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AN ANALYSIS OF THE KNAPPED IMPLEMENTS FROM EIGHT *ELOUERA* INDUSTRY STATIONS ON THE SOUTH COAST OF NEW SOUTH WALES.

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(Figures 1-103.)

This study consists of an analysis of 5,716 knapped stone implements in the Australian Museum collection from the eight most important kitchen-middens along the south coast of New South Wales (Fig. 1), from Bondi to Merimbula, a distance of approximately two hundred miles. It is the second of a series of similar investigations on sites in this State from which reasonably complete collections are available. It is considered that any deficiencies in the collection from any one of the sites are covered by material from the remainder; thus, for example, cores and blocks are well represented from Port Kembla, *elouera* from Bellambi, and *bondi* points from a number of sites. That the collection is fully representative is indicated by the fact that it was gathered by a large number of collectors, the principal contributors including the Rev. A. J. Barrett, Miss Elsie Bramell, Messrs. C. Greenwell, F. D. McCarthy, O. B. Pryor and J. S. Rolfe, and the late R. Etheridge, Jr., A. E. Ivatt, W. W. Thorpe, and T. Whitelegge, from 1900 to date.

Analyses have been made by McCarthy (1941*a*) of a uniface pebble industry at Yamba and Crescent Head, Tindale and Noone (1941) of a flint hoard from Eucla, Western Australia, and N. A. and H. V. V. Noone (1940) of quartz implements from Ceylon. In this study the nomenclature used is descriptive, as far as possible, although native names are accepted in some cases, because they are non-committal and form a convenient terminology. The classification is based on the technique employed, and

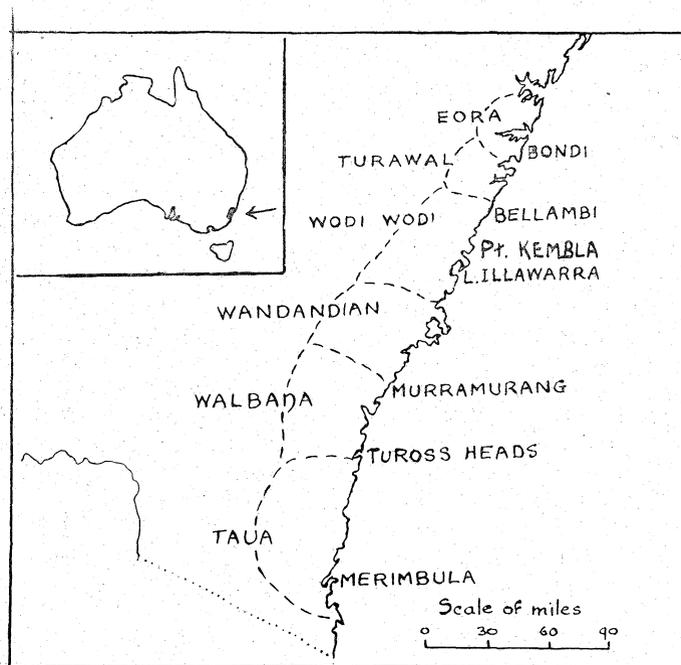


Fig. 1.—Map of the south coast of New South Wales, showing stations and tribes.

on the form and function of the implements. For want of any stratigraphical grouping, the specimens are treated as a whole, although it is probable that their production extends over a considerable period of time, during which there were changes both in the native population and in their methods of working stone. The aim of this analysis is to reveal the range of artefacts in the *elouera* industry, their nature, function and relative importance. Similar studies on sites throughout Australia will serve to bring into prominence the main features and cultural relationships of Australian lithic cultures, and permit us to differentiate local developments.

Literature.

References in early literature are confined to such statements as "the spear is fashioned to a point with a flint-stone or oyster-shell". Hunter (1793, p. 452) said that, on the Nepean River, a piece of hard stone was fixed in gum on the end of the spear-thrower, brought to a sharp edge, and used for making spears, but the type of flake so mounted is not known. The Port Jackson and Botany Bay natives hafted a shell on the end of a spear-thrower or short stick, and with it pointed spears, removed oysters from the rocks, cut cicatrices on their bodies, and employed it for other purposes (Phillip, 1789, p. 79; Hunter, 1793, p. 34; Collins, 1804, p. 358). More than a century had elapsed before any detailed work on the coastal sites was carried out, when Whitelegge discovered the Bondi, Maroubra and other workshops in 1900; in 1907 Etheridge and Whitelegge described the sites and their contents. In 1927 Doak and Doyle described the Boat Harbour and Quibray middens at North Cronulla, but mentioned only a limited number of the artefacts present. Towle (1930, 1935) published two papers on the *elouera*, in which he was mainly concerned with demonstrating that it was a scraper tool and not a chipped-back knife, as Thorpe and others asserted, and that material was the dominant factor in the production of asymmetrical flakes on the south coast and symmetrical flakes on far west sites in New South Wales. In 1928 Thorpe described various knapped implements from the Newcastle district, and Miss L. D. Hall analysed the artefacts from Morna Point, her classification being based primarily on shape. During 1931 and 1932 Thorpe described uniface pebble implements, flakes, edge-ground axes and knives, *worimi*, *elouera*, fish-hook files, coroids, and blocks from coastal sites, and in 1931 Turner discussed the use of the *elouera*. In 1941 McCarthy described two uniface pebble sites on the north coast of New South Wales, and during 1940-42 mentioned various artefacts of the *elouera* industry.

Sites.

The eight sites dealt with in this paper are kitchen-middens situated among the dunes fringing ocean beaches. They consist of deposits up to two feet thick on the dunes; on the sloping sides of the dunes are the stones, artefacts, shells and bones eroded from the midden. The deposits are undulating, and extend in some instances to basins between the dunes. Details of these sites are as follow:

Bondi.—The midden extended the whole length of the back of the beach, but it is now covered by a concrete roadway and promenade. It is only a short distance from the eastern shore of Port Jackson.

North Cronulla.—Two middens, one at Boat Harbour, twenty chains square, at the north end of the ocean beach, and the other one mile away on the shore of Quibray Bay. The latter consists of several basins almost surrounded by large dunes, and covers many acres, but the dunes have now covered a large portion of the deposit. It has been fully described by Doak and Doyle (1927).

Bellambi.—An extensive midden about one-quarter of a mile long, situated beside a creek, and near a lagoon in a marsh behind the dunes. Etheridge and Whitelegge (1907) stated that it was the largest of the collecting grounds.

Port Kembla.—A large midden and a small one on the northern side of Redhead Point, which overlooks the Five Islands, and is fringed by a sheltered beach. There is a small midden on the adjacent beach to the north.

Lake Illawarra.—Two middens on the north and south sides of the channel flowing across the beach to the sea at Windang, and scattered patches of midden along Seven Mile Beach extending northward to Redhead Point.

Tuross Heads.—A midden covering about two acres on a headland between Tuross and Coilah Lakes.

Murramarang.—A main deposit and several scattered patches of midden, almost as extensive as the Bellambi station.

Merimbula.—A workshop on a dune ridge overlooking the beach and the lagoon. It covers about one acre, and on it are an immense number of unused water-worn pebbles.

Normal aboriginal skeletons have been obtained at most of these sites.

In addition to these eight sites there are, throughout the area, numerous smaller middens and workshops on which the same types of artefacts occur.

Materials.

A wide range of siliceous materials (Harper, 1915) is represented, including chert, chalcedony, quartz, flint, jasper, latite, slate, quartzite, and porphyry, and silicified wood, tuffs, shales, grits, and Tertiary sands. From Bondi to Lake Illawarra the materials are strikingly varied, silicified wood being abundant at Bellambi, but from Tuross Heads to Merimbula coarser porphyry and silicified sands predominate. The sources of these materials are too numerous to be localized. Igneous intrusions are common throughout the area, and have been the cause of the formation of a widely varied group of metamorphic rocks suitable for knapping. There are porphyritic flows at Durras and Murramarang, and this material was commonly used on the far south coast. Deposits of water-worn pebbles occur in some localities, as at Nerriga, and form pebble beaches at Scarborough and Murramarang. Silicified wood occurs at Ulladulla and at the entrance to the Minnamurra River, among other localities. No doubt some local outcrops of stone were favoured for making artefacts, and stone from them traded between groups of natives, because a considerable proportion of the materials has been brought to most of the kitchen-middens along the south coast.

Technique.

The cores display convergent and irregular knapping, and parallel knapping is unusual. On the whole, the materials are so intractable that flakes were struck off the cores wherever possible, and the knapping face is irregular on a large number of globular and polyhedral specimens, but prismatic cores are well represented. A more or less flat striking platform was prepared by the removal of one or more flakes of the crust surface, and cores with one striking platform are in the majority. The knapping face is at an angle varying from 50° to 90° to the striking platform. On the edge of the latter are one or more projecting lips, which may be pointed, straight or rounded, and from each lip a ridge extends down the core between two flake scars. The knappers utilized these ridges in striking blades from the cores. The hammer blow was delivered haphazardly on or behind the lip—that is, anywhere from one side of it to the other on the striking platform of the core, as a study of the impact spots on the Bellambi *elouera* demonstrates: centre of butt, 102; thick margin side of butt, 90; thin margin side of butt, 19; thick lateral margin, 14; uncertain, 32.

Two techniques were employed in knapping. In the first method (Figs. 2*a-b*) the top of the flake scars, right along the knapping face of the core, was trimmed to eliminate the lips and projections and to enable the blow to be struck more easily on the body of the core; flakes from these cores have a plain platform, and the top of their outer face is trimmed. In the second method (Figs. 3*a-b*) the curved edges of the flake scars were delicately trimmed on the margin of the striking platform, and flakes from these cores have a faceted butt. The blow was usually struck behind a ridge on the knapping face, so that the outer margin of the butt platform of the flakes comprises the trimmed top edge of two flake scars separated by a ridge; the trimming extends to

long narrow spalls right across the butt platform of flakes and blades. Flakes produced by both techniques occur in all groups of knapped implements, including the *elouera* and *bondi* points.

The bulk of the flakes are asymmetrical, owing largely to the refractory materials, with odd symmetrical flakes and numerous irregular scraps; the majority have a plain butt, but the faceted butt is common. The inner platform angle of the flakes and blades varies from 90° to 130°, there being no consistency of any intermediate angle.

In knapping, the cores were either held in the hand, as the use of discoid and pebble cores indicates, or placed on an anvil stone. The cores demonstrate a lack of ability by the knappers to prepare them to produce long or symmetrical flakes and blades, except in the production of *bondi* points. Symmetrical flakes are common at Merimbula, where comparatively tractable materials were used, and in this connection it is interesting to note the scarcity of *elouera* at this site. Large flakes, especially those of the slice kind, are common at Tuross Heads, Murramarang, and Merimbula, where porphyry and silicified sands in large masses were available, in contrast to the smaller pebble cores and flake implements found between Lake Illawarra and Bondi. The *elouera* industry belongs to the blade group, as its characteristic implements, *elouera* and *bondi* points, indicate. Generally speaking, the knapper's aim was to strike from the core a blade suitable for use as an *elouera* or *bondi* point, the unsuitable flakes being used for diverse purposes, such as knives, burinates, end and concave scrapers, flake fabricators, and so on.

Towle (1935, pp. 124, 127-8, fig. 3) has asserted that the impact spot on the majority of *elouera* is not on the centre of the butt, but in our series the central impacts are approximately equal to those towards the thick or thin margins. The blow was delivered from (a) the thick side towards the middle or thin margin, (b) the thin side towards the middle and thick margin (a minority), or (c) through the centre of the butt towards the thin margin, medially, or towards the thick margin. Fourteen specimens have the impact spot along the thick lateral margin and are only suitable flakes picked out from the mass.

Trimming or secondary working was done by several methods. A direct-percussion technique was apparently employed for the bulk of the knapped implements, producing an even edge (apart from the serrated), generally worked from the cleavage or inner face. The trimming on the *elouera*, *bondi* points, and microliths is of a similar nature, although it varies on the *elouera* to a cruder percussion type of trimming. Pressure chipping must have been employed in fashioning the *bondi* points, on which the distal end is so fragile. The flake fabricators (*outils écaillés*), hitherto termed "button" flakes, were most probably employed for trimming and retouching, either held in the hand, or, to judge by the large number of the punch-like variety, placed between the hammer-stone and the implement being trimmed. McCarthy (1941c, p. 263) has already raised this point, while Malan (1942, p. 119) has suggested that they were fabricators in the Modderpoort industry of South Africa. On the south coast of New South Wales these flake fabricators are most abundant at the sites—Quibray and Bellambi—where *elouera* and *bondi* points are most plentiful, and it is possible that the trimming on the two latter implements was done with them.

Artefacts.

The artefacts dealt with in this paper comprise 489 cores, 176 core implements, 184 blocks, 2,142 normal flake and blade implements including 677 *elouera*, 2,340 *bondi* points, 142 geometrical microliths, 33 slices, 210 uniface pebble implements, and 2 biface pebble implements. Each group and the characters of several of the conventionalized types are analysed in Tables I-VII. It is realized that the figures have no absolute meaning, because the classification of some specimens is necessarily arbitrary, but it is believed that the ratios of artefacts revealed by the tables are reasonably accurate, and will be found to hold good. The analysis demonstrates the wide variety of tools in this industry, and the adequacy of the collection.

I. COROID IMPLEMENTS.

	Bondi.	North Cronulla.	Bellambi.	Port Kembla.	Lake Illawarra.	Murrumbidgee.	Thross Heads.	Merimbula.	Sub-totals.	Totals.
Cores :										
One striking platform ..	—	10	67	98	7	1	17	19	219	260
Pebble	—	3	26	5	—	7	—	—	41	
Two striking platforms :										
Opposite	3	9	20	34	9	1	4	6	86	192
Right angles	—	6	23	35	1	3	11	8	87	
Discoid	—	1	4	—	2	2	6	4	19	
Irregular	—	—	8	23	—	1	4	1	—	
										489
Core implements :										
Crown, straight-convex ..	—	6	1	16	1	2	1	2	29	28
Keeled, straight-convex ..	—	—	8	10	1	5	2	—	28	
Concave	—	—	14	29	—	—	3	6	52	30
Nosed	—	—	5	10	—	3	2	10	30	
Burinate	—	1	1	—	—	—	—	—	2	37
Biface discoids	—	8	3	6	5	4	1	8	37	
										176

II. UNIFACE PEBBLE IMPLEMENTS.

End :										
Carefully trimmed ..	—	1	8	4	1	1	—	—	15	56
Crudely trimmed ..	—	3	24	15	3	10	1	—	56	
Lateral	—	2	17	10	2	9	1	—	41	21
End and lateral :										
Carefully trimmed ..	—	—	14	1	4	2	—	—	21	17
Crudely trimmed ..	—	—	6	4	2	5	—	1	17	
Sumatra type	—	—	3	—	4	10	3	—	20	40
Split pebble	—	4	20	1	4	5	5	—	40	
										210

III. BLOCKS.

Crown :										
Straight-convex	2	5	6	6	1	3	6	2	31	85
Concave	4	3	4	10	—	2	10	4	37	
Nosed	—	—	5	6	1	2	2	1	17	
Keeled :										
Straight-convex	—	3	16	6	2	2	1	2	32	73
Concave	—	2	4	3	—	1	2	9	21	
Nosed	—	—	4	5	—	4	—	7	20	
Worimi	—	1	—	—	1	3	7	2	14	(63)
Karta	—	5	10	8	1	9	20	9	63	
Burinate	—	—	—	—	—	1	—	—	1	
End	—	—	3	—	3	—	2	3	11	26
										184

IV. SLICE IMPLEMENTS.

One straight to convex trimmed edge	—	—	3	—	2	9	2	2	18	33
Double side	—	—	—	—	—	1	—	1	2	
Concave and nosed	—	1	1	—	1	6	1	—	10	
Utilized	—	—	—	—	2	1	—	—	3	

V. NORMAL FLAKE AND BLADE IMPLEMENTS.

	Bondi.	North Cronulla.	Bellambi.	Port Kembla.	Lake Illawarra.	Murrumbidgee.	Turross Heads.	Merimbula.	Sub-totals.	Totals.
<i>Elouera</i> , type 1	4	27	104	65	34	43	2	9	288	
2	1	8	57	19	15	14	1	4	119	
3	4	6	94	87	43	32	—	4	270	677
Scrapers :										
Side	7	42	27	32	43	22	13	21	207	
Side and end	—	6	4	5	8	4	—	4	31	
Double side	—	18	6	6	8	3	6	1	48	
Double side and end	—	2	—	6	1	—	—	19	28	314
End :										
Straight	2	5	3	1	2	4	3	10	30	
Convex	11	16	13	4	6	6	5	12	73	103
Butt-end	27	3	12	—	10	5	4	13	66	
Concave	1	3	7	5	4	4	5	5	34	104
Concave :										
Lateral	3	8	20	12	2	15	18	54	132	
End	1	2	8	1	4	4	5	8	33	165
Nosed	—	2	15	5	3	8	4	32	—	69
Utilized	2	5	17	6	5	9	—	10	—	54
Knives	10	40	63	40	33	18	29	17	250	
Serrated	2	11	22	17	18	22	9	8	109	359
Smoothed	1	6	6	5	5	—	—	—	—	23
Piercers	1	2	8	—	1	5	10	6	—	33
Burinate, marginal :										
Vertical	3	4	3	1	1	1	1	—	14	
Transverse	1	3	2	2	1	2	1	—	12	
End	—	—	—	—	—	—	1	—	1	
Scaled	—	4	1	1	6	1	—	—	13	40
Flake fabricators :										
1 margin	1	10	13	9	6	—	—	—	39	
1 margin and 1 end	—	5	1	—	3	1	—	—	10	
2 margins	—	10	5	12	1	—	2	—	30	
2 margins and 1 end	—	20	11	—	—	—	1	—	32	
4 margins	2	5	—	2	—	—	—	—	9	
Punch-type	2	22	21	23	8	5	4	—	85	205
										2,142

VI. BONDI POINTS.

<i>Type :</i>										
Narrow segment	273	523	52	24	279	165	98	12	1,426	
Broad segment	173	285	35	13	146	155	92	15	914	2,340
<i>Conformation :</i>										
Left	264	483	55	22	260	201	116	16	1,417	
Right	176	325	32	16	164	125	74	11	923	2,340
<i>Partly blunted :</i>										
1 margin	44	59	18	9	52	37	19	9	246	
1 margin and butt	13	15	4	—	5	19	12	1	69	
1 margin and faceted butt	22	34	12	3	24	37	28	6	166	
<i>Fully blunted :</i>										
1 margin, 1 edge	202	407	32	15	237	154	94	6	1,147	
1 margin, 2 edges	115	259	18	7	89	73	33	5	599	
2 margins	24	38	3	2	20	4	3	1	95	
3 edges	3	8	—	1	4	1	1	—	18	2,340
<i>Point :</i>										
Trimmed all round	25	51	8	1	11	3	4	—	(101)	
<i>Butt :</i>										
Plain	214	523	63	25	266	164	85	13	1,363	
Faceted	55	101	6	4	46	26	28	6	271	

VI. BONDI POINTS.—Continued.

	Bondi.	North Cronulla.	Bellambi.	Port Kembla.	Lake Illawarra.	Murrumbidgee.	Turross Heads.	Merimbula.	Sub-totals.	Totals.
<i>Butt blunting:</i>										
Rounded, 1 edge	96	100	8	6	77	60	42	3	392	
Rounded, 2 edges	78	74	7	2	35	45	20	4	265	
Straight	4	8	1	—	3	2	10	1	29	2,340
<i>Thin margin:</i>										
Used	74	81	8	5	60	22	23	2	(275)	
<i>Size:</i>										
0-2 cm.	193	260	19	3	80	29	17	6	607	
2-3 „	213	459	53	20	255	174	89	12	1,275	
3-4 „	30	80	13	12	68	101	74	5	383	
4-5 „	4	9	2	3	21	18	10	4	71	
5-6 „	—	—	—	—	1	2	—	—	3	
6-7 „	—	—	—	—	—	1	—	—	1	2,340

VII. MICROLITHIC.

<i>Angular:</i>										
Trapezoid	4	5	—	3	5	2	1	2	22	
Crescent	6	29	3	—	7	1	6	6	58	
Equilateral	1	7	1	—	—	—	2	—	11	
Isosceles	—	10	—	—	—	—	1	1	12	
Scalene	1	6	2	—	2	9	4	2	26	
Rectangular segment	—	1	1	—	—	—	—	—	2	
Discoid	—	8	2	—	1	—	—	—	11	142
<i>Micro lithic size (included in flake and blade totals):</i>										
Abrupt trimmed blades ..	4	16	2	—	4	—	—	—	26	
<i>Elouera</i>	—	9	16	17	6	—	—	—	48	
<i>Scrapers:</i>										
Side	4	13	3	8	12	1	—	4	45	
Side and end	1	8	—	2	3	—	—	1	15	
Double side	—	8	4	—	1	—	—	—	13	
End (thumbnail)	17	20	14	1	4	2	1	5	64	
Butt end	11	—	—	—	—	—	2	3	16	
Concave and nosed	5	3	2	4	1	—	2	5	20	
Utilized	—	—	8	—	—	—	—	—	8	
Knives and serrated	1	9	15	8	8	—	2	—	44	
Piercers	—	—	1	—	—	—	—	—	1	
Burinate	—	6	2	2	4	1	2	1	18	
<i>Battered:</i>										
Punch	14	19	6	3	2	1	—	—	46	
Others	4	20	4	9	3	—	—	—	45	409

Coroid Implements.

Cores.

The cores are formless on the whole, and have been classified according to the number of striking platforms.

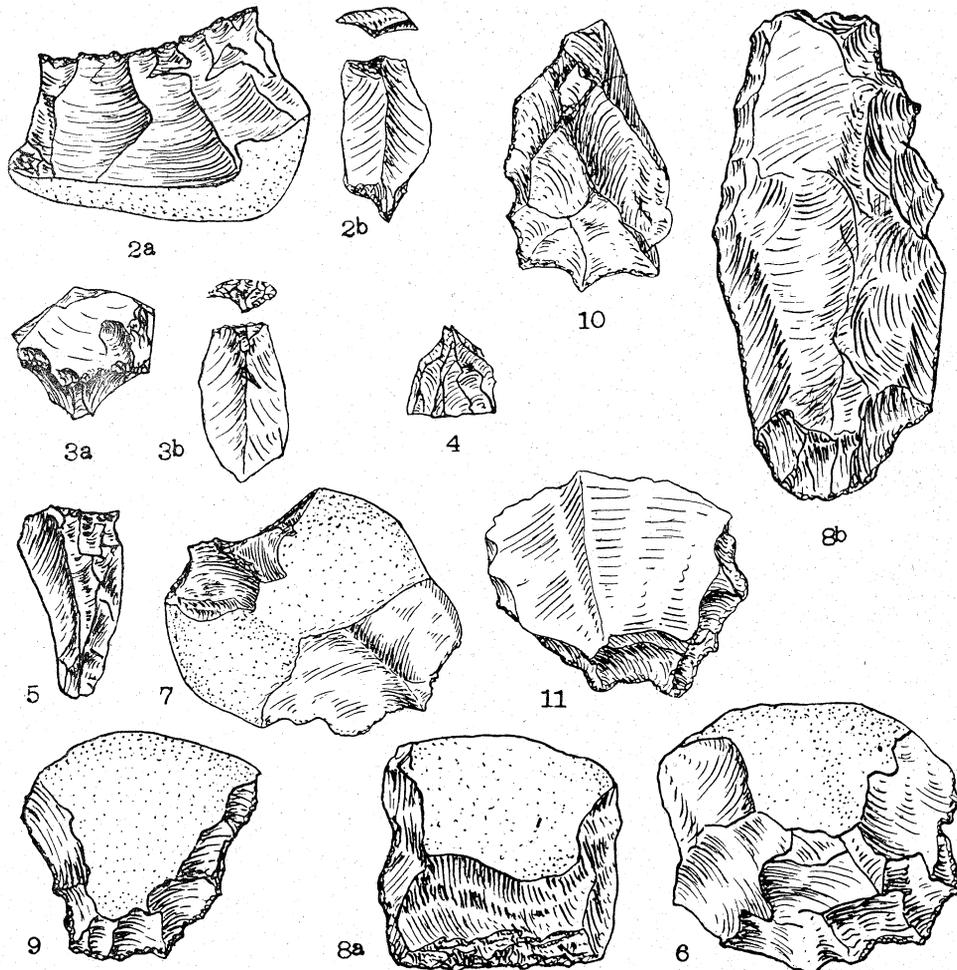
1. *One striking platform* (Figs. 2a, 32).—The distal end is either rounded pebble surface, fractured and uneven, or, on a minority, has a sharp unused edge at the end of two knapping faces.¹ On some examples it is battered, indicating that the core has either been placed on an anvil stone or used as a fabricator. The shape of the striking platform varies from circular to oval, triangular to rectangular, and its edge from straight to convex. The cores range from prismatic to irregular forms, the knapping

¹ Along this edge on a few cores flakes have been struck from both knapping faces in a skilful manner.

face and striking platform being the essential features, and a conventionalized shape, such as the conical type, of no importance. There are only six examples of the conical type in the collection, but it is more common as a pyramidal core (Fig. 4) among the microliths, there being fifteen specimens of the latter from the sites between Bondi and Lake Illawarra.

2. *Two striking platforms*.—(a) *At opposite ends*: A prismatic type (Fig. 5) in which a flake has been removed, or a flat crust surface utilized, at each end to form the opposed striking platforms. The majority are knapped longitudinally, others transversely.

(b) *At right angles*: One striking platform is made in the normal manner, and a negative flake scar on the edge of the core forms the second striking platform at right angles to the first.



Figs. 2a-8b.—2a, Core with plain striking platform, and trimming along top edge of knapping face. E.36660, Bellambi. 2b, Flake with plain butt struck from these cores. E.36660, Bellambi. 3a, Core with trimming on edge of striking platform. E.50404, Singleton. 3b, Flake with faceted butt struck from these cores. E.50280, Lake Illawarra. 4, Pyramidal core of microlithic size. E.43874, Quibray. 5, Prismatic core. E.41662, Tuross Heads. 6, Core with semi-discoidal edge knapped from both surfaces. E.43060, Bellambi. 7, Core, with burinate-like projection. E.45098, Bellambi. 8a-b, Uniface pebble implements. a, Trimmed on both ends and side. E.41250, Redhead, Port Kembla. b, Split-pebble, tranchet type. E.43385, Seven-Mile Beach, Lake Illawarra. 9, Block, crown, nosed. E.36742, Bellambi. 10, Block, keeled, concave and nosed, tranchet-shape. E.39107, Bellambi. 11, Block, keeled, nosed. E.38836, Murramarang. $\frac{2}{3}$ natural size.

(c) *Discoidal*: This type (Fig. 6) has a discoidal or semi-discoidal shape and margin, and, along the latter, flakes have been knapped alternately from both surfaces. It is an uncommon type in the industry.

3. *Pebble cores*.—Flattened oval pebbles knapped at one end, or on a lateral margin. One variety has one striking platform and a knapping face, another is knapped from both surfaces alternately; thus the pebble core combines the characteristics of the single-platform and discoid types. The edge is often sinuous, and some have undoubtedly been used as implements, one from Quibray having an even convex edge showing obvious signs of use. Six from Murramarang are laterals, and one an end type with a carefully trimmed striking platform. The Port Kembla series indicate that they are primarily cores. The materials generally are coarser than those of the other cores. It should be pointed out that, although most of the cores were originally water-worn pebbles, and the majority are lumpy in form, this variety was treated in a special way by the knappers and is therefore differentiated as a pebble core.

Remarks.—Generally speaking, the cores are up to 14 cm. long, and of irregular shape. Prismatic examples are smaller on the average, being up to 8 cm., the discoids up to 9 cm., and the pebble type up to 15 cm. long.

There is a close relationship between the sizes of the cores and the number of points at various sites; thus at Quibray a large percentage of the cores are small and suitable for producing the *bondi* points so abundant at this site, while at Port Kembla the cores are larger on the average and points are scarce.

The tables show that cores with single striking platform were preferred, and their total number is slightly greater than those with two or more platforms. Discoid and conical cores are rare, but pebble cores are common. Tortoise cores are absent.

Cores used as implements.—These implements comprise two main groups, the crown and the keeled or carinate, each of which has been subdivided according to method of use into three varieties with straight to convex working edge, concave, or concave and "nosed". Table I shows that a large number of the core nuclei were in common use as steep and slope-faced scrapers and choppers, either on one lateral margin, end and lateral margins, or on both lateral margins. There are few coroids apart from these nuclei and all have been dealt with as one series. The working edge is often step-chipped and may show considerable evidence of use.

A large number of the core implements are keeled, especially those with a concave edge on a step-face. Two specimens are of the tranchet type, with a median ridge, trimmed lateral margins and end; one from Port Kembla is 7 cm., and one from Murramarang is 12 cm. in length.

The concave-edged core implements form a most serviceable set of tools for shaping curved surfaces, because of the strong edge supported by the body of the core in use. This also applies to the "nose", which is stouter and stronger than on the flakes. The concaves range from .75 cm. to 2 cm. in width, although the majority are about 1 cm. wide. Double and multiple concaves separated by untrimmed keeled projections are common. Some of the concaves are worked back under the edge of the knapping face on the core. Edges with a series of small notches form one or more margins of some examples. The exceptionally large number of concave coroids from Port Kembla may be explained by the excellent series of coroids represented in the collection from this site.

One specimen from Tuross Heads is a small conical core, with a number of deep and shallow concaves separated by trimmed "noses". One interesting type has its distal end in the form of a rounded "nose" without concaves on each side. Among the specimens from Port Kembla one has a rounded face and edge 2 cm. wide, projecting 2 cm.; one has a straight edge, 1.25 cm. wide, projecting sharply; one has a similar edge worked back considerably by use, and one has a curved lip 1.5 cm. wide. Examples from other sites bear similar projecting working edges (Fig. 7) suitable for graving, which are closely related to the burinate edge. In size they have a similar range to the cores.

Pebble Implements.

1. *Biface*.—Only two examples, one from North Cronulla, 17 cm. long, trimmed along both lateral margins and one end, with anvil marks on one surface, and one from Bellambi, 7 cm. long, of a similar type, but much weathered on one surface. They are probably axe-blanks.

2. *Uniface*.—Although these are classified in the same way as the Yamba and Crescent Head series (McCarthy, 1941*a*), a distinction has been made between the carefully trimmed and crudely flaked examples in each group, the respective numbers of which are shown in Table II. The crudely flaked examples are probably choppers, and they are characterized by a thick steep or slope face, and a working edge which may be from straight to convex (on the majority), notched, concave, or nosed. The carefully trimmed ones appear to be *sumatras* in the making, although they were no doubt used as partially finished tools; many of them are thinner than the crudely flaked variety and are, therefore, scrapers rather than choppers. Features worth noting on examples of the various groups are as follows:

(*a*) *Working edge on one lateral margin*.—One from Tuross Heads is trimmed partly along one edge, and partly along the other edge, of the one margin.

(*b*) *Working edge on one end*.—The natural outline is preserved on the majority of the specimens. One from Bellambi has two straight lateral margins meeting in a point at the end. A large example from Bellambi is a blackish-grey pebble, with a wide concave in the middle of the trimmed end, and a straight edge on each side separated from the concave by an untrimmed peak. It is 17.5 cm. long, and was figured by Thorpe (1932, pl. xxxi, fig. 6).

(*c*) *Working edge on one end and on one or both lateral margins*.—The carefully trimmed unilateral and bilateral examples strongly suggest stages in the making of a *sumatra*. In the crudely flaked series three have a semi-discoid edge, steep face, and rounded noses wider than long; they are from 6 to 9 cm. long. One (Fig. 8*a*) from Port Kembla is thick and steep-faced, has two trimmed ends at right angles to the front marginal edge; the three margins are heavily worked and slightly concave, and it is 7 × 6 × 4 cm.

(*d*) *Split pebbles trimmed on edge of cleavage face*.—Thorpe (1932, pl. xxx, fig. 2) has figured a large pebble, 22 cm. long, from which a slice has been removed over two-thirds of its surface, which illustrates well the split-pebble or quartering technique. The impact spot may be on one end (twelve from Bellambi) or on a lateral margin (six from Bellambi). The edge trimming is slight on most specimens, and is on one end, lateral margin, or end and lateral margins as with the core type of uniface pebble implements; one specimen from Bellambi, 13 cm. long, is trimmed all round its periphery to form a *sumatra*, but this variety is rare among the split-pebble implements. A characteristic feature of the group is the extensive, flattish cleavage surface in contrast to the worked, convex surface of the true *sumatra*. An unusual pick-like example (Fig. 8*b*), with a convex blade at the distal end, was found on Seven Mile Beach.

One from Quibray has two trimmed lateral margins, and another a convex edge at each end. One from Murramarang has slight polishing or smoothing from use on both faces of the working edge. Concaves and "noses" appear on several specimens.

(*e*) *Sumatra-type*.—All oval in shape, and a small series in size. One from Lake Illawarra entrance is 21 cm. long, and is the largest of the series. Most of them are carefully trimmed.

Remarks.—Concave and projecting convex edges are common on the uniface pebble implements, as are edges with a series of shallow notches. The concaves range from 1 to 6 cm. wide, and are, as usual, often combined with "noses". Some of the latter are narrow and peaked, others are broad and rounded (Fig. 8*c*), ranging from 2 to 5 cm. wide, the majority being from 2 to 3 cm. In the Bellambi series only seven specimens show percussion use on the butt or lateral margins, and one has a series of shallow anvil pits on one surface. In shape the uniface pebble implements are mostly from oval to round, some being rectangular, and of various thicknesses and widths. A

number of examples are broken straight across in approximately the middle to form the *hache courte* of Indo-China.

Table II shows that the end type predominates at these eight sites, the lateral, end and lateral, and split-pebble varieties being equal, and the *sumatra*-type in the minority. Uniface pebble implements appear to be scarce at North Cronulla, Tuross Heads, and Merimbula, but none were collected at Bondi by Etheridge and Whitelegge, and it is not possible to say whether they were common or not at this site.

In size the uniface pebble implements form a relatively small and light series; the majority are between 6 and 13 cm. long, with a few examples up to 22 cm.

KNAPPED IMPLEMENTS.

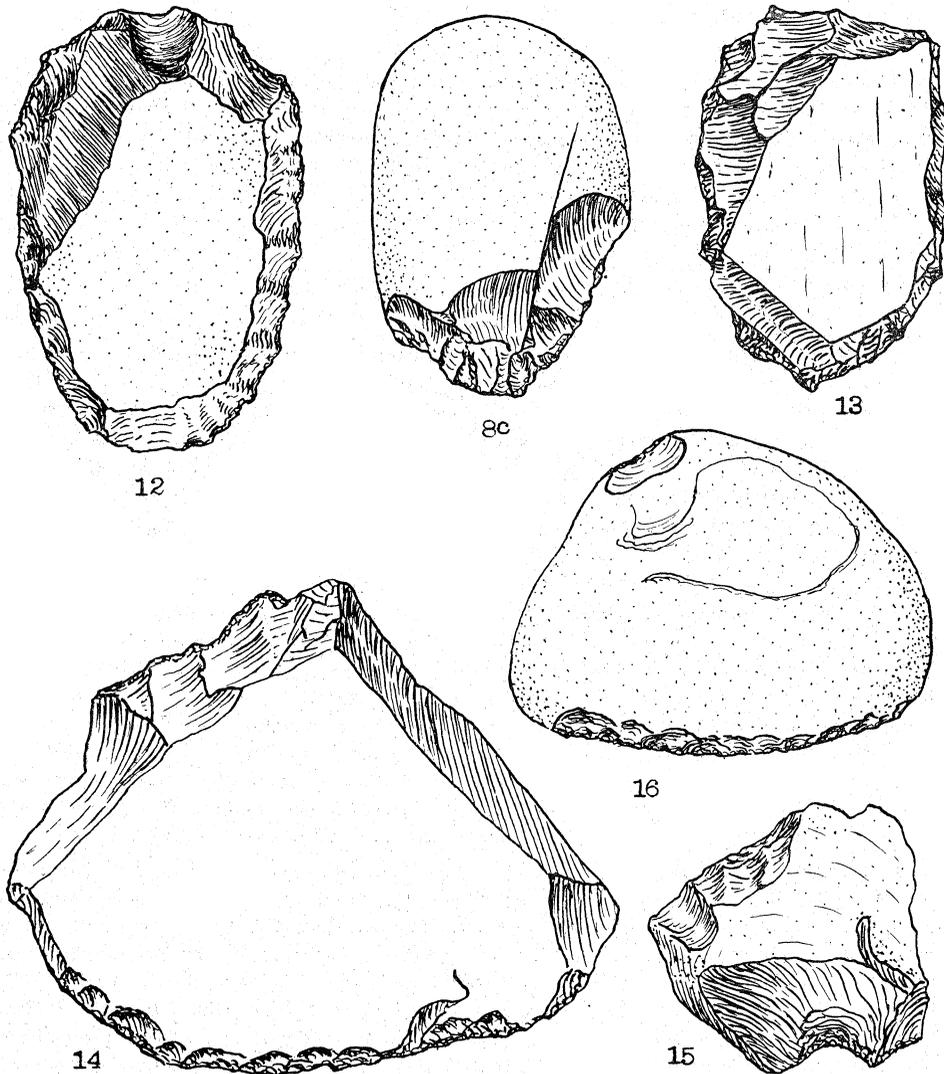
Blocks.

The blocks are distinguished from the coroids because they are knapped or quartered off larger pieces, and from the normal flake and blade implements because of their lumpy irregular nature. Like the coroids, they form two main groups, the crown and keeled or carinate, subdivided according to use, comprising straight to discoid, concave, concave and nosed, or burinate working edges; they were also used as fabricators. They are steep and slope-faced implements as a rule.

It is difficult to differentiate the *karta* as a distinct type from the description given by Tindale (1937, p. 48); they are essentially crown or carinate blocks, knapped haphazardly and not by a definite technique. McCarthy (1941a, p. 23) has defined the *karta* from Yamba and Crescent Head as split-pebble implements trimmed on the edge of the crust surface from the cleavage face (Fig. 12), and there are sixty-seven specimens of this type from the eight south coast sites. The Tuross Heads series of twenty specimens comprises steep-faced semi-discoids, discoids, end and side, and lateral trimmed margins of the notched type. One rectangular example has a broad concave, 5 cm. wide, and is trimmed on two lateral margins and one end. Five from Bellambi bear "noses" and pointed projections suitable for piercing, with concaves between; they are trimmed on various margins. One interesting type has its distal end in the form of a rounded "nose" without a concave on each side.

1. *Crown*.—In the Bellambi series four are semi-discoidal and four are discoidal to oval (Fig. 13). A discoid specimen from Murramarang has reversed trimming, half-way along one edge and half-way along the opposite edge of one margin. A tongue-shaped specimen from the same locality is trimmed along the two lateral margins and end, and is 5.5 cm. long. Some of the discoid and tongue-shaped blocks resemble the *arapia*. The concave (Fig. 15) and "nosed" (Fig. 9) series from Bellambi include discoid, semi-discoid, triangular and elongate examples. One of the semi-discoids bears three concaves from 2 to 3 cm. wide, and three trimmed "noses" (two of which are pointed). The triangular specimen has two concaves 3 cm. wide and one 1.5 cm. wide, with one "nose". Some of the concaves are only .5 cm. wide. The "noses" are up to 2 cm. wide. Similar remarks apply to the series from the other seven sites.

2. *Keeled or carinate*.—The specimens do not conform to a uniform type, but are, on the whole, irregular in shape, which may be short and squat, elongate, rounded, or rectangular. One from Bellambi is of the tranchet type (Fig. 10); it has a longitudinal median ridge, triangular section, one trimmed lateral margin, bearing a concave, and joining the distal end, which bears two concaves separated by a pointed nose, there being another nose on the corner; it is 6 cm. long. There is also a smaller one of a similar type, which is almost circular and "nosed". One from Merimbula is 10 cm. long and has one trimmed lateral margin, and another one, 15 cm. long, is bat-shaped, tapering from butt to distal end, with a "nosed" corner and one trimmed margin. Those from Bellambi bearing concaves (1 to 2.5 cm. wide) are from discoid to oval in shape, and 4 to 6 cm. long. On one specimen is a set of three concaves each 1 cm. wide, and an elongate example bears five concaves (1 to 2 cm. wide) and two sharp "noses". An unusual example from Merimbula is a rostro-carinate, 6 cm. long.



Figs. 8c, 12-16.—8c, Uniface pebble implement. Trimmed on end, with broad nose. E.39053, Bellambi. 12, *Karta*. E.49618, Lake Illawarra. 13, Block, oval, edge trimmed all round. E.33703, Murramarang. 14, Large triangular slice. E.49617, Murramarang. 15, Block, crown, concave edge. E.37639, Bellambi. 16, Slice. E.33257, Murramarang. $\frac{2}{3}$ natural size.

A common block type (Fig. 11) has a long, flat striking platform as its butt, opposite which is a convex trimmed edge often bearing concaves, "noses", and piercers combined. On the narrow examples the butt is as wide as the cleavage face, and they have been classified with the keeled group; there are three from Murramarang and six from Bellambi.

3. *Worimi*.—Those from Tuross Heads resemble closely the Anna Bay type (figured by Thorpe, 1928, pl. xxviii); all are knapped blocks, 7 to 16 cm. long, triangular in section, made of grey porphyry, and one has a well used "nose" at one end. One from Quibray is 12 cm. long and is a coroid, and two from Murramarang are 9.5 cm. long. Table III shows the *worimi* to be an uncommon implement at these eight sites, especially from Bondi to Lake Illawarra, where refractory materials were used, and where

lateral uniface pebble implements are common; on the other hand, pebble implements are uncommon at Tuross Heads and Merimbula, and *worimi* are best represented from these two sites and Murramarang, where porphyry was used. It appears, therefore, that *worimi* were made on the coast of New South Wales mainly where material is present from which large blocks may be struck, as at Anna Bay (porphyry), Newcastle district (chert), Murramarang to Merimbula (porphyry), otherwise uniface pebble implements, more especially the lateral-edged variety, were used, as McCarthy has already suggested (1941a, p. 25).

4. *Burinate*.—A general discussion of burinates, and the reasons for the use of the term, is given in the normal flake and blade section of this paper.

5. *Fabricators*.—The only locality well represented is Port Kembla and, of the ten examples, seven are battered on opposite and roughly parallel margins and three are of the punch-type.

In size, the blocks are up to 10 cm. long, being smaller on the average than the coroids.

Slice Implements.

There is no hard and fast line of demarcation between the slice implements and the normal flake and blade group. The slices are differentiated because of their great length and width compared to their thickness, being very large and comparatively thin. They are utilized rather than specialized tools.

Those from Bellambi have their margins gashed where large flakes have been removed, and bear both convex and concave working edges. One is $19 \times 10 \times 4$ cm., with two serrated margins scaled on both facets of the edge. They are more numerous at Murramarang than elsewhere in the material dealt with in this study; one is oval with a semi-discoid trimmed edge, one has four concaves, one has a concave on its butt end, and one (Fig. 16), triangular in shape and 12 cm. long, has a long convex edge trimmed from the cleavage face along the edge of the opposite crust surface; they are 8 to 15 cm. long. Four from Tuross Heads are 10 to 11 cm. long; two have notched edges, one has several concaves, and one a convex trimmed margin. A large triangular-shaped slice from Murramarang (Fig. 14) has a trimmed convex margin 17 cm. long, and bears concaves on a trimmed margin adjoining the pointed butt.

Table IV shows that slice implements were unimportant in the industry, and were common on the four most southerly sites where the porphyritic material predominates.

Normal Flake and Blade Implements.

This group is the most varied in the industry. It comprises four main divisions—scrapers, cutters, burinates, and fabricators—and the varieties in each of these groups have been classified according to their use. The *elouera* forms a special group because it is a combination tool.

1. *Scraping and Cutting: The Elouera*.—A glance at Table V will demonstrate the importance of the *elouera* in this industry. At Bellambi, for example, there are 257 *elouera*, 288 normal flake and blade implements, 87 points, 9 geometrical microliths, 92 uniface pebble implements, 4 slices, 52 blocks, and 180 coroids.

Our definition of the *elouera* is more restrictive than that of Towle (1930, 1935), who regards all asymmetrical flakes with scraper retouch on the thick margin as *elouera*. We prefer to limit the term to those which have scraper-trimming or use on one or both edges of the thick margin, and cutting use on the thin margin. The *elouera* is thus a combination scraper-knife tool. Some exceptions, however, without thin edge use, especially those trimmed on both edges of the thick margin, are so obviously *elouera* that they have been included in this group, but most of the asymmetrical blades lacking this dual use have been classified as scrapers or knives, as the case may be. The high percentage of dual-purpose *elouera* indicates that it was an all-round tool used both in the fingers and also possibly embedded in gum on a handle or spear-thrower in a similar manner to the *tula* of the interior. Mr. H. V. V. Noone has informed me that he has found *elouera*-like flakes mounted as adze-flakes on specimens in the Western Australian

and South Australian Museums. It is interesting to note that the *elouera* as a whole exhibit secondary uses which combine the functions of the other flake and blade implements, including carinate and concave scrapers, "nosed" gravers, piercers, burinates, and punch-type flake-fabricators. The use of the *elouera* as a burinate illustrates the diversity of purposes served by this tool, and three varieties are present in the 16 examples which exhibit this character.

An analysis of the characters of 257 *elouera* from Bellambi resulted as follows:

Conformation: Left trimmed, 106; right trimmed, 108; uncertain, 43.

Ridges: Curved, 96; straight, 60; multiple, 101.

Thin margin use: Knife, 102; saw, 76; scraper, 21; faint or plain, 58.

Thick margin use: Trimmed from both faces, 133; from inner face, 102; from outer face, 22.

Impact spot: Thick margin side of butt, 90; middle of butt, 102; thin margin side of butt, 19; lateral margin (thick), 14; uncertain, 32.

Size: 0-3 cm., 65; 3-4 cm., 139; 4-5 cm., 47; 5-6 cm., 1.

Attention should be drawn to the agreement of right and left trimmed specimens, the comparatively even distribution of ridges on the outer surface, and the inconsistent position of the impact spot, features which demonstrate that a specialized technique was not employed to produce the characteristic asymmetrical blade used, but instead, suitable pieces were picked out of the flakes knapped, and utilized; in this connection it might be mentioned that a low percentage of trimmed flakes is typical of *elouera* industry sites. The analysis also reveals that a slight majority is trimmed from both faces along the two edges of the thick margin.

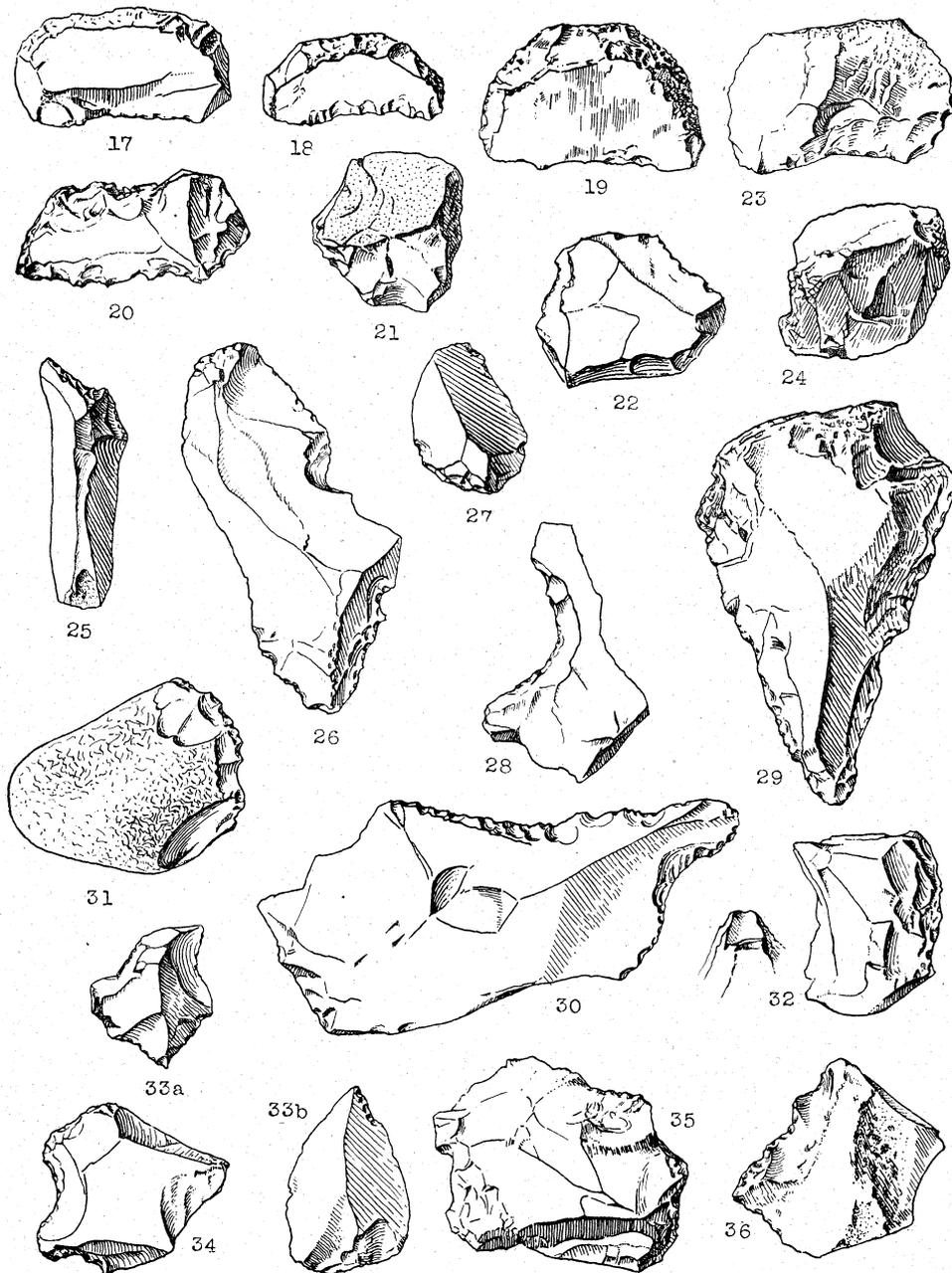
The *elouera* may be subdivided into three major varieties, of which two are approximately equal in occurrence, but the third, which might be termed the standard or ideal form, is the most uncommon. Their characteristics are as follow:

- i. Lateral margin trimmed on one or both edges, butt and distal ends untrimmed (Fig. 17).
- ii. Lateral margin wholly or partly trimmed on one or both edges, distal end often crescentic and pointed, butt untrimmed (Fig. 18).
- iii. Whole of lateral margin, including butt, trimmed, crescentic in shape, and often pointed at both ends. Ideal type, of orange-segment shape (Fig. 19).

The shape of *elouera* varies considerably. The thick lateral margin may be straight or irregular, but is generally crescentic, and the thin margin ranges from concave to convex, but is often straight. The majority are elongate blades, but others are approximately quadrangular and rectangular, being straight at both ends, or triangular. A concave end-scraper edge occurs on six examples from Bellambi, and concaves are not uncommon on the thick lateral margin of *elouera* at this site; one has two concaves, worked from opposite faces to form an S-like end. Saw-like edges are common on the *elouera* from Lake Illawarra, and several thin margins of this nature on examples from Merimbula suggest rugged use. One from Lake Illawarra has a notched edge with several sharply pointed piercer-like projections, and one from Tuross Heads has a notched scraper edge on the thin margin. *Elouera* are scarce at Tuross Heads and Merimbula.

2. *Scraping*.—Table V shows that scrapers of many varieties were employed and form an integral part of the *elouera* industry. The discoid is practically absent, its nearest approach being the tongue-shaped variety common at Merimbula. Side, end, and concave varieties predominate, while side and end, and double side scrapers are uncommon; the side and end variety is well represented among the *elouera*. Ridged and flat forms occur in every variety, and the high crown or polyhedral forms are included in the blocks.

(a) *Side*: An irregular series of normal type. One from Merimbula is of quartz. Two of *elouera* form have a scraper edge on the thin margin. Some may be termed abrupt trimmed blades. On two specimens the edge has been worked back into the inner face. In the Bellambi series 13 have a straight edge, 9 convex, and 5 slightly concave.



Figs. 17-36.—17, *Elouera*, variety i. E.43858, Tuross Heads. 18, *Elouera*, variety ii. E.32054, Boat Harbour. 19, *Elouera*, variety iii. E.36789, Bellambi. 20, Blade with serrated end scraper. E.39137, Bellambi. 21, Double side scraper, pointed. E.34478, Tuross Heads. 22, Butt-edged scraper. E.32169, Bellambi. 23, Flake fabricator used on two opposite lateral margins. E.39136, Bellambi. 24, Flake fabricator of punch-type. E.49377, Bellambi. 25, Obliquely trimmed blade, with concave edge. E.50284, Lake Illawarra. 26, End scraper, ogival-shaped end. E.38963, Lake Illawarra. 27, End scraper, ridged, steep-faced E.49374, Bellambi. 28, Concave scraper. E.39891, Lake Illawarra. 29-30, Nosed blades of borer type. E.33706, Murramarang, and E.38964, Lake Illawarra. 31, Coroid implement, plane-pusher type. E.39108, Bellambi. 32, Core with unused lip projecting from margin. E.49329, Bellambi. 33a-b, Piercers. E.39167, Bellambi, and E.33209, Murramarang. 34, Concave and nosed scraper. E.38773, Bellambi. 35, Straight-edge nose on blade. E.43090, Quibray. 36, Scraper, with triangular nose. E.33320, Murramarang. $\frac{2}{3}$ natural size.

(b) *Side and end*: One from Murramarang is a thick blade, 5 cm. long, with step-chipping along the convex margin and end, and another is tortoise-shaped, with a median ridge, like a carinate scraper.

(c) *Double-side*: The ordinary variety trimmed on two opposite lateral margins is scarce. The commonest variety is made on a concavo-convex (laterally) or plunged flake; one margin is trimmed from the inner, and one from the outer, face, but some have a saw-like edge with tiny squills off both facets. Three from Tuross Heads are pointed (Fig. 21). Two are keeled, and one has three trimmed edges.

(d) *Double-side and end, or tongue-shaped*: Table V shows this variety to be uncommon, perhaps because of the predominance of asymmetrical flakes in the industry. Thus the 19 from Merimbula may be accounted for by the use at this site of comparatively tractable silicified sand and porphyry.

(e) *End*: A variety of end scrapers were employed. Some are blades, others broad and short flakes. The true "duckbill" variety is rare, although it is common as the "thumb-nail" scraper among those of microlithic size.

The straight edge may be on an oblique margin.

The convex-edged series vary from frail, thin flakes to stout, broad ones. One form has a central median ridge sloping upwards from the thin bulbar end to a high peak, from which the chipped face extends steeply to the trimmed edge (Fig. 27). Some are of the *elouera* form, but do not possess its other characteristics. There are two unusual examples from Lake Illawarra, both trimmed to an ogival shape; one (Fig. 26) is an irregular blade, 7.25 cm. long.

The butt-edged end scraper (Fig. 22) is a common implement. One variety has a thick butt, on which one or both edges are trimmed, and from it the implement tapers rapidly to a thin distal end. Some are normal flakes used on the butt edge, often with lateral margin trimming also. At Bellambi the majority are blades, and the minority squat flakes; three are trimmed from the inner face and nine from the outer face. One has a secondary butt at right angles to the striking platform, and all four edges have been used. One is of the *elouera* form, but has no other signs of use apart from the trimmed butt. Flakes with a faceted butt, on which there is additional retouch on the outer edge of the butt platform, are included in this group; this outer edge has been used particularly on thick-butted flakes. Malan (1942, p. 124) mentions this additional retouch on butt-end scrapers in the Modderpoort industry of South Africa. N. A and H. V. V. Noone (1940, p. 12) have pointed out that butt-end scrapers occur commonly between the late Acheulean and Bronze Age in Europe.

(f) *Concave*: The large number of concave-edged implements reveals this tool as one of the most characteristic of the industry, and illustrates clearly the relationship between the stone implement types and the material culture of the area. Concaves occur as 199 special tools, and occasionally on the *elouera* and *bondi* points, in the normal flake and blade group, on 80 coroids, 41 blocks, 10 slices, and commonly on the uniface pebble implements. Concaves are often multiple in number on separate implements. When it is considered that the main function of the stone implements in the south coast area was fashioning spears, clubs, parrying and broad shields, spear-throwers, boomerangs, ceremonial objects, and other wooden articles, many of which have rounded shafts, handles and apices, the reason for the importance of the concave edge is clear.

Concave scrapers are often used on other margins, and along the same margin as that on which there is a concave, as side scrapers and "nosed" graters. The concave may be isolated on a margin, end, or corner of a flake; there may be several scattered along one margin or end, or one or more on several margins; it may be on the butt or distal end only, and a rare form is double-ended. A common variety has a concave on one or both margins, extending from the butt, so that it is somewhat tanged in appearance. The majority of the concaves are on blades, though some are on squat, irregular flakes, and usually on the thickest edge, thus utilizing the strongest part of the flake. Some are worked so deeply that the ends of the concave project as peaks, and many show pronounced step-chipping.

One (Fig. 28) from Lake Illawarra has a concave 3 cm. wide and 1 cm. deep, with a long thin arm forming one side of the tool. Another one has a concave on each lateral margin at the butt end and a trimmed end as well. One narrow blade from this site bears two small concaves on its distal end. There is a beautiful concave scraper in quartz from Murramarang.

(g) "Nosed":¹ The table shows the "nose" to be a characteristic feature of the industry; it occurs on 69 flake and blade tools, 28 coroids, 37 blocks, 10 slices, and is common on uniface pebble implements. The "nose" is closely related to the broad-edged carinate scraper common among the blocks and coroids, and to the narrow-edged burinates. It is almost always situated between two concaves, each of which may be step-chipped as a result of use.

The "nose" occurs on stout flakes, often of irregular shape, and on blades, and may be on the lateral margin or end, or on both; a number of "noses" may project from a discoid or convex scraper edge.

An exceptional specimen (Fig. 29) from Murramarang is bat-shaped, with two long, slightly concave trimmed margins extending from the "nosed" distal end, and it might well be termed a borer; it is 6.5 cm. long. Another remarkable specimen (Fig. 30), from Lake Illawarra, is an irregular blade, 9.5 cm. long, with a trimmed "nose" at one end, a short concave on one lateral margin, a long concave on the other margin, and two concaves at the butt end. One variety has its distal end in the form of a rounded "nose" without concaves on each side. A long blade from Bellambi has two notched margins, and a broad trimmed "nose". The "nose" may be straight-edged (Fig. 35); on some it tends to be triangular (Fig. 36) in shape, but on the majority is rounded (Fig. 34). At Bellambi eight are rounded and five are triangular. The "noses" range up to 2.5 cm. wide across the base.

Most of the weapons of the south coast natives were decorated with incised geometrical designs, and it is probable that the "nosed" implement was employed in this work. Whether or not the "nose" on *elouera* industry implements is due to Tasmanoid influence, in which case it would be a survival in Australia, cannot be decided until other industries have been analysed to bring out its relative importance throughout the continent, but its presence in Australia is probably due to a functional need.

(h) *Utilized*: A miscellaneous series of flakes with signs of use of a minor nature on various margins. On some specimens, both scraping and cutting edges are present. One from Bellambi, 8 cm. long, has a concave scraping edge, 2.5 cm. wide, on one margin, one corner of its butt has been worn away by rubbing, and the other margin is a knife edge.

3. *Burinate*.—This type has not previously been described in Australia, but its differentiation is warranted. In the *elouera* industry material dealt with in this paper the burinate edge occurs on 40 flake and blade implements, 2 coroids, 1 block and 16 *elouera*, some of which are microlithic in size. A minority are perfect examples of simple burin types. It is not claimed, however, that a specialized burin technique was employed to make them, otherwise a larger number of true burins would be present, but as a group the specimens distinguished exhibit the principal character of the burin, which is a specially restricted, stoutly backed, but prominent, marginal working edge. In our series the burinate edge is formed by opposing one or more spalls against a prepared platform, or against a trimmed margin, and they have been classified accordingly (Noone, 1934). Thus it might be said that burinate implements were made by the aborigines of the south coast to do work similar to the true burin, which was engraving in this area, to judge by the decorative art designs in low relief, a purpose for which the "nosed" scraper was also employed.

It is important to note that the burinate edge is often combined with a scraper edge (convex, concave, or straight), or with a cutting edge on the one flake, and this

¹ It might be pointed out that the term "duckbill" has been used incorrectly for some time in Australia to denote the "nose"; the duckbill is a broad, convex end scraper, and the name should be limited to such tools.

feature has led to their not being readily recognized hitherto in Australia; many burinates lacking this secondary use have probably not been collected on various sites. The following are the types represented:

(a) *Spalled, with marginal platform*: The spalls have been removed across the transverse axis (Figs. 96-97) of the flake or blade on 14 specimens, and on 7 *elouera*, and down the longitudinal axis (Figs. 98-101) on 12 specimens, and on 7 *elouera*. The vertical is somewhat larger on the average than the transverse form. From one to four spalls (one being the commonest) have been removed to form the burinate edge, which shows signs of use on all examples. The platform surface, being a spall scar face, is usually slightly concave. The spalls extend the full length of the marginal face on the majority of specimens, but on some are fore-shortened and end in a projecting ledge, a common feature of burins. One specimen of the transverse variety has the spall scar face across the butt-platform of the flake. The burinate edge is straight on most of the examples, and slightly rounded or gouge-like on others. It is sometimes very narrow, almost pointed, but may be up to 1 cm. wide. The spall scar face is from 1 to 2.5 cm. long.

The end or *bec-de-flute* type is represented by one specimen from Tuross Heads, and two among the *elouera* from Port Kembla and Lake Illawarra.

(b) *Scated*: An excellent series of thirteen specimens occurs among the *bondi* points, and their fashioning suggests a specialized technique. On each example a narrow spall has been removed from the point down the chord edge. This spall is approximately .5 cm. long on most specimens, of which nine are less than 2.5 cm. long and microlithic in size (Fig. 103). The largest specimen (Fig. 102), from Bellambi, is 15 cm. long, with a trimmed oblique concave edge at the distal end, against which a spall 5.5 cm. long has been removed to form the burinate edge and face. The trimmed margin opposite the burinate or spall scar face varies from concave to convex.

(c) *Burinates on blocks and coroids*: The burinate edge occurs on three coroids and one block. One coroid (Fig. 99) from Quibray is a beaked type; it is 3 cm. long, with a straight edge .75 cm. wide projecting from the body of the tool and bordered by two long slightly concave margins, the burinate edge being formed by the removal of two spalls, one long and one fore-shortened. The block from Murramarang is 5 cm. long, with a burinate edge, 1 cm. wide, formed by two shallow spalls; a flat natural surface, trimmed from the spall scar face, forms the platform, one edge of the latter being trimmed, and the opposite end of the implement bears a piercer-like "nose" on a trimmed margin. A core (Fig. 7) bears a skilfully prepared burinate edge in addition to its striking platform.

4. *Cutting*.—Table V shows that the cutting edge was as important in the *elouera* industry as the scraping edge. It occurs on 359 flake and blade implements, 186 out of 257 *elouera* from Bellambi (only), 275 *bondi* points, and on some of the slices and blocks. The knife edge develops into a saw-like edge as a result of use, but as the latter are mostly serrated, they have been classified in that group. The serrated edge (Fig. 20) is not as common as the knife edge, and both are usually on the longest margin of the flake. In the Bellambi series the knife edge is straight on 40 specimens, slightly concave on 7, and convex on 16. It is gapped on several specimens. There are 27 of *elouera* form which lack scraping use on the thick margin, and of these crust surface forms the thick margin on 15 specimens. Three are pointed flakes.

There is an unusual series of large serrated blades from Murramarang. One from Merimbula is curved at each end to form a long convex working edge. On some specimens there is a knife edge on one margin and a serrated edge on the opposite margin.

Functionally, the cutting edge in the *elouera* industry was probably used for body scarification, lacerating the gums in tooth avulsion, cutting animal flesh, skins, and fibres, skinning animals, and like purposes, for which shell knives and hafted shell chisels were also employed.

5. *Piercing* (Figs. 33a-b).—The peak or boring point is usually ridged on the outer face, flat on the inner face, and trimmed on one or both margins. It is distinct from the "nose" and the burinate edge. The flakes utilized are generally rectangular or pointed, and the piercer is often on one corner. They are uncommon in the industry, there being only 33 in the flake and blade group and 101 among the *bondi* points. The former is an irregular series, and the type is not conventionalized. There is a well defined series from Merimbula, on variously shaped flakes, one of which is an oblique blade, and one stout and strong. In the Bellambi series, five have the piercer or peak on a corner of the flake, and one has two piercers. The longest piercer in the series is .75 cm.

6. *Flake fabricators (outils écaillés)*.—This interesting group is represented by 205 specimens, and their function has been discussed under the heading of technique. Their essential character is that one or both facets of the working edge are battered and splintered. The edge is usually straight or slightly undulating on the longer examples, but gouge-like on the punch-type. Some are flimsy fragments, but the punch-type are stout and strong. In shape they are mostly parallelograms, some being chisel- or wedge-like, and others concavo-convex. They are, also, bifaces, in that most of them are trimmed on both surfaces. The punch-type is usually keeled, and may bear scraper or knife use on its lateral margins. Six varieties have been differentiated according to use, as follows: one margin (end or lateral), one margin and one end, two opposite lateral margins (Fig. 23), two lateral margins and one end, two lateral margins and two ends (four edges), and the punch-type used on both ends (Fig. 24). The punch-type occurs also on 14 *elouera*.

The table shows that the punch-type is the commonest variety, while those used on one margin and one end, and on four margins, are the most uncommon.

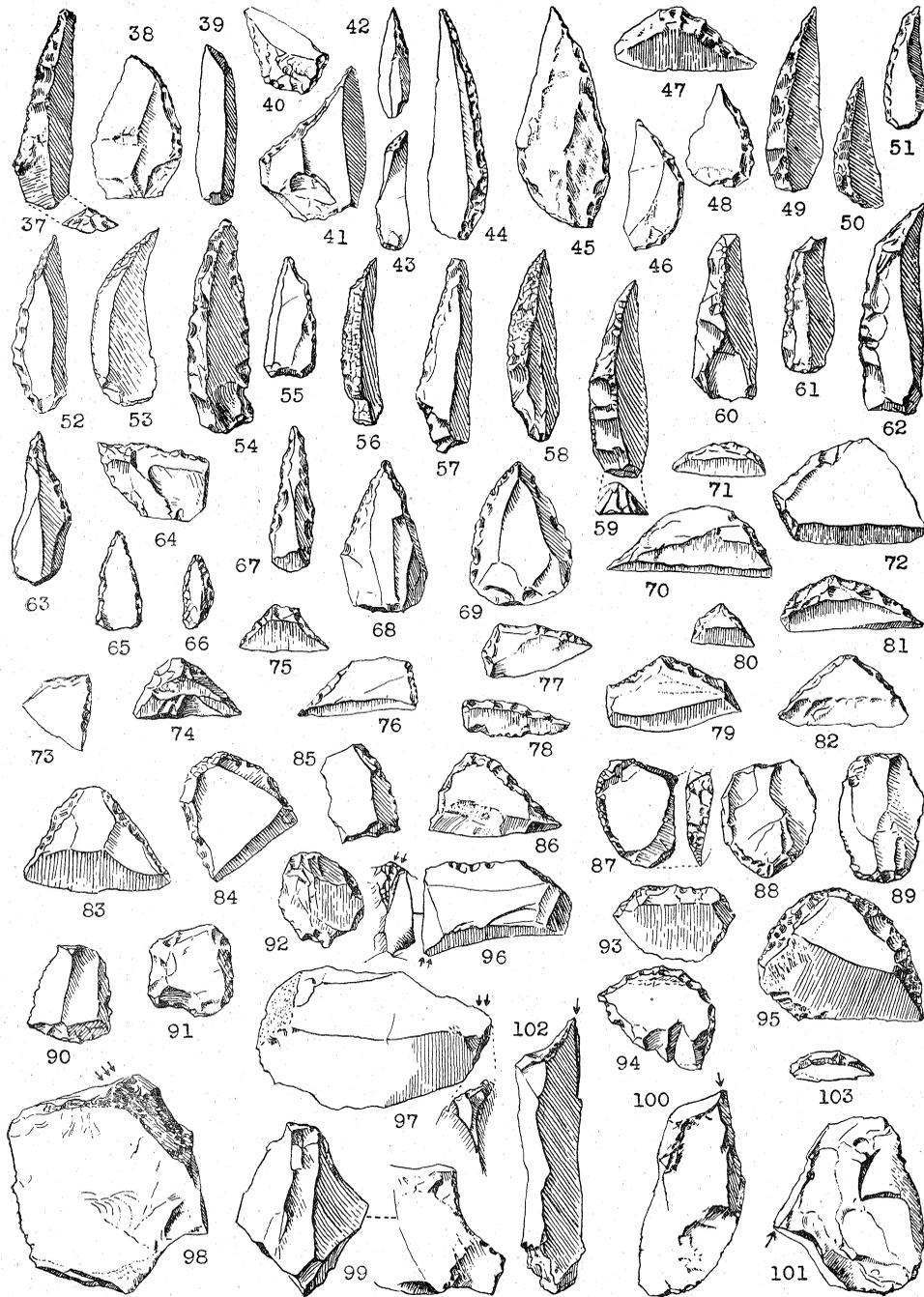
7. *Smoothed edges*.—At each of the eight sites, up to half-a-dozen flake and blade implements occur which have a smooth, polished edge on their longest margin. This polishing is not grinding or sand-blasting, but is caused by use. Some *elouera* bear this smoothing on their thin edge.

Size.—Apart from specimens of microlithic size (less than 2.5 cm.) normal flake and blade implements are between 2.5 and 7 cm. long at most of the sites from Bondi to Lake Illawarra, those from North Cronulla appearing to be slightly smaller on the average than the other sites. On the other hand, those from Tuross Heads, Murramarang, and Merimbula are up to 9 cm. long, and larger on the average than other sites. These differences in size are due mainly to the materials used, although at North Cronulla the microlithic influence is more pronounced.

Bondi Points.

The points have proved to be a most difficult but interesting group to analyse in what is the first attempt to classify and bring out their diverse characters. The name *bondi* (*bon-dai*) has been adopted for them, after the first locality from which they were figured in Australia by Etheridge and Whitelegge (1907), in preference to "Sydney" point used by Tindale (1941, p. 146), a name which has no real significance in connection with them. In all, 2,340 *bondi* points have been analysed, and we are confident that they include all characters of any importance.

Conformation.—Asymmetrical, with two types of blades, as follows: (1) triangular transverse section (Fig. 49) (isosceles to equilateral), with single-edged thin margin, double-edged thick margin, inner and outer cleavage faces, tapering in thickness from butt to point; (2) trapezoid or flattened in transverse section (Fig. 52), several ridges on outer face, inner cleavage face, two single-edged lateral margins, often thicker toward one than the other. The segments may be straight (Fig. 52), or curved (Fig. 53) at the distal end on both margins like a hook. The thin margin may be straight, incurved or convex. They vary from delicate slivers to thick, broad and stout blades. In Table VI the narrow blades are arbitrarily divided from the broad and rudder blades, and have not been defined by measurement. Points from narrow to medium in width predominate.



Figs. 37-103.—*Bondi points*. 37, Partly trimmed, faceted butt. E.34665, Tuross Heads. 38, Partly trimmed, plain butt. E.39040, Lake Illawarra. 39, Trimmed on distal end and butt. E.34486, Tuross Heads. 40, Oblique trimmed edge, trapeze shape. E.43859, Tuross Heads. 41, Oblique trimmed concave edge, broad. E.50284, Lake Illawarra. 42, Trimmed on distal end. E.36867, Quibray. 43, Trimmed on distal end and butt. E.39087, Seven-Mile Beach, Lake Illawarra. 44, Single-edge trimmed, straight but oblique butt. E.50008, Quibray. 45, Single-edge trimmed, faceted butt. E.50389, Lake Illawarra. 46, Double-edge trimmed. E.50012, Bellambi. 47, Rudder-shaped, trimmed concave distal end. E.50289, Lake Illawarra. 48, Broad, short,

Technique.—The impact spot is at the butt end on all specimens, the bulb of percussion usually occupying the greater part of the butt end of the inner face, and it is probable that a specialized technique was employed in knapping them from the cores.

Trimming.—The thick margin of the *bondi* points is abrupt-trimmed, the primary aim of the trimming being for shaping and not for use. The margin trimmed, when the outer face is uppermost, is on the left (Fig. 37) of the bulb of percussion on the majority of specimens. The partly finished group indicates that the trimming was started at the point end, there being very few specimens trimmed at the butt end only. On the trapezoidal-section points the trimming was taken (a) right along one edge only (Fig. 52), and (b) the butt was rounded off in addition (Fig. 51). On the triangular-section points the trimming was taken right along the thick margin (a) on one edge and extended across to the other edge near the point only, (b) on both edges (Figs. 49–50), and (c) the butt was rounded off on one or both edges (on a minority). Exceptions to this treatment are 69 specimens (Figs. 39, 43) with point end and butt trimmed, with a portion of plain margin between, and 166 specimens with partly (Fig. 37) or wholly trimmed margin and faceted butt, both of which constitute well-marked varieties.

The outline of the thick margin may or may not be altered by the trimming, which follows the natural straight or convex outline of the blade on a large number of specimens, but on others the outlines are shaped to a concave edge. Other characteristics are as follows:

(a) (Figs. 40–41, 47). The butt end is straight or convex, and the distal end is oblique and either straight or slightly incurved to form a rudder-shaped point. They occur in the partly finished, single-edge trimmed and double-edged trimmed points, and are a common variety.

(b) (Fig. 53). On the curved blades the oblique distal end is usually convex.

(c) (Figs. 60–62). There is a pronounced rounded corner, or hump, near the point, and the distal end is almost straight. Three from Quibray, with broken tips, have been trimmed to a rounded end, but these are rare at all sites.

(d) On two specimens from Quibray the trimming has been taken half-way along one edge, and then continued along the other edge of the thick margin.

(e) On a large number of specimens the workman has not been able to remove by trimming a hard knot on the margin, and has worked round it, leaving a rounded hump anywhere between the butt and the point, but commonly towards the distal end on stout examples.

Partly finished points.—It has not been found possible to separate the broad or oblique examples (Figs. 25, 38, 40–41), many of which could be termed oblique trimmed

double-edge trimmed. E.48530, Tuross Heads. 49–51, Double-edge and butt trimmed. E.50009, E.31182, Boat Harbour, and E.33329, Murramarang. 52, Single-edge trimmed. E.11509, Boat Harbour. 53, Curved blade, single-edge trimmed, faceted butt. E.50008, Quibray. 54, Double-edge trimmed, with saw-like edge on thin margin. E.9080, Bondi. 55, Concave butt, rudder-shaped. E.50289, Lake Illawarra. 56, Tanged butt. E.41523, Redhead, Port Kembla. 57–58, Nosed butts. E.40036, Tuross Heads, and E.39006, Lake Illawarra. 59, Fluted, steep-faced triangular butt. E.35918, Murramarang. 60–62, Sharply-turned distal end, one with concave edge. E.50012, Bellambi, E.36832, Quibray, and E.39019, Lake Illawarra. 63, Trimmed on both margins at distal end. E.36797, Bellambi. 64–65, 67–69, Trimmed on both lateral margins. E.38650, E.39289, E.39264, North Cronulla, and E.41520, Lake Illawarra. 66, Trimmed on the three edges of two margins. E.36849, Lake Illawarra. 78, Right-angled butt. E.31182, North Cronulla. 85, Right-angled butt, distal end missing. E.9079, Bondi. *Microliths.* 70–72, 74, Crescents. Note the end trimmed off No. 72 at an oblique angle. E.36856, E.43896, Quibray, E. 34487, Tuross Heads, and E.49371, Bellambi. 73, 84, Equilateral. E.36851, E.43894, Quibray. 75–76, 83, 86, Trapezoid. E.36868, E.39276, Quibray. 77, Scalene. E.38924, Murramarang. 87, Oval, trimmed on both margins and end. E.39003, Lake Illawarra. 88–90, Thumb-nail scrapers. E.43891 (2), Quibray, and E.16378, Bondi. 91, Discoid, concave and nosed. E.16384, Bondi. 92, Thumb-nail, crowned end scraper. E.43095, Quibray. 93, Abrupt trimmed blade. E.16381, Bondi. 94, Crescent, piercer-like end. E.39316, Boat Harbour. 95, Large crescent. E.39076, Seven-Mile Beach, Lake Illawarra. *Burinated.* 96–97, Marginal-platform, transverse. E.32055, Boat Harbour, and E.38444, Bellambi. 98–101, Marginal-platform, vertical. E.43083, Quibray, E.38771, E.38847, E.43152, Bellambi. 102–3, Scaled. E.50075, Bellambi, and E.50041, Quibray. § natural size.

blades, from the narrow partly trimmed forms (Figs. 37, 39, 42) because they merge imperceptibly into one another without any definite line of demarcation. On some specimens, the trimmed portion of the margin is really the distal end at an angle, and they are true oblique blades. One broad specimen from Lake Illawarra is 3 cm. long and 2 cm. wide. It is possible that some of these blades represent a stage in the making of an angular microlith. The partly finished group is in a minority, the craftsmen being careful to blunt the whole margin, preferably along one edge, but also along two edges of the thick margin. On the trapezoid-section blades the upper ridge of the thick margin is centrally situated and is not convenient for trimming unless the lower edge is worked right back to it. Thus the aborigines spent a lot of time in fashioning these points, as the immense numbers of them on the kitchen-middens testify.

Standard type.—There are two varieties of the standard or ideal type, as follows: (a) completely trimmed on one edge and butt, the latter being rounded (Fig. 51), or with faceted butt, and (b) completely trimmed on two edges of one margin and butt, the latter being rounded (Figs. 49–50), or with faceted butt. It might be stated that the rounding of the butt was relatively unimportant, as shown by Table VI.

Trimmed on two margins.—There are two varieties, as follows:

(a) One edge of two margins. Ninety-five specimens are trimmed completely along one edge (usually the thicker margin), and either partly (isolated patches in the middle or towards one end) (Figs. 64, 68) or wholly (Figs. 65, 67) along the thinner margin, the latter being in the minority. Points of both triangular and trapezoidal section were used, the former being in the majority. A broad example (Fig. 69) from Port Kembla is 2.75 cm. long and 2 cm. wide, and one from Lake Illawarra is 2.75 cm. long and 2.25 cm. wide. One (Fig. 67) of these examples resembles the *pirri*.

(b) Three edges (Fig. 66). Eighteen specimens are trimmed on both edges of the thick margin, and either partly or wholly (the minority) on the thin margin.

Butt.—The butt is treated in a number of ways, some of which are normal and others unusual, as follows:

(a) Left plain, and varies from a thin edge to almost 1 cm. thick.

(b) Faceted (Fig. 37), a common feature on about one-third of the total. Several specimens with faceted butt have no marginal trimming.

(c) Rounded (Figs. 46, 49) by trimming on edge of inner face, or on two edges of the thick margin. This trimming may join the opposite thin margin in a sharp corner (Fig. 50), or extend slightly along this margin and so round off the whole of the butt (Fig. 51).

(d) Fluted by the removal of a number of spalls from the inner to the outer edge of the thick margin, the facet being at approximately 45° from the outer to the inner face. This type of butt is eminently suitable for graving use; it is actually a small "nose", and might have served this purpose on occasion, but, on the other hand, might be due to the edge of the outer face being inwards from the butt and not directly above the edge of the inner face (Figs. 58–59). One Port Kembla specimen (Fig. 56) has a tanged butt of this type, on which the trimming is taken round the concave outer margin of the tang, which is 3 mm. long.

(e) Concave edged (Fig. 55), there being only two specimens in the whole series, both narrow segments from Tuross Heads and Windang.

(f) Burinate, with several spallettes removed across the butt from the thick margin to the thin margin at an oblique angle. They are obtuse in shape, and the opposite to the scalene form of microlith. They occur at all sites, there being four from Murramarang.

Table VI shows that the plain butt is in the majority, and that the rounded and faceted butts are characteristic features of these points.

Thin margin use.—On 275 specimens are signs of knife use on this margin. Many have a well used saw-like edge (Fig. 54) with squills removed by use on both facets of the edge. One narrow segment from Port Kembla of the same type as the points, but not trimmed, has been used as a knife on this margin. Three examples from

Quibray have a concave trimmed edge at the butt end of the thin margin, but scraper use is very rare.

Piercer use.—One hundred and one specimens are trimmed on both margins round the point, probably for piercing use (Fig. 63). The trimming on the thin margin extends up to .75 cm. from the point.

Scaled burins.—Thirteen examples occur among the *bondi* points, and are dealt with under burinates, p. 144.

Size.—Table VI shows that the points less than 3 cm. long predominate, those from 2 to 3 cm. being in the majority, followed by those up to 2 cm. long. Actually, as a whole, those less than 2.5 cm. form an absolute majority of microlithic points, an important point to bear in mind in considering the derivation of the *elouera* industry.

Materials.—Practically all of the materials of the industry are represented among the *bondi* points, with a preference for the finest grained. A large number are made of chert, jasper, silicified wood and sandstone, and some are made from attractively grained chalcedony.

Function.—It has been shown by the analysis that *bondi* points served a number of useful purposes, apparently secondary to their main function, whatever that was, and comprising cutting on the thin margin, very rarely scraping on the thin margin but more commonly on the thick margin, graving on the butt end where the butt is shaped for this purpose, and piercing with the point. It is suggested that the main function of the *bondi* point was similar to that of the bone *muduk* (McCarthy, 1940c), that is, as a spear barb and/or point, and that the use of the stone point was superseded by bone and wooden points and barbs of a dual nature. Thus they would be set in gum in a groove on the shaft, the butt end bound with sinew and also gummed. The large numbers of *bondi* points found indicate that they were not used for ritual purposes, and their use on spears is the only apparent one in connection with weapons. There is, however, no direct evidence to support this contention.

Microliths.

The microliths constitute a small but important group in the *elouera* industry. Six simple angular types are represented among the 142 specimens, and in addition there are 64 thumb-nail, 11 discoid, and 1 rectangular scrapers.

Crescents (Figs. 70–72, 74, 94–95).—These are the commonest type, and range from short and stout to long and slender or broad forms, some of which are miniatures of the *elouera*, but without any signs of use on the thin margin. One (Fig. 94) from Boat Harbour has a small concave on each margin so as to shape the pointed corner for piercing purposes, and on another one a single concave on the trimmed margin near the corner is probably for the same purpose. Those from Quibray are 1 to 3.25 cm. long, and from Bellambi 1.5 to 2 cm. long.

Trapezoids.—Two varieties may be distinguished, those with the shorter of the two parallel margins untrimmed (Figs. 76, 83), and those on which it is trimmed (Fig. 75), the latter being in the minority. In both groups are four main shapes, as follows: (a) elongate, including both symmetrical and asymmetrical forms, (b) medium, a symmetrical form on which the trimmed shorter margin is often the same length as the two oblique margins, (c) short, including both symmetrical and asymmetrical forms, broader than long, and (d) one trimmed margin at right angles to the longest margin. One from Tuross Heads has a sharp-pointed corner suitable for piercing. One from Bellambi is 3 cm. long and 2 cm. wide. In size they range from 1.5 to 2.75 cm.

Equilateral (Fig. 73).—Not very well represented. They vary from examples on which the two trimmed margins meet in a peak or sharp edge, to those on which it is rounded, the implement being hat-shaped in the latter case.

Isosceles (Figs. 79–80, 82).—They range from narrow to broad examples. The junction of the two trimmed margins often forms a peak or sharp edge.

Scalene (Fig. 77).—As with the two preceding types, the junction of the two trimmed margins forms a peak or sharp edge on the majority of the specimens;

otherwise it is rounded. Some of the specimens have almost a right angle formed at the junction of the shortest trimmed margin and long untrimmed margin.

Discoid (Figs. 87, 91).—Some are high-crowned, especially from North Cronulla and Bellambi. Two from Lake Illawarra, 1.5 and 1.75 cm. long, are trimmed round the whole of the margin except the narrow butt. They are not circular, but are oval in shape.

End or thumb-nail.—They vary from broad to elongate, and from flattened to high-crowned scrapers with either straight (Fig. 89) or convex (Figs. 88, 90) (on the majority) working edges.

Sizes.—An analysis of the lengths of the microliths is as follows: 0 to 2 cm., 91; 2 to 3 cm., 50; 3 to 4 cm., 1 (a crescent). Three are 1 cm. or less in length.

Towle's assertion (1935, pp. 119–20, 131) that crescents and other pygmy types found on the coastal sites are too scarce to be regarded as conventionalized tools, and are really variant forms, cannot be accepted. The angular microliths are exact reproductions of those found elsewhere in Australia, especially in Victoria, and in other parts of the world. Microliths are an integral part of the *elouera* industry.

Microlithic-size implements.—Apart from the angular microliths there are 409 implements less than 2.5 cm. long among the cores and normal flake and blade groups, and 1,880 out of 2,340 *bondi* points less than 3 cm. long. Thus the microlithic implements in the collection studied total 2,200 or approximately one-third of the collection.

Other Artefacts on South Coast Sites.

In addition to the knapped implements described in this paper, other artefacts on the sites include edge-ground axes (Thorpe, 1932; McCarthy, 1941*b*) and knives (Thorpe and McCarthy, 1933), axe-sharpening stones (McCarthy, 1941*b*), mortars (McCarthy, 1941*d*), fish-hook files (Thorpe, 1931*a*), percussion stones, bone awls and *muduk* (McCarthy, 1940*c*), shell implements, incised (Bramell, 1941) and magic stones (McCarthy, 1942). The edge-ground axes comprise uniface pebble, plain and trimmed pebble, trimmed coroid, and hammer-dressed types.

Affinities.

A stratified site in which all elements of the *elouera* industry occur has not yet been excavated, and rock-shelters which have been dug out have yielded little stratigraphical data.

In 1889 David and Etheridge secured several aboriginal skeletons from a rock-shelter, and a midden below it on the shore, at North Harbour, Port Jackson. The skeletons were covered with large stones, there were two white hand stencils in the rock-shelter, and one hundred and twenty yards away was a group of outline rock engravings of broad shields. The only artefacts found were two "siliceous knives", two edge-ground pebble axes, one of which was a split-pebble type, an edge-ground skinning-knife (?), and a fish-hook file. In 1889 also they described a skeleton from beneath a deposit of sand and pumice at Long Bay; associated with it were a flake and an edge-ground skinning knife. In 1896 Etheridge, David and Grimshaw described a submerged forest, with remains of the dugong, on an old land surface at Shea's Creek, Botany Bay; on this surface were found four ground-edge pebble axes. In 1899 Harper investigated several rock-shelters at Port Hacking, National Park, and from one at Little Jibbon obtained one adult and four children's skeletons, a bone awl, six perforated shell discs, and five stones for "breaking bones".

In 1934 Kennedy, from a rock-shelter at Pittwater which contained a deposit from one to three feet six inches deep, obtained the following specimens: 6 split-pebbles, 2 worked pebbles, 56 flake and blade implements, 1 *elouera*, 1 edge-ground knife, 1 core, 1 hammerstone, 1 rasp, and 2 pieces of red ochre; no *bondi* points or angular microliths were found. In 1934 McCarthy, from a rock-shelter near Emu Plains, listed the following specimens: 2 edge-ground pebble axes, 1 edge-ground knife, 1 uniface pebble

implement, 50 flake and blade implements, 4 *elouera*, 51 *bondi* points, 4 cores, 1 hammer-stone, 2 quartz crystals, and a fragment of a human skull, with some teeth. No angular microliths were present. In 1931 members of the Anthropological Society of New South Wales investigated a large rock-shelter at Lake Burrill, from which Thorpe (1931-1932) stated that more than 450 artefacts were obtained, but gave few details of their nature; the collection from this site, now in the Australian Museum, is as follows: 16 cores, 3 core implements (1 burinate), 1 biface discoid coroid, 2 crown blocks (1 discoid, 1 concave), 9 carinate blocks (1 nosed), 2 slices, 3 uniface pebble implements (2 end (cores?), 1 lateral), 17 *elouera*, 98 scrapers (31 side, 7 double-side, 7 end, 9 butt-end, 2 double-side and end, 26 concave, 11 concave and nosed, 5 utilized), 28 knives, 7 serrated, 6 burinate, 4 piercers, 18 flake fabricators, 8 percussion stones (3 coroid, 4 pebble, 1 anvil), a total of 222 implements, the remainder being unused flakes. The site was not stratified, and no angular microliths or *bondi* points were present. Generally speaking, the implements from this rock-shelter closely resemble those from Murramarang, about ten miles to the south.

Small series of specimens from test-trenches in rock-shelters on the Lane Cove and George's Rivers, in Howe's Valley, and in the Bulga district, some of which contain hand stencils, include various normal flake and blade implements, some microlithic end-scrapers, *elouera*, *bondi* points, a fish-hook file, bone implements, 1 flake fabricator, but no pebble implements. It is clear, therefore, that the *elouera* industry occurs both in rock-shelters and on open sites, which may or may not be shell-middens.

There remains to be considered the question of whether the *elouera* industry is a locally developed one, or has been built up by intermittent infusions of culture. The latter process has, it appears, been the case, and in this connection the microlithic, uniface pebble, edge-ground and hammer-dressing techniques, fish-hooks and files, and the bone *muduk* appear to be important extraneous items. The uniface pebble implements are of the same nature and varieties as those of the *kartan* culture of Kangaroo Island (Tindale and Maegraith, 1931; Tindale, 1937, 1941) and of Yamba and Crescent Head (McCarthy, 1941a), where they occur as a distinct series, now regarded as an extension of the Hoabinhien I culture to Australia (McCarthy, 1938, 1940a).

Geometrical microliths are widely distributed in Australia and, taken in conjunction with the large number of flake and blade implements of microlithic size, appear to constitute a distinct culture, of which the *elouera* industry may well be a variant. The possibility of the microlithic culture being an independent development in Australia must be considered, and it is not known whether it is historically related to Asiatic cultures of the same nature, especially in India. The edge-ground technique in south-eastern Asia and Malaya first appears in the Hoabinhien II culture during the "mesolithic" period, and the hammer-dressing technique during early neolithic times (McCarthy, 1938, 1940a), and both techniques appear to have spread by means of the migrations and contacts of the early groups of people who invaded the Oceanic region.

Tindale (1941, p. 147) linked the *elouera* industry with the *pirrian* of the Devon Downs site on the Lower Murray River, and stated that the *pirrian* "is dominated by the *pirri* or leaf-shaped point, but the small so-called 'Sydney' point, which has a triangular section and the back worked so that one end of the blade forms a point, also occurs, as well as a rather typical *elouera*". The other elements of the *elouera* industry do not occur in the *pirrian*.

There is evidence to believe, the evidence being limited to distributional data at present, that the bone *muduk* (McCarthy, 1940c), and the making of fish-hooks (McCarthy, 1940b, p. 269) spread down the east coast from Cape York, and both are probably New Guinea influences.

Patination occurs on odd artefacts in the *elouera* industry of the coastal kitchen-middens, but not generally in any series of the one technique or type.

Horne (1921) has described the stone implements of south-eastern Victoria, where most of the artefacts in the *elouera* industry occur, the most notable deficiency being the *elouera* itself, although it might be present in this area because it had not been differentiated as a conventionalized type when his paper was written. Kenyon (1927),

too, has shown that many elements of the *elouera* industry occur on Victorian sites, but more detailed analyses are required before the relationships can be specified more precisely. Mr. H. V. V. Noone has informed me that he has identified typical *elouera* in the Queensland Museum collection from Bundaberg and Stradbroke Island, in the South Australian Museum from south-eastern South Australia, and in the Western Australian Museum mounted as a *tula*. The Australian Museum possesses an *elouera* from Hook Island, Whitsunday Group, Great Barrier Reef, and odd specimens from western New South Wales.

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