Knocknalappa Crannóg, Co. Clare.

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INTRODUCTION.

The crannóg was first brought to notice in May, 1936, when Mr. J. N. A. Wallace of Limerick and Sergt. James Long, G.S., Newmarket-on-Fergus, reported the finding by them of a bronze sword, a bronze gouge and a polished stone axe.\(^1\) The association of these articles in a lake-side settlement was sufficiently important to justify the systematic excavation of the site.

The work was carried out in August and September, 1937, the supervision of the excavation being undertaken by Miss Helen M. Roe, M.A.; Miss Eilís Mac Neill, B.Arch., and the present writer. To my two colleagues, as well as to Miss Elizabeth Curran, B.A., and Mr. Brendan O’Connor, B.Arch., who helped for a shorter period, I wish to record my gratitude for efficient, painstaking and conscientious co-operation. My best thanks are also due to Mr. H. G. Leask and Prof. Adolf Mahr, Dublin, who made the excavation possible; to Dr. Hugh O’Neill Hencken, who loaned engineering instruments; to Mr. J. N.A. Wallace and Sergt. Long, both of whom rendered invaluable local help; and to the landowner, Mr. James McInerney, Rossroe, Sixmilebridge, Co. Clare, for never-failing aid and courtesy.

THE SITE.

Situated at the base of the steep hill which flanks the southern side of Rossroe Lough, the crannóg now takes the form of a not very obvious projection into the lake.\(^2\) That it had originally been an island-rather than a promontory-settlement is shown by the accumulation of a thick layer of marl (called secondary marl in section C-D, Fig. 2) on the southern side. This clearly was laid down in a lake or in slowly moving waters at a period subsequent to the erection of the crannóg. There is still evidence, in the form of a shallow waterlogged depression, of the former existence of a narrow channel between the crannóg and the lake shore, but no trace of a causeway of any sort was discovered. It is possible that boats, wading or swimming were the only means of connection with the mainland, the space being rather too wide to bridge conveniently.

Before excavation the site appeared as a low, irregular, oval mound, whose long axis (41 metres) lay roughly E-W. (Pl. I : 1.) The mound, which was steep-sided all round, was from 15-20 metres wide, and between it and the water’s edge lay a flat area with an upper surface of marl. This area, which varied in width from 7 to 18 metres, is here termed the “foreshore.”

The crannóg was a one-period habitation and its construction was simple, as may be seen from the plan (Fig. 1), and the sections (Fig. 2). Fundamentally the site consists of a slight natural rise in the marl bottom of the lake (primary marl), forming something in the nature of a shoal quite near the

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2. The site may be located on O.S. 6-in. Clare Sheet 42. 54 cm. from right-hand margin, 48 cm. from bottom margin. It lies in the townland of Knocknalappa, parish of Kilmurry, barony of Bunnatty Lower, County Clare.
water's edge. The area to be inhabited was then marked out by an oval of piles averaging from 3 to 15 cm. in diameter, and mainly of hazel. Where the line of piles was single it was strengthened by a loose heaping of stones in the form of a "breakwater" between and around the piles. The "breakwater" ran mainly on the northern and eastern sides of the crannóg; elsewhere the line of piles was doubled. On the south-eastern side the "breakwater" lay at a considerable distance below the surface (Section C-D, Fig. 2), and could not be traced at every point. This incomplete examination of the site, though a matter of regret, was due to the impossibility of coping with water at the low levels. A motor pump, working all day, was not sufficient to lessen the inflow. The find-producing layers were, however, investigated all over the site.

The lines of piles and stones served as a revetment for the main mass of the crannóg, which consisted of a thick layer of peat artificially laid down over the primary marl. About midway in it was a single layer of poor brushwood, which was not woven as was the custom in crannóga of the Early Christian Period. It consisted rather of thin branches and twigs thrown haphazardly (Pl. II, 4), and which seem to have been used as filling and, to a minor extent, as strengthening material. The elaboration of the latter idea gives us the finely woven brushwood floors of such crannóga as Lugore and Ballinderry I.4

The function of the sloping wooden "platform" (Pls. I: 4 and II: 2) which overlay the brushwood and was separated from it by a small thickness of peat is not very clear. The planking consisted of nine timbers (averaging 1.80 m. long) lying side by side, the total width of the "platform" being c. 85 cm. Its long axis lay approximately N.W.—S.E., the latter end being crossed by a smaller, narrower piece, which evidently held all the timbers together, though no evidence of fastening by metal or wooden pegs or thongs was found. Both ends of each piece of timber were roughly pointed and the lower (S.E.) halves still had their bark in position. At each of three corners was a round stake, obviously a part of the structure. A fourth pile, if such ever existed, was missing. Resting directly on the "platform," and scattered all over it, was charcoal in small particles, as well as ten small stones similar to those in the stone layer above the peat. These stones did not appear to have any structural value, but must be noted, particularly in view of the fact that no other stones occurred anywhere else throughout the artificial peat layer. Resting on one of the timbers was the pointed end of a small pile, 2.5 cm. in diameter. It had evidently been driven into the peat before the overlying stone layer was put in position, as it was broken off short just below the stones.

It is difficult to assess the rôle which this "platform" played in the structure of the crannóg. It must have been more than mere fill to judge from the apparently careful way it was laid down, and its position with regard to the corner posts. These are now not tied in any way to the sloping timbers, but it is likely that they were originally joined together by some means.

The "platform" was also clearly not part of a habitation level—such did not exist anywhere in the peat. The only explanation that suggests itself is that it was used as a temporary base on which to stand if, for some reason,

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3. A representative selection was examined by Dr. P. O'Connor, Keeper, National History Division, National Museum, who pronounced them to be of hazel ( Corylus ). For this information, and for the identification of all wooden and stone objects discovered on the site, I am grateful to Dr. O'Connor.

the peat used in the building of the crannóg became very wet. The charcoal might then be easily explained as spread from a workman’s fire—lighted possibly in a brazier or on a small pile of such stones as were actually found on the “platform.”

Above the “platform,” and separated from it by a thin band of artificially laid peat, was a mixed layer of small angular stones, charcoal (small quantity), and many broken and crushed animal bones. As well there were discovered in this layer the remains of a large pottery vessel (No. 14 on plan, Fig. 1) and other objects. These artefacts, however, clearly belonged to a pre-crannóg period, i.e., they had been broken and discarded before or during the construction of the island habitation. Otherwise they could not have occurred in a layer which was not a habitation level, but only part of the fill of the site. The same argument holds good with regard to the finds from the Brown Peaty Soil (see Section C-D, Fig. 2).

At the eastern end of the island, and above the mixed level which formed the only stable layer on the site, were five charcoal patches. They were none of them very large, and were clearly also only part of the fill: they did not represent burning in situ.

Running partly under the stone layer and extending beyond it on the northern side of the crannóg was a level of brown peaty soil, which was also fill and which contained finds. Above the charcoal and stone layer was a layer of marl, about 20 metres long and 6.50 m. wide (here called tertiary marl). From its granular nature it was clear that it had been artificially deposited, and from the fact that the shells were unbroken, the conclusion must be drawn that the marl had been dug in large lumps (as is peat) and then placed in position.

As has already been pointed out, the thickest layer on the site, which was most instrumental in raising the mass above the water level, was the substratum of peat which had been laid down artificially.

Outside the crannóg mass, however, a considerable quantity of natural peat had formed, as was shown by the occurrence of many tree roots in natural positions. (Peat No. 2 on Section C-D, Fig. 2). This peat formation must have taken place over a long period before the waters again encroached to lay down the secondary marl; and at a later period, when the area of the secondary marl became a marsh, a further layer of peat was formed, covering both the secondary marl and natural peat No. 2.

Finally, a thin layer of humus, in which some trees and bushes were growing, covered the whole site.

As well as the features above described, there are some other details which should be noted. Thus on the northern side of the crannóg there was the layer of brown peaty soil already mentioned, and at the western end of the island a double row of stout piles jutted out into the waters of the lake (Pl. II: 3); these probably represent the remains of a pier or slipway for boats, though the few horizontal timbers remaining in situ did not appear to have any structural function.

At various points on the site cut timbers of varying sizes were uncovered, but none of them appeared to belong to any recognisable structure. They looked more like fill or debris.
To sum up, the stratigraphy of the crannóg is as follows (from the top):

1. Humus.
2. Artificially deposited marl layer (*tertiary marl*).
3. Mixed layer of stones, etc. (*fill*).
3a. Brown peaty soil in parts underlying layer 3.
4. Thick layer of artificially deposited peat.
5. Original (*primary*) marl.

**THE FINDS.**

Before discussing the history and implications of the site, it seems advisable to indicate the nature and stratigraphical positions of the various finds. They were not numerous and we shall list them according to their strata rather than typologically.

**Humus.** Small amber bead, 1.1 cm. in diameter, with sides flattened round the perforation; 7 cm. below the surface, Section E. No. 19 on plan, Fig. 1.

Fragment of a flat rotary quern of quartzite, 9 cm. long. Fig. 4 : 2. (6)

**Tertiary Marl.** Large amber bead, flattened section. Perforation not quite central. 4.5 cm. diameter. Section F. No. 1 on plan.

**Stone Layer.** Bronze ring, 2.8 cm. external diameter, 6 mm. thick, flattened oval section. At one point there is a thickening of the ring, the purpose of which is not clear. Fig. 4 : 8. Section E. No. 26 on plan.

Bronze sunflower pin with flat disc head, 2.25 cm. in diameter. The pin, which is incomplete, is now 3.35 cm. long. Fig. 4 : 7. Section E. No. 5 on plan.

Part of a lignite bracelet, 4.9 cm. long, of rounded triangular section. Fig 4 : 3. Section E. No. 28 on plan.

**Bottom stone of a saddle quern of quartzite.** It measures 40 cm. by 26 cm., and averages 7 cm. thick. Like the next example to be described, it is flat and rough on the underside. On top it has two artificially smoothened ends flanking the rubbing hollow. Section D.

**Flattened oval pebble, slightly used as a hammerstone.** Of fine-grained sandstone, it measures 7.9 cm. by 5.6 cm. Section A.

**Round ball of sandstone, slightly used as a hammerstone.** 6 cm. diameter. Section A.

**Sherds of a large pottery vessel of a type common to the site.** This will be dealt with in detail later (*infra pp. 59 et seq.*). Section A. No. 14 on plan.

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5. I am dealing only with the structure of the crannóg, not with the geological history of the site, so I shall here ignore the later, naturally deposited, peats and marls.

6. See footnote (3) above.
Bottom stone of another saddle quern of micaceous sandstone. It is now broken, but its measurements are similar to those above. Section E.

Long, heavy, slightly kidney-shaped hammer-stone of fairly coarse sandstone, 19.2 cm. long by 7.1 cm. wide. Section E. No. 31 on plan.

Another oval hammer-stone, as above, also of fine-grained sandstone. Section E.

Single potsherd of same class as No. 14. Section E. No. 25 on plan.

A triangular object of fine-grained sandstone with rounded angles, 6.5 cm. high, 5.8 cm. wide, and 2.5 cm. thick. Fig. 4:1. For a tentative suggestion as to its probable use see infra, p. 66. Section F. No. 2 on plan.

Brown Peaty Soil. Crescentic object of lignite, Fig. 4:4. Section F. No. 6 on plan. It is not clear what purpose this enigmatic object might have served. It appears to be complete but it might still lack a suspension hole or holes, in which case it might have served as a pendant.

Piece of flint, chipped but not utilised. White patina. 4.9 cm. long. Section D.

A roughly cylindrical object of fairly coarse sandstone. Fig. 4:6. It is 9.6 cm. long by 3 cm. diameter. One end has a flattened cone-shape and was slightly used for hammering; the other end is flat. It might have been used as a whetstone, though this was hardly its primary function. The pointing of one end must indicate some other use, though it it difficult to suggest any.

Bone knife made from the inner side of the right metatarsal of a red deer. Fig. 3:3. Section F.

One complete half of pottery vessel was discovered with a pile driven through it.

Used and polished tine of young deer.

"Breakwater"—A small flat circular amber bead, 9 mm. in diameter. Section F. No. 11 on plan.

Part of amber bead, broken at perforation through a flaw in the material. 9 mm. in diameter, 8 mm. length of perforation. Section F. No. 12 on plan.

Quadrant of large amber bead with perforation 1.85 cm. long. Originally it must have had a diameter of c. 3.25 cm. Section E. No. 27 on plan. Small flat bronze bead, irregular in shape, measuring 6 mm. wide each way. Perforation not central. Section F. No. 13 on plan. 2 small potsherds; usual site type; No. 29 on plan. Section E. 25 potsherds, No. 22, 23, 24 on plan. Section F. They all appear to belong to the same vessel. Spindle whorl: head of femur of ox. Bone handle: part of ox radius. 5 phalanges of ox (see Fig. 3:5). One perforated laterally also.

Foreshore. Flint chip, not utilised. Section C. Thin bronze wire-like band with one flattened end. Not complete. Section E. No. 18 on plan. 79 potsherds (No. 15 on plan), (Fig. 4:10), one rim and shoulder fragment (16 on plan, Fig. 4:11), 4 sherds (17 on plan), and 9 sherds (21 on plan). Section D. With No 21 were found one fragment of charcoal which has been pronounced to be of ash (fraxinus) by Dr. O’Connor, and
some small fragments of burnt bone about which Mr. Stelfox, of the Natural History Division, National Museum, has written: “I am sorry I can say nothing about the burnt bones. They could be either human or ox or any animal as large as man.” Rim sherd. Section D.

Bronze sword, found by Mr. Wallace. Fig. 3 : 2.
Socketed bronze gouge (Fig. 3 : 6) and stone axe (Fig. 4 : 5), both found by Mr. Wallace and Sergt. Long.

Bone point. Fragment of long bone. Ox?

Dark Lake Mud (i.e., under foreshore marl). 7 potsherds, including one rim fragment. Section D. No. 32 on plan.

Wooden object of poplar (populus). It is incomplete, but measures 4 cm. in diameter and 1 cm. thick in the centre. It is a disc with one side flat and one slightly dished, and has as well a depression round the edge, giving the object the appearance of a modern pulley-wheel. I do not know what its original function might have been.

DISCUSSION.

I have already pointed out above that the site under discussion was a crannóg, i.e., an island artificially raised above water level to provide a habitation and possibly a refuge. But though habitation relics did occur, of habitation itself there was not a trace (I do not consider that the “platform” in the middle of the artificially laid peat represents at the most more than a workmen’s support). The stone layer above the peat gave stability to the whole mass, but itself was only fill. The animal bones which were mixed with the stones represent habitation, of course, but on another site.

The same refers to the charcoal—there was no indication anywhere on the site of the existence of a hearth. The great majority of the finds came from the stone layer, and it seems very likely that it is largely composed of midden material from the former dwelling-site of the crannóg builders. Other objects, such as the sword and gouge found on the “foreshore” are probably the result of loss during the period of occupation of the crannóg. The same must apply to the potsherds also found there. The fact that they are exactly similar to the pots from the stone layer and from the brown peaty soil of the crannóg mass is important: it makes it at once clear that the two periods represented on the site are culturally contemporaneous. The first period is that of the finds in the make-up of the crannóg, i.e., they are pre-crannóg. This is particularly obvious in the case of the vessel in Section F (No. 7 on plan) through the centre of which a pile had been driven (Pl. II : 1). The second period, is, of course, that of the finds lost during the making of the crannóg. (I do not believe, as I shall show later, that it was ever inhabited).

The topmost (tertiary) marl must have been the only possible occupation level on the site. (I do not think it likely that a complete habitation level above it could have been swept away by the lake-waters: a layer of natural marl completely coterminous with the site would have been the result). On this marl layer, however, there was no trace whatsoever of occupation: the only find was the large amber bead already noted (supra, p. 56), there was no hearth, no postholes, no traces of any thatching material, nor of foundations for the walls of huts. The querns, which might have indicated a longer period of habitation, came from the surface or from the fill of the crannóg and thus belong to the pre-crannóg habitation site. The impression made by the site is that the crannóg was heaped up but never used. There might have been a hut.
or huts made of marl lumps (7) which later collapsed on to a prepared marl floor, but then there should have been some traces of roofing material, and of heaps into which the collapsed superstructure would form. Above all, there should have been some indication of the existence of fires on the site. Added to this was the complete absence from the crannóg of any indication of a midden; there was no refuse (animal bones, etc.) such as accumulate around the outside of the normal crannóg palisade. The few objects found on the foreshore could easily have been lost (in the case of swords and similar objects) or broken (as with pottery) during the period of erection of the crannóg.

I believe that the crannóg was made purely as a refuge in case of danger and that skin tents would have sufficed for shelter, but that the builders never had any occasion to avail themselves of their retreat for a longer period than, say, a summer’s day, when a fire could have been dispensed with.

We now come to the chronological position of the site. As I have pointed out above, the finds are culturally contemporary; there may have been a difference of a few years between the formation of the pre-crannóg midden and the placing of it as fill in the body of the crannóg, but, apart from that, it may be considered a one-period site, and all the finds confirm this view.

The most important objects from the site are the potsherds in that they are amongst the first pieces definitely established as domestic pottery in either the Bronze or Iron Ages in Ireland. (8) With the exception of the two groups numbered 7 and 14 respectively on the plan (which represents two vessels) altogether 183 sherds of varying sizes were discovered on the site. It is difficult to say exactly how many pots are represented, but the groups numbered 15, 20, and 22-24 seem each to be the sherds of a single pot. There are thus at least five vessels known, though the other sherds may indicate the existence of more.

The pots are all fundamentally the same. Only one (No. 7 on plan) was capable of adequate reconstruction and it gives a clear idea of the type. (Fig. 3:1.) The vessels have a slightly sloping neck, joining at a fairly sharp angle a swelling body with a slight S-curve; the body, whose maximum diameter is about 18 cm., slopes down to a base 10 cm. in diameter, where it is slightly splayed and curved. The proportions are good (averaging 22.5 cm. high and 16.5 cm. in external rim diameter) and the vessels have a pleasing shape. They were easy to handle and their capacity was not too limited. They are all hand-made, the vessels being built up of large pieces; the neck was made as a separate entity in the form of a ring and then affixed (before the clay had dried, of course) to the body. The whole then appears to have been strengthened at the various joints and probably also decorated in that the rough, unfinished appearance was removed by the addition on the outside of a coarse slip, which was applied before firing.

The biscuit is very uneven; some sherds are of quite hard-baked pottery, others are soft and crumbly. The firing took place in the main in a non-oxidising atmosphere and the result is a dull ware, black all through. This is uniform all over the site, but a few sherds show a yellowish red or brown

7. Such material dries out very hard and I am informed by my colleague, Mr. Stelfox, that it is used to the present day in parts of Ireland, particularly in the North, for building partition walls in houses.

8. The only other sites where domestic Bronze Age pottery has come to light in Ireland are at Ballinderry crannóg, which was excavated in 1933, and at the crannóg at Island MacHugh, at present being excavated by our northern colleague, Oliver Davies.
tinge, as if the clay had not been sufficiently fired. Calcite (calcium carbonate) was used as bonding material, though this was hardly good, owing to the fact that calcite is so easily metamorphosed by heat. The walls of the pots averaged 10 mm. in thickness, but were much stouter at the junction of body and base. Due to the fact that the pots were hand-made, there is no rigid uniformity of rim or base profile. Fig. 3:1 shows various rim sections of No. 7, while the same figure and Fig. 4:10 show entirely different base profiles.

The most important point to note with regard to the Knocknalappa pottery is its shape: the pots are unlike anything we know so far in the Bronze Age and must be referred ultimately to the period when, all over the Continent, the bulbous vessel with a shorter partly upright neck as a separate item superseded the normal wares of the Bronze Age. The classic examples belong, of course, to the Gündlingen phase (Reinecke, Hallstatt A) and from that period onwards this was the fundamental shape for practically all pottery vessels. There are, of course, slight differences from period to period: thus the Gündlingen vessels have higher necks than that those of the Alb-Salem or Koberstadt cultures, and they again differ somewhat from the pottery of Jastorf or Wessenstedt, or from that west of the Rhine. The "provincial" wares of areas such as France and Britain again show regional dissimilarities. But they may all be referred to a common prototype which can be shown to lie partly in late urnfield traditions (Hallstatt A and B) and partly in the bronze situale of the same period.

From this is it clear that the Knocknalappa pottery belongs to the Hallstatt period. But a closer dating is desirable, particularly in view of the fact that such a period cannot be recognised in Ireland as yet, and that a distinction between bronzes of the Bronze Age and of the incipient, though transitional, Iron Age has never been drawn conclusively. Mahr, in his Presidential Address to the Prehistoric Society, made tentative steps in that direction by his division of the late Bronze Age into three phases, but his ideas have not been followed up. What Mahr also failed to stress was the fact that "in due course, Late Bronze Age movements take on a definite Early Iron Age character," and he therefore missed the logical conclusion that the Early Iron Age (Hallstatt) culture must have had a considerable influence on this country. Ireland about 600 B.C. was looking forward to iron, not backwards to bronze.

Exact parallels to the Knocknalappa pottery are not easy to find. In Ireland itself I know of the finding of only one other similar vessel. It comes from Tullyhullion, about 5 miles west of Letterkenny, Co. Donegal. It was found with a socketed bronze axe and "the remains of a fire." These objects have come from a private collection as a result of which the information is entirely unsatisfactory; but it seems clear that at least one whole pot was discovered, though only one sherd (luckily showing rim and shoulder) has found its way to the National Museum (Fig. 4:9). This sherd is of the same black ware as the Knocknalappa pottery, and as the illustration shows, the shape of the vessel must have been closely allied to that of our crannóg pots. The importance of

9. See footnote (3) above.
11. Grimes, Guide to the Collection illustrating the Prehistory of Wales, 111.
the Tullyhullion sherd cannot be over-rated: it shows that the culture represented at Knocknalappa must have been more widespread in Ireland than appears at the moment and that the crannóg is not an isolated phenomenon.

An examination of the relevant material in Britain helps us considerably in our problem: the Knocknalappa pottery is paralleled there by a series of vessels which belong exclusively to Iron Age A, and thus confirm the conclusion already arrived at as to the general date. Probably the best sites for our purpose are those at All Cannings Cross,\(^\text{13}\) Park Brow,\(^\text{14}\) and Hengistbury Head.\(^\text{15}\) The first-mentioned site has produced a great quantity both of plain and decorated pottery from a site which was occupied for some time, to judge from the number of refuse pits uncovered. Some early Iron Age B fibulae of iron (La Tène I type) were recovered from the site and Mrs. Cunnington concludes that this site gradually fell into desuetude about the beginning of the La Tène period in Britain: the habitation is to be dated between 500 and 300 B.C., though a date nearer the latter figure is most probable.

The pottery from Park Brow, while clearly belonging to the same culture as the other pottery mentioned, does not show quite the same similarities with the Knocknalappa vessels as that from All Cannings Cross. The Park Brow pots are usually haematite-covered, are squatter and have almost equal bodies and necks; the former are very bulbous, the latter are not upright but slope out to form a funnel opening. The date, however, is the same: somewhere between 500 and 300 B.C., with the stress on the later figure. Hengistbury Head is of the same general date. In other words, we have a certain amount of evidence to date Knocknalappa crannóg to a period corresponding to Iron Age A in Britain: that is, it may be referred to that transitional phase between the ages of bronze and iron in Ireland, which I have elsewhere designated as Iron Age I.\(^\text{16}\)

Knocknalappa affords further evidence of connection with All Cannings Cross in the peculiar lignite object (Fig. 4: 4) and the small bone objects (of which five were recovered) illustrated on Fig. 3: 5. The former is a complete object in that its sides and ends are rounded off: it is not part of any other object, and so far is without parallel in Ireland. The only other similar objects come from All Cannings Cross,\(^\text{17}\) where three such were discovered. Save that they are thicker in section, they resemble very closely the Knocknalappa specimens, and due to the fact that their ends are slightly fractured, they have been considered by Mrs. Cunnington to have been parts of armlets, though she prints this statement with a query. Actually they would have been extremely large and clumsy to use as bracelets, particularly in view of the finely-made fragments of bracelets actually known from the site. The same applies to Knocknalappa, where a small fragment with sub-triangular section occurred (Fig. 4: 3). What the true purpose of these crescentic objects was I am unable to say.

\(^{13}\) M. E. Cunnington. *The Early Iron Age Inhabited Site at All Cannings Cross Farm, Wilts*. (Devizes, 1923.)

\(^{14}\) Archaeologia 76, 1935-7, 1-46.


\(^{16}\) Féilgíithbhm Ein mic Neill, p. 275.

\(^{17}\) M. E. Cunnington, *op. cit.*, Pl. 23: 1.
The other objects mentioned above as showing connection between Knocknalappa and All Cannings Cross are made from the phalanges (toe bones) of oxen. All have an opening in one side only and are hollowed out inside; as well one has a perforation running the length of the bone. The somewhat similar, though more perfectly finished, objects from All Cannings have sometimes an opening on two opposite sides and always have the longitudinal perforation, which justifies the assumption that they were toggles or runners used in connection with cords. This might conceivably have been the case also at Knocknalappa. In any case the further parallel with All Cannings strengthens the ascription of Knocknalappa to the Hallstatt period and the dating based on the pottery.

Other Knocknalappa finds offer contributory evidence of date. An important find, indeed that which gave rise to the excavation of the site, is that of the bronze sword (Fig. 3:2). It measures only 40.9 cm. in length and is thus a very small specimen, so small indeed that there is a doubt as to whether it could have been used as anything more than a dagger. It is certainly not a slaying sword, though modelled upon such: the weight tends rather towards the handle than the blade. Apart from its size, which I think must indicate degeneracy (i.e., lateness of type), the sword belongs to the group of flange-hilted weapons which were at once so widespread and so localised in Europe at the end of the Bronze Age/beginning of the Hallstatt Period.

The earliest examples of the group (which can be divided into many classes) may be dated to Reinecke E (Hallstatt A/B), in round figures to about 1000 B.C. I do not propose here to go into the question of a Late Bronze Age "invasion" of Ireland, but I would suggest that good examples of flange-hilted swords were introduced about that time, weapons which served as models and prototypes for a long series, reaching possibly into the beginning of Christian times in the country. Degeneration was inevitable, but it is as yet not easy to say which swords are later than others, though on general grounds it might be suggested that the smaller weapons (with ricasso) are the later. This, at least, seems to be the case at Knocknalappa, for as I have already pointed out, it is a one-period crannóg: if the pottery can be dated to between 500 and 300 B.C., it follows that the sword belongs to the same general period.

In discussing single finds (Einzelfunde), we are too prone to be influenced by what we consider to be the commencing date of a cultural phase; we forget that such may normally stretch over several hundred years and the finds must likewise be distributed. This is a matter of difficulty with regard to the swords, as I have said, so that a distribution map (Fig. 5) which shows all swords with ricasso is not as conclusive as it might be in that it shows late as well as early examples on the one sheet. Some points are, however, clear from a comparison of distribution maps, namely, that the slightly earlier type (bronze flange-hilted swords without ricasso) was comparatively rare in the country and that bronze swords with ricasso represent about the largest group of bronzes in the country.

The distribution map here reproduced shows no real concentration of finds anywhere, though there are some areas to be considered. Ignoring the river sites which have been drained (and which, therefore, tend to give an artificial and unbalanced picture) the vast majority of these swords occurs in the Central

19. See e.g., Peake, The Bronze Age and the Celtic World and Sprockhoff, Germanische Grißzweigenschwört.
Plain; there are few west of the Shannon and the whole south is very bare. There are also comparatively few in the north-east of the country, an area which is prolific in other finds.

A fact to be noted is the almost non-existence of finds on coastal sites, with the exception of County Donegal (incidentally not far from the find-spot of the Tullyhullion axe and pot); slightly further inland, however, there is a suggestive string of finds spreading inwards along the river valleys from Sligo Bay. This I would postulate as at least one point of entry of the type: I do not think, to judge from the paucity of finds in the north-east, that that area can have had any influence on the introduction of these swords. This leads to the further deduction that they were not introduced from Northern Britain through the Tyne Gap but that the old Atlantic sea route was in part at least again utilised. This becomes clearer when one considers the Continental background.

From about 1100 B.C. there was a period of general unrest in Europe which naturally reacted on the west Alpine cultural regions. This, as Evans has shown,\(^{20}\) led to a fairly widespread expansion westwards from that centre, using the radiating rivers of France as ways of approach to the coast. From here it was but a step across the Channel to Lowland Britain, where a new culture appeared, though whether due to invasion or trade is a question which is at the moment outside our survey. This route was to have considerable importance at a later period, when about 800 B.C. the lake-dwellings of the Alpine area were flooded, which fact, coupled with an increased pressure from the east, gave rise to a general exodus. Allied to this was an expansion of Urnfield peoples from southern Germany, all combining to follow the old river route westwards. This upset in the west Alpine province gradually affected England, where sites such as Old England, near Brentford, show the main points of ingress. The latter is a most important site in that it gives us evidence of some form of pile structure, together with all the concomitants of an Alpine lake-dwelling centre.

On its passage, this phase (Hallstatt B) was considerably influenced by the early La Tène culture emanating mainly from the Greek settlement at Massilia, and it is this mixture that we see so admirably represented at sites such as All Cannings Cross and Park Brow.

So far, however, the flange-hilted sword has not been found associated with pottery of the Park Brow type,\(^{21}\) but its area of distribution corresponds very closely with that of Iron Age A in Britain\(^{22}\) and it does not seem reasonable to suppose that the bronze sword had gone completely out of use before the beginning of that period.

Bearing the Knocknalappa pottery in mind and its lowland parallels, it would seem that one probable route led from Lowland Britain through Cornwall and on to Ireland by the old Atlantic trade way, which most likely impinged on the western seaboard of Ireland, thus explaining in part the distribution of the swords and the (as so far established) westerly distribution of the Knocknalappa type of pottery.

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21. A fragment of a socketed bronze axe was, however, discovered at All Cannings Cross.

22. Fox, Personality of Britain, p. 16, Fig. 5.
There is another possible route, but the evidence for is it at the moment rather tenuous. It is that of the fuller, direct Atlantic seaway from the south-east, touching land only at Cornwall and ignoring the Channel ports. Flange-hilted swords are certainly not common, if they occur at all, in the Iberian peninsula, but the discovery, in the copper area of Spain, of seventy-five swords of Beachy Head type (in the Huelva hoard) is suggestive of the possibility of the existence of more in that country than has heretofore been suspected. And this, of course, should not be a matter for surprise in that the Urnfield expansion took the bearers of that culture into north-eastern Spain late in Hallstatt B.

In Hallstatt times the sea route from Spain to England, via Brittany, is marked by the duck-stamped pottery of sites such as Kerwiller, Sabrose, Hengistbury and Chun Castle, and a more direct line of approach to Ireland (probably just an extension of that outlined) is suggested by the discovery of a little Iberian bronze statuette which, though not definitely localised, is known to have been found in Co. Sligo, in that area which we have seen from the distribution map (Fig. 5) to have been a likely point of entry for flange-hilted swords. The touching of this stream on the western coast of France may have been partly responsible for the direct introduction to Ireland of crannógach such as Knocknalappa: apart from Old England such novel ideas of construction appear to be absent from England at this early period, so that it is hardly likely that the impetus can have come from there. I am aware that Evans thinks that old contacts between Brittany and Ireland seem to have been broken at that period, and that the culture currents were deflected along the English channel, but in view of the evidence above cited, the indubitable fact of Ireland's dependence on Cornish tin, and that there is no evidence for the severance of Hiberno-Breton connection, I think it must be admitted that such was still in existence and that Ireland shared in the rewards or otherwise of the old trade route.

The next important find from Knocknalappa crannóg is the sunflower pin (Fig. 4:7). It is clearly a very degenerate specimen and on that account alone it must be placed late in the series which may, perhaps, be best exemplified by that fine specimen in the Belfast Municipal Museum from Barnish, Co. Antrim. This shows the typical sunflower pin to have a large head, usually decorated, and supporting a conical boss. The Knocknalappa example, however, has no trace of decoration, has a very small (but better proportioned) head, and no boss.

Sunflower pins are normally considered to be part of the Late Bronze Age culture of the country, but the evidence of hoards suggests that they must be ascribed to a late date and that Hallstatt influence was strong in the culture with which they were associated. In the Boolibrien (Co. Clare) hoard one was found with some chain-mail links of Hallstatt type; at Cromaghs, Co. Antrim, another was found with a bronze bimid razor which may also be said to be of transitional date and to point to the west Alpine areas through France; while a third came to light (at Derrydale, Co. Armagh) with three small glass beads, which cannot be dated any earlier than the developed Hallstatt period. In other words, as far as these islands are concerned a date not earlier than 7800 BC is accepted for the sunflower pins. The Knocknalappa.

25. UJA 4, 1898, 126.
example, as it is late in type, can thus be dated somewhat later and confirms the already suggested dating for Knocknalappa, namely, between 500 and 300 B.C.

The association in hoards of some of these sunflower pins with great numbers of amber beads is a matter of interest, particularly as so much amber, relatively speaking, was discovered at Knocknalappa. This association I consider to be a pointer in the direction whence the pin type ultimately came.

The chief sources of prehistoric amber in Europe were the coasts of Pomerania and Jutland, and this is where we should normally seek the home of our amber. When we take the sunflower pins into consideration, the case appears in a stronger light.

Mahr has shown that the only places in Europe where sunflower pins occur are Britain-Ireland and the Nordic province (nördischer Kreis) and that they date to about 900-800 B.C. He also points out that the ultimate prototype is to be sought in the looped pins of eastern Germany, in the fully developed Lausitz culture. He, however, thinks that the Irish and Nordic groups represent two parallel developments from the parent type, but I prefer to see the northern class (which differs only slightly from the Irish type) as a stage on the route to these islands. This view is strengthened to a certain extent by the fact that Irish objects of Late Bronze Age/Hallstatt times do occur in the Nordic province, but never reach the centre of the Lausitz area. The route from the Nordic centre then follows the sea way to north-eastern Britain or round its northern coast to Ireland. The distribution map (Fig. 6) indicates the likelihood of the northern route in that, unlike the distribution of the swords, the main concentration lies in the north-eastern corner of the country. There is a second group west of the Shannon, with a relatively high proportion in Clare. These latter finds may be due to an extension westwards of the northern sea route.

The amber from the crannóg, as I have indicated, also suggests northern influence and the gouge (Fig. 3:6), a type which, as Mahr has said, has not been adequately studied, also presupposes a northern origin, in that prototypes occur in the Nordic province but nowhere else.

Before bringing our remarks to a conclusion, it is necessary to say a few words about some of the other objects from the site.

The fragment of lignite bracelet (Fig. 4:3) is subtriangular in section, which does not affect the dating of the site as arrived at from other evidence. This type occurs alone at Ballinderry II, Co. Offaly, associated with a bronze socketed knife; it also occurs at All Cannings Cross, but fragments with D- and rectangular sections were found there also; the same seems to apply to those from Cush, Co. Limerick. Lignite bracelets with various sections occur also in later periods, but there is no reliable evidence for the later occurrence of those with triangular section. It is, however, not certain enough to be used as a dating criterion.

27. Seger in Prehistorische Zeitschrift 1, 1909, 55-64.
28. E.g., a gold bracelet in a Harpstedt pot from near Bremen (c. 600 B.C.) and a bronze spearhead with loops on the socket from Schoenwerling. The latter is also probably late, as in Ireland the type falls into Jesse Zone VII/VIII. (See Mitchell and Raftery, Proc. Roy. Ir. Acad. 46, C, 6, 1941).
The bone knife (Fig. 3 : 3) is well-smoothened, but can hardly have been very effective as a cutting instrument. Bone knives are common, particularly on English sites, and as they are made from only slightly modified natural bones not much can be said about the present specimen from the point of view of dating. The same applies to the bone spindle whorl (Fig. 3 : 4), which is of a type used down to the mediaeval period.

The stone object illustrated in Fig. 4 : 1 is very smoothly polished and it is difficult to suggest a use for it, though it is possible that it was a pottery burnishing stone with which the slip could have been smoothed. Such stones are not commonly recognised, but Dr. Curwen illustrates a rather similar specimen (though of considerably later date) in *Antiquity* 15, 1941, Pl. II.

The final object from the site to be noticed is the fragment of rotary quern (Fig. 4 : 2). As I have reiterated, Knocknalappa is a one-period site, and this fact is of considerable importance in that it allows us to place a knowledge of rotary querns in Ireland in the period between 500 and 300 B.C. Curwen, who has devoted considerable research to the question of the origin of quern-types in Britain, has come to the conclusion that the rotary quern was introduced by Iron Age B folk during a late phase of their influence upon southern Britain, perhaps about 100 B.C. In a later article he says that he has discovered no reason to change his opinion. In this connection he seems to have overlooked Ó Riordáin’s paper on Cush, where the author, dealing with the querns from Ring-Fort 5 there, says that “a conclusion that rotary querns were used at Cush contemporaneously with Late Bronze Age cultural elements . . . is one which . . . is forced upon us by the facts.” Though the evidence was not as definite as the excavator would have wished it to be, it is clear that the find of a fragment of a thin light quern at Knocknalappa at a not too dissimilar date rather strengthens the view expressed. Knocknalappa also produced two saddle querns, showing that at that period, as indeed into Early Christian times, both types were used on the same sites.

**SUMMARY.**

We have now described the site and seen it to be a crannóg formed in the main of an artificially deposited layer of peat surrounded by rows of piles and stones. The evidence leads one to the conclusion that the site was partially built from a pre-existing midden and that, as it was apparently never inhabited, it was most likely destined as a refuge in case of attack. It underwent various natural vicissitudes, being first partly overgrown by peat, then flooded and partly covered by marl, and at a later stage, when the waters receded, peat was again formed. It was more or less in this condition that the site was discovered.

The culture represented is all of one date, which from external evidence may be placed between 500 and 300 B.C., in other words, though the culture is preponderantly what we like to term “Late Bronze Age,” in type, in time it belongs to Iron Age I, showing very considerable Hallstatt influence.

It is by no means an unmixed culture: it is clear that there are at least two main streams of influence to be reckoned with, one from the south and one from the north. That both had already intermingled to such an extent as to

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become one before arriving at Knocknalappa is obvious, so that Knocknalappa cannot be considered the point of impact; nor is it so important as Mahr thought (33): it was not the first Bronze Age crannóg to be discovered in Ireland, as the lower level of Ballinderry II is of Late Bronze Age date, and a slightly later crannóg seems to have existed in Lough Mourne, whence came an iron socketed axe, copied from a bronze model.

The evidence of the Ballinderry II pottery indicates a route across the south of Scotland, to north-eastern Ireland and thence southwards (34) and while this does not bear directly on Knocknalappa, it indicates at least strong connection with the north, if not eventually with the homeland of such types as the sunflower pins.

The second—southern—stream of influence may be traced eventually through Lowland Britain and France to the west Alpine culture centre. A fact of importance in this connection is that this is the only area where any structures analogous to the Irish crannóga are to be found. These form the small group of so-called Steinberge, and all seem to belong to the beginning of the Hallstatt period (35). This naturally leads one to think that some crannóga at least were built as a direct result of influence from the West Alpine area.

I am aware that Mr. Davies has discovered a Neolithic level on his crannóg site at Island Mac Hugh, and I am grateful to him for permission to publish this information (36). But I think that the evidence in favour of a Swiss connection at the period of transition from bronze to iron there is too strong to be ignored: all we need presuppose, in view of the Island MacHugh evidence, is that crannóg—building (of Steinberg rather than of Pückewerk type) was introduced into a country where artificial lake-dwellings were already known.

34. I am grateful to Dr. Hugh O'Neill Hencken, the excavator of Ballinderry II, for this information.
35. I must express my gratitude to Professor O. Tschumi of Berne, who forwarded notes on the nature and occurrence of the Steinberge in Switzerland.
36. The crannóg at Lough Enagh has also produced Neolithic levels.

APPENDIX I.

A certain amount of charcoal was discovered, as has been noted above, but nowhere was there any evidence of burning in situ. Samples have been examined by Dr. O'Connor, who reports as follows:—

From the charcoal layer below the tertiary marl 43 specimens were examined, and of these 15 proved to be hawthorn (Crataegus), 15 hazel (Corylus), 1 ash (Fraxinus), 1 holly (Ilex), 2 alder (Alnus), 2 salix-populus, and 4 oak (Quercus).

Of the charcoal which rested on the “platform” in Section A 13 specimens were examined as follows:—5 were of oak (Quercus), 4 of salix-populus, 2 of ash (Fraxinus), 1 of hazel (Corylus), and 1 of alder (Alnus).

APPENDIX II.

REPORT ON BONES FROM KNOCKNALAPPA CRANNÓG.


Some fourteen bags of bones came to the Museum for examination. The animals represented by these are red deer, ox, sheep (or goat), pig, horse, dog, hare, raven, cormorant, tufted duck and lapwing. Although dated rather earlier than most sites from which I have examined animal remains, the breeds of ox, sheep and pig do not seem to differ in any way
from those still prevalent during 7th-10th century, A.D., and probably later. There is, however, nothing surprising in this, and in the article on the skulls of oxen found in some prehistoric sites in Ireland, published in The Irish Naturalist’s Journal, Vol. VII, p. 205, 1939, Mr. C. Bryner Jones points out that there would appear to have been no change of types from Roman or even Neolithic times, down to a comparatively recent period, and that all the modern breeds of cattle were already represented in the mixed stock of the earliest known period from which remains of the domesticated ox has been obtained in both Britain and Ireland. Mr. Jones concludes with the remark:—“It is certain that from Neolithic times onwards the domesticated ox has been of a strikingly variable character and it continues, as is seen in modern breeds, to show the same variation to the present day.”

The same remarks can no doubt be applied to the sheep and pig, though these animals are not so variable as the ox, probably due to a less mixed origin.

The remains of a dog found on the present site, though very scanty, appear to be of greater interest, and to represent a somewhat primitive type of powerful dog, of large terrier or small sheepdog size.

LIST OF ANIMALS REPRESENTED.

RED DEER (Cervus elaphus L.)

The remains of this animal found in the crannóg are few and consist mainly of portions of antlers. They come mostly from the Brown Peaty Soil, but a brow tine comes from the “Breakwater,” and the beam of an antler (18) broken off about three inches above the burl, and curiously worn, is from the “Foreshore.” A bone knife or dagger (10) appears to have been manufactured from a slice off the inner side of a right metatarsal of this animal: it is from Brown Peaty Soil, Section F.

The very few bones present suggest that the Red Deer did not form any considerable proportion of the food supply of the inhabitants of the crannóg.

OX (usually referred to as Bos longifrons Owen.)

Remains occurred throughout the site and the majority of the long bones are split, including the metatarsals and metacarpals, which last are in my experience more usually found complete. In passing, I should like to remark that the manner in which bones are broken often varies from site to site and is a subject that requires looking into.

The size of the animals represented varies much, as likewise does the age of the individuals, but all represent a breed of small cattle.

SHEEP (Ovis aries L.)

There is no positive evidence of the presence of the goat, but some of the broken bones may, of course, represent that animal. As usual with early Irish sites, the breed of sheep resembles what are nowadays referred to as “mountain” sheep. The remains were scanty, but occurred throughout the site.

PIG (Sus sp.)

A small and active breed is represented throughout the site. Only a very few of the humeri are without a well-marked foramen in the olecranon fossa.

HORSE (Equus caballus L.)

No bone occurred, but a breed of small horse is represented by four teeth, two of which come from the “Foreshore” (and may not be very old); the other two are from the “Breakwater.”

DOG (Canis familiaris var.)

Fourteen bones and teeth were found. These come from the “Breakwater” in Section A, the “Foreshore” and the “Brown Peaty Soil”; they include a broken skull (5) with the left and right first and second molars in position, but the remainder of the teeth are unfortunately absent; a left mandible (6), presumably of the same individual, with all four premolars in position, but unfortunately the very large carnassial tooth is lost; a canine (3) from a different part of the excavation, which, perhaps, fits the empty socket of this mandible; another and similar sized mandible, containing the broken stump of the canine and the 4th premolar tooth only; and a fragment of left maxilla (16) with the 2nd and 3rd molars still in position. The chief characteristics of the remains are: great width of skull across the zygomatics compared with very short nasals, large crowded premolars, and perhaps the most striking feature, namely, the truly enormous 2nd upper molars.

When these are compared with the large quantity of dog remains from the crannóg at Lagore, Co. Meath, it is at once obvious that the skull and mandible do not agree with those of any dog represented from that site and in the collection of the Museum none of the modern breeds represented are in any way like it. In fact the only skulls in the National collection

*These numbers refer to the MS. catalogue in the Natural History Division, National Museum, Dublin.
which resemble it in its chief characteristics are those of the Wild Dog of India, the Alpine Dog and the Lapland Dog, but the resemblance to these is by no means striking and none of these have the large 2nd upper molars. Similarly in skulls of modern breeds of the same size the 2nd upper molars are only about half as large as those of the Knocknalappa dog.

(Perhaps I have unduly stressed the characteristics of these somewhat scanty remains, but I have done so on purpose in order to attract the attention of future archaeologists to the advisability of taking an interest in the prehistoric breeds of the domestic animals, and especially of the dogs found in Ireland. No more interesting subject can possibly deserve their attention, but if the most is to be made of the available evidence it will be necessary so to rearrange the methods of excavation that the remains are recognised as excavated and the various skeletal parts kept together and no teeth lost).

As well as the above-mentioned skull (5) and mandible (8), there is a 1st cervical vertebra (7), very black in colour and in the same state of mineralization, which almost certainly belongs to the same individual. In addition to the above bones there is a series of long-bones in a very different state of preservation—right and left humeri (13 and 14), right and left radii (11 and 25), a left ulna (12), right and left femora (36 and 30), and a probable dog's rib (17)—which gives the impression of having belonged to one individual—possibly, but not certainly, that to which the second left mandible and the fragment of left maxilla also belonged: these limb bones are, however, all more or less damaged—one or both ends missing or incomplete—so that accurate measurement is impossible, though they appear to represent a dog of large terrier size. There is nothing remarkable about these bones, except the very large size of the foramen in the olecranon fossa of the two humeri.

The two mandibles agree so closely and the teeth in these and in the skull and fragment of maxilla are so alike in every way that it is obvious that the two individuals must have belonged to the same breed of dog, whatever that was.

HARE (Presumably Lepus hibernicus Bell.)

The calcaneum of a young hare is the only evidence of the presence of this animal. It occurred in the "Brown Peaty Soil."

RAVEN (Corvus corax L.)

A complete humerus (2) and another broken one (41) came respectively from the "Brown Peaty Soil" and "Humus on level of 'Tertiary' Marl: section E."

CORMORANT (Phalacrocorax carbo L.)

Left and right humeri and a right ulna (all 46) come from "Section A : 'Breakwater.'"

A coracoid (38) is from the "Brown Peaty Soil."

TUFTED DUCK (Mergans fuligula L.)

A humerus (34) and an ulna (36) are from the "Brown Peaty Soil"; while a broken ulna comes from "Sect. A : 'Breakwater.'"

LAPWING (Vanellus vanellus L.)

One humerus from the "Brown Peaty Soil."
VARIOUS OBJECTS FROM KNOCKNALAPPA.

Fig. 3—1. Large pottery vessel; 2. Bronze sword; 3. Bone knife; 4. Bone spindle-whorl; 5. Bone “toggle” (?) 6. Bronze gouge.
Fig. 4—1, Stone pottery-burnisher (?); 2, Fragment of rotary quern; 3, Portion of lignite bracelet; 4, Lignite object; 5, Stone axe; 6, Stone hone or pounder; 7, Bronze sunflower pin; 8, Bronze ring; 9, Potsherd from Tullyhullion, Co. Donegal; 10, Potsherd (base); 11, Potsherd (rim).
Fig. 2.
Sections A—B, C—D.
1. General view of the site before excavation.
2. Tertiary Marl, Section A.
3. Stone layer, Section F.
4. Brushwood and "platform"; Section A.
1. Pile driven through pot. Section F, No. 7.
2. "Platform," Section A.
3. Pier or slipway for boats.
4. Detailed view of brushwood, Section A.