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SEELANDS AND SAI YOK PEBBLE TOOLS: A FURTHER CONSIDERATION

Pebble tool industries, in which the dominant tool types are made on water worn pebbles obtained from river or beach gravels, with a working edge created by the junction of either two flaked surfaces or a flaked surface with the pebble cortex are relatively common in lithic technologies, understandably since the pebble tool is a simple, readily-made stone artefact which can serve as a multi-purpose tool. Pebble tools are found in the earliest industries of the Palaeolithic, such as the Oldowan; so we often tend to consider them as unsophisticated, crude, and primitive to be placed at the base of any evolutionary, typological series. Certainly they are a very generalised tool type, as the range of forms which may be produced is limited by that of the pebble itself, the choice of the maker expressed as much in his selection of the original pebble as in the shaping of the final product. Stylistic preference may be shown in the production of a bifacial or unifacial working edge. Both forms occur in Australia, the former in a distinct industry given the name 'Gambieran' (whose status and context is still to be studied), found in southwestern Victoria and adjacent parts of South Australia, and the latter in assemblages with a wider distribution from South Australia and Tasmania to coastal southern Queensland. This group is a challenging one in the questions it raises in terms of its distribution in Australia in time and space, of its cultural associations, and significance in Australian technologies. Do these industries in Australia form an early industrial complex as they do in so many other parts of the 'stone age' world? Are the tools all similar in technology and form, or are there significant variations from region to region within Australia and over time? Above all are the questions these unifacial pebble tools raise about connections with the pebble tool assemblages of Late Pleistocene and post-Pleistocene South-East Asia, especially those of the 'Hoabinhian techno-complex'.

Unifacial pebble tools are found in industries with a coastal geographical spread in south-eastern Australia from Kangaroo Island and the South Australian coast, Tasmania, up the east coast through New South Wales to Moreton Bay and Bowen in Queensland. Inland distributions seem less consistent, as they are reported from non-coastal and even upland sites in South Australia and the Southern High Tablelands (e.g. Buchan and Jindabyne - Flood 1973) and the southwestern slopes of New South Wales. In northern New South Wales however their distribution is strictly coastal (see McBryde in press). These tools have been most fully studied as parts of total assemblages in South Australia and for North Coast New South Wales; in these areas they form the dominant elements in implement assemblages. The tools of the two areas show superficial similarities, as between most pebble tool assemblages, but their cultural relationship remains to be fully tested, especially as the implement types associated with them differ markedly. The South Australian group form part of the distinctive Kartan

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assemblage with its heavy core tools and hammer stones, while the northern New South Wales group are associated with backed blades and ground edge artefacts. The associated tool types from both areas have wider distributions in differing contexts, and so raise the whole question of the cultural status and functions of the uniface pebble tools in their assemblages. Certainly it would be unwise to think of them as 'cultural markers' of any significance. A survey of the range in time of dated examples reinforces this point; they occur in Pleistocene industries from Clogg's Cave, Buchan, in Victoria (Flood 1973) and Burrill Lake rock shelter on the New South Wales south coast (Lampert 1971), but are also found in south coast assemblages dating from a thousand to a few centuries ago (Currarong and Shellharbour - Lampert 1971 and Tindale 1965). Their manufacture was recorded in the Southern Uplands near Jindabyne at the end of the nineteenth century (Helms 1895). On the north coast of New South Wales, where we have the largest group of dated assemblages including pebble tools so far investigated, they occur in industries of all periods. At Seelands they are the dominant element in basal levels, but continue throughout, to be associated with backed blades from about four thousand years ago to 1600 AD. They comprise from over 50% of the total assemblage in the basal levels through over 40% in levels dating to the beginning of the second millennium BC, to 17% in those of the second millennium AD. So, though pebble tools may be more important in early industries in Australia, we cannot isolate them as representing a distinct early technological phase superseded by more sophisticated elements. They continue in use into the recent past. Information from Lampert's studies of the Kartan pebble tool industries of Kangaroo Island should add new dimensions to this aspect of the study of Australian pebble tool industries. He has obtained Pleistocene dates for a flake tool industry from the Seton site (a rock shelter) but as yet the large tools of the traditional Kartan industry from the surface sites of the island are undated. Research on the relationship between these two distinct industries is in progress (Lampert 1972:in press).

The first reports on the pebble tool industries of both South Australia and northern New South Wales compared them closely with those of South-East Asia. Tindale commented after his 1936 visits to Amsterdam and Harvard, and his examination of Malaysian Upper Palaeolithic specimens that those from Kangaroo Island 'seem to be morphologically indistinguishable from these' (Tindale 1937: 47); he even suggested 'Sumatra' as a convenient name for the implement. At about the same time McCarthy was engaged on a programme of surface collection from sites on the north coast, recovering uniface pebble tools very similar visually to those of Kangaroo Island (McCarthy 1941, 1943). He described these as Kartan, but made further comparisons with Hoabinhian artefacts on the basis of his own tour of museums in South-East Asia in the late 'thirties (McCarthy 1938). Though he used the term Kartan he recognised that the association of his north coast pebble tools differed from those of the South Australian examples, noting that horsehoof cores and Karta were scarce on these sites, while the Worimi cleaver and the ground edge pebble

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axe were not; they were elements absent from South Australian pebble tool assemblages. McCarthy considered these assemblages an Australian variant of the Hoabinhian I pebble tool industries of Indo-China and Sumatra, (Colani 1927) and used the term in describing the tools from a series of middens near Clybucca on the Lower Macleay, positioned on what could be regarded as an Old Pleistocene coast line. He also compared them with Kangaroo Island assemblages. On geological grounds he suggested a date of between 11,000 and 5,000 for the Clybucca sites, in spite of the current view (based on faunal evidence) that the Hoabinhian was a post-Pleistocene Mesolithic culture. Other north coast sites investigated at this time he also described as 'Hoabinhian'.

> The Yamba and Crescent Head sites represent Hoabinhian I type industries. The south-east Australian and Tasmanian occurrences of this industry form an extension of the Hoabinhian I culture from south Asia and Malaya.
> (McCarthy 1941:24-5).

So in the immediate pre-war period the major workers in Australia had each recognised distinct uniface pebble tool industries in South Australia and New South Wales, and made assumptions about their antiquity and connections with Late Palaeolithic and Mesolithic Hoabinhian assemblages of south-east Asia. These assumptions were based on untested theories concerning the geomorphological history of both regions in Australia, which suggested a Pleistocene age for the sites concerned, and on an untested acceptance of a superficial morphological similarity between examples of a very generalised tool type as indicating cultural connections or derivation. All these assumptions required rigorous testing. In the literature of the time the differences between the Hoabinhian and the Kartan or the New South Wales collection were not stressed. For example, in the Australian Kartan assemblages elements of the Hoabinhian such as the short axe, the bifacially flaked tool, and the edge-ground tool, were not found, but the significance of this absence was not discussed. There were no questions asked about the similarities or differences between the New South Wales and South Australian industries, though McCarthy did give some comments on differences in their components.

For almost twenty years the relationships between the Australian industries and those of the Hoabinhian proposed in this early work remained untested, as indeed also did those between differing regions of Australia. However in the last decade the dimensions of the problems posed by the suggested relationships have changed. There has been new work on Hoabinhian sites in Thailand, Cambodia and Indo China, and on the Australian pebble tool industries such as Matthews' quantitative study of pebble tool collections from Australia and Thailand, my own work on northern New South Wales prehistory and recently Lampert's research on the Kartan of Kangaroo Island. The major problems can no longer be conveniently left in 'suspense account'.

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Matthews' study of uniface pebble tools from sites in South Australia, Kangaroo Island, the north coast of New South Wales, and the Sai Yok site in Thailand, was the first investigation to take up the major questions posed by the conclusions of the workers in the forties (Matthews 1966, 1968). He aimed to test objectively and quantitatively the suggestions of relationships between these three groups of industries. The results were unexpected; the pebble tools of the north coast sites of Yamba and Seelands showed closer affinities to those of the distant Hoabinhian site than to those of South Australia, with which they showed little relationship on the variables tested. The South Australian industries were not closely comparable to those of the Hoabinhian site. So the problem posed in the forties was presented again, in a different form. The final answer of course must rest with the application of similar rigorous analyses to total dated, excavated assemblages, with well established stratigraphic and cultural contexts. However while we await the result of further excavations in south-east Asia, the full definition of the Hoabinhian as a 'culture' or a 'techno-complex', and fixing of its chronological status in the Late Pleistocene, useful preliminary work may well be undertaken by making full studies of the Australian industries of this type and establishing their features and typological relationships. The superficial resemblances of pebble tools could mask fundamental differences in techniques of manufacture, and in functions, as well as of cultural derivation. We must understand our Australian collections before we embark on far-flung comparative studies.

In my study of the New England region pebble tool industries were constant features of research; they formed major elements in the assemblages of coastal occupation sites I excavated, such as Seelands, Wombah and Jacky's Creek, while eroded surface sites on the dune systems at Station Creek, Schnapper Point and Moonee produced immense collections of these tools. In my field studies of the early 'sixties I did not work on the Macleay sites; it seemed premature to do so until detailed geomorphological studies of the area had been undertaken. After Hails' investigations we began surveys of the area (Campbell 1972) and its midden sites as a preliminary to excavation, which is now in progress under the direction of Graham Connah (Connah 1975). On dates already received for the Clybucca middens and others on the lower Macleay their build-up belongs to the last five thousand years. In my own work on the Seelands industries, apart from Matthews' results, I was intrigued by the elements there (and in other north coast assemblages) that seemed to be features of the Hoabinhian industries:-

1. the association of the unifacial pebble tool with edge-ground tools;
2. their association with bifacially flaked pebble tools and,
3. the presence of truncated pebble tools.

These were features common to both industries, (beyond the metrical similarities between the non-truncated unifacial tools) which

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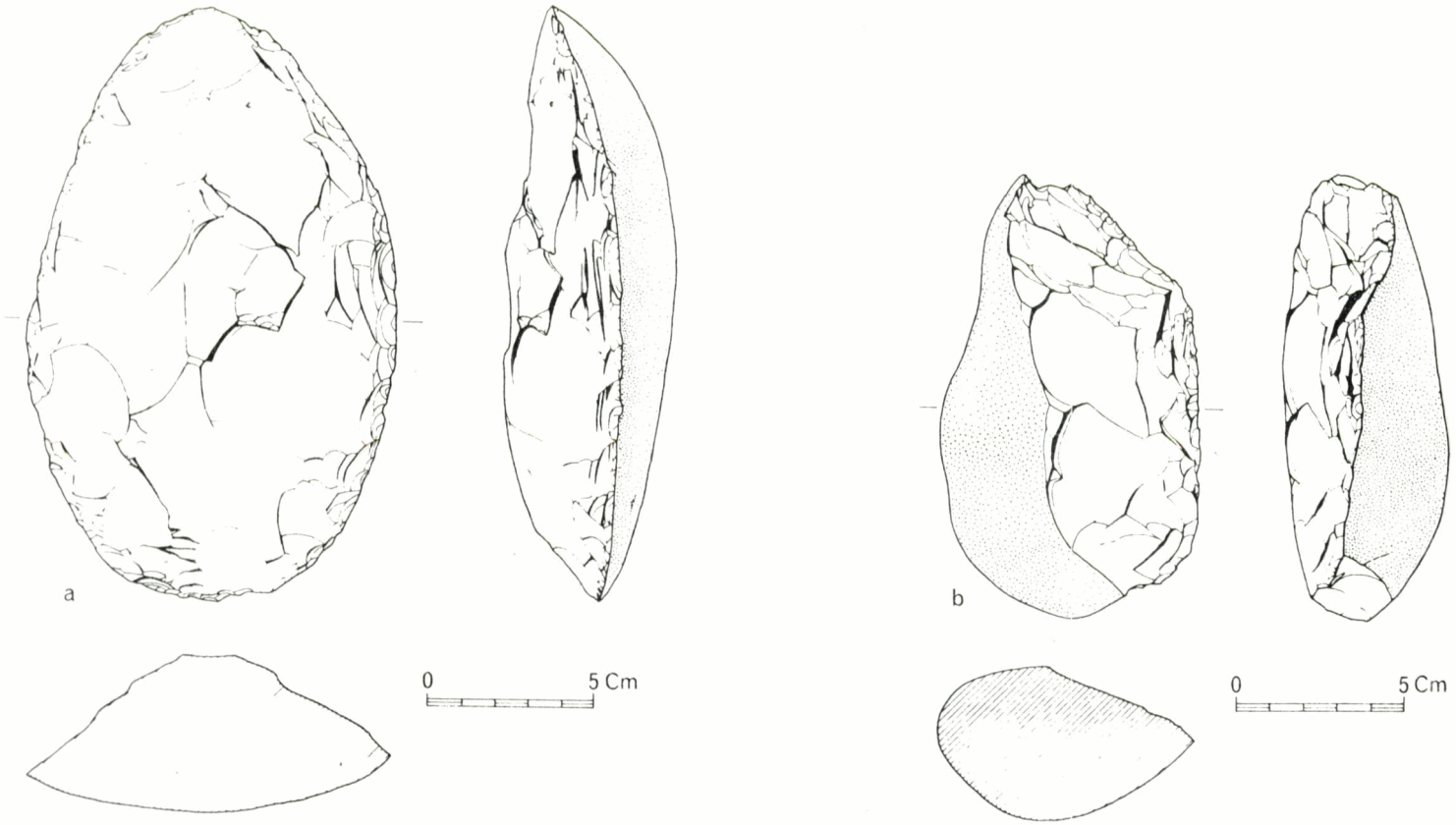

UNIFACE PEBBLE TOOLS FROM NORTH COAST SITES. a) Completely worked on one surface - from 'Red Rock' on the banks of the Clarence River, Copmanhurst, upstream from Seelands; b) from the Station Creek site, an eroded site in coastal dunes near Woolgoolga.

marked them off from the South Australian assemblages. During sabbatical leave in 1968 my own understanding of the Hoabinhian industries was greatly increased by opportunities to see collections of these artefacts in Bangkok, Basel, Paris and Leiden. At Leiden, through the great kindness of the late Dr van Heekeren, I was able to record a collection from the Sai Yok site, which had just arrived from Denmark, after the division of the collections from the Thai Danish expeditions. My main aim of course was comparison with the Seelands material, following Matthews' interesting results. Would an independent study, on a slightly different collection, and using a slightly different range of variables, result in the same hints of close relationship?

The Sai Yok collection in Leiden came from Sector (d) of the site (see van Heekeren 1966:83 ff.), a trench cut into the steep slope of the talus deposit below the cave. The deposit here was shallow, and the excavator concluded that the majority of the artefacts there could have been derived from other parts of the site and so represent a mixed collection which could not be strictly correlated with the assemblages of the occupation levels of the main cave, though belonging to the pre-ceramic horizon of these. In all 228 pebble tools were recovered in the excavation of this part of the site, compared with over six hundred from the area of Section (x) from which the sample Matthews studied was taken. In addition the section x trench was dug into soil of the terrace at the base of the talus slope, and though there was the possibility of mixture the pebble tools had clearer stratigraphic context in an aceramic horizon. So the collection is not as satisfactory as that on which Matthews worked.

In choosing the collection from Seelands with which to make comparisons problems also arose. Matthews took for his study a sample of forty two artefacts from the entire Seelands collection, so including specimens from all phases of its 6000 years of occupation. In 1964, when his measurements were made, we had dates for only the intermediate levels of the site, so the problems involved here were not obvious, also Matthews considered the collection as a whole to be internally consistent, hence such combination seemed a safe procedure, and allowed the sample to reach a satisfactory size. However the Seelands collection does include artefacts of widely separated chronological periods, and widely differing associations; to 'lump' them may mask differences relevant for comparative studies. From my own work on the pebble tools from Seelands I felt that certain trends and changes through time could be seen, even though they were of a minor character (McBryde 1974:246-251). The obvious choice for comparison was the assemblage of the basal levels. Unfortunately this was numerically too small for worth-while results, so I was forced to choose the earliest group of any size with a clear stratigraphic and chronological context. So I have used the uniface pebble tools of level IIIA (dated to the beginning of the first millennium BC) in which pebble tools form the largest single component in the total implement assemblage. Further, in this level there is the first appearance of truncated pebble tools on the site, a form which is also characteristic of Hoabinhian industries.

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In making this comparative study and presenting its results I have been very conscious of its limitations, and its inconclusive nature. Three aspects particularly affect the validity of any statements based on it:-

1. Comparisons of artefact collections in isolation (especially if one tool type is selected from its parent assemblage) can only yield very tentative results concerning questions of cultural derivation, at the most suggestions of possible relationships to be tested more fully against a wider range of archaeological evidence.

2. The samples used in this study were necessarily small; though unavoidable this does diminish the strength of the statistical results.

3. The pebble tool itself is a very generalised tool type; the number of controllable, deliberate variations which may be created in its form are limited, so it may not be a suitable tool type to choose for analyses of this kind.

The comparisons between the two collections, from Sai Yok (sector (d)) and Seelands level IIIA was made in terms of basic dimensions - length, width, thickness, and in terms of features which might reflect either technological traditions or fashion, or the effects of functional demands. An estimate of mass as indicated by weight is not included here as I was not able to weigh the Sai Yok artefacts. Size, however is well presented in the other dimensions measured. The results were drawn up into frequency distribution tables (presented here in graph form and in tables) and the figures from the tables subjected to X^2 tests of significant difference. As well, means, standard deviations of these, medians and modes were calculated as another way of comparing the basic data and of presenting it in the form of descriptive statistical analysis (see Table 1).

In measuring the artefacts they were oriented along the long axis, length taken as maximum on this axis, and width at right angles to this, thickness being the maximum height of the tool. In describing the position of the working edge in terms of margins retouched I have taken this orientation of the tool and the descriptive terminology rather as one would in describing the position of the retouch on an end-struck flake or blade tool. This may not be entirely satisfactory, and one loses the possibility of quantifiable information on the total extent of retouch on the tool, but it gives a clearer mental image of the tool's morphology than Matthews' quadrant system and is a more flexible approach. Certainly it allowed clearer classification for these collections than trying to use Matthews' approach. The division into Groups A, B, and C is merely to test the importance of the technological distinctions which could be made between the tools as a whole, that is between those made on a complete pebble (Group A) those made on a split pebble or large pebble flake (Group B) and those made on a truncated pebble (Group C - which corresponds to the *hâche court* of the typologies used of the Hoabinhian collections). Both

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TABLE 1

Attribute	SAI YOK Sector (d) Group A	Group B	Group A + B	Group C	SEELANDS Level IIIA Group A	Group B	Group A + B	Group C
	N = 45	N = 6	N = 51	N = 12	N = 15	N = 7	N = 22	N = 8
Length $\bar{x}$	8.88	7.80	8.75	6.95	10.25	10.8	10.22	5.51
s	1.71	1.33	1.70	1.40	1.98	1.53	1.80	1.24
Median	8.9	8.1	8.7	6.7	10.4	9.2	9.95	5.0
Mode	8.5	8.0-8.9	8.5	6.0-6.7	-	8.9	8.9	5.0
Range	6.3-14.4	5.9-9.0	5.9-14.4	5.1-9.8	6.4-13.7	8.9-13.1	6.4-13.7	3.6-7.1
Width $\bar{x}$	5.87	5.60	5.84	6.83	7.33	8.35	7.68	7.80
s	0.96	0.60	0.92	1.16	1.25	1.53	1.41	1.14
Median	6.0	5.4	5.8	6.5	7.5	7.7	7.55	7.6
Mode	6.0-6.9	5.3-5.8	6.0-6.9	6.1-6.9	8.4	7.2-7.7	7.5-8.4	7.0-7.9
Range	4.3-7.8	4.7-6.4	4.3-7.8	4.9-9.2	5.3-9.4	6.8-11.0	5.3-11.0	6.0-10.0
					N = 14			
Thickness $\bar{x}$	3.27	2.45	3.17	3.39	3.61	2.73	3.29	2.83
s	0.69	0.24	0.70	1.05	1.04	0.8	1.04	0.60
Median	3.3	2.4	3.1	3.0	3.65	2.6	3.1	2.5
Mode	3.3	-	3.3	3.0-3.5	2.5	3.1	2.0-2.9	2.6-2.7
Range	1.9-5.2	2.1-2.8	1.9-5.2	2.2-6.2	2.1-5.6	1.7-3.9	1.7-5.6	2.3-3.9

TABLE 1 (continued)

Edge Angle	$\bar{x}$	72.27	67.50	71.71	75.67	74.80	51.00	67.23	70
	s	9.48	11.29	9.70	13.63	17.11	11.20	18.97	13.69
	Median	75	65	72	75.5	75	50	63.5	70
	Mode	80	65-70	80	75	-	60	60	-
	Range	53-94	50-85	50-94	58-96	45-97	35-65	35-97	50-85
									N = 7
$\frac{L}{W}$ x 100	$\bar{x}$	153.29	139-17	151.63	102.25	140.80	119.57	134.05	72.43
	s	30.42	17.22	29.42	15.29	20.82	14.28	21.21	18.47
	Median	149	140.5	145	98.5	134	119	132.5	71
	Mode	143	141-142	143	-	150	-	131-138	71-77
	Range	108-257	111-165	108-257	80-124	99-172	101-138	99-172	46-97
									N = 6
$\frac{W}{L}$ x 100	$\bar{x}$	67	73	68	99	72	84	76	138.83
	s	12	10	12	15	12	11	12	23.95
	Median	67	71.5	69	92.5	75	81	78	129.5
	Mode	65	70-73	60-65	80-88	75	-	75	129
	Range	35-92	60-90	35-92	80-125	58-101	72-97	58-101	107-178
						N = 14		N = 21	N = 7
W_{th} x 100	$\bar{x}$	185.24	230.17	190.53	211.17	215.86	338.43	256.71	296.29
	s	40.79	30.94	42.12	46.74	43.45	59.58	76.14	66.01
	Median	178	232.5	181	203.5	219.5	365	240	287
	Mode	160-167	232-257	160-167	190-191	212-219	-	-	-
	Range	108-309	189-261	108-309	129-276	148-286	242-400	148-400	182-385

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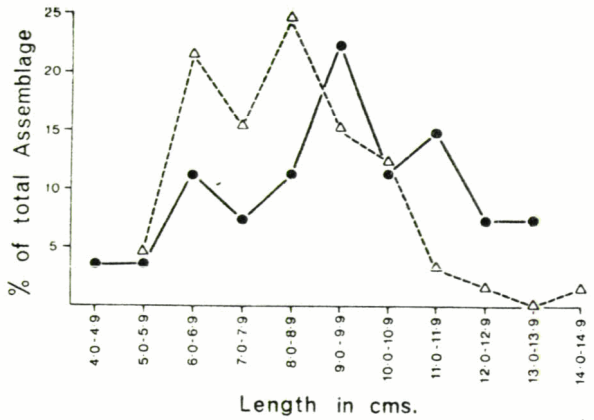
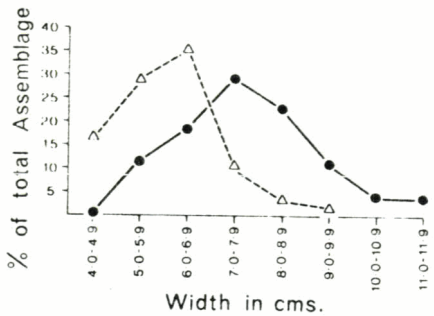
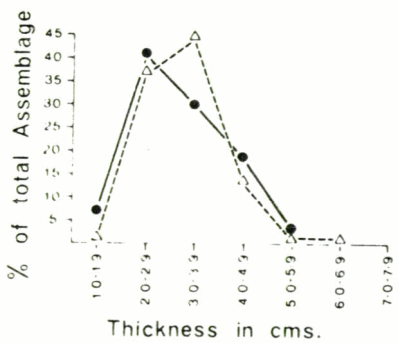
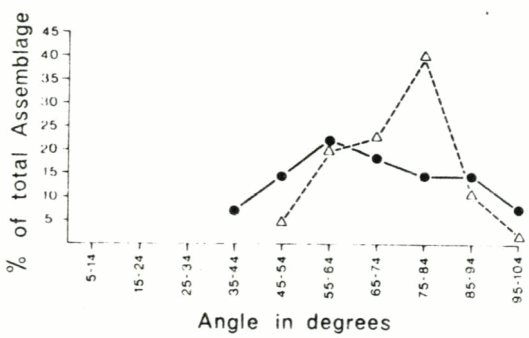
Uniface Pebble Tools:

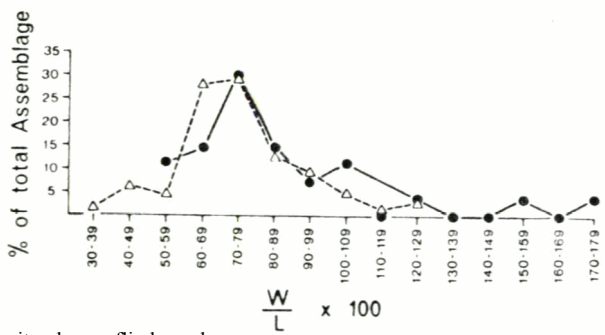
—●— Seelands level III A (N=27)
---△--- Sai Yok Sector (d)(N=65)











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technological tradition and functional demands could influence this choice, but the fact of the choice is clear.

The division of the two collections studied into these groups is given in the table below:-

	Sai Yok (Section (d))	Seelands (Level IIIA)
	N = 65*	N = 27*
Group A	47 (72%)	14 (52%)
Group B	6 (9.2%)	8 (29.4%)
Group C	12 (18.8%)	5 (18.6%)

* Note that in Table 1 the total for Sai Yok artefacts is 63. Two of the Group A tools, included in the original tabulation, and so in the X^2 tests, were omitted. In the same way the Seelands total In Table 1 is larger, as some incomplete specimens were added where appropriate to give a larger sample size in Group C, raising the number for this Group to 8, and for the full total to 30, but not altering the figures of Groups A & B.

The basic dimensions of the two collections of pebble tools are shown in the graphs and the tables giving means and standard deviation of these measurements (see Table 1). Other features which cannot be presented so easily in these ways include position of retouch, for which we find in both collections the majority of tools are retouched on all margins (for Sai Yok 75.4% [N = 65] and for Seelands 63% [N = 27]) the next largest category being those with the retouch on the end and two margins (for Sai Yok 24.6% and for Seelands 18.5%). So the weighting is definitely towards tools with one surface completely retouched; the group of tools with only one margin retouched (11.2% of the Seelands collection) is not represented in the Sai Yok sample. On the two open dune sites of Station Creek and Schnapper Point studies in my New England research the weighting towards full retouch of one surface is found at Station Creek (56.5% of the uniface pebble tools having all margins retouched) but not at Schnapper Point (where 53.5% of the uniface pebble tools had retouched on one margin only, 19.7% on all margins). Other features of the tools are tabulated below:-

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	Sai Yok	Seelands Level IIIA
	N = 65	N = 27
1. Extent to which the tools are completely uniface - measured in terms of the number of flake scars on the non-retouched surface.		
Number of flake scars:		
None	44 (67.5%)	10 (37%)
1	13 (20%)	6 (22.2%)
2	3 (4.6%)	5 (18.6%)
More than 2	5 (7.7%)	6 (22.2%)
2. Artefacts with pebble cortex still remaining on the retouched surface.	21 (32.2%)	3 (11.2%)
3. Artefacts with step-flaked working edges.	44 (67.5%)	3 (22.2%)
4. Artefacts with concavities on the working edges.	21 (32.2%)	7 (26%)
5. Artefacts with use polish on working edges	1 (1.5%)	2 (7.4%)

In terms of selectivity of raw materials the makers of both collections show a high degree of preference. Of the Sai Yok artefacts 63% were made in quartzite, 12.3% in quartz, while of the Seelands artefacts from level IIIA 74% were made in greywacke, 22% in cherts. This represents a complete change in the pattern of exploitation of locally available raw materials from that of the preceding levels at the site.

On visual examination of the means and standard deviations shown in the tables (see Table 1) there seems confirmation of the subjective, visual impression that one gains from looking at the artefacts, that the Sai Yok examples are somewhat smaller and narrower than the north coast New South Wales artefacts. But such visual impressions can be dangerously misleading. When the figures from the frequency distribution tables for the measurements and features of the two collections were subjected to X^2 tests of significant difference however, some quantification of the subjective impression emerges. In the following table the results of these tests are presented; where the result was statistically of the order of 'highly significant difference' this is indicated by three asterisks, where the result was one of statistically significant difference but only marginally so (that is only at the 10% level) one asterisk is given. Two asterisks indicate 2½% level.

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The results of the X^2 test on the frequency distribution tables seem definite, but must be interpreted bearing in mind the small total numbers involved.

TABLE 2

Pebble tools from Sai Yok (Sector [d]) and Seelands (level IIIA), results of application of X^2 tests to frequency distribution tables:-

Attribute	Result
Length	Significant difference *
Width	Significant difference ***
Angle of working edge	Significant difference **
Division into Groups A,B,C	Significant difference *
Extent to which the artefact is completely uniface	Significant difference **
Thickness	No significant difference
Length/Width	No significant difference
Position of retouch	No significant difference

When a number of the expected frequencies are less than 5, even with a wide range of comparison on many degrees of freedom, the results cannot statistically be regarded as conclusive, whatever the value for X^2. This qualification applies here to the results on the figures for width, length, length against width, and the angle of the cutting edge. There is also the question of the archaeological significance of a difference or absence of difference that has been statistically demonstrated as valid.

However, the results obtained suggest that the two groups of artefacts are closely related in terms of the variables of thickness, length/width ratio, and the position of the retouched working edge, but not in terms of length, width, the angle of the cutting edge, their division into technological groups, and the extent to which the tools were completely uniface. Comparison of features such as the frequency of step-flaked working edges, concavities in the working edges, and the presence of use polish, also revealed differences. These last would suggest differences in function, and perhaps should be expected given the differing environments of the sites. Though one might here ask whether the sub-tropical river valleys of the north coast of New South Wales three thousand years ago would have presented an environment so very different to that of the riverine Sai Yok location in Thailand? However features reflecting the preferred dimensions of a tool, stylistic characteristics such as the extent of cortex left on the retouched surface or of flake scars on the unretouched surface, and those

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reflecting the techniques of manufacture, should be more reliable indicators of derivative relationships. Certainly the results here hint that the question is one which should be further explored on a wider range of evidence which can offer more satisfying answers to questions of this importance than isolated studies of one tool type.

This second look at the Seelands and the Sai Yok pebble tools has brought out the same hints of similarity, and in the same variables, as Matthews' study, even though the samples from the two sites were slightly different, as were the range of variables assessed. In this presentation there would seem more stress on the differences discernible between the two collections, and so a modification of Matthews' thesis. However where the results of tests of significant difference favoured no close relationship most of these results were marginal rather than indicating 'highly significant difference'. Where this latter result was obtained there still remains the qualifications imposed by the small total sample and by the very low expected frequencies in some cells of the tables which diminish the value of tests such as X^2. Further, this study concentrated on two elements within Matthews' three-part comparison, and its results are quite in accord with his argument that on the variables tested the Seelands pebble tools bore a closer relationship to those of Sai Yok than they did to those of the South Australian sites. These were markedly distinct from the Thailand sample. Matthews made very cautious comments on the possible Hoabinhian affinities of the north coast collections. From his figures, and from the data presented in this paper, the distinction of the north coast and Sai Yok pebble tools from those of the South Australian sites is fairly clear, at least in terms of basic dimensions and certain typological features. However, that still leaves us with the problem of defining the exact relationship between the two more similar groups, for the three-part presentation of the question (as in Matthews' study) may obscure the differences that exist between the two collections which become aligned because of their distinction from the third. A wider range of archaeological evidence is needed, as well as rigorous analyses of artefact collections of known date and cultural associations both within Australia and from Hoabinhian contexts in south-east Asia, before satisfying answers can be offered to these questions whose parameters are as yet but vaguely defined. It would seem unlikely however, that their solution will come from typological or metrical analyses alone.

References

Campbell, V.M. 1972 'Some radiocarbon dates for Aboriginal shell middens in the Lower Macleay River Valley, NSW', *Mankind* 8.4:283-286.

Colani, M. 1927 'L'age de la pierre dans la province de Hoa-binh. (Tonkin)', *Mem. Serv. Geol. de l'Indochine* XIV Fasc.1.

Archived at Flinders University: dspace.flinders.edu.au

Connah, G. 1975 'Current research at the Department of Prehistory and Archaeology, University of New England', *Australian Archaeology* 3:28-31.

Flood, J.M. 1973 *The Moth Hunters*, PhD Dissertation, ANU, Canberra.

Glover, I.C. 1973 'Late stone age traditions in southeast Asia' in N. Hammond (ed.) *South Asian Archaeology*, London.

Gorman, C. 1971 'The Hoabinhian and after', *World Archaeology* 2.3:300-320.

Helms, R. 1895 'Anthropological notes', *Proc. Linn. Soc. NSW* II, 10:387-407.

Heekeren, H.R. van and Eigil Knuth 1967 *The Thai-Danish Expedition 1960-1962* vol.1. *Sai Yok*.

Lampert, R.J. 1971 *Burrill Lake and Currarong*, Terra Australia 1, ANU, Canberra.

_____ 1972 'A carbon date for the Aboriginal occupation of Kangaroo Island', *Mankind* 8:223-4.

_____ in press 'The Kartan and the problem of Kangaroo Island' in R.V.S. Wright, *Stone Tools as Cultural Markers*, AIAS, Canberra.

McBryde, I. 1974 *Aboriginal Prehistory in New England*, Sydney.

_____ in press 'Determinants of assemblage variation in New England prehistory...' in R.V.S. Wright (ed.) *Stone Tools as Cultural Markers*, AIAS, Canberra.

McCarthy, F.D. 1940 'Comparison of the prehistory of Australia with that of Indo-China, the Malay Peninsula, and the Netherlands East Indies', *Proc. Third Congress Prehistorians of the Far East*, Singapore Jan. 1936 30-50.

_____ 1941 'Two pebble industry sites of Hoabinhian I type on the North Coast of New South Wales', *Rec. Aust Mus.* 21:21-26.

_____ 1943 'Trimmed pebble implements of Kartan type from ancient kitchen-middens at Clybucca, NSW', *Rec. Aust. Mus.* 21:164-167.

Matthews, J.M. 1965 *The Hoabinhian in South-east Asia and Elsewhere*, PhD Dissertation, ANU, Canberra.

_____ 1966 'The Hoabinhian affinities of some Australian Assemblages', *A.P.A.O.* 1:5-22.

_____ 1966 'A review of the "Hoabinhian" in Indo-China', *Asian Perspectives* IX:86-95.

Archived at Flinders University: dspace.flinders.edu.au

Tindale, N.B. 1937 'The relationship of the extinct Kangaroo Island culture with cultures of Australia, Tasmania, and Malaya', *Rec. S.A. Mus.* VI (1):39-60.

_____ 1964 'Radiocarbon dates of interest to Australian archaeologists', *Aust. J. Science* 27 (1):24.

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