Microlithic and Bronze Age camps, 75–26 ft OD, N Carn, Isle of Jura

by John Mercer

SUMMARY

N Carn supports and extends the reconstructions proposed in the three previous papers. At the new site the transgression's washing limit came somewhere upon the steep rock-slope which backs the Main Area of occupation, the latter now at 46 ft OD (47 ft at Lealt Bay). Undercutting and tunnelling of the OLS (its lower part a now-dry hardpan) at 41 ft OD is thought to mark the maximum height of the maximum stand's normal spring tides. The OLS unluckily held no pollen; peat overlying the Main Area was shown by pollen analysis to have begun in the Sub-Boreal. The artefacts (713 microliths) roughly parallel those from Lealt Bay as to rolling, single and double patination and proportional vertical distribution; however, a part were in the OLS (none at Lealt Bay), the rest in the overlying gravels. The general typology of the two divisions falls within Lealt Bay's evolutionary range, with a peculiar, further set of microlithic quadrilaterals considered horizontal variants. The main occupation also yielded a few heavy quartzite tools (not the Lussa River–Oronsay hammerstone, also lacking at Lealt Bay), pumice, red ochre, carbonised hazel-nut shells and charcoal. The main charcoal concentration was within a small sunken L-shaped stone-setting (Main Area) made from the OLS: the charcoal at the base gave a C14 age of 7414±80 BP (SRR–161), implying a calendar age around 6000 BC. Charcoal from the top of the transgression gravels gave a C14 age of 3584±65 BP (SRR–162), corrected age about 2080 BC; the same trench held a fragment of a scale-flaked tool, possibly then associated with the date. No certainly Neolithic-type tools were found, but, upon the marine gravels at 34 and 26 ft OD, two charcoal patches, 25 yds apart, were each accompanied by minute barbed-and-tanged points, and in the latter case by the first limpet-shells found in the N Jura excavations; in these trenches, the lower only 35 yds from the present HWMAST, no other *in situ* occupations were found, but microlithic material – most of it clearly rolled – and copious charcoal were scattered through the underlying gravels, suggesting that, in N Jura, microlithic industry had ended well before the Early Metal Age.

INTRODUCTION

The writer's earlier papers in this series provide essential background to the present report (1968; 1970a; 1970b; 1971). The industrial sequence so far can be recapitulated: Phase 1A, proto-trapeze tanged point Lussa Bay no. 88 (others will be published), pre-7000 BC; Phase 1B Lussa Bay trapeze-triangle industry (two *in situ* occupations have since been excavated elsewhere in N Jura), present by 7000–6500 BC; then – evidence bridging the evolutionary gap will be published shortly – Phase 2, e.g. the Lealt Bay 'Early' forms, centred on the sea's maximum stand (*c* 5500–4250 BC); this evolves without a break into Phase 3, e.g. Lussa River (includes 3450–2940 BC) and probably some comparable material at Lealt Bay. From at least 4600 BC, the microlith-makers produce the known 'Obanian' sites. Probably after interaction throughout the fourth millennium, the culture gives way to Neolithic advance early in the third millennium.

REPORT

Location and description of site (pl 1a, fig 1)

This site (NGR NR 685939) occupies the final stretch of the N bank of the burn shown at Carn on previous location maps, 2½ miles N of Lealt Bay. The small N Carn Bay (fig 1) affords little shelter, as its unstained, well-rounded beach cobbles show; similarly, those covering the Pre-Recent platform behind are still for the greater part unturfed, amongst the most bare on the E coast. However, there is cramped shelter in the lee of the back rock-hump (trench F), 26 ft OD, whilst the Main Area (trenches A–D, G), 45–47 ft OD, gets some protection from the now extinct headland, top *c* 60 ft OD (the notchless vertical span of the latter's face is also evidence of its exposure to seas of the past). Above the Main Area all flat places are at present quite without shelter. The only trees, a few stunted birches and rowans, are huddled in the deep narrow watercourse adjacent to the Main Area. There seem no traces or records of recent human activity at N Carn Bay, which lies two-thirds of a mile from the present track up N Jura. However, until the nineteenth-century clearance of the settlement of Carn, half a mile south, the main track ran along the cliffs and, doubtless continuing to the N tip of Jura, must have passed close to the present site.

The excavation of the Main Area (figs 2, 3)

General

Though parallelling that at Lealt Bay, the N Carn natural stratification was clearer since the materials of Deposits 1–3 had not all come from much the same source with little intervening alteration. Reading upwards on fig 2, bedrock passed into shattered bedrock mixed with worn angular cobbles, the mixture cemented into a yellow pan. This graded into the OLS, an almost stoneless, blackish, greasy, well-packed soil with much unrolled grit; the few stones were cobbles of various angularities, with occasional sharp fragments of rock doubtless shattered off the slope behind. The OLS was surfaced by a compact layer of clean, highly-rolled small cobbles, gravels and some finer material ('the gravels'). Pl 2 shows the OLS layer about half-removed in trench B (around the biggest boulder, and in section down to the shadow line), and, beyond, untouched in trench C. In the furthest wall of the latter can be seen the rolled upper gravels *in situ* (the peat is thinning against the backing slope), whilst the rolled gravels removed from B and C can be seen heaped along their trench walls, left. Fig 2 shows the stone tools' vertical distribution in trench B, typical.

Trenches K, L were in keeping with general theory. Trench K, *c* 65 ft OD, exposed (below peat) a bedrock runnel with a 20 in depth of rounded and angular gravels; there were some two hundred flints (3 oz), patination light for the site, including a minute rolled specimen. In trench L, *c* 75 ft OD on the level summit of a knoll (the ground falling away behind too), there was no sign at all of the transgression, the peat covering worn angular cobbles hard-packed in a floury grey matrix (leached A_2) becoming humic (B) at 6 in: in the top of the matrix there was a fair quantity of charcoal (⅛ oz) and a few dozen quartz and patinated flint artefacts (2 oz).

Trench H, 41 ft OD, was sited on a beachwards ledge-cum-path which would have been fully exposed to the transgression seas: on clean bedrock under 19 in of peat there were a dozen highly-rolled pebbles, charcoal and two dozen flint chips, one rolled. This result was to be expected from the position.

Trench areas (all zones): A–E, G, H, each 5 by 5 ft; F, L, 6 by 6 ft; K, 3 by 3 ft; M, N, 10 by 5 ft. Total 356 sq ft.

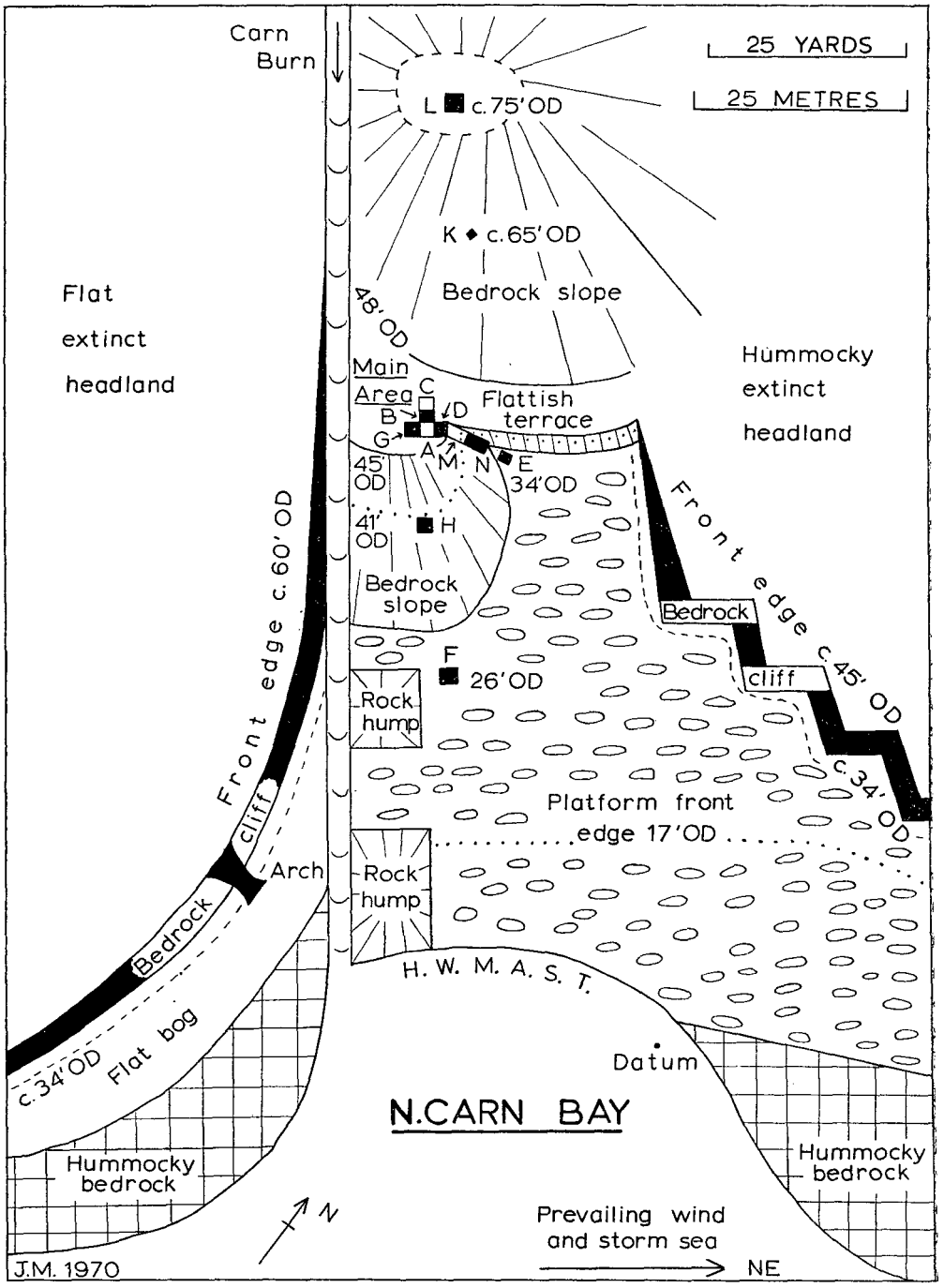

FIG 1 Plan of N Carn

Stone-setting and boulder (fig 2)

In trench A there was discovered a small sunken L-plan stone-setting, back to the present prevailing wind, its base in a soft soil pocket in a scoop in the hardpan and its top protruding an inch or two into the bottom of the peat. A slight mounding of the OLS immediately N of the scoop was considered scoop throw-out: its freedom from rolled gravel was the main evidence that the setting was sunk from the OLS, i.e. at least just pre-maximum-stand, when the transgression's storm-flung gravels were still falling short of the Main Area. Sieved away from the site, a soil sample from the surface of the 'throw-out' mounding yielded only a myriad of lead-shot fungus sclerotia (Appendix 3) and a little charcoal, apart from flints.

Flints and charcoal were scattered within, around and below the setting; this last position suggests the site had already had some occupation, though perhaps effectively contemporary. The trench A charcoal was distributed (dry weight): about ½ oz in the gravels, ⅛ oz OLS top soil, 1 oz within setting below level of the last, ½ oz at base of setting stones. B gravels ½ oz, OLS top soil very little; G gravels ¼ oz; E gravels 2 oz (increasing downwards); L ⅛ oz; the rest very little. The most obvious indicator of a late date of construction, transgression gravels as basal packing, was not recognised, though this is unreliable as evidence since the pan and fine OLS soil would be the most ready for the immediate packing no matter when the stones were sunk. However, the basal area disturbed was an oval up to 3 ft by 1 ft 6 in, a large patch to dig out to make what is assumed to be a place for a fire if one is working from on top of the rolled gravels. Further, when found the stones hardly protruded above the rolled gravels, so that as such they would have been useless as a wind-shelter; they could however have enclosed (partially) a pit which had filled by the time the peat began.

The boulder also protruded an inch or two up into the peat, its base a few inches down into the OLS: sieving of the stone-free soil at the very centre beneath produced six minute pieces of flint and two of charcoal (together with lead-shot fungus sclerotia), suggesting the boulder too was placed in position subsequent to the very earliest occupation and – because of the absence of rolled gravel beneath it – seemingly before the transgression's maximum stand. The boulder narrows towards the base: about 3 in into OLS soil, hard under the further side, was found perhaps the site's most significant flint tool, no. 47, whilst the less primitive but akin no. 49, bulbar, lay near by, 2 in above. The boulder is unlikely to have been deliberately sunk; it may have been moved or moved itself over the OLS, settling a few inches once in position; it could have been placed on the scoop-digging throw-out and then settled, or the throw-out could have been heaped up around it. Since it was this surrounding OLS-type mounding (merging downwards into the OLS itself) which was the matrix for specimens such as nos 47, 49, these are not certainly in primary position. Nevertheless, to accept the setting as dug in from the OLS is to date all OLS-soil flints (but see further limitations in typology section) to just pre-maximum-stand time also.

Overall, the stone-setting and the boulder have a 5 ft span, suggesting a hearth and seat.

Suggested interpretation

1. Pre-maximum-stand occupation, sinking the stone-setting a few inches into the then-surface (OLS) and placing the boulder near by, each manœuvre covering a few artefacts (flints and charcoal). To this period belong all the OLS flints. The setting's charcoal (cleaned weight 5·6 gm) gave a C14 age of 7414 ± 80 BP (SRR–161), implying a calendar date around 6000 BC.

2. Maximum-stand occupation during which the transgression storms fling gravels on to the Main Area, doubtless washing away most of the scoop-digging throw-out, charcoal and other light-weight relics of the earlier and also the current (e.g. summer) occupations. These gravels,

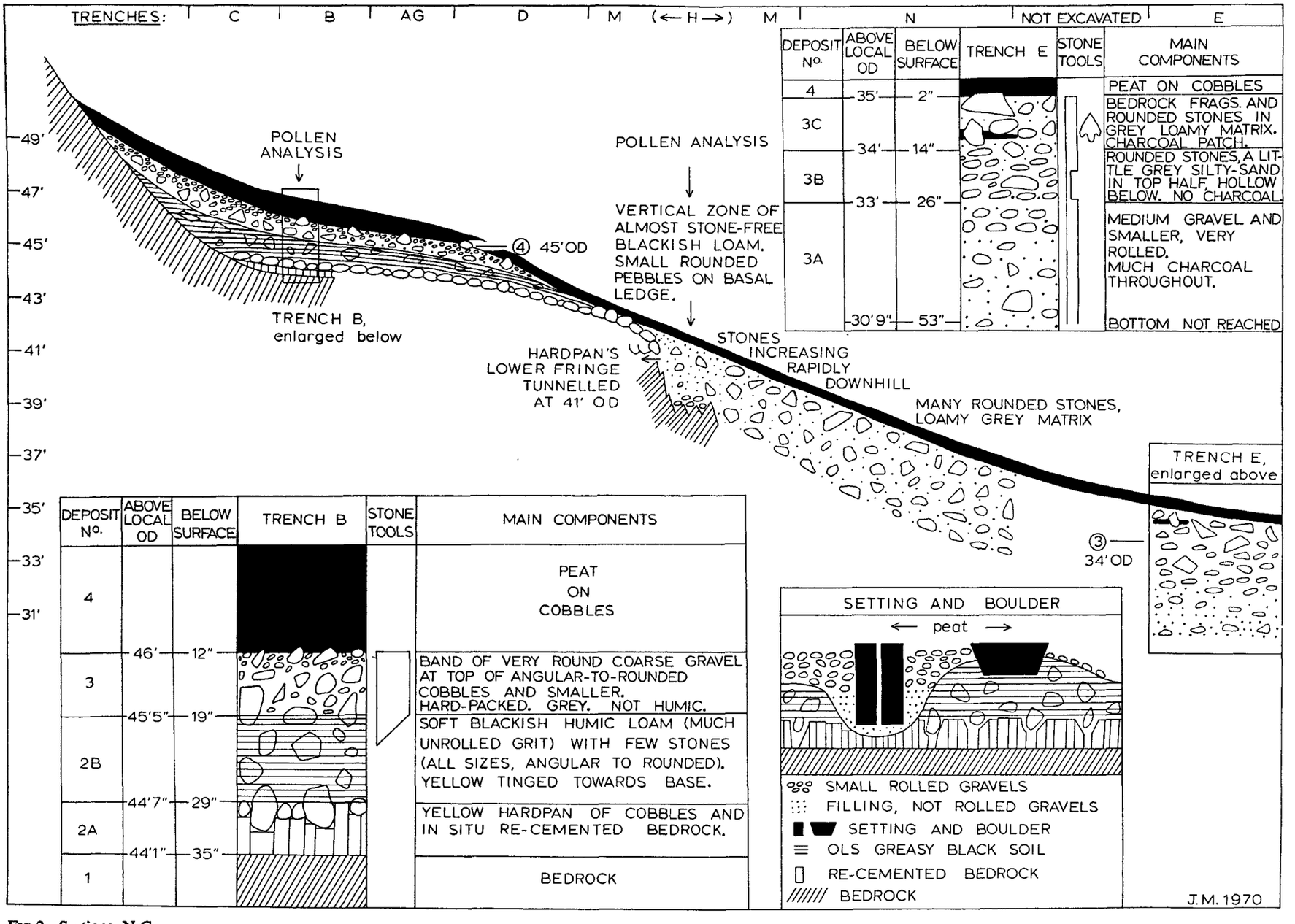

Fig 2 Sections, N Carn

with the occasional bedrock fragments from above, gradually bury the setting, boulder and mounded OLS.

3. Late Neolithic or Early Metal Age occupation leaves a fragment of a scale-flaked tool and charcoal; latter (cleaned weight 4·2 gm) gave a C14 date of 3584 ± 65 BP (SRR–162), being a calendar age of *c* 2080 BC. Sometime after the last occupation the peat begins.

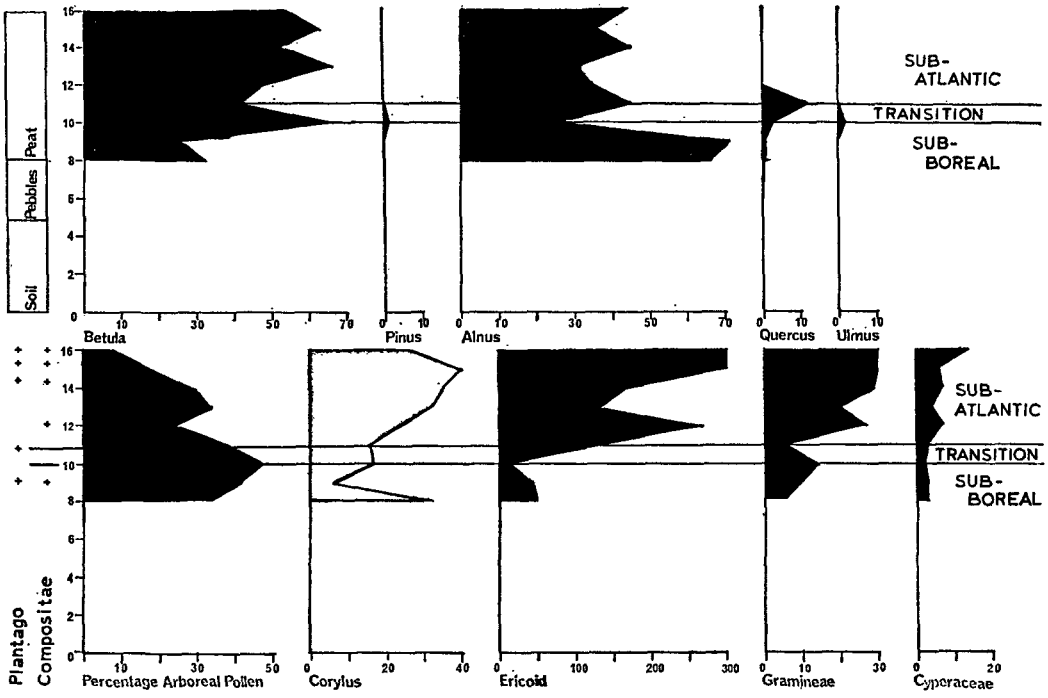

FIG 3 Pollen analysis, N Carn

Pollen analysis (figs 2, 3)

Pollen analysis was carried out on the B trench peat, 16 samples at 2 inch intervals from the base of the OLS unpanned soil to the present surface. Only the sixteen inches of peat held pollen (i.e. from sample 8 upwards). Dr Durno zoned the diagram (fig 3) as indicated – a Sub-Boreal opening – noting that from sample 9 upwards small amounts of herbaceous pollen were found, mentioning the cultivation weeds *Plantago* (9, 11, 14, 15, 16) and *Compositae* (9, 12, 14, 15, 16). This zoning agrees with the Early Sub-Boreal age of the trench G charcoal, immediately below the peat.

The excavation of the gully (fig 2)

A steep, narrow gully leads from the Main Area down to the back of the Pre-Recent platform, 34 ft OD. The gully was surfaced by 2–9 in of wet turf holding battered dirty flints. Fig 2 shows how the Main Area hardpan, always relic-free, underlay the turf down to 41 ft OD; its surface bore rounded, root-filled hollows where cobbles had been plucked out, some perhaps by the sea. At 41 ft OD the hardpan ceased abruptly and at one point it had been undercut to beyond arm's reach. Reading left from the tunnel, the pan's fringe lies along the top of the disappearing bedrock as far as the larger rectangle, up the latter's side and across its top. The

pick and the brush lie on the cleaned, extremely hard pan; a natural drainage furrow comes in from the upper right; the horizontal measure marks the trenches' M–D boundary. The undercutting is considered to mark the maximum height of the transgression's calm or normal spring tides.

Leaving aside the area of the larger rectangle, to be discussed shortly, the next lowest zone of the gully held a mixture of shattered bedrock, hillwash, rolled gravels and sands, with a good quantity of flints scattered haphazardly throughout, very varied in condition.

The larger rectangle frames the superficial area of a pocket of soft stoneless hillwash, 2 ft deep (fed by the mentioned drainage furrow): this hillwash may be likened to the 'rapid fill' of the ditch excavator, i.e. it is considered to have begun to accumulate the moment the transgression's washing limit withdrew from *that* point (39 ft OD), mostly originating from the Main Area, above, and piling up on the bedrock ledge to be seen in fig 2. Downhill it abruptly coarsened into the cobbles, shattered bedrock, etc. Some 500 flints were scattered throughout the 5–6 cu ft, including 12 microliths; they increased downwards (cf Lealt Bay's deposit 3B). Twelve samples were taken at 2 inch intervals from the base to the top, excluding all material above the level of the adjacent hardpan. Table I shows the pollen-grain count. Dr Durno noted that the absence

TABLE I
POLLEN COUNT

Inches above bedrock	*Betula*	*Pinus*	*Alnus*	*Ulmus*	*% Arboreal*	*Corylus*	*Ericoid*	*Filicales*	*Lycopodium*	*Sphagnum*	*Plantago*	*Caryophyllaceae*	*Varia*	*Mineral*
23	16		13			10	2	4		2		1	X	XXX
21	16		19	1		7	3	4					X	XXX
19	9		18			1		2			1		X	XXX
17		1				1		1					X	XXX
15		1						3	1				X	XXX
13		1	1					3	1				X	XXX
11	2	1	1					2	12				X	XXX
9		2	2						12				X	XXX
7			4			1		1	2				X	XXX
5	1		12			1	2	11	3				X	XXX
3		1						5	1					XXX
1				NO IDENTIFIABLE POLLEN										XXX
Totals	44	7	70	1		21	7	36	32	2	1	1		
% (of 201)	22	3	35	1	61	10	3	18	16	1	1	1		

of the less robust types (e.g. grasses) could be due to differential preservation; the preservation state of identified grains did not differ significantly between levels. He also wrote that the higher counts in the top probably represented pollen in primary position rather than derived from the OLS above; he could not give an opinion on the derivation or otherwise of the lower pollen. Dr Durno remarked that the alder frequency suggested a date within the Atlantic-Sub-Boreal period.

Since the deposit is considered 'rapid fill', one might also treat the twelve samples as one. Added together, the straightforward pollen proportions are birch 22%, pine 3%, alder 35%, elm 1%, giving A.P. 61%, heather 3%, ferns 18%, mosses 17%, plantain 1%, pink 1%, with an outside 10% hazel. In the Main Area peat diagram, pine and elm only occur in sample 9, the

last point at which alder dominates birch and the first at which plantain appears, together with the lowest hazel, 7%, fallen from 32%, prior to its immediate steady return to 40%; samples 9–10 show the maximum A.P., 45%, with heather falling to as low as a fifteenth of its later figure, when it dominates the N.A.P. It seems very probable, then, that the 'rapid fill' at 39–41 ft OD coincided with Main Area sample 9, some 2–3 in up from the base of the peat.

This has interesting implications, and it is suggested that a series of such observations could result in useful geochronological data. The maximum stand's N Carn washing limit is likely to have always been higher than that of Lussa Glen, 55 ft OD: N Carn is the most exposed site so far reported (it was noted earlier that trench K, *c* 65 ft OD, yielded a minute rolled flint, thus probably being within the transgression-maximum's spray zone). Based only on say 60 ft OD, then the rapid fill, built up on a ledge at 39 ft OD, could not start until the washing limit had fallen back by 21 ft. In his last paper the writer most tentatively proposed an overall land-recovery rate of 25–35 years per foot (Mercer 1971, 1), and on this basis the ledge's rapid fill could not begin until a minimum of 525–735 years into land-recovery times. Based on the equally-tentative Lealt Bay pollen date of Mid-Atlantic for the opening of the land-recovery period, the fill and Sample 9 would then date to Late Atlantic. Also implied is that, at the time of Main Area Sample 8, with the seemingly transgression-loving alder dominating local vegetation, storm-seas were still just washing over the 39 ft OD ledge. A date of 3200–2800 BC has been suggested for the return to the present land-sea relationship (Mercer 1971, 1).

At variance with the last paragraph's deductions is the C14 assay of the charcoal in the top of the gravels, implying the base of the peat to be younger than *c* 2080 BC. However, the C14 date may be suspected: the next section will describe *in situ* occupations probably of Beaker age at 34 and 26 ft OD, showing that at *c* 2000 BC the washing limit had certainly *long* left the 41–39 ft OD ledge – but *if* the ledge's rapid fill had the same pollen content as Sample 9 above (separated by 2 in of peat from the underlying gravels) then clearly the C14 date is far too young.

Of course, accuracy will be approached only when there are more plentiful and reliable datings from which to start. Perhaps a site can be found where it will be possible to correlate a series of analyses down a deposit-filled gully with a closely-dated Main Area pollen diagram, extracting from the result a time-height land-recovery rate. Generally, the similarity of the pollen of the two vertical feet of hillwash (41–39 ft OD) and that of a single sample from very near the base of the Main Area peat (47 ft OD) does support the interpretation of the physical side of the N Jura land-sea relationships.

Two excavations at the back of the Pre-Recent platform, 34 and 26 ft OD (pl 1b, fig 2)

Digging was extended onto the 'raised beach', maximum 34 ft OD, in search of a Phase 3 (Lussa River) occupation. It is recalled that the Lussa River site is now 550 yds from the sea, that the similarly-placed Lealt Bay trench, yielding only seemingly-derived flints (some clearly rolled), was 85 yds away; whilst the two trenches about to be described were only 60 yds and 35 yds from present HWMAST.

Trench E, fig 2, was sited in the shelter of the gully mouth on the first level ground reached on descending from the Main Area. The stratification, normal for the landscape position, is illustrated in fig 2. No Phase 3 *in situ* occupation was found (though one could have been washed into the gravels) and it is possible that the proximity to the sea (i.e. the slow rate of horizontal recovery of the platform) did not encourage the last microlith-makers to move down, unlike at Lussa River; Phase 3 relics have since been found elsewhere at Carn (again a site probably with long occupation), and will be published in due course.

In fact, it seems that the first occupation in the 34 ft zone *after* the ultimate falling-back

of the washing limit was by Early Metal Age (? Beaker) people, since, below recent gully-talus and upon the marine cobbles, trench E yielded an *in situ* charcoal patch with a minute, unpatinated barbed-and-tanged point (pl 1b, lowest), good quality translucent grey-brown flint.

To check on this information, trench F (26 ft OD) was dug in the platform's only other sheltered area, the lee of the upper rock hump. The stratification was similar to E, with less talus, gravels throughout and well-rounded bedrock at 2 ft 9 in. Again upon the gravels and below talus, this trench revealed a charcoal patch, three minute barbed-and-tanged points (with a few waste chips), a small round flat-flaked scraper with a sharp working-edge and two limpet-shells (the first found at any N Jura site; it is interesting that these should accompany the latest occupation so far excavated). The points, two of good flint, bore light to medium patinas; the scraper, an opaque grey, may have been burnt. The scanty talus suggests that these tools (pl 1b, upper quartet) lay exposed to weathering for longer than the trench E specimen, thus acquiring their heavier patinas.

Including sites still under study, the following is the N Jura distribution above OD of scale-flaked points recognisably either leaf-shaped or barbed-and-tanged:

Leaf-shaped, *c* 100 ft – one (fragment, large, probably 'dagger' type)
c 75 ft – one (milky quartz)
60 ft – two
55 ft – two (with polished axe chip and flat-flaked transverse arrowhead)
47 ft – sixteen (Lealt Bay)
37 ft – one (Pre-Recent platform's backing slope, definitely not on the platform)
Barbed-and-tanged, 34 ft – one, very small (? beaker type), N Carn on Pre-Recent platform
26 ft – three, as previous

This excludes two of each type from Lussa Bay, found derived in the present river mouth. The summary's limitations and its implications, especially of the lack of overlap, seem clear.

Catalogue of the finds

In addition to the Early Metal Age relics already described:

1. Small patch of puce-coloured soil (trench B gravels). Analysed by Dr McKerrell but no positive conclusions.
2. Two pieces of red ochre (trench N, amidst the stones) and a broken microlith with red matter on the tip (Main Area gravels), Appendix I.
3. Piece of green pitchstone similar to the first variety at Lealt Bay (fig 2, trench B, 18–19 in).
4. Piece of dark grey pumice, 1½ in long, Appendix 2 (trench A, middle of rolled gravels).
5. Three tool-like pieces of quartzite.
6. Flint and quartz artefacts.
7. Five dry oz of charcoal and carbonised hazel-nut shell (already discussed).

The quartzite specimens

No. 1 is the best, a chopping tool; it is made of a fragment of a large rolled cobble. No. 2, with the same function, was a complete rolled cobble. No. 3, if a tool, was improvised on a sliver shattered off worn bedrock or a boulder. All were Main Area, top half of gravels.

The flint and quartz artefacts

Material and condition. Markedly similar to those at Lealt Bay. Total was 21 lb 14 oz, of which 16 lb 4 oz was flint and the rest milky quartz, proportions thus 3 : 1, as at Lealt Bay (Lussa River 1 : 8). Two pounds, mostly flint, were in the OLS. As at Lealt Bay, the quartz tools were microliths (2), scrapers (4), 'chisels' (7), use signs only (5). Other parallels were 16 pieces of colourless quartz, including crystal (and also the flake of green pitchstone). The Lealt Bay descriptions apply for basic colour (a few red pieces), single patination and cortex. The OLS specimens were, on average, less patinated than the rest of the artefacts; probably soon trampled into the soft soil, they support the writer's earlier suggestion that the time-lapse before being covered was the main factor in the patination of N Jura's flints.

The following table covers rolling and double patination. Many of the E, F specimens had been damaged after rolling, but most probably by marine action. The figures exclude the considerable number of white-patina artefacts with worn brown edges, the result of trampling, hillwash action or slight marine rolling.

Description	*Trenches K, L*	*Main Area*	*Trenches H, M, N*	*Trenches E, F*
1. Small rolled complete pebbles, many probably reverted artefacts	0	8 (2 oz)	0	18
2. Rolled artefacts not struck since rolling – no. 240 (trench A)	1 (K)	7	5	695
3. Rolled artefacts struck since rolling	0	4	1	2
4. Two-patina specimens (i.e. two-period artefacts), without rolling – nos 72, 225	0	12	1	0

OLS: One in class 1, one in class 4. The rolling of E, F specimens could have occurred at any stage in the transgression of those trenches' zone.

Typology. Following consideration of the typology of all examined sites, published and unpublished, it is now thought that the lack of diagnostic information from some commonly-used categories and analyses makes worthless their detailed further pursuit. The writer therefore intends to concentrate on the informative aspects, otherwise noting only deviations from the typology to be expected as a result of the three previous reports.

Specimens described below as 'OLS' were found in the Main Area in the very top of the OLS soil and also in the filling of the stone-setting scoop. The following ambiguities will show the limitations of the division:

(*a*) Others amongst the collection, perhaps many, must derive from the OLS, as a result of erosion, water transportation, etc. This makes statistical comparison between the two divisions valueless.

(*b*) About half the 'OLS' artefacts came from the scoop throw-out (around the boulder 'seat'). The surface of this soil mounding was flush in places with the surface of the gravels, i.e. right up to the end it formed or was very near the surface of the Main Area in this one place, and its artefacts can be supposed to cover the whole N Carn occupation period.

Yet it would be inadequate not to describe the artefacts from the OLS soil: thus, quantities will be given in the text and illustrated specimens (55) will have their numbers underlined in the figures.

When making comparisons with Lealt Bay, it should be remembered that N Carn yielded only 40% as many artefacts (weight). Early Metal Age occupation material not included.

1. Cores (15 with scraper shaping)	50
2. Platform flakes	26
3. Part-cortex flakes	39
4. Arched, tip-heavy flakes	9
5. Steeply-trimmed tools, mainly microlithic	713
6. Micro-burins (35% of 713)	247
7. Scrapers (inc. 15 cores)	96
8. Blades over 1⅛ in (18 end-narrowed)	36
Blades under 1⅛ in, end-narrowed	19
Blades with other trimming	7
9. End-narrowed other than blades	26
10. Gravers	38
11. Chisels (7 quartz), 1:23 microliths	31
12. Transverse, not scraper-like	4
13. Perforators	17
14. Spatulates	4
15. Scale-flaked	1
16. Trimmed but not classified	109

1. *Cores (15 with scraper shaping)*. Six OLS (nos 4, 7, the former about the site's largest). Six were the asymmetrical type of which strikingly-uniform examples were noted at Lussa Bay; four (no. 5) of them were in trenches E, N, one in D (no. 4, above). Scraper shaping: no. 4 (platform and tip), no. 6 (upper platform), no. 7 (side).

Six were rolled almost back to pebble status, two in the top of trench B (one re-flaked, as was Lealt Bay no. 7), one in N.

2. *Platform flakes*. Class 1, eighteen (two OLS); class 2, five (no. 8 OLS, no. 183, and the third in trench N); angle between 1 and 2, three (no. 249). Twelve cores had two platforms, only those of a rolled F trench specimen being opposed.

3. *Part-cortex flakes*. Half were cortex-backed on the left, half on the right. Three OLS (no. 9, the site's largest).

4. *Arched, tip-heavy flakes*. Probably fortuitous. One OLS.

5. *Steeply-trimmed tools*. There were 135 OLS microliths (77 not described) of which 71 (36) came from the top of the throw-out: thirty OLS are illustrated. Five were rolled, one Main Area and four E, F.

Described (Table II)	198
Fragmentary but some identity (Table II)	133
Miscellaneous (Note *f*)	10
Not described	372
Site total	713

(*a*) The finding of nos 47, 49 has already been described. Similar to no. 49 is the fragment no. 50, found in trench D with no. 48 (improvised on a fragment in origin). The face of the seemingly deliberately broken-off tip of no. 50 bears secondary patination.

(*b*) Fully-evolved rods were a characteristic of Lussa River. At N Carn nos 70–4 are the most evolved; no. 70, burnt, is not very steep; no. 71 came from L trench. Fragment no. 72 – E trench, significantly perhaps – is a clear example of a tool made on much older material, the upper and lower faces with white patination, the trimmed sides a translucent grey, as indicated by the section; fragment no. 73 may also be two-period. Fragment no. 74 is unpatinated (surface of gravels).

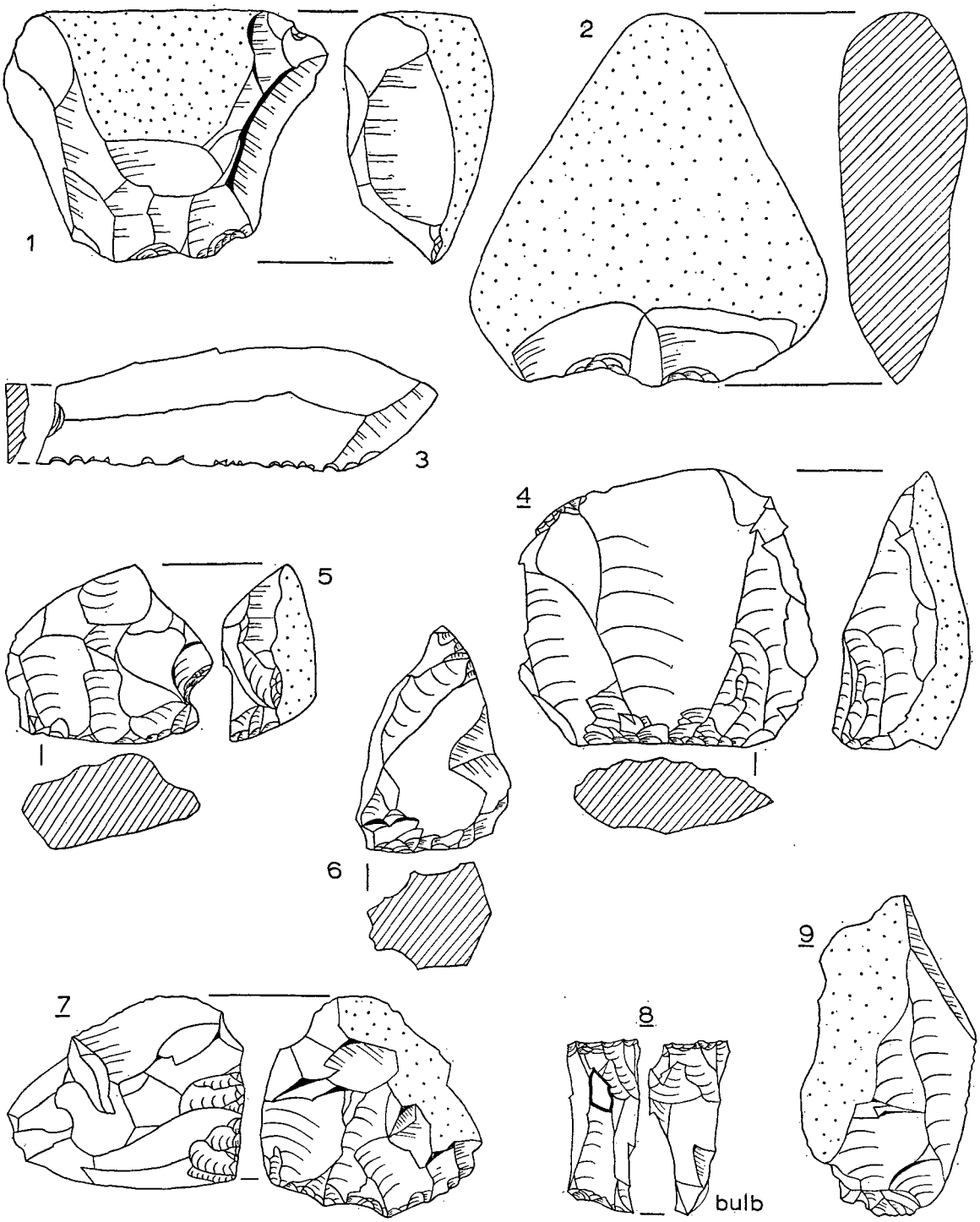

FIG 4 Quartzite tools, nos 1–2 (1:2), 3 (1:4) and cores etc (1:1)

TABLE II

STEEPLY-TRIMMED TOOLS

	Description	*Heavy patina*	*Quantity*	*Bulb*	*Prob. frag.*	*Illustration nos and notes*
Basal end not separately trimmed						
1A	Partially trimmed one side					
ia	Centrally, concave	6	6	6	0	Compare LUB e.g. nos 32–3. Nos 10–15.
b	End, obliquely, 1–$\frac{3}{5}$ in	5	5	4	0	Nos 16–20, last not bulbar.
ii	End, obliquely, under $\frac{3}{5}$ in	4	5	3	2	Nos 21–3, last bulbar.
1B	Fully trimmed one side					
ia	Trimmed side convex 1–$\frac{3}{5}$ in	4	4	2		No. 25. Nos 24, 26 bulbar.
b	Trimmed side convex, under $\frac{3}{5}$ in	6	7	2	9	Nos 27–8 bulbar. Nos. 29–31. Frags a/b.
iia	Trimmed side straight or concave, 1–$\frac{3}{5}$ in	5	6	1	0	No 32 (? class 6A), nos 33–5.
b	Trimmed side straight or concave, under $\frac{3}{5}$ in	16	16	12	14	Nos 36–46, all bulbar. Frags a/b
1C	Partially trimmed each side	3	3	1	1	Nos 47–50. Note A.
1Di	Fully trimmed one side, partially the other 1–$\frac{3}{5}$ in	10	11	2	0	Nos 51–4, 55–6 bulbar.
ii	Fully trimmed one side, partially the other, under $\frac{3}{5}$ in	5	7	2	10	Nos 57 (bulbar), 58–9. Frags i/ii.
1E	Fully trimmed each side, maximum width over a quarter of length	19	20	6	8	Nos 60–2. Rest under $\frac{3}{5}$ in.
2	Fully trimmed each side, maximum width under a quarter of length	4	4	2	7	Nos 68–74. Nos 69–71 bulbar. Note B.
Basal end separately trimmed						
3Ai	Base tapered by trimming from below	10	10	4	1	Nos 75–81. Nos 76, 80–1, bulbar. Hybridise with 3D, 4.
3Bi	Base trimmed convexly	0	0	0	3	No. 82 unpatinated (K), no 83 patinated (E).
ii	Base trimmed straight or nearly so	1	2	0	2	No. 84, lightly patinated. Nos 85–6. Compare class 6.
3Ci	Base trimmed concavely, symmetrically	0	1	0	0	No. 87, lightly patinated, prob. same worker as no. 84.
ii	Base trimmed concavely, asymmetrically	1	1	0	1	No. 88 (note pointed corner). No. 89 (but see LUB no. 154).
3D	Misc. shouldered and tanged forms	14	18	7	5	Nos 90–5 marked humps. No. 96 tanged. Nos 97–102 undercut only. Nos 98, 102 light patina Butt-end frags merge with microburins.
Triangles						
4B	Scalene					
i	Lower left angle	2	2	0	0	Nos 103–4.
ii	Upper left angle	3	6	0	0	Nos 105–10. No. 108 unpatinated high grade brown flint. Nos 105, 107 light patina. Merge into class 6A.
Crescents						
5A	Median spine towards arc	6	7	0	1	Poor. Nos 111–15.
5B	Median spine towards chord	0	0	0	1	No. 116, light patina
Quadrilaterals						
6	A–C upper end frags				50	Five concave backs (nos 117–20). Five with light patina. Class 6 frags below are basal ends.

TABLE II (*contd.*)

	Description	*Heavy patina*	*Quantity*	*Bulb*	*Prob. frag.*	*Illustration nos and notes*
6A	Sub-trapezoid, sub-trapezium, base not trimmed	25	34	12	0	Nos 121 upper bulb, largest, unpatinated, E trench, 122 bulbar, smallest, 123 only concave back, 124 bulbar, reversed (cf nos 161–2).
6B	Trapezoid, trapezium, base trimmed					
i	Base trimmed convexly	0	0	0	1	No. 125 (cf 3Bi).
ii	Base trimmed straight or nearly so	3	5	1	3	Nos 126–31. Nos 128, 131 light patina. No. 129 bulbar, light patina, K trench.
iii	Base trimmed obliquely					
a	Back straight	6	7	1	3	Nos 132–6. Frags nos 137–9.
b	Back concave	2	4	0	0	No. 140 (micro-burin facet). Nos 141–2 light patina. Nos 141, 143 poor. No. 142 good.
iv	Base trimmed concavely					
a	Symmetrically	0	1	1	1	No. 144 quartz. No. 145.
b	Asymmetrically/obliquely	0	0	0	4	Nos 146–9, fine work. No. 147 basal?
6C	Rhomboid	0	1	0	1	Nos 150–1, poor. Concave backs.
6D	Right-angled upper end					
	Upper-end fragments	0	0	0	4	Nos 152–5. No. 155, F trench, rolled, recalls no. 83, E.
	Straight					
i	Base not trimmed					
	Upper end concave	1	1	0	0	No. 156.
ii	Base trimmed					
	Straight/straight	1	1	1	0	No. 157, bulbar.
	Straight/concave	0	1	0	0	No. 158, upper edge steep cortex (? trimmed).
	Concave/concave	1	1	0	0	No. 159.
	Concave/oblique	0	0	0	1	No. 160, bulb at upper end (occ. all class 6).
Pentagons						
7	Irregular, symmetrical	1	1	0	0	No. 161. Note E.
	Totals	164	198	70	133	

SUMMARY

Site	*Class*	1A ia	1A ib, ii	1B ia, iia	1B ib, iib	1C	1D	1E	2	3A i	3A ii	3B	3C	3D	4A	4B i	4B ii	5
Lealt	*Total*	0	11	57	13	4	26	3	6	8	8	6	3	15	2	7	25	51
Bay	%	0	3	16	4	1	8	1	2	2	2	2	1	4	1	2	7	15
N Carn	*Total*	6	10	10	23	3	18	20	4	10	0	2	2	18	0	2	6	7
	%	3	5	5	11	2	9	10	2	5	0	1	1	9	0	1	3	3
Lussa	*Total*	0	11	2	12	0	6	4	19	1	1	3	2	5	1	0	4	11
River	%	0	9	2	10	0	5	3	16	1	1	2·5	2	4	1	0	3	9

Site	*Class*	6A	6B i, ii	6B iii	6B iv	6C	6D	7	*Total*	*Heavy patina*	*Bulb*	*Micro-burin*	*Micro-burin heavy patina*
Lealt	*Total*	54	17	9	11	4	2	1	343	254	54	346	266
Bay	%	16	5	3	3	1	1	1	100	74	16	27	77
N Carn	*Total*	34	5	11	1	1	4	1	198	164	70	247	208
	%	17	3	5	1	1	2	1	100	82	35	35	84
Lussa	*Total*	21	11	3	0	1	0	1	119	29	26	70	20
River	%	18	9	2·5	0	1	0	1	100	27	22	28	29

(*c*) Lealt Bay nos 135, 139 were there treated as 'Miscellaneous', but at Carn the number of such specimens has brought class 6D into being. The diagnostic feature is that, when the long-edge blunting is, as usual, to the left, the upper edge forms a right angle, sometimes concavely trimmed. The lower end then develops (including the second Carn site, mentioned earlier) through the full range of 6A–C variations; fragments can present the same problems as those of the other quadrilaterals, and it will also be understood that those pieces entered beside 6B, C (all basal ends) could equally belong to 6D. Class 6D may – partially at least – be replacing 6Biv, very low.

(*d*) That both oblique and right-angle class 6 ends can be concavely trimmed raises the problem of their use. Although probably with a common origin, nos 132, 159, for example, are markedly dissimilar in aspect – either they did the same work in differing ways or they had evolved into different tools.

(*e*) No. 161 is thought to be evolving towards the pentagon (e.g. Lealt Bay no. 134, Lussa River no. 95), a little nearer to these than Lealt Bay no. 108 (more pentagons occur at the second Carn site).

(*f*) *Miscellaneous.* No. 162 light patina (affinities with no. 161?). Nos 163–4 bulbar, light patina, E trench. No. 165 on bulbar end of broken bladelet, point stained.

Hollow-blunted bladelets are not unknown in N Jura (e.g. nos 12, 15, and Lealt Bay no. 42) but the light-patina no. 167, with a spur at the base, is so far unique. It is in fact similar to the continental *pointe avec cran à la base* or *à base recurrente* (respectively Sauveterre and Cuzoul de Gramat, both Tardenoisian II and the latter with an Obanian-type antler mattock); the French form appears to be the extreme stage of the reduction of the shorter vertical edge of the right-angle trapeze, the latter unknown in Jura's region. No. 167 leads one to look twice at nos 168–71, otherwise perhaps basal-end micro-burins – but this in turn suggests that no. 167 itself may just be a bladelet prepared for division but not snapped.

(*g*) Four undescribed fragments are rolled, one from trench A, one from E, two from F.

6. *Micro-burins.* OLS 23% (56), compared to microliths 19% (135). Class percentages did not vary diagnostically between the OLS and the gravels.

		Lussa Bay		Lealt Bay		N Carn		Lussa River	
Class	*Description*	*Quantity*	%	*Quantity*	%	*Quantity*	%	*Quantity*	%
1	Notch on right, butt end (no 172, largest)	12	66	199	71	136	64	40	69
2	Notch on right, tip end (no. 173)	1	6	15	5	9	4	2	4
3	Notch on left, butt end (no. 174)	4	22	33	12	27	13	6	11
4	Notch on left, tip end (nos 175–7)	1	6	34	12	40	19	9	16
5	Indeterminate	2	—	65	—	35	—	13	—
	Totals	20	100	346	100	247	100	70	100
	% to total microliths	24		27		35		28	

The Lussa Bay percentages are based on so few specimens that differences from the rest need confirmation. The only variation in the percentages of the other three sites comes in class 4: the comparatively high N Carn proportion may be reflected in the site's equally high bulbar-microlith percentage.

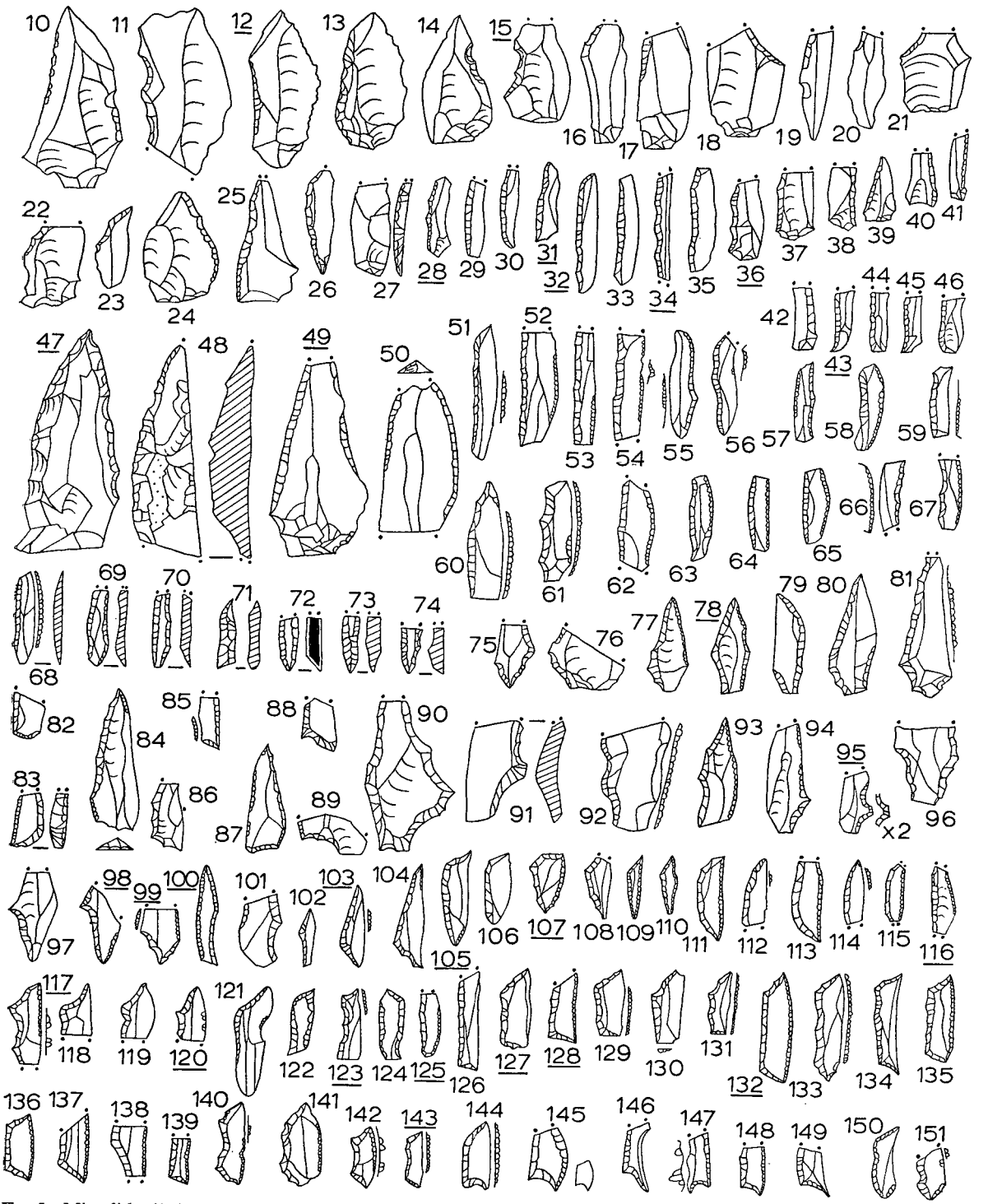

FIG 5 Microliths (1:1 except no. 145 at 2:1)

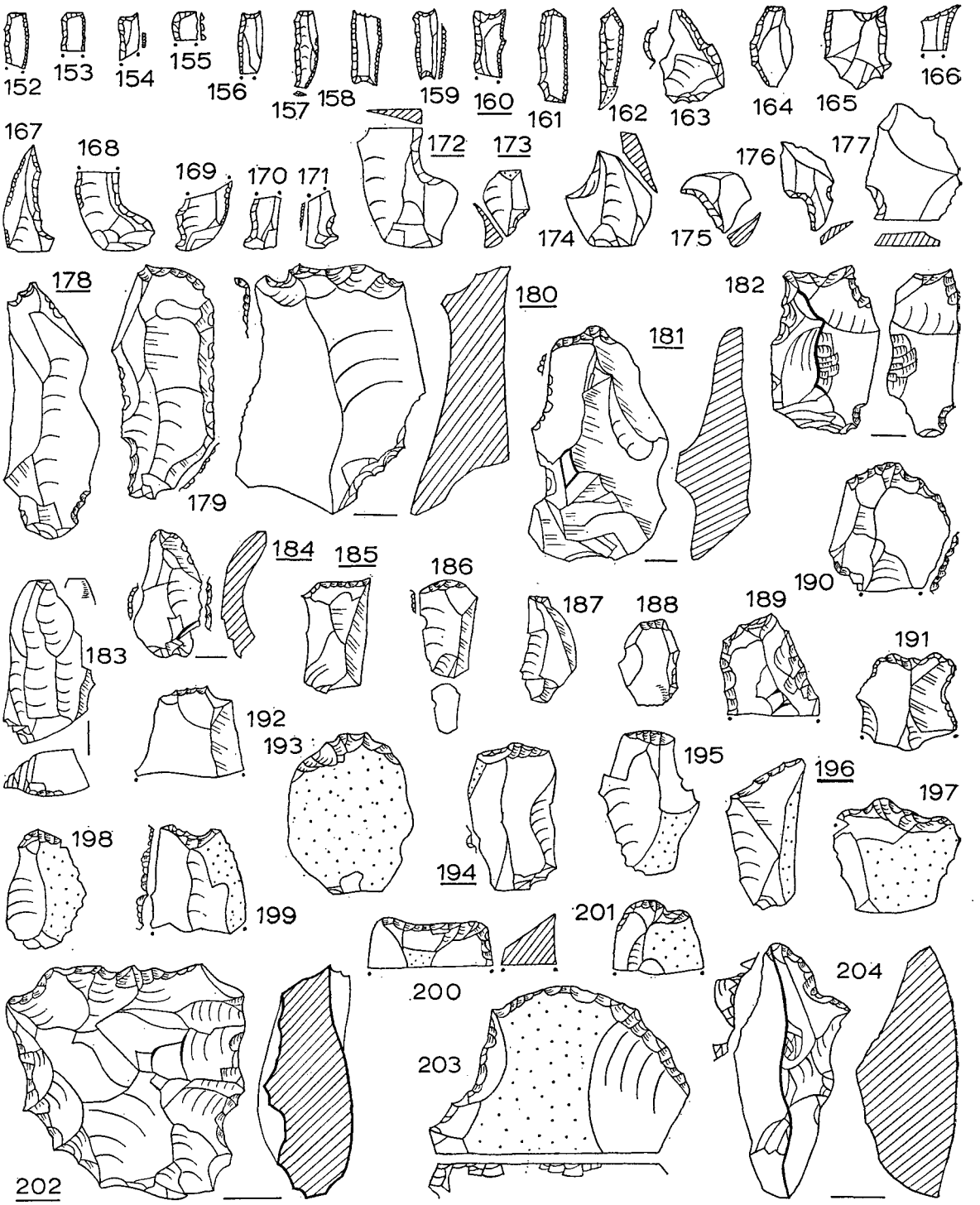

FIG 6 Microliths, micro-burins, scrapers (1:1 except nos 165, 186 at 2:1)

7. *Scrapers (inc. 15 cores)*. Classification as at Lealt Bay, Lussa River. Poor and unstandardised.

Class	*Description*	*Convex*	*Straight*	*Concave*	*Total*	*Over 1 in*
1A	End, on blade (nos 178–9)	1	1	0	2	2
B	End, on cortex-free flake (nos 180–8)	7	3	0	10	4
2	Broken cortex-free working part of 1, 3 or 5 (nos 189–92)	4	0	0	4	0
3	End, on cortex-flakes used complete (nos 193–8)	7	2	0	9	0
4	Broken cortex-bearing working end of 3, 5B or 6 (nos 199–201)	1	1	1	3	0
5	End, basic material a fragment					
	A Without cortex	0	0	0	0	0
	B Cortex-flake	0	0	0	0	0
	End scraper series	20	7	1	28	6
6	Neither end nor steep, on cortex flakes, fragments etc (nos 202–207, 209–11)	29	3	0	32	19
7	Steep, inc. 15 cores (nos 4, 6, 7, 208, 212–14)	18	5	0	23	21
8	Side (nos 216–18)	1	1	7	9	7
	Quartz (no. 215)	2	2	0	4	3
		70	18	8	96	56

(*a*) Two from E, F were made on rolled earlier material, and not rolled again; four from the Main Area were made on earlier unrolled material (3 being concave forms).

(*b*) Seventeen (3 cores) came from the OLS, nine being from the throw-out. Nos 4, 7, 178, 180–1, 184–5, 194, 196, 202, 205, 209, 214.

(*c*) Group 7 also includes three flakes bearing the working edges of scraper-cores.

(*d*) The nearest to the well-made and standardised Lussa Bay end-series was no. 193, rolled, E trench. No. 180 includes a nose similar to Lealt Bay no. 212.

(*e*) A distribution diagram contrasted the trenches A, B core: scraper ratio (20 : 47) to that in N, E (18 : 13). Probably cores roll downhill more easily than do scrapers, mostly much flatter.

8. *Blades (44 trimmed)*. There were 36 blades (9 OLS) over $1\frac{1}{8}$ in long (no. 219, OLS), 18 (6 OLS) with end-narrowing (nos 220–1, latter OLS, and scrapers nos 178–9) and 2 with other trimming. Of the smaller blades, 19 had end-narrowing (one OLS) and 5 (3 OLS) other trimming.

The figures are comparable to those of Lealt Bay.

9. *End-narrowed other than blades*. Eighteen are whole (no. 223 OLS, nos 222, 225, the latter two-patina, top B gravels), 8 only butt-ends (nos 224, 226). Six OLS.

10. *Gravers*. One of the strongest categories. It is now clear that the main N Jura division is between two means of shaping the working edge: by blow, 20 (nos 227–34, nos 228, 229 being markedly *busqués*) and by chipping, 18 (nos 235–41). Sometimes the blow-forms use chipping for slight undercutting of the working edge (no. 229), passing into hybrids such as nos 233–4, chipped beaks or angular corners combined with a blow. These lead to the second, rather lighter-weight division, always shaped by direct chipping: nos 235–41, *becs à encoche*. Usually there is opposed finger-rest trimming, occasionally a naturally-blunt surface. Wear is clear on the working edges of classified specimens. A few spalls were noted (no. 242, faceted blow-platform, spall-removal bulbar face to right). Seven OLS (nos 228, 230, 237, 241). No. 240, A trench, was rolled as was an F trench specimen; a Main Area specimen had been made on old material.

11. *Chisels*. These are the usual *éclats écaillés*. OLS: one, dubious. Light patina, 5; average for site, 19 (no. 244 made on hinged tip of broad flake and probably including a graver blow). Seven quartz (no. 243).

12. *Transverse, not scraper-like*. Nos 245–7. Poor (a fine example of the true *petit tranchet*, only the second in N Jura, the first being Lealt Bay no. 255, has been found at the second Carn site).

13. *Perforators*. These are separated from beaked gravers by their double notching. No. 248, with fortuitous finger-hollow; the inverse notch-chip at the non-bulbar end, later, is perhaps natural damage. No. 249, a platform flake (most N Jura sites have one or two as perforators, adapted for the dipping and tapering of the last flaking scar): the tip is glossy and smooth. On no. 250 the thick bulb provides a finger rest, on no. 253 (only OLS) there is a well-made graver-like blunted rest. Nos 251–2. No. 254, almost unpatinated, has a *cran*-like steeply-trimmed basal end (cf nos 167–71); top of the gravels. No. 256, emphasis of existing point, base of small blade. No. 255, naturally-blunt edge (cf nos 240–1 and Lealt Bay no. 206). See also no. 260.

14. *Spatulates*. No. 258, OLS, unpatinated, basal-notch, and nos 257, 259.

15. *Scale-flaked*. No. 260, barely-patinated grey flint, trench G, in top of gravels; its original or intended shape is not clear; the arrow indicates post-fracture perforator-like edge-trimming (cf Lealt Bay).

N Jura typological comparisons

The microlith-makers' relics probably represent a fair period rather than one or two rapidly-succeeding occupations. These occupations had begun by *c* 6000 BC, when the eustatic rise (effective earlier at N Carn than at the other published sites) first forced the camps to move up onto the Main Area OLS, continued during the maximum stand phase – intercalated with the gravel-flinging storm-seas of the winters – but not certainly into the land-recovery period (again slower in horizontal effect at N Carn than at the other published sites).

Although the bulk of N Carn's tools do not parallel those at *Lussa Bay* (e.g. its diagnostic microliths, scrapers, blade content), nevertheless a few artefacts, some certainly found in the OLS, are comparable; in particular these are nos 4, 8, 9, 13, 47, 49. Gravers nos 228–9 also have a primitive aspect. These then suggest themselves as N Carn's earliest tools, with at least those in the OLS being associable with the stone setting's date of *c* 6000 BC. Correspondingly, common forms with Lussa Bay were probably in use late at the latter site; and the typical Phase 1B trapeze is likely to have ended before 6000 BC, since at N Carn this dating is associated with a Phase 2 trapeze.

Lealt Bay, at the same height as N Carn, had one tool in particular, the proto-triangle no. 90, suggestive of the Lussa Bay collection; it probably represents a first, pre-maximum-stand occupation of the terrace and, typologically a little older than the typical 1B triangle, may then be well before 6000 BC in age.

Comparing now N Carn and *Lealt Bay* directly, some important 'Early' forms at the latter are lacking at the former, notably the large blunted bladelets, and also the larger and better-made of the triangles and crescents.

At the recent end of the sequence, there is an absence at N Carn of *Lussa River's* diagnostic features. These were proportionally twenty-four times as much quartz as flint as at Lealt Bay and at N Carn; the Oronsay 'Obanian' hammerstone, lacking at each; the dominance of *éclats écaillés*, four to three microliths, where Lealt Bay yielded 1 : 12 and N Carn 1 : 23; the final stage in the evolution of the microlithic rod (to a stout, square section), not definitely reached at either site.

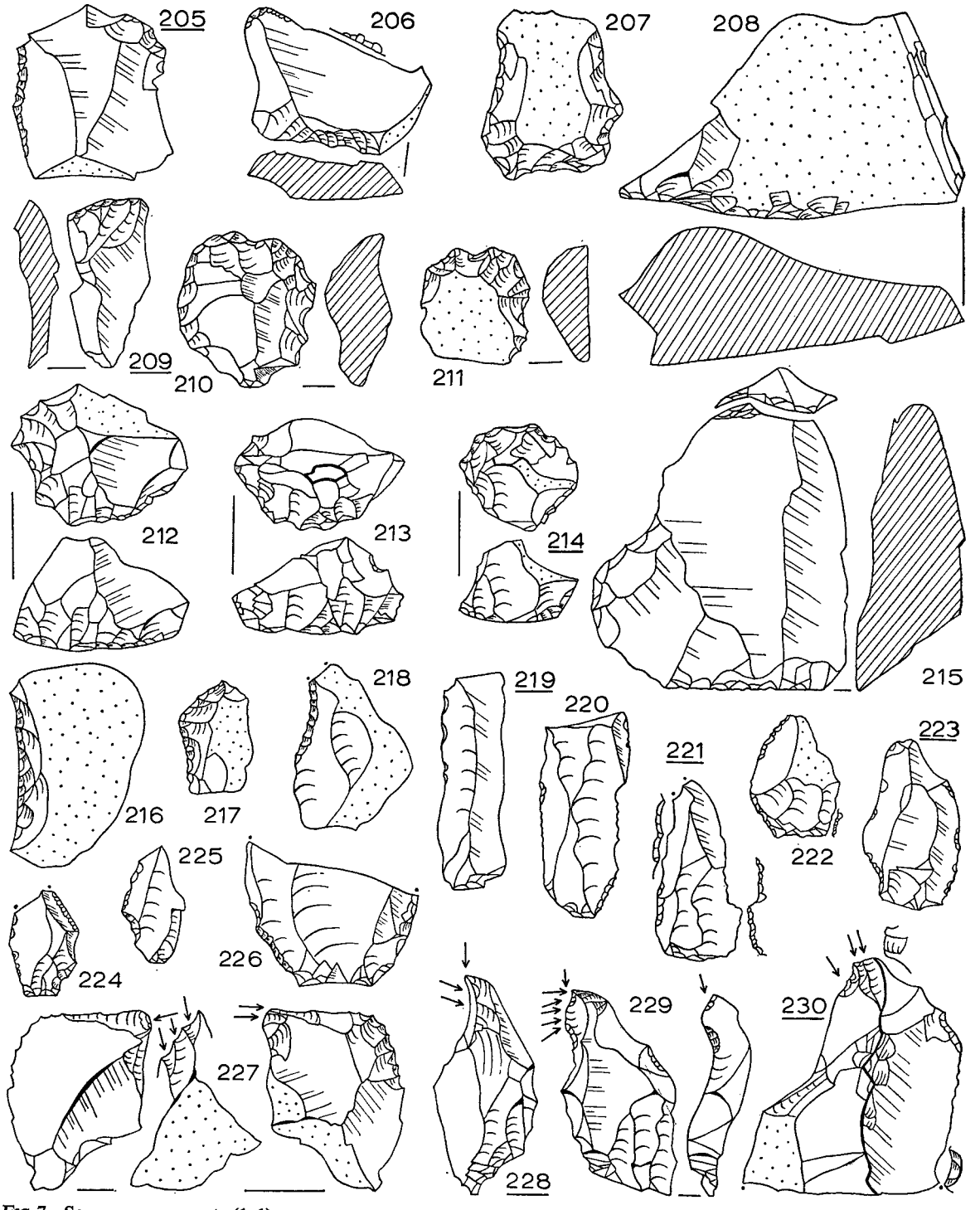

FIG 7 Scrapers, gravers etc (1:1)

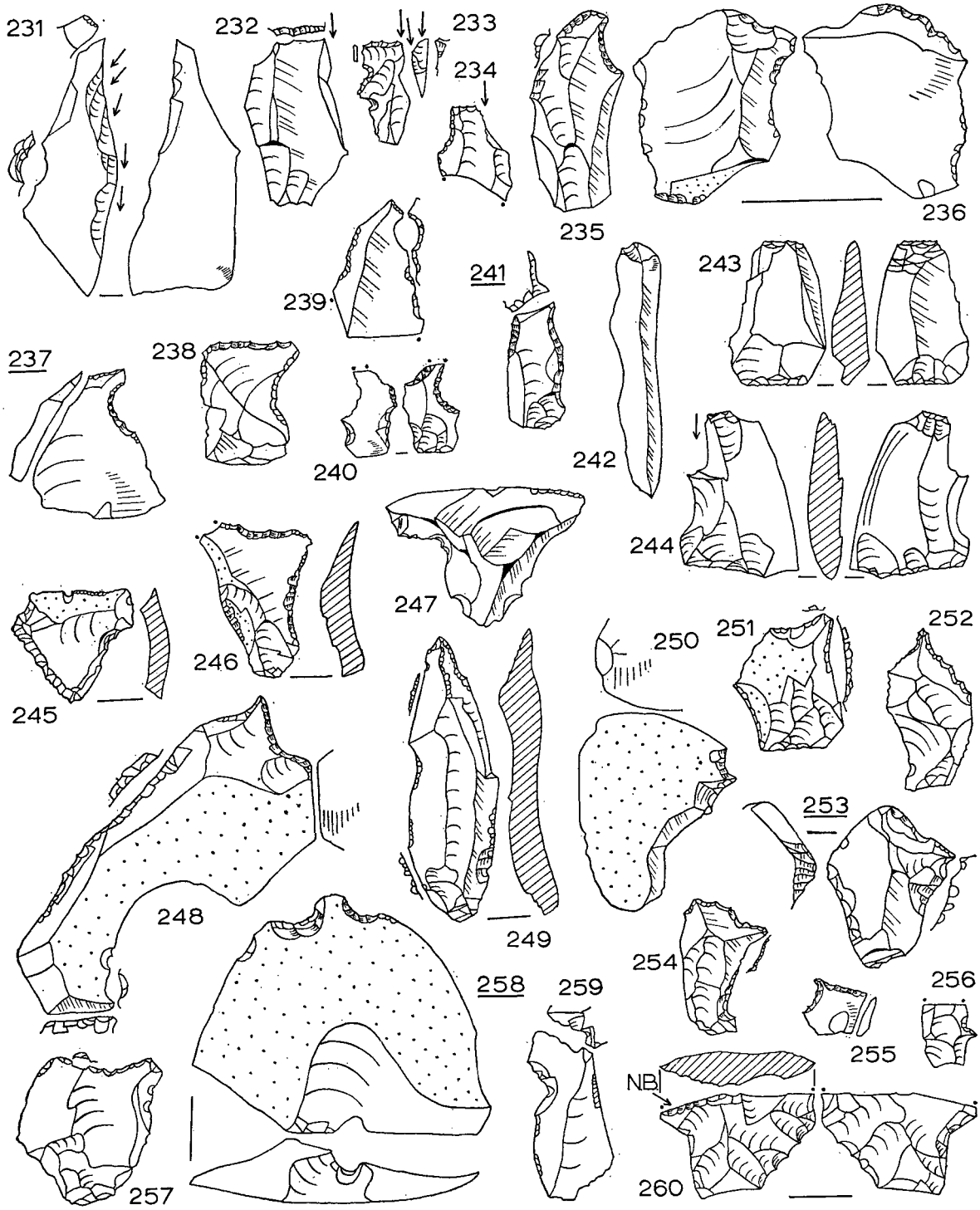

FIG 8 Gravers, perforators etc (1:1 except no. 260 at 2:1)

It seems clear, then, that N Carn is to be grouped with Lealt Bay, both sites' main occupations being of maximum stand date, which is to say of locally intermediate age, Phase 2. Quite probably each of the two sites represents numerous intermittent occupations which will first need identifying individually and then intercalating in order to provide the sequence *within* this stage; it is early yet to do more than describe the evidence.

Other terms now proposed are 'Lealt' and 'Carn' for the respective oblique and right-angle microlithic quadrilateral facies, since the full range and some of the forms have not been reported elsewhere. It is noted that the 'Lealt facies' occurs strongly at both sites and at Lussa River. But the 'Carn facies' was not at Lussa River and only feebly at Lealt Bay, seemingly; so that it was perhaps a short-lived horizontal variant.

ACKNOWLEDGMENTS

Dr S E Durno once more kindly carried out the pollen analyses, Mr R E Binns the pumice analysis, Mr G H Collins the identification of the red ochre pieces. Dr A E A Werner, Research Laboratory, British Museum, is thanked for examining the microlith with possible red ochre on the tip, Mr D M Henderson, Regius Keeper of the Royal Botanic Garden, Edinburgh, for the sclerotia determination, Dr H McKerrell, National Museum of Antiquities of Scotland, for the soil report. The C14 assays were carried out by the Scottish Universities Research and Reactor Centre, East Kilbride, Glasgow. Mr and Mrs A R Nelson were again kind enough to allow excavations on their land. Susan Mercer has as usual shared in the work throughout. The excavation took place, whilst camping under extremes of insect, rain and wind harassment, during August–October 1968.

APPENDIX 1

Microlith with Red Matter on the Tip

Dr A E A Werner reported that microscopic examination indicated that the red matter could well be ochre. Analyses would have absorbed the whole of it and so was not done.

APPENDIX 2

Piece of Dark Grey Pumice

by R E Binns

Tromsø Museum, Norway

The method of study was as for the Lussa River specimen. 'Colour of glass fragments in ordinary light is medium brown. The refractive index is $1{\cdot}520 \pm 0{\cdot}001$. Some fragments contain many minute inclusions. Crystallites and microlites are common. Plagioclase feldspar is common as microlites and larger crystals. Its refractive index ranges from 1·532 to 1·548 (both $\pm 0{\cdot}002$) and indicates an unusually broad range in composition (only a little less than that of the Lussa River specimen) including albite, oligoclase and andesine varieties. Most of the fragments appear to be oligoclase. One feldspar fragment has a lower refractive index than of albite. It is probably anorthoclase, although the characteristic twins of that mineral are very indistinct. A little clinopyroxene and hornblende are observed'.

Conclusions were as for the Lussa River specimen (Mercer 1971, 30–1): dacitic, probably from Hekla *c* 6700 radiocarbon years ago, less probably *c* 4000 radiocarbon years ago. See also Binns 1972.

APPENDIX 3

Lead-shot Fungus

Mr Henderson added the following note to the *Cenococcum graniforme* determination: 'The resting bodies of sclerotia of this fungus are hard spherical objects 1–2 mm diameter which lie apparently unattached to any plant in the soil. However, the fungus is known to be involved in forming the mycorrhiza of a wide range of plants. The relation of *Cenococcum* to other fungi is however unknown – one suspects that it may have other stages in the life cycle or be derived from fungi with other stages. A chance showing of the *Cenococcum* from Jura to a mycological friend at Kew suggested that *Cenococcum* may be related to the genus *Mycosphaerella* which forms *Cenococcum*-like bodies in culture. This possibility is now being examined. . . .'

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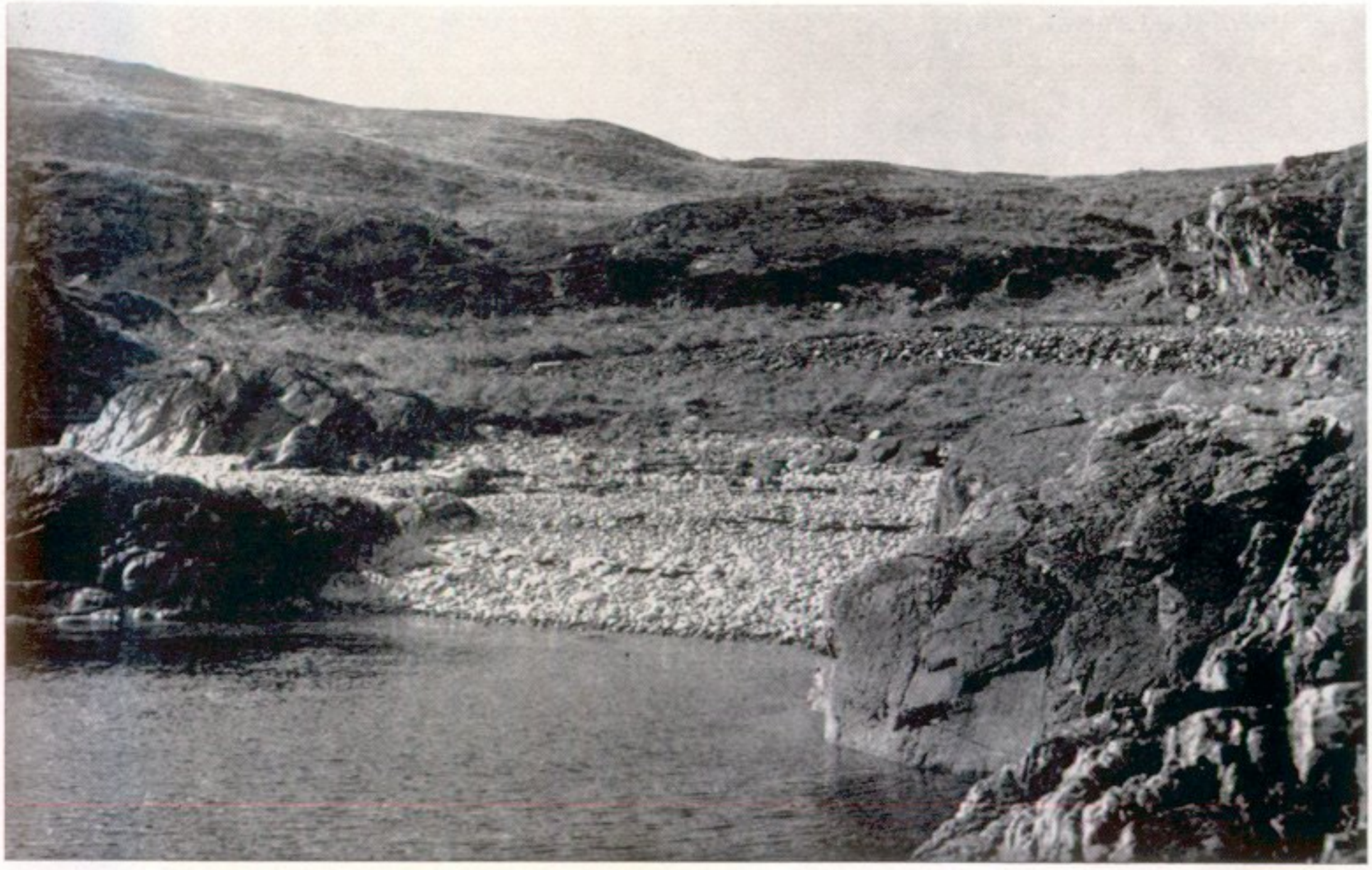
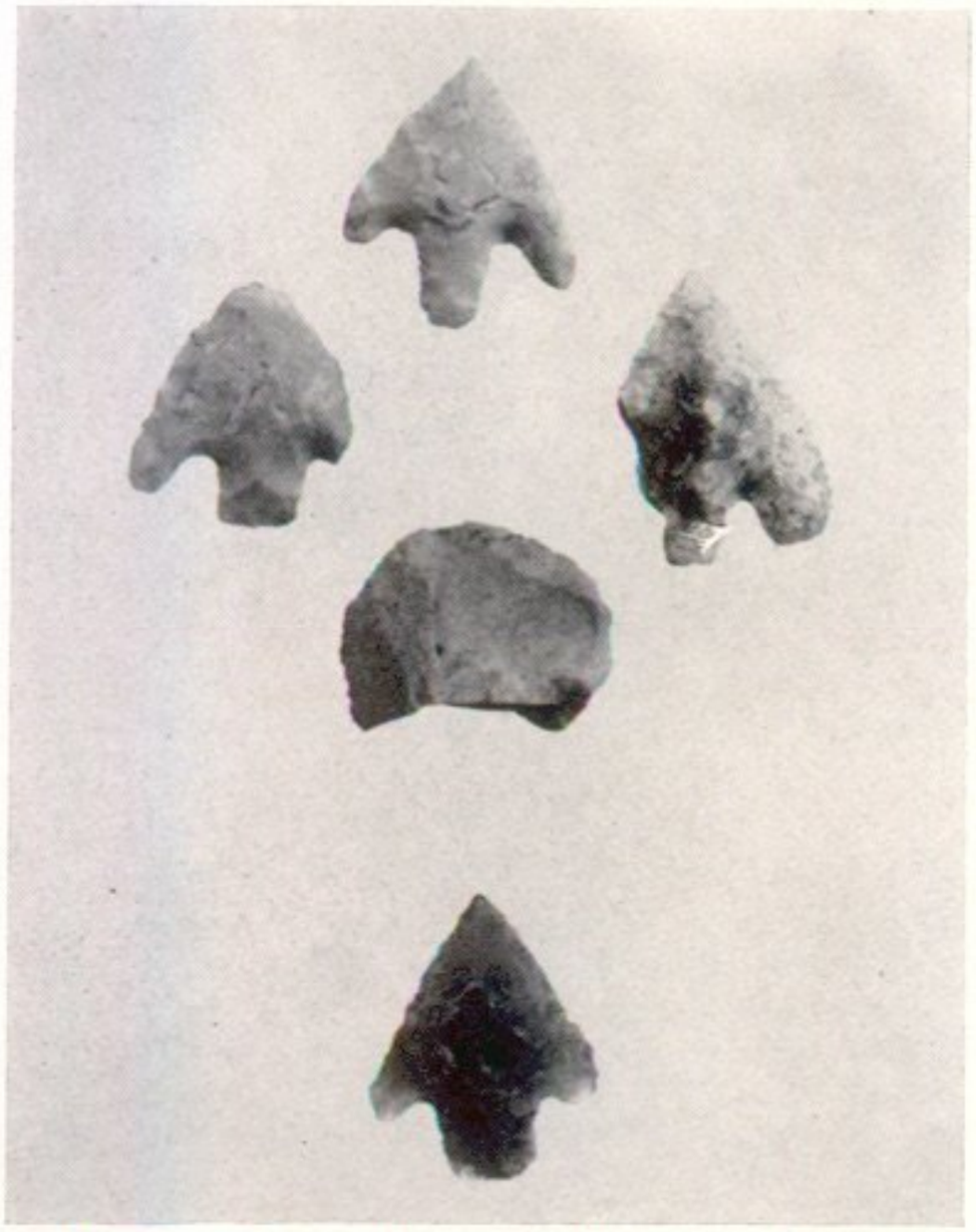


a N Carn, general view



b Bronze Age artefacts (trench F above, E below)