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THE WINDANG, OR EDGE-GROUND UNIFACE PEBBLE AXE IN EASTERN AUSTRALIA.

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(Plate xvi, figures 1-6.)

The Australian Museum possesses a series of one-hundred and eight axes of a type that may be considered transitional between the trimmed uniface pebble implements and edge-ground axes. The characteristics of the type are simple: it is made from a pebble, half of a split-pebble, or a slice from a pebble, trimmed partly or wholly on one surface only, with a blade ground on one or both facets.

Attention has been drawn to occasional specimens but the series has not been described, nor has attention been drawn to its affinities. In the following analytical description, the series is divided into two groups, coroid and split-pebble.

Coroid.

The varieties in this group are the same as the trimmed uniface pebble implements, and they have been classified according to the trimming to draw attention to the relationship. The ground-edge blade is always at one end.

(A). *Trimmed at one end* (Plate xvi, fig. 1).—The chipping is limited to one facet only. The butt end is lacking on two, and one has a trimmed concave edge adjoining the butt. The eighteen specimens range from 9 to 18 cm. long, 6 to 11 cm. wide, 2 to 5 cm. thick, and from 8 oz. to 3 lb. in weight. They range from round to elongate-oval in shape, and one from Prairie, Queensland, is pear-shaped.

Localities.—*North Coast*: Clarence River, Bulga (Hunter River Valley). *South Coast*: Quibray, Shellharbour (2), Bellambi. *Inland*: Gunnedah, Oberon (2), Bathurst (2), Nattai River, Waste Point (Snowy River) (3). *Queensland*: Prairie. *Victoria*: Cape Liptrap, Tarwin.

(B). *Trimmed on one lateral margin.*—There are few examples in the collection, and the trimming on them appears to have been done for shaping and not for use. The trimmed uniface pebble implements with lateral working edge are the most unsuitable type in the group for addition of the ground blade. There is, however, one example, E.49513 (Plate xvi, fig. 2), and it is a most unusual axe, from the Macquarie River, between Dubbo and Narromine. The trimmed lateral margin is steep-faced and step-chipped. The blade is ground on both surfaces at one end, but it has two facets separated by a ridge on the trimmed surface, and one on the crust surface. These three facets form a two-edged gouge-like blade. It is $14 \times 7 \times 4$ cm., and 1 lb. 2 oz. in weight. It is made of a fine-grained indurated shale, and is elongate-oval in shape.

(C). *Trimmed on one or both lateral margins and end* (Plate xvi, fig. 3).—The trimming is limited to one margin and end on two specimens only, and is present on both margins and end on eighteen. On the latter series a tongue of crust extends from the butt along the surface between the trimmed margins. Two exceptions have the ground blade on the untrimmed end. They are all oval in shape, and range from 9 to 21 cm. long, 6.5 to 11 cm. wide, 2 to 6 cm. thick, and from 8 oz. to 3 lb. 8 oz. in weight.

Localities.—*North Coast*: Bulga (Hunter River Valley). *South Coast*: Quibray (2), Bellambi, Lake Illawarra (4), Shellharbour (4), Murrumurang. *Inland*: Lower Macquarie River (Geurie parish), Glen Allan, Ginkin, Duckmaloi River (2), Bungonia. *Victoria*: Cape Otway.

(D). *Trimmed all over one surface* (Plate xvi, fig. 4).—Some are thick at the butt end and taper to the blade, others have a rounded crown in the middle of the flaked surface. The majority are oval in shape, but four are made from straight-sided pebbles, and two are pear-shaped. One from Cape Otway is elongate, straight-sided, and shoe-

shaped. Most of the thirty-eight specimens display the characteristic technique of the *sumatra*-type. Some of the others have a trimmed working edge along one lateral margin, and one along two margins. They range from 9 to 19 cm. long, 6 to 12.5 cm. wide, 2.5 to 6 cm. thick, and from 6 oz. to 3 lb. 4 oz. in weight.

Localities.—*North Coast*: Clarence River (North Arm), Woodburn, Woodville, Coff's Harbour, Myall Lakes, Raymond Terrace (2), West Maitland, Bulga (2), Paterson River. *South Coast*: Bellambi (2), Burrawang (2), Sassafras (Shoalhaven River) (2), Murramarang (3), Merimbula, Bermagui, Lake Illawarra (2), Wollongong, Shellharbour. *Inland*: Nymboida, Walcha, Inverell, Boorook, Ando, Jindabyne, Hampton (Blue Mountains), Argyle, junction of Murrumbidgee and Cotter Rivers. *Victoria*: Cape Liptrap, Cape Otway. *Queensland*: Springsure.

Split-Pebble. (Plate xvi, fig. 5.)

Thirty-seven are made from one of the two portions of a split-pebble or from a pebble slice. The cleavage surface distinguishes them from the coroid group; it is trimmed along one or both lateral margins on eighteen, and is continued round the butt on an additional nine. Some are untrimmed and have a smooth, slightly convex, cleavage surface. In the splitting of the pebbles the knappers selected the most suitable spot on the margin at which a blow would produce the desired result; thus the impact spot is on one corner or in the middle of the butt on seventeen, in various positions along one lateral margin on seventeen, and indeterminate on three. They are all oval in shape, and range from 9 to 16 cm. long, 7 to 12 cm. wide, 1.5 to 4 cm. thick, and from 4 oz. to 2 lb. 8 oz. in weight.

Localities.—*North Coast*: Richmond River, Crescent Head Beach (2) and quarry (1), Arakoon, Woodville, Anna Bay. *South Coast*: North Cronulla (2), Bellambi (2), Lake Illawarra (4), Bermagui (2), Shellharbour (4), Tilba Lake (2). *Inland*: Stradbroke (Paterson River) (2), Duckmaloi River (2), Glenbrook and Blaxland (Blue Mountains), Richmond, Emu Plains, Rockton, Jindabyne, Eugowra, Murrumbidgee and Naas Junction, Louth. *Victoria*: Dellicknora.

Analysis.

Trimming.—The trimming on these axes is the same as that on the uniface pebble implements lacking the ground-blade. Exceptions to be noted are: (1) the end trimmed variety in the coroid group, on which the trimming often appears to be for the purpose of simplifying the grinding of the blade, and (2) the trimmed uniface lateral margin type which is unsuitable for use as an axe in most instances and is represented by only one specimen in this series.

A minority have odd flakes struck off the crust surface, some due to battering or percussion use, but none of these are trimmed intentionally along the margins of this surface.

Blade.—The application of the grinding technique to trimmed uniface pebble implements is of some interest because it indicates that they were in use at the time of the diffusion of this technique in eastern Australia. Some of them may be tools discarded by previous generations, and subsequently picked up and made into axes after the introduction of the ground blade. On the great majority, eighty-two, the blade is ground on both facets, but twenty-six are ground on the trimmed facet only, and on ten of the latter there is use-polish on the crust surface at the same end. Two of the split-pebble examples, E.4604, North Cronulla, and E.46011, Dellicknora, Victoria, have narrow blades ground on both facets at each end. On most of the specimens the ground facets, which are from 0.5 to 4 cm. wide, are broader on the trimmed surface than on the crust side, and on the former surface the facet may be gapped and irregular, or smooth and well polished. The edge of the blade is in the middle line, but the sharp curve of the crust surface sometimes produces an adze-like blade. The edge of the blade is gapped on forty-six, and smooth on sixty-two, but it has been flattened by percussion on two specimens.

Although the blade is at the end on all the specimens described in this paper, attention is drawn to split-pebble trimmed coroid tools with a ground lateral blade, commonly called skin-dressers (Thorpe and McCarthy, 1933).

Percussion use.—Sixty have been used for hammering on the butt, and they occur among all varieties. A small number is also battered along one or both lateral margins. Only ten bear percussion marks, and one an anvil-pit, on the upper or lower surface, and they are on the latter or crust surface in most instances.

Materials include sedimentary, igneous and metamorphic rocks of the usual types found among river pebbles; most of them are grey in colour.

Name.—It is proposed that the name *windang* be adopted for this type of axe to simplify reference to it in literature and to define it as a distinctive type among Australian artefacts. It is the name of the entrance to Lake Illawarra, and many axes of this type have been collected on the two kitchen-middens situated on the dunes on the north and south side of the entrance.

Affinities.—The *windang* axe forms a transition between two important phases of stone working in Australia, that in which edge-trimmed implements only were used, and that in which edge-ground tools came into use. It is recorded from Bacsonien sites of the Hoabinhien II culture in Indo-China; the examples figured by Mansuy (1925, Pl. ix, figs. 4a-b, from Co-Kho, Pl. xxx, figs. 4a-b, from Binh-Long, and Pl. xxiv, figs. 2a-b, from Lang-Trang) and by Mansuy and Colani (1925, pp. 25-26, Pl. i, figs. 2a-b, 3a-b) compare exactly with the Australian specimens, and it is important to note that in Indo-China Hoabinhien I consists of trimmed uniface pebble implements of which the *sumatra*-type is the best known. It might be claimed, therefore, that the *windang* axe represents another link in the chain of evidence supporting a relationship in the pebble industries of Australia and South-east Asia.

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EXPLANATION OF PLATE XVI, FIGURES 1-6.

Fig. 1.—*Windang* axe trimmed at one end, Shellharbour, N. S. Wales. Austr. Mus. Coll. Regd. No. E.34266.

Fig. 2.—*Windang* axe trimmed on one lateral margin, Lake Macquarie, N. S. Wales. Austr. Mus. Coll. Regd. No. E.49513.

Fig. 3.—*Windang* axe, trimmed on both lateral margins and end, Duckmaloi River, N. S. Wales. Austr. Mus. Coll. Regd. No. E.49503.

Fig. 4.—*Windang* axe trimmed all over one surface, Clarence River, N. S. Wales. Austr. Mus. Coll. Regd. No. E.28964.

Fig. 5.—*Windang* axe of split-pebble type, with edge-ground blade at both ends, Cronulla, N. S. Wales. Austr. Mus. Coll. Regd. No. E.28969.

Fig. 6.—*Windang* axe showing plain lower surface, Louth Plains, N. S. Wales. Austr. Mus. Coll. Regd. No. E.44883.

Photos.—G. C. Clutton.

