Notes and News

Air reconnaissance: recent results, 33

PLATES VII–VIII

The three hillforts illustrated lie not far apart in south Aberdeen and in Angus (pls. VII–VIII). Their defences are amongst the most remarkable in Scotland, but the sites remain comparatively little known outside their immediate neighbourhood.

The hillfort on the Barmekin of Echt crowns a conspicuous, isolated hill (274 m.) of granite, 11 km. N of Banchory, and only a few km. N of the much larger granite mass, known as the Hill of Fare. The site commands wide views over Midmar. The hill top lay within a plantation of firs till a century or so ago: it is now bare of trees, but supports a thick growth of heather and bracken, and is thus best visited in spring before details of the earthworks are masked by vegetation. Three earthen and stone ramparts set close together follow a contour course round the summit of the hill. Apart from the 1:2,500 Ordnance Maps (latest ed., OS plans NJ 7207 and NJ 7307), the most recent published plan seems to be a sketch by Douglas Simpson at about the same scale (Simpson, 1920, 45). These all show that the triple ramparts cover a width of some 17 m. and include within them an area about 145 m. from E to W, by 155 m. from N to S, some 2·4 hectares. These ramparts are interrupted at a number of points (probably five) for access to the interior. Thus two entrances are clearly visible on the left-hand (west) side of the photograph (PL. VII) and a third appears in the foreground. The ramparts are slightly inturned as they approach these entrances, and the ends of the ramparts are connected by a cross-bank. The entrance on the right of the photograph appears to be entirely modern, at least in its present form, designed to give access to a small observatory erected in 1882. A full study of the entrances must await detailed examination on the ground. Published plans raise the question whether the outermost of the three ramparts may be an addition to the other two, and this is but one of a number of points about this earthwork that can be settled only by a careful study of the monument involving a special large scale survey.

Within the earthworks the photographs show two lines of tumbled stone walls originally perhaps 3m. thick. These are composed of the natural granite boulders that formerly covered the hill. The first lies not far from the innermost earthen rampart, the second wall is at a distance of 13m. further in, more or less. Their present appearance gives little clue to their original character, but in places the rough blocks can be seen to have been fitted together to achieve a crude facing (Simpson, 1920, 47). Whether timbering was present is undetermined, but the difficulty of building to any height with undressed granite boulders without some form of timber lacing might seem to imply this. Two at least of the entrances through the earthen ramparts lead up by a notably staggered approach to the outer stone wall, the approach being defined by low banks comprising both earth and boulders. This stone wall now continues unbroken past a number of entrances through the earthworks, like that in the foreground of PL. VII. The defences have clearly undergone a long and complicated development that would repay further study.

The hillforts known as the Brown and the White Caterthun, 8km. NW of Brechin, occupy twin summits of a ridge separated from the Highlands by the small valley of the West Water. The ridge, composed of sandstones of the Old Red Sandstone formation, rises from the edge of Strathmore over which it commands extensive views. The forts have long been known: they were first planned in the mid-eighteenth century by Roy (1793, pls. XLVII–XLVIII), and are noted in various county histories of Angus.

The most remarkable of the two is the White Caterthun (PL. VIII *a*) which crowns the south-western summit (298 m.). The hill is encircled by several seemingly unrelated lines of defence, oval in plan (Christison, 1898, 256; 1900, 100)*. The outermost comprises not very formidable double earthen ramparts with ditch between, which follow a contour course some way down from the flat summit. These enclose an area about 350 m. by 225 m. An entrance may be detected in the foreground of the photograph and another on the NW (left-hand) side: a third is visible in the distance to the right of an 'annexe', attached to the outside of the enclosure. The nature of the outer, supplementary, ditches visible on the left is not clear. Another defensive circuit unrelated to that just described, remains as a fairly substantial rampart on the NW (left in PL. VIII *a*) having an almost continuous line of quarry-scoops on its uphill side. Elsewhere the rampart has been largely denuded, but the hollow formed by the quarries is visible on the photograph right round the hill. This circuit, which has some claim to be the oldest element in the defences, does not seem to have been described before. Higher up the slope, and at a distance of between 35 and 70m. from the outermost circuit is another earthen rampart with quarry-ditch above it. This rampart is interrupted at a comparatively narrow gap on the SW (foreground) and at a much wider gap in the distance. Within this circuit is the principal element of the defences, following a line that crowns the steep slopes of the hill, and encloses the level area on the summit. This consists of a huge dry-stone wall, no doubt comprising several structural elements, and now spread to a width of some 25m. The area within measures about 150m. × 65m. Fallen debris from its outer margin forms a scree that has trickled down the slope to the inner earthwork. This wall is built of blocks of the micaceous sandstone of which the hill is composed. This stone splits unevenly to give slabs that could be used as masonry in irregular courses to build facing walls that would retain between them a rubble core. Use of timber interlacing, which may surely be presumed, would greatly strengthen such a structure. Whether one wall or two separate walls are in question, or one wall that has subsequently been greatly increased in thickness, is not now clear. Even in its present ruined state, the rubble stands up to 2m. high, and vertical faces of the walling, perhaps even vestiges of timbering, may be concealed beneath the debris.

There seem to be at least four separate defensive circuits on this hill. The earthworks no doubt represent Iron Age fortification as perhaps does the first stone-built enclosure, but, in its latest form, the huge dry-stone wall may mark re-use of the defences in the post-Roman period.

The Brown Caterthun lies 1·2km. NE of its neighbour on a rather flatter summit (287m.). The site presents its own problems for aerial photography (PL. VIII *b*) since the heather with which it is covered is often cut or burnt in strips, thus giving the ground a curious patterning in shades of light and dark. Five lines of earthen rampart encircle the hill (Christison, 1898, 261; 1900, 105). The outer two seem to go together, at least on the N, W (left) and S sides. The outermost line comprises both a rampart and ditch, but for the next there seems now to be a rampart only: perhaps the material for its construction was obtained by paring the surface of the ground. On the E a curious re-entrant angle in the inner rampart causes the lines to be separated for some distance. No fewer than eight gaps occur in these earthworks, but they may not all be original. The area within the inner of these two ramparts extends to about 290m. by 250m. The third line comprises a ditch with rampart on the uphill side, now much denuded. This circuit matches neither the outer two, nor the line of rampart within it. Some four gaps (? gateways) have been recognized but details are obscure. The fourth element of the defences, and the best preserved, comes next, comprising a substantial earthen bank, up to 2m. high, now with nine gaps, probably not all original. Traces of a ditch, outside the bank, appear occasionally. The disposition of the entrance gaps bears no relation to the much denuded third circuit already

* See also OS plans, 1:2,500 scale, NO 5465, 5466, 5566 and 5567, published 1969–70.

described, and the two cannot go together. The innermost circuit, consisting of a rampart, now greatly reduced, but no visible ditch, encloses a mere 0·5 hectare round the summit of the hill. The Brown Caterthun thus differs from its neighbour, in the general disposition of the defences, in having ramparts of earthen construction only as far as can now be judged, in the general absence of quarry-scoops, and in the multiplicity of gates, if indeed most of these are original.

The Caterthuns appear to be amongst the strongest as they are certainly the largest hillforts that would have been encountered by Roman troops advancing up Strathmore. If they were then held in force no army could afford to by-pass them. Indeed, the existence of a large Roman fort at Stracathro, by the North Esk, only 6·5 km. away is evidence of the attention paid to the head of Strathmore, when garrisons were disposed in permanent forts after the battle of Mons Graupius. J. K. ST JOSEPH

CHRISTISON, D. 1898. *Early fortifications in Scotland.*
1900. The forts, 'camps', and other field-works of Perth, Forfar and Kincardine, *PSAS*, XXXIV, 43–120.
ROY, W. 1793. *The military antiquities of the Romans in Britain.*
SIMPSON, W. D. 1920. The hill fort on the Barmekin of Echt, *PSAS*, LIV, 45–50.
1944. *The province of Mar*, 61–2.

A Scottish crannog re-dated

The Milton Loch crannog at Crocketford in Kirkcudbrightshire (NX 839718) was excavated by the writer in the autumn of 1953. At that time the water of the loch in which it, and another crannog, had been built, was returned to approximately its original level after having been artificially raised for many years, and consequently the crannog, once again exposed to dilapidating and eroding weather conditions, was excavated to make it possible for a complete plan of its structure to be recovered, and its chronological position determined (Piggott, 1953).

To summarize, almost the whole plan of a circular house was discovered, together with its possible internal divisions, its small harbour, and its surrounding platform reached by a wooden causeway from the bank of the loch (FIG. 1). The two most significant finds were the combined plough-head and stilt of a wooden ard buried beneath the foundations (Fenton, 1963), and an enamelled bronze dress-fastener of Pannonian affinities and dating from about the 2nd century AD (Wild, 1970). As the latter was found within the area of the house, it was regarded as satisfactory dating evidence, and the subsequent discussion in the report was written with a sub-Roman cultural setting in mind.

What appears at first sight to have been unimpeachable dating evidence turns out, however, to have been nothing of the kind. The ard head was subsequently submitted for radiocarbon dating, and gave a reading of 400 bc ± 100 (K–1394; Lerche, 1969). Recently part of a structural pile from the crannog was obtained by Dr Duncan McArdle, as part of a wider survey of Scottish crannogs, and a radiocarbon measurement made by the Copenhagen Radiocarbon Laboratory as a check on their date for the ard head. The result is extremely satisfactory, for a sample taken from year-rings 30–50, of in all 70 growth-rings of the pile, gave a reading of 490 bc ± 100 (K–2027). The wood was identified as oak (*Quercus* sp.)

Such an early date (*c.* 460–500 BC if corrected) need not surprise us now that our whole concept of British Iron Age cultures and chronology is having to be re-thought, though its implications for early plough-agriculture in North Britain are significant: the complementary ard beam from Lochmaben, 25 km. away, has a date of 80 bc ± 100 (K–1867; Lerche, 1972). It should not be forgotten that where there is very shallow soil, the utmost caution needs to be applied to finds as dating evidence. We know, for instance, how hillforts were used and re-used, brought up to date and modified. What more natural than to find some Roman or native using the little decayed and grass-grown crannog as a suitable position from which to fish, some six hundred years or so after the original occupants of the site had died?

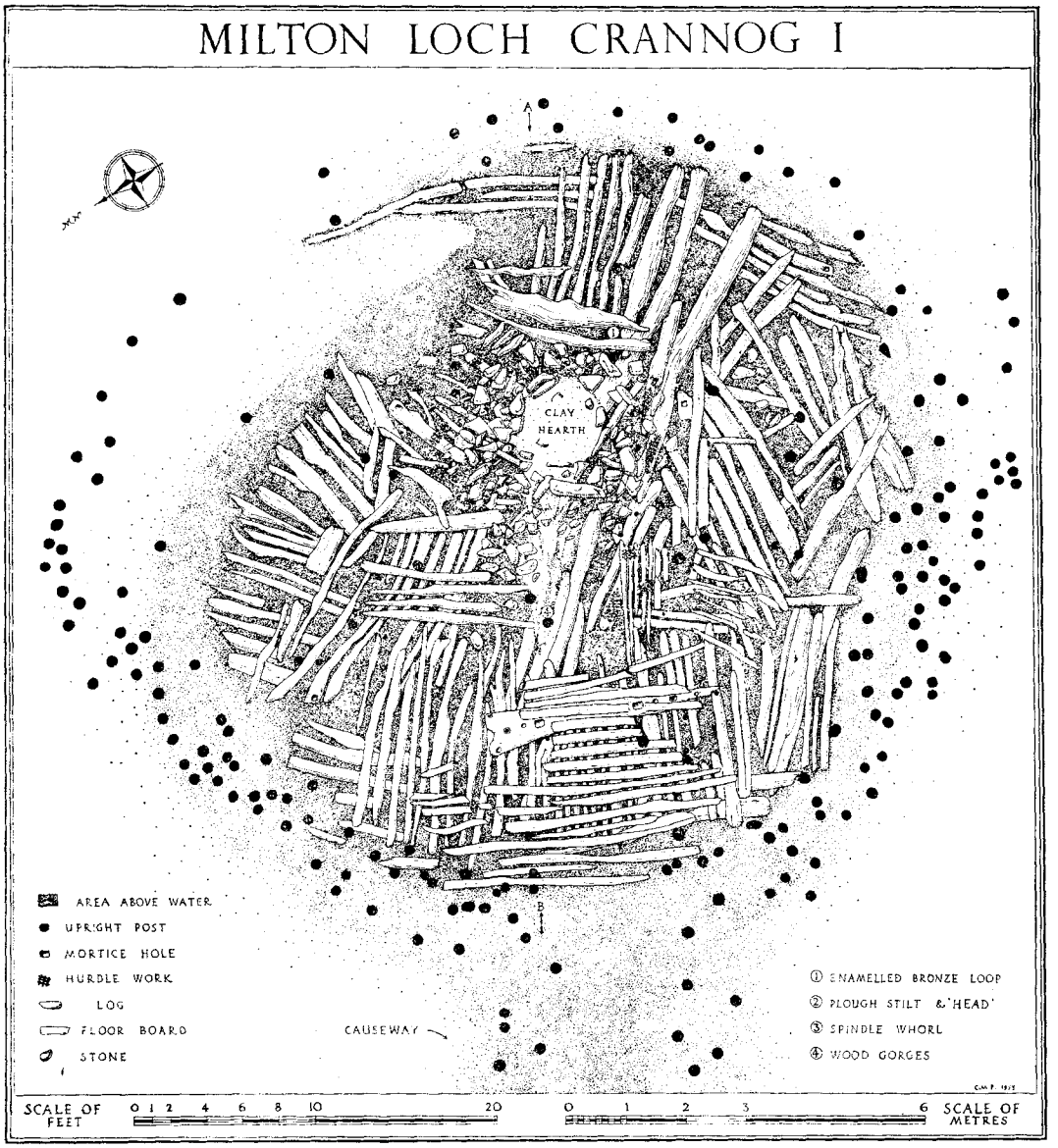

Fig. 1. Milton Loch Crannog I drawn in 1953 (From PSAS, lxxxvii, fig. 7)

These dates for the crannog in the mid 1st millennium BC open up new aspects of the Iron Age of Scotland and of Northern Ireland in particular. They also sound a warning note to excavators working in shallow soils, lest they should always take at face value the evidence for date and culture which only a few finds might suggest.

I am grateful to Professor Piggott and Dr McArdle for obtaining the new sample, and to Dr Tauber and the Copenhagen Radiocarbon Laboratory for the date. MARGARET GUIDO

FENTON, A. 1963. Early cultivating implements in Scotland, *PSAS*, XCVI, 269.
LERCHE, G. 1969. The radiocarbon dated ploughing implements, *Tools & tillage* 1:2, 128.
1972. Ibid., II:1, 64.
PIGGOTT, C. M. 1953. Milton Loch Crannog I: a native house of the 2nd century AD in Kirkcudbrightshire, *PSAS*, LXXXVII, 134–52.
WILD, J. P. 1970. Button-and-loop fasteners in the Roman provinces, *Britannia*, I, 137–55.

The prehistoric longbow from Denny, Scotland

During that lengthy period of time encompassing the fourteen centuries contemporary with the 4th to 19th Dynasties of Egypt, longbows were made in the British Isles. Five specimens only of these weapons are known to have survived. None of them was intact and the remains were preserved entirely due to the anaerobic conditions in the peat bogs in which they were buried. This note briefly relates the circumstances of the discovery, identification and dating of the unique fifth prehistoric longbow.

In 1889 preparations were being made for the construction of a new reservoir in the vicinity of the river Carron in Stirlingshire. During the progress of the excavations an employee of the civil engineers from Glasgow discovered the remains of an obviously ancient, wooden object lying buried in the peat which covered the site at Denny, near Falkirk (NGR NS 768832). After being cleaned, the relics were presented to the Dollar Park Museum at Falkirk for display, where they were catalogued as the remains of an ancient canoe paddle. The owner, Mr Alexander Frew, kindly allowed the object to be shown and described by Mr C. E. Whitelaw, FSAScot. at the January meeting of the Glasgow Archaeological Society in 1902 (*Trans. Glasgow Arch. Soc.*, IV, 1903, 498), and it was also displayed at the Scottish Exhibition of Natural History in 1911 (*Prehistoric catalogue, Scottish Exhibition of Natural History*, 1911, 879). Since that time it has remained undisturbed and unrecognized.

However, following the paper by Dewar and Godwin (1963) on the discovery of Neolithic longbows from Meare and Ashcott in the Somerset fens, and the paper by Clark (1963) on ancient bows of Europe, Mr R. W. Feachem, who was engaged upon the compilation of part of the 'Prehistoric Inventory of Stirlingshire', noticed the strong resemblance of the object in Falkirk museum to an illustration of one of these bows. It seemed possible to him that the artifact found in the peat at Denny was part of a similar bow. Since the number of bows listed from Britain was so very few, the importance of the object would be enhanced if indeed it proved to be a further example. The suspicion was fully confirmed by Professors Clark and Godwin who were later able to examine the find thoroughly in Cambridge.

As may be seen from the sketch (FIG. 1), the object resembles Clark's pl. VI, 2 (1963) and represents a typical self-bow of constricted hand-grip, Class B. Unfortunately, both of the ends of the bow, and nock shields, if any, are missing, and the existing portion, of length some 95 cm., shows slight warping. The stave is plano-convex in section with a thickness-to-width ratio of 2:3. This falls almost centrally within the range quoted by Clark for North European longbows, and is governed by the physical properties of the timber used in the construction. The section of the hand-grip itself is more nearly elliptical. The width of the stave is 7 cm. and its thickness 3 cm., whilst the corresponding figures for the grip are 3 cm. and 2·5 cm. respectively.

The material of the longbow was unequivocally identified in the Sub-Department of Quaternary Research of Cambridge University by Mrs C. A. Dickson as a species of oak (*Quercus*). A transverse section of the wood demonstrated that it was strongly ring-porous with tyloses filling the large vessels. The late wood vessels were in radial lines surrounded by xylem parenchyma. The rays were both uniseriate and also compound, whilst the longitudinal section showed them to be partially heterogenous. These features characterize the wood as a species of oak, and the presence of compound rays and radial late wood vessels

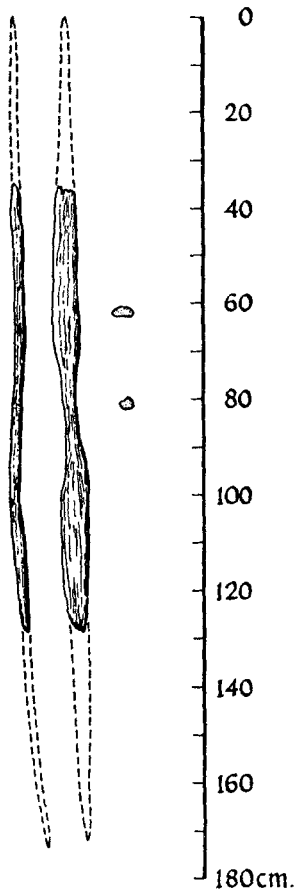

Fig. 1. The prehistoric longbow from Denny (after Feachem)

readily distinguish it from wood of ash (*Fraxinus*) and elm (*Ulmus*) which are the only other strongly ring-porous native timbers of sufficient size. This identification is most surprising, for no other specimens of oak longbows are recorded in Britain or Europe. The usual wood for such bows is either ash or, most often, yew (*Taxus*), which trees are long lived and slow growing and produce timbers which have the properties of toughness and resiliency more suited for the purpose than is oak. Clark mentioned that bows of other than yew wood are used only in countries where the climate is too cold for the yew to make substantial growth, such as Schleswig-Holstein and Denmark. Long bows are normally made from billets split from large timbers, and in the case of this bow much labour must have gone into its manufacture. It is possible that, like the Meare bow, this was intended for ceremonial purposes, for there are no signs of wear such as would be present on a frequently used weapon.

In view of the scarcity of such longbows in the British Isles it was important to determine the age of the find. Hence during its examination in Cambridge a specimen of wood suitable for radiocarbon dating was removed by Mr E. C. Lilley of the Museum of Archaeology and Ethnology, who so expertly repaired the bow that it is difficult to discover from where the sample was removed. The wood sample was treated chemically in order to remove any possible organic preservative that may have been applied after its discovery and during its stay in the museum. It was then oxidized in the Cambridge bomb combustion unit and the resulting highly purified carbon dioxide was measured for radiocarbon content in the gas proportional counter (Switsur, 1972). The date of the bow determined by this method was, in conventional radiocarbon years, 1300 bc. The radiocarbon ages of all the British longbows are included for comparison in Table 1.

The Denny longbow was thus contemporary with the bow from Edington Burtle, Somerset.

Material	Specimen	Laboratory Number	Age bp	Age bc	±
Yew	Meare Heath	Q–646	4640	2690	120
Yew	Ashcott Heath	Q–598	4615	2665	120
Yew	Cambridge Fens	Q–684	3680	1730	110
Yew	Edington Burtle	Q–669	3270	1320	110
Oak	Denny, Falkirk	Q–1196	3250	1300	85

Table 1

The table demonstrates the very long period of time over which this type of bow, with very little change, must have been in use.

It is interesting here to note one of the coincidences of history, for it was near the spot where the bow was found, at the first Battle of Falkirk on 22 July 1298 AD, that the longbow was first employed successfully as the main arm of an English army against pikemen arranged in *schiltrons*. King Edward I, on his return from Flanders, sped northwards to avenge the defeat a year earlier, at Stirling Bridge. His success lay in the deployment of lines of longbows to bring about the downfall of the powerful forces of William Wallace by the rapid fire of arrows at rates of up to six salvos per minute. From the development of these ideas were forged the weapons used so devastatingly at Crécy, Poitiers and Agincourt.

Acknowledgment. I wish to acknowledge the interest and help in this study given by Mr R. W. Feachem, now Archaeology Officer, Ordnance Survey, Southampton, who first realized that the object in the Falkirk museum might be part of a prehistoric bow, and who drew this to the attention of the specialists in Cambridge.

ROY SWITSUR

CLARK, J. G. D. 1963. Neolithic bows from Somerset, England, and the prehistory of archery in North West Europe, *PPS*, XXIX, 50–98.

DEWAR, H. S. L. and H. GODWIN. 1963. Archaeological discoveries in the raised bogs of the Somerset Levels, England, *PPS*, XXIX, 17–49.

SWITSUR, V. R. 1972. Combustion bombs for radiocarbon dating, in (eds.) T. A. Rafter and T. L. Grant Taylor, *8th International Conference on radiocarbon dating, New Zealand*, B11–B23.

Thermoluminescence dates from Thailand: comments

Dr H. H. E. Loofs, Reader in Asian Civilizations in the Australian National University, Canberra, has some comments to make on the note entitled 'A thermoluminescence series from Thailand', by Bennet Bronson and Mark Han, which we published (1972, 322–6).

In this highly interesting note the authors discussed the significance of the dates, obtained by thermoluminescence, of 22 potsherds from various sites of Thailand by the Museum of Applied Science Center for Archaeology at the University of Pennsylvania Museum. These dates come from the sites of Ban Chiang, Non Nok Tha, Ban Kao, Lopburi Army Camp, Chansen and Ban Dai.

On the whole they were surprisingly, though in some cases not unreasonably, high. Some further comments may help the reader who is not entirely familiar with the present archaeological scene in mainland South East Asia to appreciate more fully their implications. For convenience sake, I shall follow the pattern of the aforementioned note and comment on each of the sites in turn.

Ban Chiang. Although it is unfortunately correct to say that the site itself remains so far unpublished, several works have already appeared (notably Sangvichien, 1972) which endeavour to evaluate the significance of the dates attributed to this site for the archaeology of a wider area. A summary of the latter article (published in Thai and in a Journal which does not seem to enjoy a wide circulation outside Thailand) could be as follows.* 'In 1967 Ban Chiang site, Udon-Dhani Province, yielded decorated pottery similar to that of Ban Na Di site in Khon Kaen Province, except for being of a larger size. These pots were mainly found together with skeletons. The high thermoluminescence dates attributed to them by the University of Pennsylvania, make certain scholars believe that this is the oldest pottery in Asia. It appears that there must have been two distinct ethnic groups who lived at Ban Chiang in remote times. The first and earlier one, whose remains are found upward to 150 cm. below the present surface, must have been fairly big people with strong bones, who used mainly simple pottery with impressed decoration. The other later group, whose remains are found above 150 cm., must have been the inventors and users of painted pottery, although unpainted pots of different shapes and sizes have been

* The writer of this note wishes to acknowledge the help of Mr Siripan Singhsiri, former MA scholar at the Australian National University, in translating this article.

found near the skeletons as well. What was also found near these skeletons were bronze and iron objects (tools, ornaments, etc.) and glass beads. Carbon 14 dates for bronze objects and pottery from layers 19 to 21 of Ban Na Di site show some similarity with those given for Ban Chiang. If these dates can be trusted, they would confirm the existence of two different peoples and cultures having lived in Thailand about 5,000 years ago. The first, using only stone and bone tools, living in Kanchanaburi Province, and the second, already using metals, living in North Eastern Thailand. Later, some iron tools from the second group found their way to the first; there are also some instances of the transmission of pottery from the more advanced to the less developed group. Both groups, however, are believed to have been of the same race.'

Although they are not explicitly spelt out in this article, certain reserves with regard to the ready acceptance of the above-quoted dates for this site can be implied, particularly by the clear statement that the controversial painted pottery was found in association not only with bronze objects (see Bronson and Han's statement, p. 322, that 'the site is rumoured to contain copper or bronze artifacts'), but also iron objects and even glass beads. It is well known that the earliest examples of the latter anywhere in the world date from a considerably later period.

Non Nok Tha. As this site, too, has remained largely unpublished so far, except for various preliminary reports (Bayard, 1971; 1972; n.d.), the 'evidence for both tin bronze metallurgy and (?dry) rice cultivation at a surprisingly early date' (Bronson and Han, 322) can of course also only be accepted as preliminary evidence. Of the two articles cited (Solheim, 1968 and Bayard, 1971), the former contains few hints as to the actual dating of the site. The latter quotes two evidences to support these early dates which seem unsuited for this purpose. They are the somewhat controversial dates of the Ban Chiang pottery commented on above; and the finds of sandstone double moulds similar to those from Non Nok Tha at the site of Hàng Gòn I, near Saigon, allegedly dated at 2000 ± 250 bc by carbon 14 dating (Saurin, 1968, 1–3). In this source, unfortunately, nothing is said about the origin of the moulds, of the objects actually dated (potsherds of a black ware including charred vegetable matter as temper) or of the exact relation of the two. One has to go back to an earlier article to find out that it was the clearing of the area by bulldozers which brought these objects to light, although from the position of some potsherds in the roots of felled trees it was surmised that they must have been mainly at a depth of 50 cm. to 1 m. (Saurin 1963a, 434). It is also surmised that all finds belong to one habitation period which must have been such a short one that it could not have presented a complex stratigraphy. Although this is of course quite possible, the likelihood of some finds coming from a somewhat later (or earlier) period (the bulldozers are said to have disturbed the soil in some areas 3–4 m. below surface!) seems to be somewhat too lightly dismissed, so that all finds from this site (potsherds, flaked and polished stone artifacts, stone moulds for bronze axes and needles and grooved stones) are treated as belonging to precisely the same time. Moreover, all pottery of this site is said to be wheel-made (Saurin 1963a, 438; 1963b, 163).

On archaeological grounds, i.e. before the above-quoted dates were available, this site which is also thought to have close connexions with the megalithic tomb at Xuân Lôc nearby, was dated provisionally 'aux environs du début de notre ère' (Saurin 1963b, 166). The acceptance of a date two millennia earlier would compel us, not only to presuppose the use of the pottery wheel, but also the existence of a fairly well developed megalithic complex (because there are indications of similar tombs in the area) at this time in the southern part of the Indochinese Peninsula. Both assumptions lack support from other sources so far, and the latter in particular looks somewhat out of place when compared with what is known of the development of megalithic civilizations in South East Asia. It is not surprising therefore that the excavator himself expresses astonishment at this high date. This is quite understandable, also, on account of the fact that the dating

by C14 of potsherds containing charred temper is still a notoriously difficult matter, the result of which can therefore not always be looked upon as overly reliable. This astonishment, however, does not seem to have found its way into any quotations.

Ban Kao. 'A cemetery and residential site in Western Central Thailand of somewhat uncertain date.' The excavators, however, seem fairly certain of the Neolithic (Early and Late) dating of most of the burials of this site (Sørensen and Hatting, 1967, 110–11), although strong and partly convincing objections were voiced in a review of this excavation report (Parker, 1968, 309–12) to the effect that it would have to be dated considerably later, i.e. that the burials are essentially Iron Age rather than Neolithic. 'A date earlier than 500 BC for the beginning (of the site, rather than the proposed 1800 BC) would be virtually impossible' and that 'a date of about 500 AD for the end of the Ban Kao Cemetery would not be impossible' (Parker, 1968, 311). In the same breath it is also said that 'this would let the middle part of the Ban Kao range fall into the period 200 BC to 200 AD; *precisely the point at which we might expect iron to appear*' (my italics): a rather more conventional estimate for the beginning of metallurgy, including iron, than that implied in the dating of the Ban Chiang site (above), or of Lopburi and Chansen sites (below). The BC 290 $\pm$ 255 date for this Ban Kao site, even if only from a surface find, would thus fit well in the sequence as proposed by Parker (if accepted), and it is thus surprising to see that it is now surmised that 'there are solid grounds for believing that Ban Kao is earlier than the 3rd century BC', and that this TL date is thus not to be trusted. It would have been helpful to hear what these solid grounds are other than those attacked by Parker, or if these were the same, why the criticisms were not considered convincing.

Lopburi Army Camp. This site is included by the authors in 'a group of sites . . . which can be called Late Metal Age—that is, they contain (1) iron as well as bronze artifacts, and (2) inhumation burials showing that they antedate the diffusion of those Indian-derived cultural traits (including cremation) which mark the beginning of the protohistoric period in the area. The exact dating of these sites is problematical' (Bronson and Han, 324). Now, if the criterion for a Late Metal Age site is that it contains iron as well as bronze artifacts, and inhumation burials, i.e. precisely the characteristics shown by Ban Chiang site also, one may be forgiven for concluding that the latter site's dating may not be as clear-cut as the given TL dates would make us believe, and that it should also be qualified as 'problematical'.

Chansen I. The dates given here complement a fairly comprehensive sequence (based partly on carbon 14 dates) published earlier (Bronson and Dales, 1970). Phase I, from which no charcoal was retrieved, is there provisionally dated '200(?) BC–0 AD Late Metal Age', although it is suggested that it may have begun earlier than 200 BC (p. 42). In view of the explicit statement that 'a several-thousand-year time-span for the Late Metal Age is clearly excessive' (Bronson and Han, 324) should not a TL date of BC 1340 $\pm$ 200, and still more so one of more than two further millennia earlier for a seemingly similar phase at Ban Chiang, arouse a certain suspicion which should have been expressed in a comment on these dates?

In the same paragraph Kok (or Khok) Charoen site in North Eastern Central Thailand for which revised TL dates from Oxford were published some time ago (Loofs and Watson, 1970, 77–8) is qualified as a 'pure bronze site' (and in the postscript 'a Late Early Metal Age site'). But in the article quoted as reference (Watson, 1968), as well as in the other preliminary reports published on this site so far (i.e. Watson and Loofs, 1967, Loofs, 1970) it is made quite clear that the site itself is Neolithic in character. No metals whatsoever were found in association with the burials, and the earliest phases of this site may well be considerably older than the two TL dates so far obtained suggest. It would thus seem that there are no grounds for including Khok Charoen in this group of Metal Age sites, even if the TL dates seem to fit conveniently.

Ban Dai. Here the dates do not fit and thus are qualified 'less convincing'. Without at all wanting to defend the accuracy of the TL dates of the 9th to the 11th centuries, one could argue that, the stumbling block being the comparatively late inhumation burials, the likelihood of these dates depends to a great extent on the period accepted as the introduction of Buddhism in the area. Proof for such an early introduction at the very beginning of the Christian era is not given, but the possibility is conceded, that the practice of inhumation may have lingered on for one or two more centuries afterwards. From generally available sources it would appear that the earliest clear signs for a fairly widespread Buddhism in the centre of Thailand (as opposed to the finds of isolated Buddha figures, votive tablets and the like) can be dated only to the beginning of the kingdom of Dvāravatī, say 6th to 8th centuries AD. Add to this the 'lingering on period' mentioned earlier and the 'improbable late' dates for inhumations look somewhat less improbable.

In some parts of northern Central Thailand one may even to this day come across 'temporary' inhumation burials, to give relatives time to economize sufficient means for a decent (secondary) Buddhist cremation. If these economies do not materialize quickly enough, or some other unforeseen developments intervene, those 'temporary' inhumations may well become fairly permanent and may later on pose intriguing problems to future archaeologists.

This however, as well as the surprisingly late TL dates just discussed, seems to concern fairly isolated cases and should not be looked upon as a plaidoyer for a strict reliability of all TL dates. On the contrary, it is hoped that the comments contained in this note have contributed to instil a healthy scepticism with regard to the unquestioning acceptance of such dates by archaeologists working in the still widely unexplored field of South East Asian pre- and proto-history. If there is too blatant a difference between a date arrived at, however provisionally, on archaeological grounds, and a TL date, the primary reflex should not automatically be to force or adjust the archaeological evidence to suit the TL dates, like cutting off the heel of Cinderella's sister so that her foot may fit into the beautiful shoe, but rather to ponder about what could be wrong with the latter. This desirability becomes clearer still when looking at the dates given for the last site listed in this survey.

Chansen VI. Here a phase dated indirectly, on archaeological considerations to about AD 800–1050 in a former report (Bronson and Dales 1970, 45) now gets such widely differing TL dates so as to make them practically meaningless—AD 300 $\pm$ 120 and AD 1340 $\pm$ 100, thus leaving the bewildered archaeologist with the choice from AD 180 to 1440, or in other words from Roman Britain to Henry VI. The dating on archaeological evidence, as much guesswork as it may be, seems far more precise and adequate in these circumstances.

It is certain that TL dating will eventually play an immensely important role in South East Asian archaeology as in that of other parts of the world. At this stage of development of this highly complicated dating technique it would, however, be unwise to take every such date as a cornerstone solid enough to support major hypothetical edifices, specially if these are in turn used to strengthen further theories of far-reaching importance. Those scientists working on the improvement and refinement of this dating method are probably the first to agree with this cautioning advice and very much count on the enlightened co-operation of those archaeologists for the benefit of whom they, after all, work. In any case, on the dating of the mainland South East Asian Neolithic and Metal Age, Late or Early, the last word is not yet said.

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Conference on salt

A weekend conference to study ancient methods of making salt has been arranged by the Colchester Archaeological Group from 20–22 September 1974. It will be held at the University of Essex, where residential accommodation will be available, under the chairmanship of Mr Hugh Thompson, Assistant Secretary of the Society of Antiquaries. Participants from this country and the Continent will read papers, and there will be displays of artifacts and pottery from sites under discussion, and a bookstall. Further information from *Mrs K. de Brisay, Corner Cottage, Layer de la Haye, Colchester CO2 oLE. Telephone: Layer de la Haye 274.*

The Stonehenge bluestones

In the summer of 1970 a small piece of what appeared to be Stonehenge bluestone (volcanic ash) was found in an undisturbed neolithic context on the top of Silbury Hill. In reporting this discovery (Atkinson, 1970) I drew the inference, because the date of Silbury is indistinguishable from that for Stonehenge I, that at least some of the bluestones were already in Wiltshire some centuries before their first use at Stonehenge itself, in period II.

This rock fragment has now been sectioned, through the good offices of Dr Isobel Smith, by the Implement Petrology Survey of the South-West (serial no. 1617, WILT 391). It is identified as a hornblende schist greenstone with a suggested origin in Cornwall, and is compared with a flake from a greenstone axe found in the neolithic levels at Maiden Castle (Stone and Wallis, 1951, no. 256). The deceptive macroscopic resemblance to one of the Stonehenge bluestones is thus shown to be illusory, and the inference drawn from it to be invalid.

Nonetheless, it must still be regarded as likely that the bluestones reached Wiltshire well before their first use at Stonehenge. The evidence for this, about which there is no petrological uncertainty, is the well-known boulder of spotted dolerite (preselite), now in the Salisbury Museum, which was found in the earthen long barrow known as Bowls Barrow, some 18·5 km. (11·5 miles) west of Stonehenge (Cunnington, 1922, 1924).

Up to a few years ago, when only a couple of radiocarbon dates were available for earthen long barrows, it was still possible to suppose that the building of such barrows might have

continued long enough to overlap with the building of Stonehenge II. Now that we have dates for nearly a dozen long barrows, of which the latest are for Giants Hills, Skendleby (2460 bc ± 150, 2370 bc ± 150, BM–191, 192) and for Beckhampton Road (2517 bc ± 90, 2307 bc ± 90, BM–506b, 506a), it has become very difficult to sustain the hypothesis that Bowls Barrow was built as late as, or later than, the arrival of the bluestones at Stonehenge. For this event itself there is no radiocarbon date; but it seems unlikely to have been more than a generation earlier than the abandonment of Stonehenge II, whilst still under construction, at a date of 1620 bc ± 110 (I–2384) or, on less direct evidence, of 1720 bc ± 150 (BM–46). The discrepancy becomes even larger, of course, when the dates quoted above (all with the 5570 year half-life) are corrected. The best test of this hypothesis will be a re-excavation of Bowls Barrow, to see if it contains other bluestone boulders and to obtain, if possible, a radiocarbon date for its construction.

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Radiocarbon dates for the Spanish Solutrean

Mr Iain Davidson, a research student in archaeology at Selwyn College, Cambridge, has recently obtained C14 age estimates on collagen from bone samples selected during his analysis of the fauna from the cave of Parpalló, Valencia province, Spain (Pericot, 1942; Davidson, 1972, 11 fn.). He here considers the Spanish Solutrean culture and economy in the light of these new dates.†*

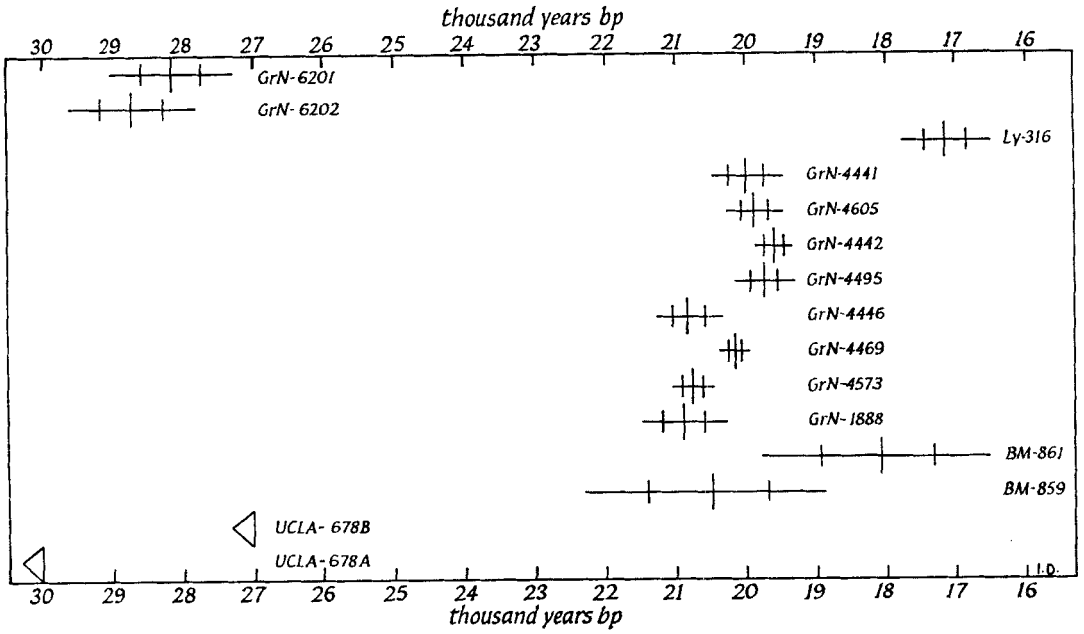
Laboratory number	Date years bp	Depth metres	Industry (Pericot, 1942)	Material	Comment
BM—858	> 40 000	—	before Solutrean	vertebrae *C. ibex* and *C. elaphus*	no definite stratigraphic position other than this
BM—859	20 490 + 900 − 800	6·5—7 m.	Lower Solutrean	bones and antler of *C. elaphus*	two samples combined
BM—861	18 080 + 850 − 770	4·75–5 m.	Upper Solutrean	antler of *C. elaphus*	associated with barbed and tanged arrowheads

The lowest of these samples (BM–858) was of specimens labelled only as 'before the Solutrean' The date of greater than 40,000 years bp is older than was previously expected for the Parpalló sequence, whose earliest cultural remains are described by Pericot as Gravettian.

Pericot compared the cultural remains with the sequence in South-West France and Cantabrian Spain, but unfortunately no statistical analysis of the Parpalló materials has ever been carried out. BM–859 dates a level described as Lower Solutrean by Pericot, which

* But now appointed Lecturer in the Department of Prehistory and Archaeology, University of New England, Armidale, NSW, Australia.

† I would like to thank Mr R. Burleigh of the British Museum Radiocarbon Laboratory for carrying out these analyses, and Mr G. de G. Sieveking for his help. None of the analysis or research leading to these conclusions would have been possible without the most generous co-operation of Professor Luis Pericot García, and Don Domingo Fletcher Valls, of the Servicio de Investigación Prehistórica de Valencia.



GrN–6201	28 160 ± 435 bp	Kent's Cavern.
GrN–6202	28 720 ± 450 bp	Kent's Cavern.
Ly–316	17 150 ± 300 bp	Solutré Middle Solutrean.
GrN–4441	20 000 ± 240 bp	Laugerie Haute Ouest top Upper Sol.
GrN–4605	19 870 ± 190 bp	,, ,, ,, ,, ,, ,,
GrN–4442	19 600 ± 140 bp	,, ,, ,, Middle/Upper Sol.
GrN–4495	19 740 ± 200 bp	,, ,, ,, ,, ,, ,,
GrN–4446	20 810 ± 230 bp	,, ,, ,, top Lower Sol.
GrN–4469	20 160 ± 100 bp	,, ,, ,, ,, ,, ,,
GrN–4573	20 750 ± 150 bp	,, ,, ,, base Lower Sol.
GrN–1888	20 890 ± 300 bp	,, ,, Est Lower Solutrean.
BM–861		
BM–859		
UCLA–678 B	>27 000 years bp	Dar es Soltan Upper Aterian
UCLA–678 A	>30 000 years bp	,, ,, ,, Lower Aterian.

Fig. 1. Chart of radiocarbon estimates

has coarse, leaf-shaped points. The date of 20,490 years bp agrees closely with the date of 20,890 years bp (GrN–1888) from the Lower Solutrean at Laugerie-Haute Est. The chart (FIG. 1) shows the available Solutrean radiocarbon age determinations for France and Spain, together with Aterian and British Early Upper Palaeolithic dates from Kent's Cavern.

As the chart shows, the new dates from Spain do not shed direct light on the origin of the Solutrean (see Smith, 1966 for discussion). Dates older than the French might have indicated an African origin, younger a northern one. The Aterian, tanged point, industries, are fundamentally Mousterian and Levalloisian in technique, which suggests a basic difference from the European blade industries, whatever the dating of the two industries. This argument is unchanged by the new dates.

The possible origin in the British Early Upper Palaeolithic (McBurney, 1965, 29) has recently been supported by the age estimates

from Kent's Cavern (Campbell and Sampson, 1971). That the oldest estimate for Parpalló is not much older than the French dates does not support this hypothesis, but certainly does not falsify it.

BM–861 dates a layer which Pericot calls Upper Solutrean to 18,080 years ago. This date should remove any lingering doubt about the age of the barbed and tanged arrowheads. The dating also suggests that the Solutrean in Valencia lasted longer than in Dordogne (see FIG. 1).

Other isotopic dating of Solutrean industries in Mediterranean Spain has been inconclusive (Almagro Gorbea, 1970). At both Reclau Viver and Cueva Ambrosio the dates were several thousand years more recent than the French dates, but neither set of estimates was in stratigraphic order. The new dates from Parpalló confirm the doubts about the earlier assays.

It is now possible to investigate the reasons for the remarkable similarity in cultural materials and in date between S-W France and Parpalló. Davidson (1972, 12) proposed the consideration of systematic seasonal exploitation between the Pyrenees and Valencia. Mobile economies, integrating in the Pyrenees animal exploitations of areas to north and south, could explain the remarkable similarities in style and technique in the early Solutrean levels. If long distance migrations ceased, each area would develop in its own way, and the absence of barbed and tanged arrowheads in France could be seen in this light. The problem is being investigated.

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New C14 dates from the Isle of Jura, Argyll

Radiocarbon dates from the Scottish Universities Research and Reactor Centre at East Kilbride have now confirmed the general industrial succession proposed during the last few years (Mercer, 1970a). Ten sites have been excavated since 1967, yielding a working framework based on land-sea relationships, pollen, eight C14 dates and over a quarter-million flint and quartz artifacts. The industrial sequence, at its most distinct in the evolution of the 8,000 backed blades—and of the trapeziforms in particular—has been divided up by reference to three main phases in land-sea relationship:

1A. A few pre-7000 BC proto-trapeze tanged points, derived and rolled in marine gravel, overlapping in size with S. British specimens. The climatic amelioration from c. 12,000 BC would have allowed Eskimo-type hunters to occupy the region, at first in the summer and then permanently.

1B. Trapezes (similar to those of Star Carr), blades and end-scrapers. At Lussa Wood I these lay within three continuous-construction stone rings 13 ft. (4 m.) overall, with minute bone fragments, limpet shell, red ochre and burnt hazel-nut shell and wood; the latter, from one ring, gave C14 years 8194 ± 350 bp (SRR–160), from the other two combined 7963 ± 200 bp (SRR–159), assumed to fall within 7000–6500 BC in calendar date. These cooking places, with the oldest Scottish C14 datings, appear to be the country's earliest stone structures showing an awareness of symmetry. Towards the end of this phase sea-level was rising towards its maximum Post-Glacial stand.

1B–2. Evidence is thin for this transition, suggesting comparatively abrupt change on the island: there are only a few trapezes of intermediate size, shape and blunting. At N. Carn, stone-setting charcoal below a typical Phase 2 floor gave C14 years 7414 ± 80 bp (SRR–161),

probably about 6000 BC calendar date; the structure was associated both with a tool otherwise found once at a 1B site and with a large Phase 2 trapeze.

2. Small, narrow trapezes with the whole back blunted; degenerating blades and end-scrapers. So far no C14 as charcoal rarely found, perhaps often washed away—phase dates to maximum sea-level. General age for latter, plus Jura pollen indications, centre this industrial phase on first half of Atlantic period.

3. Without evolutionary break. Phase 1 tools have disappeared, those of Phase 2 have degenerated. Three groupings which were scarce in Phase 1 and increasing in Phase 2 now attain maxima of one kind or another: the microlithic rod reaches a square-section, the *éclat écaillé* becomes very common (perhaps more so than the microlith), milky quartz is overwhelmingly preferred to flint as raw material. A fourth diagnostic aspect is a quite new standardized double-notched hammer-anvil stone. At the typical site, Lussa River, C14 ages of 4620 ± 140 bp (BM–556) and 4200 ± 100 bp (BM–555) suggest 3450–2940 BC lay within this final phase's span. Land-recovery period.

In an outline such as this the 'Obanian' aspect can only be mentioned briefly. The peculiar hammer-anvil is the only distinctive tool in the Oronsay 'Obanian' stone industry, dominated by the *éclat écaillé*. Jura's acid soils have not conserved any organic tools nor have microliths been found on Oronsay. If one explains the latter absence as due to differing work (e.g. land-hunting on Jura, marine on Oronsay, one of Britain's main breeding grounds grounds for seals), then it can be suggested that Oronsay's—and probably all Argyll's—'Obanian' sites were a product of the now-evidenced West Scottish final, post-glacial Palaeolithic people; more exactly of late Phase 2 and Phase 3, to judge by the Oronsay sites' geomorphology and C14 dates and by the Jura dating of the common tools.

Finally it can be mentioned that the Jura excavations have produced evidence of six Neolithic (oak-elm decline, leaf and transverse points, polished axe chip) and three Early Metal Age ('dagger' and barbed-and-tanged points) occupations. Site associations suggest the Neolithic groups interacted with or followed closely on to the last microlithic-making people, with the Early Metal Age occupations long after these.

Full reports on the excavations are appearing in the *Proceedings of the Society of Antiquaries of Scotland* (Mercer, 1967, 1969, 1970b, 1971, and in preparation).

J. MERCER

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Mithraic studies: congress

The Second International Congress of Mithraic Studies will be held at Tehran and Shiraz from 11–18 September 1974, with the patronage of Her Imperial Majesty Farah Pahlavi, The Shahbanou of Iran, and supported by the Ministry of Culture and Arts of the Imperial Court. Both Indo-Iranian and Roman Mithraism will be discussed, including papers on historical, archaeological, linguistic, iconographic and theological topics. Inquiries concerning attendance and the presentation of papers may be addressed to *E. D. Francis, Secretary, Society for Mithraic Studies, Department of Classics, Yale University, 1967 Yale Station, New Haven, Connecticut 06520, USA.*

PLATE VII: AIR RECONNAISSANCE, RECENT RESULTS, 33

The Barmekin of Echt, 11 km. north of Banchory, Aberdeenshire, NJ 726071. Oblique photograph taken 28 July 1972

See pp. 52-4

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a PLATE VIII: AIR RECONNAISSANCE, RECENT RESULTS, 33 *b*

(a) The White Caterthun, NO 548661 and (b) The Brown Caterthun, NO 555668, both in Menmuir parish, Angus. Oblique photographs looking NE and N respectively, taken 31 July 1965

See pp. 52-4