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TWO PEBBLE INDUSTRY SITES OF HOABINH IEN I TYPE ON THE NORTH COAST OF NEW SOUTH WALES.

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(Plates v-vi.)

During a reconnaissance on the north coast of New South Wales I examined two occurrences of water-worn pebbles, at Yamba and Crescent Head, which had been quarried for the manufacture of Hoabinhien I type implements. Their importance lies in the fact that each site presents a single industry unmixed with the numerous extraneous influences found on kitchen-middens south of Port Macquarie. Moreover, it appears probable that neither site has been visited previously by collectors.

Yamba.

Yamba Point, at the south end of the surfing beach, is flattened and considerably eroded; although the greater part of it is covered with wind-blown sand, patches of dark soil are exposed, and large weathered blocks of sandstone, fantastically shaped, project here and there. Several acres of this headland are covered with water-worn stones of all sizes from small pebbles up to boulders which extend down the beach into the water; a layer of pebbles occurs in the sand dune skirting the shore end of the headland, and where the sand has blown away the pebbles lie upon the eroded surface of a "raised beach". Implements were collected over the whole area covered by the pebbles, and the following is a description of the various types.

Cores.—E.48707-12. Originally spherical or thick pebbles from which flakes have been struck; two are irregular in shape and two are roughly triangular with vertical faces on two sides. They are 8, 10-15 cm. in length. 48712 (Pl. vi, fig. 1) is the only *horse-hoof* core, and the edge of its flat ventral cleavage surface is carefully chipped all round; it is $12\frac{1}{2} \times 10 \times 6$ cm., and weighs 33 oz. 48713 has a domed top slightly chipped.

Pebble Core Implements.—E.48710, 48717-21, 48765. Pebbles chipped from both surfaces at one end so as to produce a bevelled blade or striking platform. On some specimens the edge of the blade end is undulating as a result of alternate flaking and they would appear to be cores; others have a comparatively straight trimmed edge, and appear to be hand axes. They are from 9 to 15 cm. long, and weigh from 20 to 36 oz.

Karta.—E.48713-4, 48797 (Pl. vi, fig. 2), 48809. Made from either the core or slice portions of a split-pebble, though all may be regarded as core implements. The working edge is chipped from the cleavage surface. 48714 has a carefully trimmed edge along the two lateral margins and the curved end, and only an island of the dorsal crust remains. They are from $8\frac{1}{2}$ to $11\frac{1}{2}$ cm. in greatest diameter, $2\frac{1}{2}$ to 5 cm. in thickness, and from 8 to 17 oz. in weight.

Uniface Pebble Implements.—This type constitutes the majority of the implements at Yamba, and comprises five varieties:

- A. Working edge on one lateral margin (Pl. vi, fig. 3). E.48722-49, 48751-62, 48764, 48789. 43 specimens. The working edge varies from concave to convex, and on some specimens is irregular and gapped. The trimmed "nose" occurs on 48761. Secondary chipping has been carried out on many examples, especially those made of fine-grained stone. The series range from 7 to 18 cm. in length, $5\frac{1}{2}$ to $11\frac{1}{2}$ cm. in width, 2 to 6 cm. in thickness, and from 6 to 44 oz. in weight.

- B. Working edge on one end. E.48766-73. 8 specimens (Pl. vi, fig. 4). As with group A, the working edge varies from concave to convex, although it is generally regular and even. 48768 is triangular in shape. They range from $5\frac{1}{2}$ to $13\frac{1}{2}$ cm. in length, 6 to $9\frac{1}{2}$ cm. in width, $1\frac{1}{2}$ to 4 cm. in thickness, and 4 to 26 oz. in weight.
- C. Working edge on one end and on one or both lateral margins (Pl. vi, fig. 5). E.48715, 48748, 48750, 48763, 48793-94. 6 specimens. The trimmed "nose" occurs on 48763. Some have a steep-faced working edge, but on 48793-94 the chipped portion is almost parallel to the crust surface beneath it. They range from 6 to $11\frac{1}{2}$ cm. in length, $5\frac{1}{2}$ to 9 cm. in width, $2\frac{1}{2}$ to 5 cm. in thickness, and 6 to 33 oz. in weight.
- D. Trimmed on edge of cleavage surface. E.48779-87, 48790-92, 48795, 48798-804, 48806, 48808. 22 specimens. Made from split pebbles, 16 from the core portion, and 6 from the slice part, although all may be regarded as core implements. Oval and irregular oval in shape. The edge may be partly or wholly trimmed, and on some examples is steep-faced. 48781 is a large slice, 17×10 cm., and 22 oz., on which the pronounced bulb of percussion occupies almost half of the cleavage face which slopes away to a long chipped edge. They range from 7 to 18 cm. in length, 6 to 11 cm. in width, 2 to $4\frac{1}{2}$ cm. in thickness, and 6 to 22 oz. in weight. This group is trimmed from the crust surface, but differs from the *sumatra*-type in having an unworked cleavage surface.
- E. *Sumatra*-type.¹ E.48774-76, 48783, 48796, 48805, 48807. 7 specimens. One surface of the pebble is flaked, and its margin is trimmed. This surface is convex and the crust has been flaked away on all examples. On some of the specimens a ridge on the crust surface forms a keel, which assists in gripping the artifact, and this keel is preserved on the worked surface, so that they are roughly quadrangular in section. 48777, the thickest specimen, has two faces on its worked surface, and weighs 35 oz. 48774, 48783, and 48796 (Pl. vi, fig. 6) are the finest examples, carefully trimmed all round their margins. 48774 is thick at one end, from which it tapers to an axe-like blade at the other end. They range from 10 to 14 cm. in length, $5\frac{1}{2}$ to 11 cm. in width, 2 to 5 cm. in thickness, and 16 to 26 oz. in weight.

Flakes.—A large number of flakes were noted and a series collected. None are trimmed on the edges. Most of them were probably struck off the pebbles in the making of the implements, but the occurrence of cores on the site suggests that the flakes had some use.

Hammerstones.—Only one specimen was found (E.48812). It is a round pebble $14\frac{1}{2} \times 9 \times 3\frac{1}{2}$ cm., and weighs 28 oz. Several flakes have been struck off one surface as a result of use.

Summary.—The following artifacts were collected: 6 cores (one of the *horse-hoof* type), 7 pebble core implements, 4 *karta*, 86 uniface pebble implements (including 7 *sumatra*-types), 1 hammerstone, and a series of flakes. The scarcity of *karta*, *horse-hoof* cores, and hammerstones is noteworthy.

Crescent Head.

There are two stations at Crescent Head, a quarry on the headland and pippy middens along the beach.

The Quarry. (Pl. v, fig. 1.)

Crescent Head consists of tuffs, sandstones and shales in which rhythmical deposition is marked; the tuffs and sandstones vary greatly in colour, texture and composition, and inclusions of grey shale are abundant in the sandstones (Voisey, 1934, p. 340.). Masses of stone are pounded off the headland by the sea and washed

¹ The name *sumatra*-type was given to this variety of the uniface pebble implements by P. V. van Stein Callenfels as a result of the excavation of kitchen-middens in north-east Sumatra during 1925 and 1926. In these deposits the *sumatra*-type was almost the only type of artifact found.

on to the two beaches where they eventually become smooth and water-worn. The smooth stones cover the small beach between the two headlands, extend across a narrow spit (where they are covered with sand and grass), and are massed for about one-quarter of a mile along the edge of the reserve at the southern end of the beach; as at Yamba, their size varies from small pebbles to large boulders.

The aborigines quartered suitable pebbles by percussion and used both the core and large flake portions in the making of their implements. Apparently the pebble boulders were employed as pestles to split the pebbles. The implements collected are as follows.

Cores.—Owing to their great size, only two specimens were collected, although pebble cores are abundant on the site. E.48815 (Pl. vi, fig. 7) is $22\frac{1}{2} \times 23 \times 8\frac{1}{2}$ cm., and weighs $3\frac{3}{4}$ lb.; a large slab has been struck off each side, and their size is indicated by the negative impression on the core. E.48816 is $18 \times 15 \times 5\frac{1}{2}$ cm., and weighs 5 lb. They are both oval, elongate pebbles of the slender type. One core was noted as being the same length as E.48815, but twice as thick.

Pebble Core Implements.—E.48818–24, 48826 (Pl. vi, fig. 8). Pebbles chipped from both surfaces to produce a bevelled blade at one end or on one lateral margin. 48821 is one portion of a split pebble and is $18\frac{1}{2} \times 14 \times 8$ cm., and weighs $4\frac{1}{2}$ lb.; alternate flakes have been struck off its edge, leaving a scalloped line, as though it were a core. 48822, a similar type, is 16 cm. long and weighs 3 lb. 48819–20 and 48826 are small examples from 10 to 13 cm. long, and weigh from 12 to 18 oz. The trimmed edge on some examples is regular and appears to have been used.

Karta.—E.48823, 48825, 48829–34 (Pl. vi, fig. 9). Split-pebble implements, trimmed on the edge of the crust surface from the cleavage face. 48829 is keeled and shoe-shaped and is chipped round the tongue-shaped end; it is $20 \times 13 \times 6\frac{1}{2}$ cm., and weighs 4 lb. 48830–31 are irregular types, both 13 cm. in diameter and 5 cm. thick, and weigh $1\frac{3}{4}$ lb. and $2\frac{3}{4}$ lb. respectively. 48832–33 have lateral blades and are 10 and 11 cm. long. 48834 is a tanged slab, $18 \times 13\frac{1}{2} \times 4$ cm., weighing $2\frac{1}{4}$ lb.

Uniface Pebble Implements.—E.48827–28, 48835–42, 48867. As at Yamba, they consist of pebbles which have been split by percussion and both the core and slice sections used as implements. The bulb of percussion is pronounced on some of the latter type. The edge is only partly trimmed on the cleavage surface, mainly from the crust face, though a few flakes have been struck off, either by intention or as a result of use on the edge of the crust face on several specimens. 48827 is a lateral type with a tongue-shaped projection between two concave edges forming the working edge. Three have been rolled by the waves. There are no *sumatra*-types in this group. They vary from 8 to $18\frac{1}{2}$ cm. in length, $6\frac{1}{2}$ to 14 cm. in width, up to $4\frac{1}{2}$ cm. in thickness, and 1 to $3\frac{3}{8}$ lb. in weight.

Flakes.—E.48845–52. A series of large flakes with trimmed margins, varying from irregular quadrangular to oval in shape. They are from 8 to 12 cm. in length.

Beach Middens.

A long beach extends northward from the quarry at Crescent Head. A small lake, which is usually closed, has its entrance at the southern end of the beach, and near its northern shore is an aboriginal burial ground in the sand dunes. About one mile along the beach a series of middens begin; they consist almost entirely of pippies (*Plebidonax deltoides* Lamarck) and extend for another mile or more along the dunes. In some places they are built up into conical heaps about a metre in thickness, and there are extensive areas of scattered shells (Pl. v, fig. 3). Fireplaces, which are numerous, are made up of small pebbles washed up on the beach; these stones are now red as a result of being burnt, and if crushed would be suitable for use as pigment. The aborigines took the pippies to the fireplaces, extracted the animal and roasted it in the ashes. The late T. Dick had a series of photographs showing the aborigines of Port Macquarie collecting pippies on the beach and roasting them in the fires. Pippies are still gathered in quantities on Crescent Head beach by local fishermen.

Not more than several dozen artifacts were observed on these middens. They were all carried by the aborigines from the quarry and were not made from the small thin

pebbles scattered along the beach. It may be concluded, therefore, that they are all implements, and not blanks or rejects.

Horse-hoof Core.—E.48868. The flat ventral surface is pebble crust, and its edge is chipped along one side. It is $10\frac{1}{2} \times 7 \times 5\frac{1}{2}$ cm. Weight 19 oz.

Karta.—E.48857-62 (Pl. vi, fig. 10). Similar to those found on the quarry. Several specimens are discoidal and wedge-shaped, chipped along the lower edge of the thick side and along the thin edge. They are 10-15 cm. long, 7-12 cm. wide, $3\frac{1}{2}$ - $6\frac{1}{2}$ cm. thick, and weigh 14-30 oz.

Worimi.—E.48863 (Pl. vi, fig. 11). A large crescentic implement, triangular in section. One of the sloping surfaces is a cleavage face, the other a crust surface. The thick crescentic side is carefully shaped and bears percussion marks. It is $16\frac{1}{2} \times 11 \times 7$ cm., and weighs 44 oz. Artifacts of this type, made of porphyry and chert, form a conventionalized type in the Newcastle district and in the neighbouring north and south coastal area. As they are abundant in the territory of the *Worimi* tribe, the adoption of this name has been considered advisable.

Sumatra-type.—E.48856 (Pl. vi, fig. 12) is shoe-shaped, keeled and triangular in section. Several large flakes have been struck off the side and end of the crust surface. On one side of the keel is a flat cleavage face and the edge it forms with the keel is heavily work with stepped chipping. The other face of the keel is worked, and the edge it forms with the ventral crust surface is well chipped. One end is bevelled from the keel to the end of the crust surface, and its edge is also well used. It is $15 \times 7 \times 5\frac{1}{2}$ cm., and weighs 24 oz. On 48867 the crust surface is flattened, the worked surface is convex, and one edge is chipped. Several other uniface pebble implements were noted but not collected.

Flakes.—E.48853-54. Side scrapers made from pebble flakes 5 and 8 cm. long. A number of unchipped flakes were collected.

Ground-edge Axes.—Only three specimens were collected, one on the quarry and two on the middens. They are made from split pebbles, and are actually uniface pebble implements with a ground edge at one end. On each specimen the blade is ground on both faces. E.48866 is $13\frac{1}{2} \times 9 \times 3\frac{1}{2}$ cm., and weighs 20 oz. 48865 is $12 \times 7\frac{1}{2} \times 4$ cm., and weighs 17 oz. Both have a very narrow blade. On 48814, from the quarry, the blade is ground from $1\frac{1}{2}$ to $2\frac{1}{2}$ cm. wide. It weighs 12 oz. It is probable that local residents have collected other ground-edge axes on the quarry and beach sites.

Summary.—The following artifacts were collected on the two stations: 4 cores (one of the *horse-hoof* type), 8 pebble core implements, 14 *karta*, 1 *worimi*, 14 uniface pebble implements (including 1 *sumatra-type*), 3 ground-edge axes, and a series of flakes. Points of interest are the absence of pebble hammerstones, the scarcity of *horse-hoof* cores, and the high proportion of *karta*.

Relationship of Weight to Length-Breadth Index.—The *karta* and uniface pebble implements from Crescent Head range from 13 to 40 oz., with one at 67 oz.; there are 8 at 13 oz., and 19 from 20 to 40 oz., so that there might be said to be a light series and a heavy series. The length-breadth indices reveal the large size of the implements, which range from 46 to 100; there are 3 between 46 and 65, 16 between 70 and 85, and 6 between 90 and 100. At Yamba the *karta* and uniface pebble implements range from 4 to 44 oz.; the peak is from 12 to 20 oz., there being 79 specimens from 8 to 24 oz., 7 from 28 to 44 oz., and 3 at 4 oz. The length-breadth indices range from 43 to 100, with a decided peak at 65; there are 19 between 43 and 55, 33 between 60 and 70, 31 between 75 and 90, and 6 at 100. Although the series is a light one, its length-breadth ratio is comparatively high.

Affinities.—In 1931 Tindale and Maegraith described a culture from Kangaroo Island which consists of *horse-hoof* cores, *karta*, *sumatra-types*, trimmed discoidal flakes and dual pebble hammer and nether stones. The Yamba and Crescent Head sites agree closely with the Kangaroo Island culture in the types of artifacts, although they have local features which are in conformity with the variations of the implements present in South Australian and Tasmanian occurrences of the Hoabinhien I type culture. The

main point of difference lies in the presence of pebble core-implements and the scarcity of horse-hoof cores and pebble hammerstones at Yamba and Crescent Head.

In 1937 Tindale discussed the relationships of the Kangaroo Island culture, pointing out the similarities and local variations at Fulham, Hallett's Cove, and in Tasmania; he concluded that the Kangaroo Island industry in South Australia is related to cultures of the "Upper Palaeolithic of Malaya". I pointed out in 1939, 1940*a* (p. 39) and 1940*b* (p. 262), as a result of an examination of museum collections in Java and the Malay Peninsula during 1937-38, discussions with delegates at the Third Congress of Prehistorians of the Far East, Singapore, 1938, and literature on the subject, that the Kangaroo Island industry is identical with Hoabinhien I of Indo-China, Malay Peninsula, and Sumatra; this culture is tentatively assigned by prehistorians to the beginning of the mesolithic period of southern Asia and Malaya.

Hoabinhien I Implements on the New South Wales Coast.—It is noteworthy that from the neighbourhood of Port Macquarie northward there is a predominance of Hoabinhien I implements. The Australian Museum has series from Coff's Harbour, Clarence River, Yamba and Crescent Head, and specimens from the Manning River, Byron Bay and Tallow Beach. Jackson (1939, figs. 1-3) has recorded them in the Point Cartwright district, Moreton Bay. The Crescent Head beach station indicates that the use of these implements survived on the north coast till the British occupation, although ground-edge axe techniques diffused into the area.

South of Port Macquarie, to the Victorian border and beyond, Hoabinhien I implements occur on numerous coastal middens, where they are intermixed with the *elouera* industry, bone implements, ground-edge axes, incised pebbles, mortars and pestles. In the Newcastle district hand-axes made of large pieces of chert and porphyry, for which the name *worimi* is proposed, seem to have taken the place of the pebble implements.

The axe of the type found at Crescent Head, described on p. 24, is a uniface pebble implement ground at one end, on one or both faces, to form a blade. In the Australian Museum collection there are examples from Victoria, eastern New South Wales, and Queensland. It is probable that old *sumatras* and other pebble implements lying about on the quarry-sites and middens, and those in use at the time, were transformed in this way to ground-edge axes, and they would appear to be a transitional stage in the use of the latter technique in those areas where Hoabinhien I implements were used. Thorpe (1932, p. 307, Pl. xxvii, fig. 2) also arrived at this conclusion.

Conclusion.—The Yamba and Crescent Head sites represent Hoabinhien I type industries. The south-east Australian and Tasmanian occurrences of this industry form an extension of the Hoabinhien I culture from southern Asia and Malaya.

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EXPLANATION OF PLATES.

PLATE V.

Pebble industry site on Yamba Point, Yamba.

Fig. 1.—General view.

Fig. 2.—Portion of the eroded surface of the "raised-beach".

Pebble industry site at Crescent Head.

Fig. 3.—View of the headland and accumulation of water-worn boulders along the edge of the Reserve.

Fig. 4.—Ground-edge axe (E.48866) *in situ* among pippy-shells scattered on the beach middens.

Photographs by F. D. McCarthy.

PLATE VI.

Pebble industry site on Yamba Point, Yamba.

Fig. 1.—Horse-hoof core. E.48712.

Fig. 2.—*Karta*. E.48797.

Fig. 3.—Uniface Pebble Implement. Group A. Lateral working edge. E.48728.

Fig. 4.—Uniface Pebble Implement. B. Working edge at end. E.48768.

Fig. 5.—Uniface Pebble Implement. C. Working edge on side and end. E.48715.

Fig. 6.—Uniface Pebble Implement. E. *Sumatra*-type. E. 48796.

Pebble industry site at Crescent Head.

A. Implements from quarry.

Fig. 7.—Large pebble core. E.48815.

Fig. 8.—Pebble core implement. E.48819.

Fig. 9. *Karta*. E.48831.

B. Implements from beach middens.

Fig. 10.—*Karta*. E.48859.

Fig. 11.—*Worimi*. E.48863.

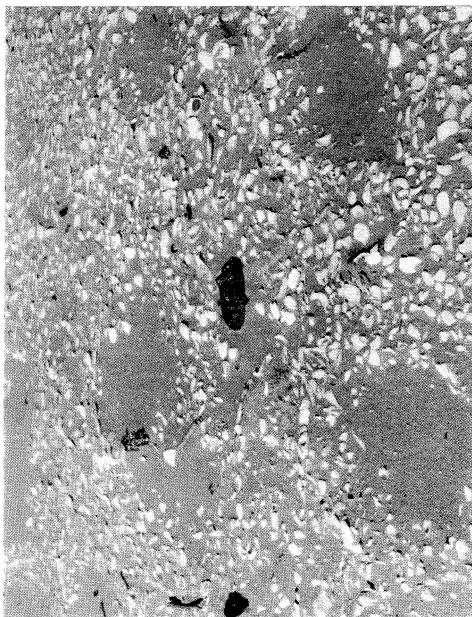
Fig. 12.—*Sumatra*, keeled and shoe-shaped. E.48856.

Photographs by G. C. Clutton.

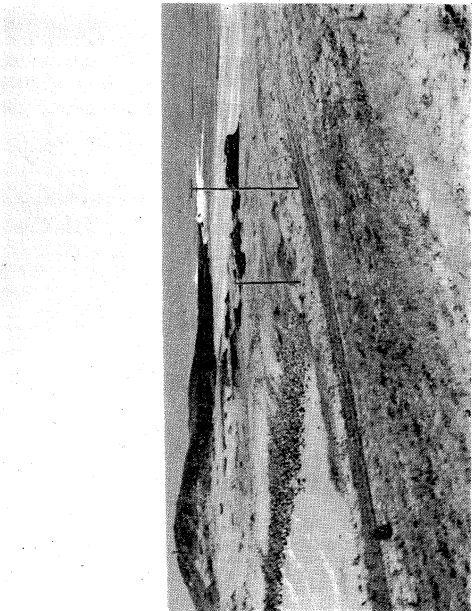
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