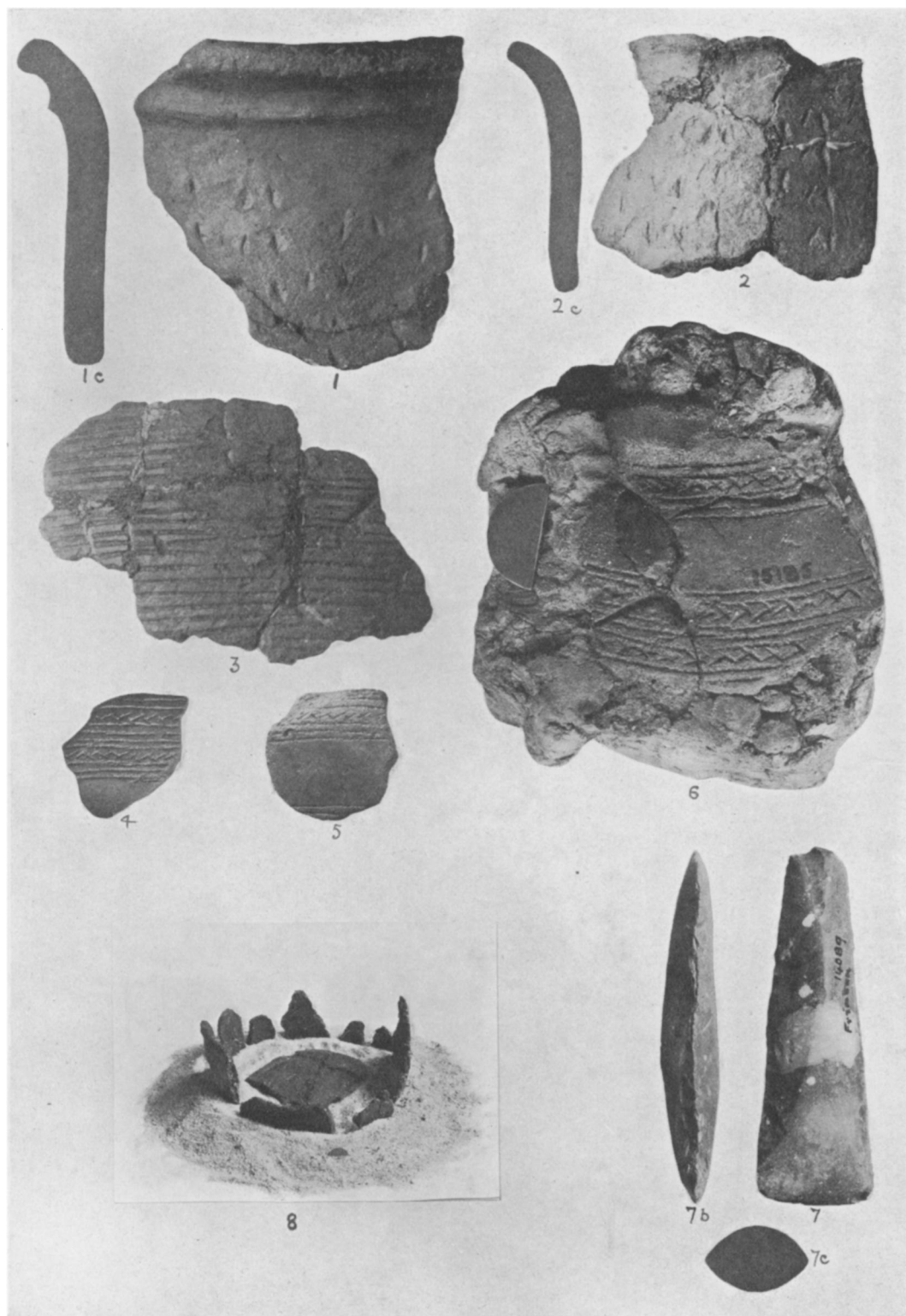
(S. H. W. Photo.)

PREHISTORIC REMAINS FROM EASTERN ESSEX.



(S. H. W. Photo.)

PREHISTORIC REMAINS FROM EASTERN ESSEX.



(S. H. W. Photo.)

PREHISTORIC REMAINS FROM EASTERN ESSEX.



FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.

PREHISTORIC REMAINS FROM EASTERN ESSEX.

the beaker figured by Pitt-Rivers, *Excavations in Cranborne Chase*, vol. ii, Plate lxxvii.

Figs. 4 and 5. Two fragments of No. 3 quality pottery, with characteristic beaker ornamentations. The thickness of the specimens shown in Figs. 3, 4 and 5 is from 5 to 8 mm.

Fig. 6. Portion of rim of beaker, shown in original matrix. The scale of this photograph is shown by the half-circle placed on the matrix, this is one inch in diameter.

Early Series.

Fig. 7. Polished flint axe or chisel. This was found on the same site as that shown in Plate XIII, Fig. 1. The bevels of the edge are particularly well polished and the edge is still keen. This is a recent addition (January 1912), and has had to be placed rather out of its proper order in the plates. 124 × 40 × 21 mm.

Later Series.

Fig. 8. "Sham urn," made of pottery of quality No. 1b. This was replaced in sand approximately in its original position. It was about 12 inches in diameter, see description in the text, page 120.

The specimens shown in Figs. 2, 3, 4, 5 and 6 were found on one of the special sites described in the text. All except Figs. 6 and 8 are approximately $\frac{1}{2}$ natural size. All are in the author's collection.

PLATE XVIII.

Fig. 1. Polished flint axe head made from a piece of tabular flint. Probably Early Series. Photographed as it was first seen. It has also been figured and described in the *Essex Naturalist*, vol. xvi, 1908, Plate vi, Fig. 4, and page 50.

Fig. 2. The axe-head shown in Plate XII, Fig. 1, photographed where it was found.

Fig. 3. Photograph of the prehistoric interment found near Walton-on-Naze. This was taken by Mr. Miller Christy, as soon as the bones were exposed and before they had been disturbed.

Fig. 4. The stemmed arrow-point shown in Plate XV, Fig. 6, photographed where it was found on a little patch of gravel among the salting vegetation.