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LONG ISLAND, PAPUA NEW GUINEA — ASPECTS OF THE PREHISTORY

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SUMMARY

Five archaeological sites are described from the present-day coast of Long Island, and their probable ages are discussed. The earliest human occupation was at least 1000 years ago, with further occupation between about 350-550 years ago. Obsidian was imported from Talasea, New Britain, and possibly several kinds of pottery may have been imported from the mainland of New Guinea. The relation of Long Island to historically-known trading networks is discussed.

INTRODUCTION

Long Island, in the Madang Province of Papua New Guinea, stands at the northern end of Vitiaz Strait, about 50 km from the New Guinea mainland. Although administratively placed within the Madang Province, the island is culturally, as well as geographically, intermediate between the Madang-Rai coast areas and the communities of Vitiaz and Dampier Straits. Studies of their oral history and mythology (Ball and Hughes 1982) reveal that the islanders have a recent history which reflects this position. However, their main external contacts during the period of white contact appear to have been with the peoples of the Vitiaz Strait, with the island standing at the westerly limit of the Vitiaz Strait exchange network (Harding 1967); the island appears to have been by-passed by traders operating from the Madang area.

Our interest in Long Island arose from our archaeological and ethnographic studies in the Madang (Egloff) and Huon Peninsula (Specht) areas. With Long Island standing, as it were, at the interface between our research areas, we decided to visit the island in 1973 to examine several archaeological sites reported by earlier visitors. Finds from these sites suggested that they might pre-date the last major eruptive phase to devastate the island, and thus might provide information on Long Island's position in the exchange networks of our respective research areas prior to the period of European contact.

THE ARCHAEOLOGICAL SITES

Five archaeological sites are known from Long Island (Fig. 2) but, with the exception of brief notices by Bassot and Ball (1972: 27), Johnson *et al.* (1972: 48), and Egloff (1975: 14), no details of these sites have been published. The first site to be recorded, JCT, was reported to Specht in 1969 by J. S. Womersley, formerly of the Botanic Gardens, Lae; this site has not been visited by the authors. The second site, JAB, was recorded in 1970 by J. Wood, then with Gem Exploration and Mining Pty. Ltd. In 1972 Hughes collected at this site and visited two others, JCB and JCC. The fifth site, JCW, was visited by R. Blong, C. Pain and C. McKee in 1976, but no artefacts were collected. In 1973 Specht and Egloff visited JAB, JCB and JCC with Hughes, and each site was visited by Ball on subsequent occasions. This paper is based mainly on data recovered in 1973, with additional information and artefacts from other visits included

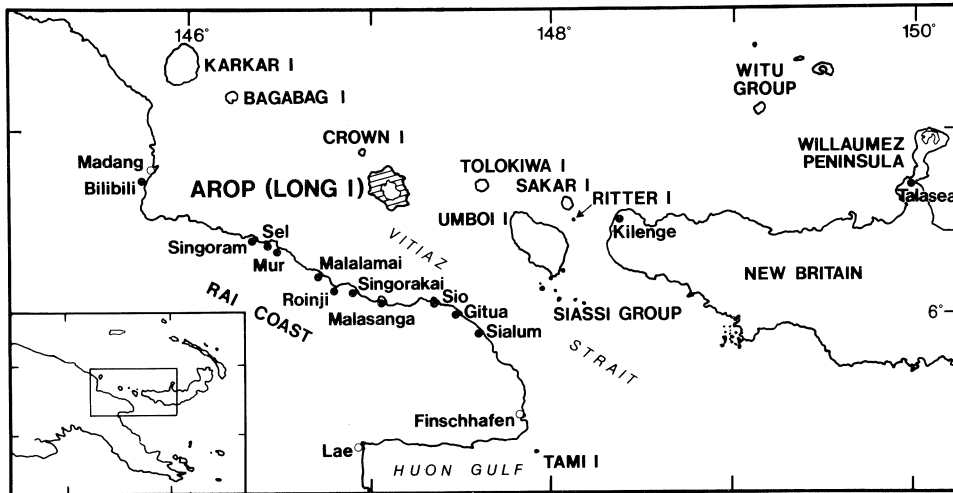


Fig. 1. Long Island in relation to New Guinea and the adjacent islands.

where relevant. The artefacts described here have been deposited in the National Museum and Art Gallery, Waigani, Papua New Guinea.

All of the sites are beach front exposures revealed by marine erosion of the pyroclastic mantle by wave action. This erosion is a continuing process, so that during the six years over which the three main sites (JAB, JCB, JCC) have been visited and collections made from them, each site has presented a slightly different exposure to the various investigators and presumably has decreased in size in the horizontal plane. Therefore, no two collections at any one site have necessarily come from the same position within the site. At one site, JAB, the exposure studied by Hughes in 1972 was totally concealed by cliff fall in 1973, when observations were made at a different though nearby locality which is presumed to be part of the same stratigraphic horizon, though this cannot be demonstrated. For the purposes of this paper, the various collections at each site are distinguished according to their collectors.

Archaeological surveying has not been conducted in the island's interior, where sites earlier than deposits of the last eruptive phase, the Matapun beds, may be revealed by erosional channels cutting through the pyroclastic mantle. The current inhabitants of Long Island have reported several other former settlement sites on the coast which we have not visited, but are unaware of any in the island's interior.

None of the sites described here has been excavated. In 1973, time permitted only the recording of the sites and collection of samples of cultural materials eroding from them, including organic material for ^{14}C dating. Only limited stratigraphic analysis was possible in the field, but subsequent discussions with Ball, Blong and Pain have clarified the relationships of the archaeological horizons to the various pyroclastic deposits.

JCB: Biliau: This site is on the west coast near the settlement of Biliau. Here the cliff rises to a maximum of about ten metres above the beach, with sherds and obsidian flakes eroding in small quantities at about 70 cm above the present beach level. In 1973 artefacts were collected at two points, A and B, in the cliff face about 40 metres apart, and from the beach surface below and between these points. In 1976

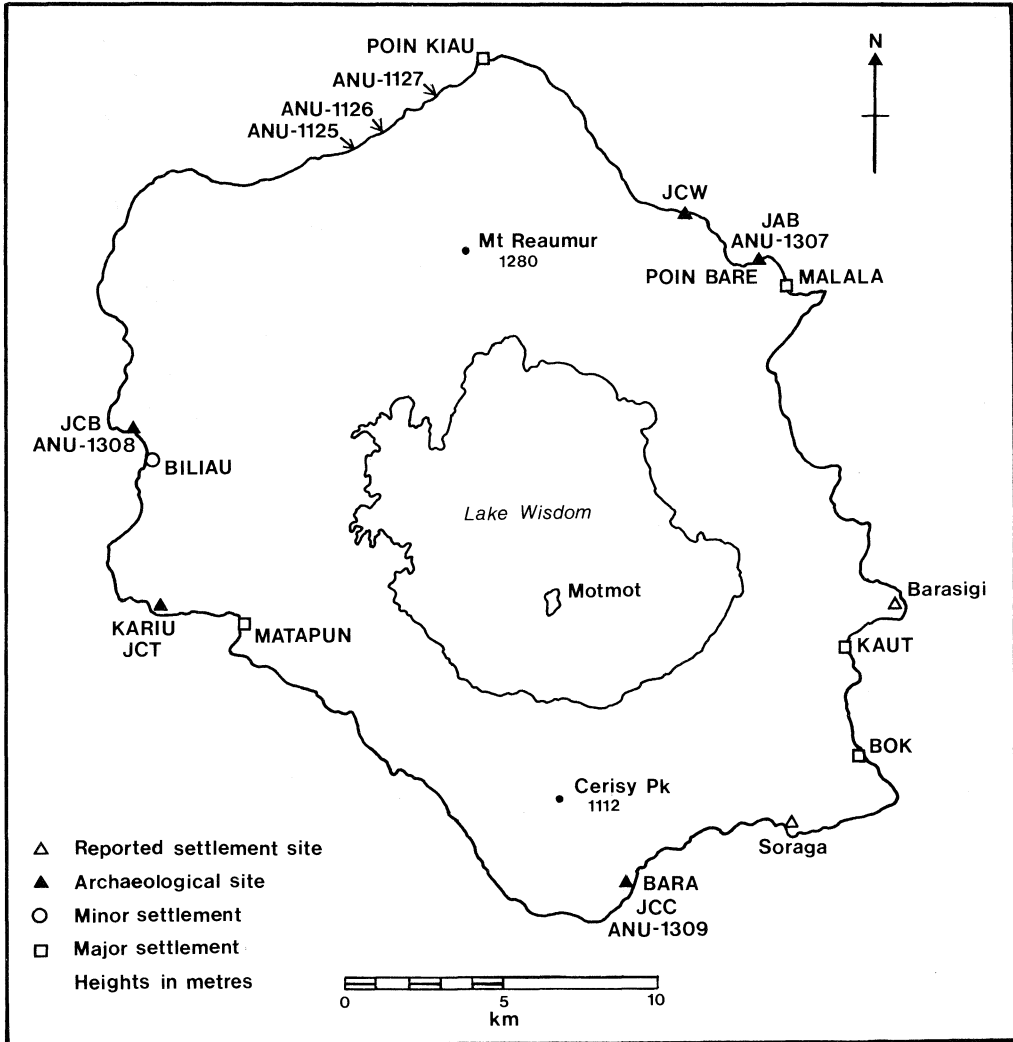


Fig. 2. Long Island: location of prehistoric sites.

Blong, Pain and McKee also collected at this site, but the position of their collection locality relative to points A and B is not clear. They recovered sherds and an obsidian flake from the top of the oldest of three palaeosols in the upper section of the Biliau beds, beneath what they term 'leaf ash'. Our 1973 collection at point B of sherds and obsidian flakes came from immediately above and below a thin deposit of pumice lapilli. This lens shaped deposit was not noted by Blong, Pain and McKee, and its significance is not clear; it could indicate two phases of occupation or reworking of the deposit, though Blong and Pain suggest that reworking is unlikely. The 1973 collection probably came from one of the three palaeosols in the upper section of the Biliau beds, possibly the youngest one. At this stage it is assumed that point A also relates to one of these palaeosols.

Charcoal collected at point A yielded a radiocarbon age of 1040 years \pm 80 bp (ANU-1308) (see Appendix I). This sample may refer to the age of the single sherd found here or to the age of the palaeosol. This sherd has also been dated by the thermoluminescence technique to 'greater than 360 years' (Appendix I). Five sherds from point B have also been dated by this technique; four from above the pumice lapilli gave ages of 390, 410, 200-460 and 'greater than 260 years' (Appendix I), and one sherd from below the pumice lapilli has an age of 'several hundred years'. The apparent discrepancy between the radiocarbon and thermoluminescence ages will be discussed below.

JCC: Bara: This is an exposure near the base of a low cliff at the southern end of the island. Fragments of marine molluscs, bones, pottery and obsidian were found in a red-brown mud-flow deposit together with coarse rounded to sub-angular gravels. The mud-flow is a pre-Matapun beds deposit inset into the top of the Biliau beds. This identification of the stratigraphic position was made by Blong and Pain from photographs and fieldnotes recorded by Ball in 1978. A radiocarbon sample collected in 1973 gave an age of 470 years \pm 240 bp (ANU-1309). Since the deposit is now recognised as a mud-flow deposit, and thus may incorporate charcoal from events widely separated in time, it is impossible to identify what the sample is actually dating; this date will not be considered further.

JAB: Poin Bare: This site is on the east coast to the north of Malala village. J. Wood, who reported the site in 1970, observed human bones eroding from the cliff base, an observation also made by people of Malala village. In 1972 Hughes collected sherds from the cliff base, just above high tide level, point A, but did not see bones. This point was concealed by cliff fall in 1973 and could not be re-examined then. About 50 metres to the north in 1973 an artefact-bearing deposit exposed by wave action, point B, was examined (Fig. 3). This is a pre-Matapun beds deposit. Its relationship to point A cannot be established now. Blong, Pain and McKee suggest that these deposits may relate to a palaeosol of the Biliau beds, possibly the uppermost one.

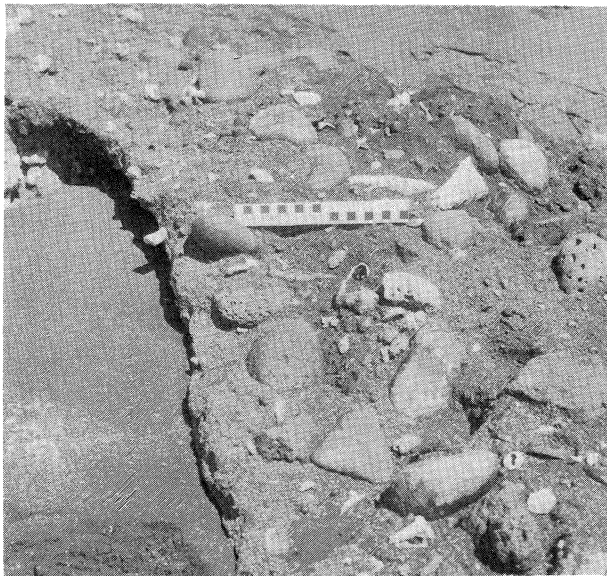
Charcoal collected in 1973 at two points several metres apart at point B has a radiocarbon age of 350 years \pm 70 B.P. (ANU-1307). This charcoal came from the layer containing marine molluscs, bones, sherds and obsidian flakes.

JCT: Kariu Point: According to J. Womersley (pers. comm.), this site is on Kariu Point just north of Matapun village. Womersley reported bones, shell and sherds eroding from near the cliff base.

JCW: Patauru: This site was recorded by Blong, Pain and McKee in 1976 as a cliff-face exposure near beach level about 2.5 km north from site JAB. They did not collect at the site, but observed sherds. The deposit is apparently an upper level of the Biliau beds.



a



b

Fig. 3. Long Island: (a) general view of site JAB/B, (b) cultural materials eroding from beach deposits at JAB/B.

CULTURAL MATERIAL COLLECTED

Fragments of marine molluscs were collected at JAB/B and at JCC. The following identifications and comments were provided by P. Swadling, National Museum of Papua New Guinea:

JAB/B: one half valve of *Tridacna crocea*, young specimen.

JCC: one gastropod whorl fragment, possibly *Turbo crassus*; one whorl fragment of a coral reef gastropod, possibly of the family Muricidae.

The Womersley collection from JCT includes one bivalve fragment, possibly *Tridacna crocea*.

T. crocea and the Muricidae are coral reef dwellers; fringing reefs are present at many points around the island. *T. crassus* prefers a fairly exposed rocky shore; such conditions are present today on the south coast near site JCC.

Bone fragments have been identified by J. I. Menzies, Department of Biology, University of Papua New Guinea:

JAB/B: pig — three fragments of a third molar, fragments of the distal end of a fibula, and four long bone fragments which might be pig.
human — one possible proximal end fragment of a radius.

JCC: human — two fragments which may be from a radius and an ulna.

In 1978 Ball collected fragments of a pig molar and an unidentified long bone at the site JCC.

Sherds and obsidian flakes were the only artefacts found at the sites; none of the molluscan remains appear to have been utilised, though their poor state of preservation may conceal evidence for use.

Small chips of obsidian have been found at three sites: none of these has been secondarily worked, though several display what might be usewear along thin edges. They are all small, with a length range of 11-28 mm and weight range of 0.1-1.2 grams. Their site distribution is shown on Table 1.

TABLE 1.

Obsidian from Long Island sites

JAB		JCB		JCC	
point A	0	point A	1	1973	10
point B	2	point B	2	Ball	8
Blong <i>et al.</i>	10	Ball	3		
		Blong <i>et al.</i>	1		
Totals	12		7		18

Trace element analysis using atomic absorption conducted by W. Ambrose, Department of Prehistory, Australian National University, shows one sample (No. 206) from JCB/B to be indistinguishable from the Talasea source on New Britain. Samples 207 and 208 from JCB/B and 209 and 210 from JCC have density values which fall within the Talasea range.

A total of 144 sherds has been found since 1969; their distribution is shown on Table 2. Five clay bodies are apparent from hand specimens examined under a 10 x

hand lens. The integrity of these identifications has not been tested by petrographic or other compositional analysis, and some modification may be necessary when this is carried out. Since it is not known whether tempers were deliberately added, the term 'inclusion' is used here for the distinctive constituents of each clay body.

Clay A varies in colour from dark grey to light brown, probably reflecting differing firing conditions and post-firing histories. The sherds contain fine white or translucent inclusions up to 1 mm long; grey, red and red-brown inclusions up to 1.5 mm long; and small rock fragments up to 2 mm in length. Sherd thickness ranges between 2.5 to 8 mm, with a mean of 5.2 mm.

Clay B resembles clay A, but also contains variable amounts of shiny black, flat angular inclusions 1 mm or less in length, and lacks the red and red-brown inclusions. The single sherd of clay B from JCB/A contains hornblende and a significant quantity of magnetite, and possibly pyroxene and plagioclase (F. L. Sutherland, pers. comm.). The sherds have a thickness range of 3 to 9 mm, with a mean of 6.1 mm.

Clay C is represented by one sherd only, from the beach in front of JCB. It is made from a fine clay without visible inclusions, which has formed hard, chunky plates during firing. The surfaces are dark red-brown, with a dark grey to black core. Its thickness is 6-8 mm.

Clay D is tentatively identified from one sherd from JCB/C and one from JAB. It has a gritty texture of blue-grey colour, lacking the inclusions typical of clay A; macroscopically it does not resemble the other clays. Their thicknesses are 7 mm and 8 mm.

Clay E is represented by a group of sherds collected by Hughes at JAB/A in 1972. Their similarity as a group is such that they probably represent one or two vessels only. In colour they are purple-brown throughout, very hard and with a gritty texture. The inclusions are translucent or black, up to 1.5 mm in length. Thickness ranges between 5 and 19 mm, with a mean of 12.1 mm. These sherds differ markedly in appearance from the others, and may have been subjected to greater heat during firing or in a volcanic eruption.

Most sherds are too small to determine construction techniques, and generally surface treatments have obliterated any indications which may once have existed. Only the paddle and anvil finishing technique can be identified with certainty. The sherd of clay C is splitting along its longitudinal axis, possibly indicating an additive technique of construction, or perhaps reflecting qualities inherent in the clay.

The only vessel form recognised is a round-bodied vessel with an incurving upper body and everted or vertical rim; some sherds display an angled shoulder. The latter is found only on sherds of clay E at JAB/A and on one sherd of clay A from JCB. The round-bodied form also occurs in Clay B. Eight rim profiles are recognised (Fig. 4), though several of these (e.g. profiles 1 and 2) could be fragments of others (e.g. profiles 3 and 4).

Several sherds of clays A and B appear to be coated with a red to red-brown pigment, possibly a slip; on the clay B sherd from JCB/A the pigment extends over the lip on to the rim interior, and on the exterior of a clay A sherd from JCT the pigment ends abruptly in a straight line as though it had been painted on to the vessel. Occasionally the pigment covers various kinds of decoration.

Decorative techniques include linear incision, applied relief, and short slashes or punctations. Applied relief varies from prominent to very narrow, low bands; on occasions the latter are so indistinct that they may not be applied but the result of

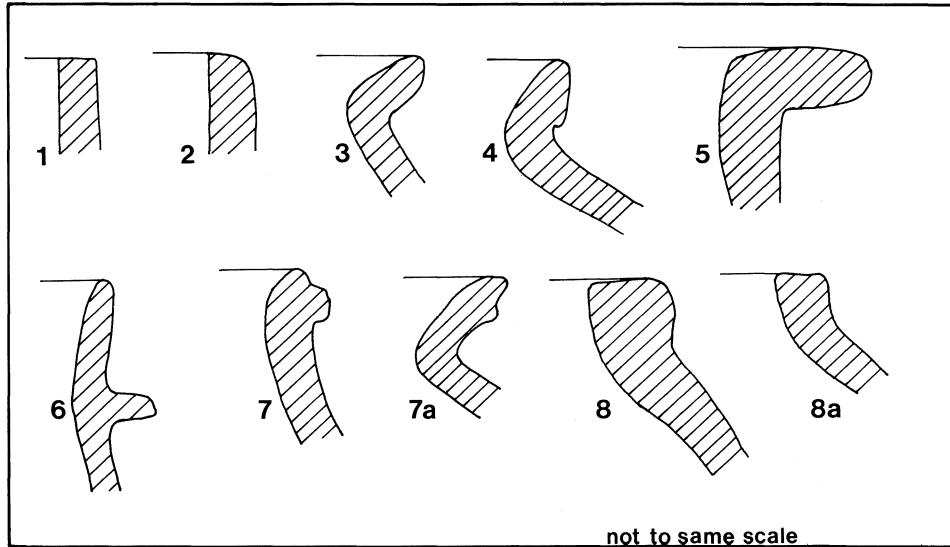


Fig. 4. Long Island: rim profiles of prehistoric sherds.

finger-trailing over wet clay. The prominent bands are often notched. No sherd combines applied relief and linear incision. Designs are mostly simple, arranged around the neck and upper body (Figs 5, 6). The clay B sherd from JCB/A has incised lines on the rim interior.

Notching is common on the interior and exterior angles of the lip, and occasionally on the interior angle of the rim. The external flanges of profiles 6 and 7 are also notched. The notching is broad and smoothly curving, or narrow and sharp.

Tables 2 to 5 summarize the associations of clay group, rim profiles and decorative techniques for the four sites.

TABLE 2. Distribution of clay groups at Long Island sites.

Group	JAB/A	JAB/B	JCB	JCB/A	JCC	JCT	Totals
A	—	18	58	—	29	4	109
B	1	2	6	1	2	—	12
C	—	—	1	—	—	—	1
D	—	—	2	—	—	—	2
E	20	—	—	—	—	—	20
Totals	21	20	67	1	31	4	144

Note: The figures for JAB/B, JCB, and JCC combine collections made over several years by Ball, Hughes, Egloff and Specht, and Blong, Pain and McKee.

TABLE 3. Distribution of diagnostic sherds.

	JAB	JCB	JCC	JCT	Totals
Rim	5	7	3	1	16
Decorated body	12	17	—	1	30
Totals	17	24	3	2	46

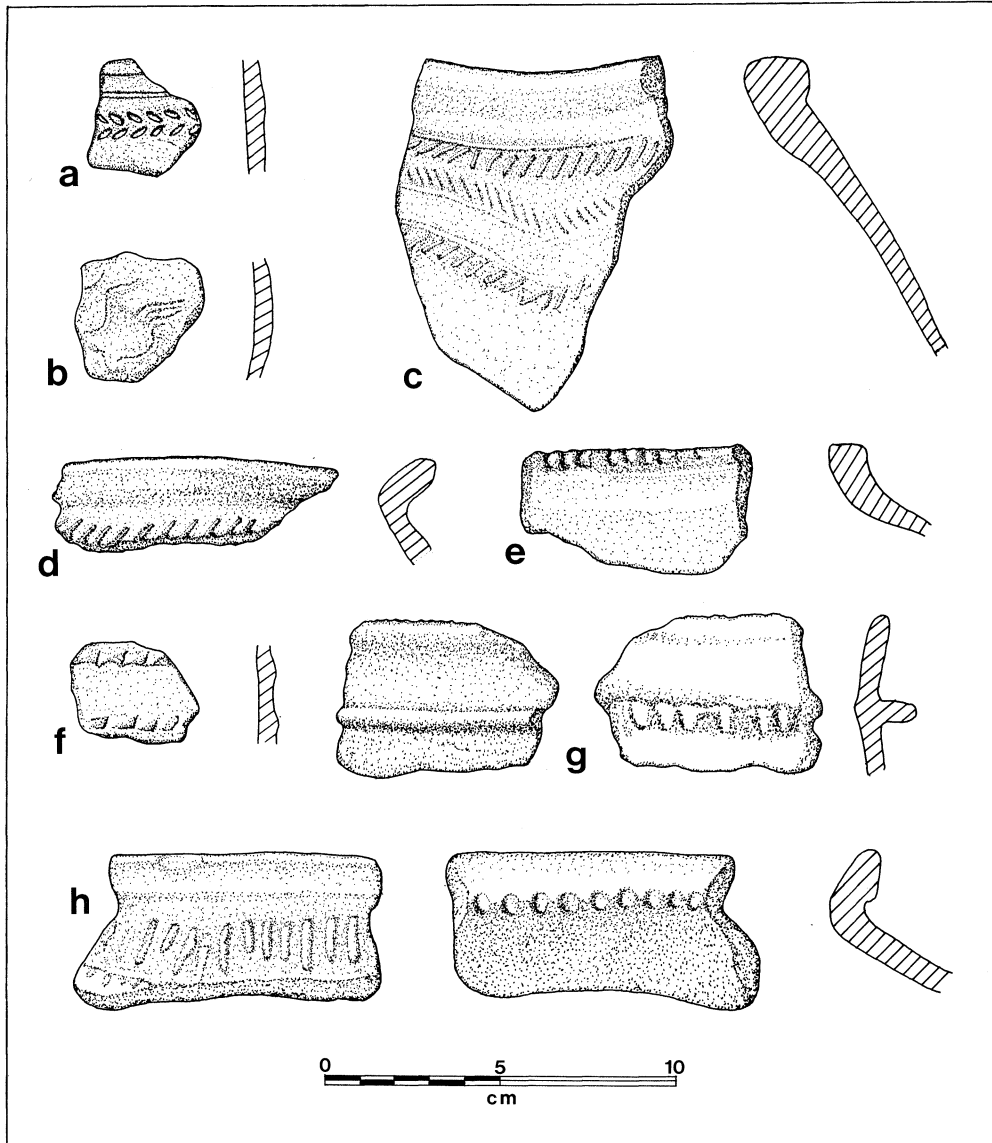


Fig. 5. Long Island: decorated and rim sherds from prehistoric sites. (a) JAB/B, clay A, incised and punctate. (b) JAB, clay A, incised. (c) JCC, clay A, relief. (d) JAB, clay A, relief. (e) JCC, clay A, notched interior lip. (f) JCB/B, clay A, relief. (g) JCB, clay A, exterior rim flange, interior notching. (h) JCB, clay A, relief, Interior notching.

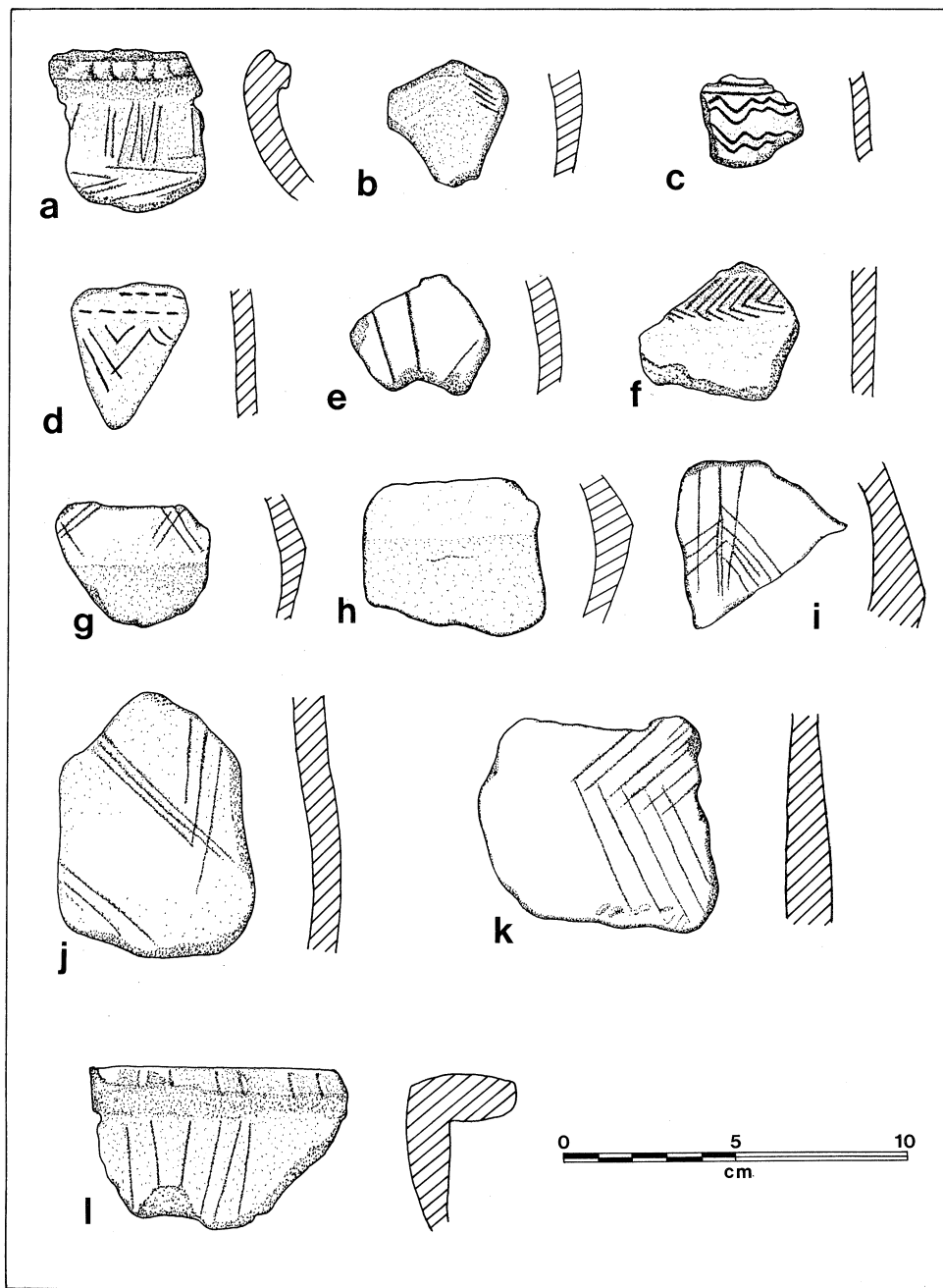


Fig. 6. Long Island: decorated and rim sherds from prehistoric sites. (a) JCB/A, clay B, incised and notched decorations, thermoluminescence sample No. 1027. (b) JCB, clay B, incised. (c) JCB, clay B, incised. (d) JCB, clay B, incised. (e) JCB, clay C, incised. (f) JCB, clay D, incised. (g) JAB/A, clay E, incised. (h) JAB/A, clay E, plain. (i) JAB/A, clay E, incised. (j) JAB/A, clay E, incised. (k) JAB/A, clay E, incised. (l) JAB/A, clay E, incised.

TABLE 4. Distribution of rim profiles by clay group.

Rim Profile	JAB	JCB	JCC	JCT	Totals
1	A,B	—	A	—	3
2	—	A	—	—	1
3	B,E	A(2)	—	—	4
4	E	A	—	—	2
5	—	A	—	—	1
6	—	A	—	—	1
7	—	B	—	—	1
8	—	—	A(2)	—	2
Totals	5	7	3	1	16

TABLE 5. Distribution of decorative techniques by clay group.

	JAB	JCB	JCC	JCT
incised	A,B,E	A,B,C,D,	—	—
relief	B	A	A	—
pigmented	B	A,B	A	A

Note: the incised category includes short slash strokes.

The small sample sizes limit the comparisons which can be made between the sites. As might be expected, the largest sample, from JCB, shows the greatest variety of attributes, yet each of the other sites have attributes unique to them individually. The scarcity of sherds of clays C and D at JCB, where one sherd each came from the beach, compared with the higher frequency of clays A and B, is possibly a reasonable picture of the relative frequency of the four groups, though frequency comparisons would be better based on vessel numbers rather than sherd counts. On the other hand, red pigment does not appear to occur with linear incision at any of the sites, and may indicate a real stylistic difference. A tentative stylistic grouping of the sherds is offered below.

The largest group includes sherds of clays A and B, from vessels finished by the paddle and anvil technique, with the following characteristics: rim profiles 1, 3 and 4; notching on the lip or rim interior; relief decoration, occasionally notched and covered by or applied with a red pigment; linear incision without pigment. These sherds form style group I.

The collection from JAB/A in clay E forms group II, currently not represented at the other sites. It has rim profiles 3 and 4, only linear incision decoration, and is generally thicker than the other style groups.

The single clay C sherd constitutes style group III which can be only sketchily delineated from this one sherd. Its identity with sherds from sites on the Huon Peninsula, between Sio and Tami Island, allows greater precision. The distinctive characteristics of this style group in the Long Island context are the clay group, hardness and smooth red-brown surfaces. On the Huon Peninsula this style has a wide range of thickened and everted rims, with rectilinear incised body decoration.

The clay B sherd from JCB/A and the two clay B rims collected by Blong, Pain and McKee from 'below leaf ash' at JCB are provisionally placed into style group IV, since their external flanges are not shared by any other style group. Group IV is further characterised by its rim profiles — profiles 7 and 8.

Many decorated body sherds, especially incised sherds, cannot be allocated with

certainly to any specific group, though some may belong to style groups I or II.

The relative and absolute datings of these style groups are not clear. Some group I sherds definitely come from levels dated to about 350 years ago (ANU-1307) at JAB/B; style group II sherds at the same site are thought to come from a comparable level. The single sherd of style group III from JCB is unstratified and cannot be referred to any age determination from Long Island.

The three style group sherds may be as old as 1000-1100 years. The sherd from JCB/A came from a level dated to 1040 years \pm 80 B.P. (ANU-1308), though it is not certain that this date actually refers to the age of the sherd rather than to the age of its surrounding matrix. The other two sherds are assigned by Blong, Pain and McKee (pers. comm.) to the oldest of three palaeosols in the Biliau beds at JCB; by extrapolation in stylistic terms, this palaeosol may be of the same or similar age as the JCB/A deposit. This does not necessarily conflict with the dating attributed to style groups I and II, since at JCB sherds of these styles were found in the latest of the three palaeosols and hence should be younger than style group IV. The thermoluminescence date for the group IV sherd from JCB/A is greater than 360 years, at least as old as, if not older, than the groups I and II sherds from JCB/B dated by this technique.

Further indications of the ages of the style groups can be inferred from comparisons with archaeological sites on the mainland of New Guinea. None of the Long Island sherds resemble the recent coiled pottery of the Gogol River area inland from Madang (Biro 1901), but some can be compared with contemporary and prehistoric pottery from the coastal areas of Madang and the Huon Peninsula.

The contemporary pottery of Bilibili — Yabob, just south of Madang, has various sand tempers, including a black volcanic sand, and is finished by beating with a paddle and anvil (Tuckson 1966: 13; Egloff 1975: 12). Although no stylistic study of vessel forms, rim profiles and decoration of the modern industries has been published, Allen (1971) and Egloff (1975) have described archaeological sherds from sites in the Madang area which they identify as being directly ancestral to the modern pottery. They characterise this ancestral pottery as having globular/spherical vessel forms with everted or direct rims; incised, punctate and various relief decorations; commonly a red slip; carved paddle impressions; and a range of rim profiles. The red slip is often thick, and frequently extends on to the rim interior surface (Allen 1971: 3; Egloff 1975: 3). Some relief designs appear to be 'heavy blobs' of slip (Egloff 1975: 3) and formed from thick slip 'apparently painted onto the already slipped surface' (Allen 1971: 4). Incised sherds, however, are less often slipped than sherds with other decorative techniques (Egloff 1975: 10). Some rims are notched on the interior angle of the neck (Allen 1971: 3; Egloff 1975: 9), though this, and relief decoration are absent from the modern pottery. At the JCA site near Madang this ancestral pottery is at least 550 years old (Egloff 1975: 14).

This ancestral Madang pottery is identical to style group I on Long Island, though carved paddle impressions are not present in style group I and, as might be expected with a small sample, the range of designs is more limited than in the Madang area.

On Karkar Island Egloff found a different, distinctive prehistoric pottery which he has named the 'Sarong Style' (Egloff 1975). This has not been identified on Long Island. Conversely, the Long Island style groups II, III, IV have not been reported from the Madang-Karkar areas.

Surface collections and test trenches at archaeological sites on the coast of the Huon Peninsula between Wasu and Finschhafen and on Tami Island have yielded sherds similar or identical to all four Long Island groups. Sherds of style groups I and

III have been found in a test trench at site KBP on Sigawa Island, Sio, where a wood charcoal radio-carbon date of 360 years \pm 100 bp (NSW-86) has been obtained. The significance of this date is open to question, since the deposit appears to have suffered post-depositional disturbance (Specht, unpublished fieldnotes). Abramson (1969: Plates IA-b, f and IB-e) reports this group from Tami Island in an undated context. Style group III occurs at several sites at Sio, Sialum and Finschhafen (Specht, unpublished fieldnotes) and on Tami Island (Abramson 1969: Plate IB-i). At Sio, in addition to occurring in the KBP site, style group III sherds are found in the mainland site of KBQ, for which a wood charcoal radiocarbon date of 800 years \pm 100 bp (NSW 87) has been obtained. At the Sio sites, the style group III sherds occur with sherds of other styles, but at several sites at Sialum and Finschhafen style group III is the only pottery present. The significance of these distributions is currently not known.

The occurrence of style groups II and IV on the Huon Peninsula coast is less certain. One unstratified sherd from Sialum resembles group IV, and several sherds on the Abramson collection from Tami Island are similar to group II. In both cases these comparisons must be treated with caution.

Most of the archaeological pottery from the northern Huon Peninsula coast seems to relate to the history of the modern pottery industries of Sio and Gitua (Groves 1934; Harding 1967; Specht, in prep). Several incised sherds and notched rims from Long Island, especially in clay B, resemble this ancestral Sio/Gitua pottery, Curvilinear incised designs comparable with that shown on Figure 6c from JCB can be closely compared with sherds made from a clay similar to clay B from the KBQ site at Sio. Curvilinear incision of this kind is absent from the modern Sio/Gitua industries, which are made from calcareous clays as yet unrepresented in the Long Island collections.

These external relationships of the Long Island style groups can be summarised as follows:

- (a) style group I belongs to a late prehistoric style which is ancestral to the modern industries of the Madang area. This style is widely distributed along the north coast of New Guinea to Tami Island. On the mainland this style is at least 550 years old.
- (b) style group II may occur on Tami Island, but has not been recognised at sites on the mainland. On Long Island its presumed stratigraphic position places it at about 360 years ago.
- (c) style group III does not occur in the Madang area, but is found from Long Island, through Sio, southwards to Tami Island. Its age is uncertain, but at the KBQ site at Sio it is at least 800 years old.
- (d) style group IV is poorly known on Long Island, where it may be 1000-1100 years old. On the mainland of New Guinea it is apparently absent from the Madang area, but may occur at Sialum.
- (e) some of the ungrouped incised sherds, and some notched rims from Long Island resemble sherds ancestral to the modern pottery of Sio, dated at the KBQ site to about 800 years ago. Modern Sio pottery has not been identified with certainty on Long Island.

GENERAL DISCUSSION

The first evidence for human occupation of Long Island is thus about 1000 years ago, but the recognition by Blong, Pain and McKee (1982) of a palaeosol dated about 4000 years ago indicates that habitation may have been possible at an earlier date.

Between 350 and 550 years ago there were at least five settlements on what is now the coast. If our interpretation of the stratigraphy at site JCB is correct, this site was occupied twice during periods of soil formation. These occupations were separated by a period of volcanic activity which deposited airfall tephra; these may have prevented continuous occupation of the site, and possibly of other parts of the island. The later occupation of JCB and the occupations of JAB, JCW and possibly also JCC appear to have ended just prior to the emplacement of the Matapun beds during the last major eruptive phase of the island. Charred wood and charcoal collected by Hughes from coastal exposures of the Matapun beds in the northwest have yielded radiocarbon ages of 380 years \pm 70 bp (ANU-1125), 230 years \pm 75 bp (ANU-1126), and 200 years \pm 65 bp (ANU-1127), supporting the date obtained for the occupation of JAB. The emplacement of the first deposits of the Matapun beds may have destroyed the JAB settlement, for both J. Wood and Malala villagers saw human remains eroding from the JAB area, though these bones could have come from burials of a slightly earlier age.

The few molluscan remains from the Long Island sites are compatible with the exploitation of locally available species. Obsidian, on the other hand, was obtained from the Talasea area of New Britain, some 350 km to the east. At this stage it is impossible to determine with certainty whether any of the Long Island pottery was actually made on the island. According to Blong and Pain (pers. comm.), clays suitable for pottery manufacture may have been available on Long Island prior to the emplacement of the Matapun beds, possibly associated with deposits of the Sauro beds. However, neither the islanders nor any of the investigators have observed suitable deposits. The stylistic identity of style groups I and III with mainland prehistoric pottery suggests that pottery of these groups at least may have been imported to Long Island. A recent study of oral traditions of the Madang area indicates that the distribution of pottery making centres in the past may not have been the same as today (Mennis 1978). These oral traditions describe the existence in the past of an island called Yomba westwards from Long Island. The Yomba islanders are said to have made pottery prior to their escape to the mainland at the time that Yomba erupted. Mennis (1978) argues that the destruction of Yomba took place before the last major eruption of Long Island; her estimate is not too early for some of the Long Island pottery to have originated from Yomba.

Long Island lies between the historically-known trading networks which operated from the Madang and Vitiaz Strait areas. None of the early written accounts of the Madang network appears to include Long Island, but the island certainly received goods from the Vitiaz Strait. The islanders were visited by Siassi Islanders seeking hand drums, dogs, tobacco and other goods (Harding 1967: 18, 33, 133-4), and themselves occasionally visited the Sio villages (Vogel-Hamberg 1911: 260; Harding 1967: 23, 134). The presence of Talasea obsidian on Long Island suggests that these contacts may be of long standing. Blong, Pain and McKee found an obsidian flake at JCB in the earliest of the three palaeosols of the Biliau beds, for which an age of about 1000 years has been proposed above, while undoubted Talasea obsidian is associated at the same site with sherds of style group I dated about 350-550 years ago. An age of about 1000 years is reasonable, since Talasea obsidian was present at the KBQ site at Sio by 800 years ago, and has been transported widely throughout Melanesia for over 3000 years (Ambrose 1976a). However, this does not mean that the Vitiaz Strait trading network existed in its present form at that time; indeed, Harding (1967: 10-11, 18, 185ff) specifically notes changes in trading patterns of the Madang, Vitiaz Strait and Tami Island networks, especially since the arrival of Europeans.

Changes in trading patterns are implied by the archaeological evidence from Long Island, and receive some support from linguistics and oral traditions (Ball and Hughes

1982). Most of the prehistoric pottery from Long Island can be attributed to style group I, which has its closest external links with the Madang area. It would seem that about 350-550 years ago Long Island had comparatively close contacts with the Madang area, yet in historic times contacts with the mainland seem to have been mainly with the Rai Coast — Huon Peninsula. Harding (1967: 197) places the eastern limit of the Madang network at Sio, but Z'graggen (1976) and Lincoln (1976) agree that the eastern limit was in fact 160 km west of Sio, but still including the Rai Coast. The Madang style pottery found on Long Island could have come directly from the Madang area or through contacts with the Rai Coast. Long Island figures in origin stories of the Bogadjim area near Madang (Hagen 1899), and Rai Coast contacts are prominent in the recent oral history of the island as presented by Ball and Hughes (1982). It is possible that the Talasea obsidian on Long Island was obtained from the Rai Coast, which was visited by the Vitiaz Strait traders (Harding 1967: 19), and not through contacts with Sio or by direct voyaging from the Siassi Islands. Lincoln (1976) places Arop in his Korap language subfamily, together with Sel, Singorakai, Malasanga, Lokep, and Barim on Umboi. He raises the possibility that the distribution of this subfamily may reflect a trade network, now defunct, operating between the Madang and Vitiaz Strait networks. More detailed and comprehensive data are needed from archaeology, linguistics and oral histories to test this proposition, as well as the possibility that the production of Madang style pottery was formerly more widespread (*vide* the Yomba Island traditions). For Mailu on the south coast of Papua, Irwin (1977, 1978) has argued a case for the reduction through time in the number of pottery producing centres, accompanied by increasing specialization by one community. A similar development may have taken place on the north coast of New Guinea at Madang or Sio/Gitua, or at both. In historic times Long Island was known as being rich in certain resources (e.g. Harding 1967: 133-4), and this may have been the situation also before the emplacement of the Matapun beds some 250-350 years ago. If this were so, it is unlikely that Long Island would have been omitted from trading networks linking and probably sustaining communities which were resource deficient both on the mainland and in the Vitiaz Strait.

APPENDIX I. RADIOMETRIC AND OTHER DATES FROM LONG ISLAND

Radiocarbon 14 age determinations

All radiocarbon dates cited in this paper are given in radiocarbon years based on the Libby half-life value of 5568 years, with AD 1950 as the reference date. They have not been calibrated against any correction curve to yield calendrical ages. The expressions bp and BP refer to 'before present' with bp for uncalibrated ages and BP for calendrical dates.

During his visit to Long Island in 1972, Hughes collected three samples from exposures of the Matapun beds on the north-west coast:

(a) ANU-1125: 380 years \pm 70 bp.

Charred wood of *Neonauclea* sp.; age determined on wood cellulose fraction which was isolated by NaClO₂ treatment. Sample size adequate; counting for 1540 minutes.

(b) ANU-1126: 230 years \pm 75 bp.

Charred wood, unidentified. No pretreatment. Sample size adequate; counting for 980 minutes.

(c) ANU-1127: 200 years \pm 65 bp.

Charcoal. No pretreatment. Sample size adequate; counting for 1020 minutes.

IN 1973 Egloff, Hughes and Specht collected three samples:

(a) ANU-1307: 350 years \pm 70 bp

Soft charcoal lumps in volcanic ash soil from site JAB/B, collected at two points several metres apart in the artefact-bearing layer in the uppermost unit of the Biliau beds. Examined for rootlets and pretreated with hot 2N HCl at the laboratory. Sample size 67% of laboratory requirements; counted for 1380 minutes.

(b) ANU-1308: 1040 years \pm 80 bp

Large charcoal lumps mixed with volcanic ash soil from JCB/A, from a layer subsequently identified as the earliest of three palaeosols in the upper levels of the Biliau beds. Soil rinsed from sample in the laboratory, examined for rootlets and then pretreated with hot 2N HCl. Sample size only 53% of laboratory requirements; counted for 1660 minutes.

(c) ANU-1309: 470 years \pm 240 bp

Soft charcoal lumps mixed with soil, from mudflow deposit at site JCC. Soil washed from sample in the laboratory, examined for rootlets and pretreated with hot 2N HCl. Sample size only 11% of laboratory requirements; counting for 1860 minutes.

Samples ANU-1307 and ANU-1309 were calculated using approximately 95% of the measured activity of the Oxalic Acid C-14 Standard as the modern reference sample; for ANU-1308 the activity level was only $87.9 \pm 0.9\%$.

Thermoluminescence age determinations

Six sherds were submitted to Dr A. Mortlock, Department of Physics, Faculty of Science, Australian National University, for thermoluminescence dating. The determinations are reported without standard deviation calculations. For all samples the annual dose rate was estimated by measuring the potassium content by XRF and the uranium content by delayed neutron activation, with an assumed uranium to thorium ratio of 1:4. For samples 1027 and 1028 the alpha efficiency factor K was measured.

(a) JCB/A sample 1027: 360 years bp (decorated sherd, Fig. 6a).

(b) JCB/B 'above pumice lapilli':

sample 1028: 260 years bp
 sample 1029: 410 years bp
 sample 1030: 390 years bp
 sample 1031: 200-460 years bp

(c) JCB/B 'below pumice lapilli':

sample 1032: 'several hundred years' bp

Obsidian hydration rind dating

Five samples of obsidian from sites JCB and JCC were submitted to W.A. Ambrose, Department of Prehistory, Research School of Pacific Studies, Australian National University, for hydration rind measurements. One piece, sample No. 206, from JCB, was analysed for trace elements by atomic absorption and is considered indistinguishable from the obsidian found in the Talasea area of New Britain. The other pieces have density values within the Talasea range.

The following rind thickness measurements are averages of 30 or more readings per sample:

(a) JCB: No. 206: 4.2 mm	d 2.347
No. 207: 4.2 mm	d 2.355
No. 208: 5.4 mm	d 2.343

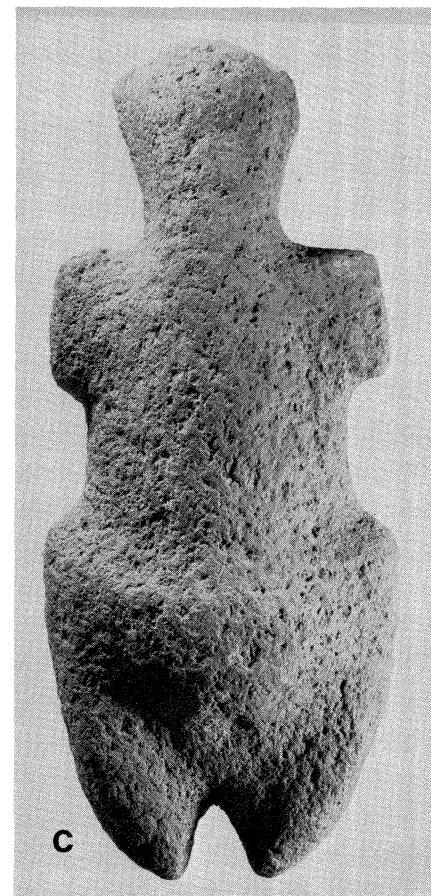
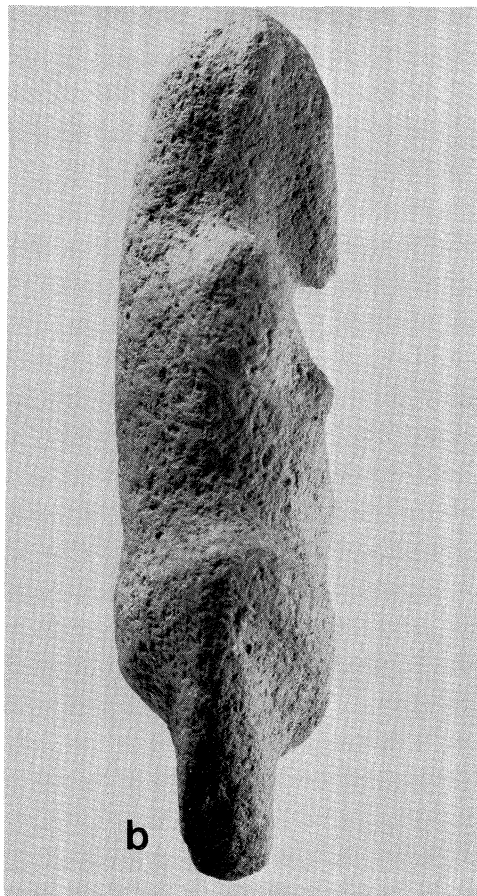
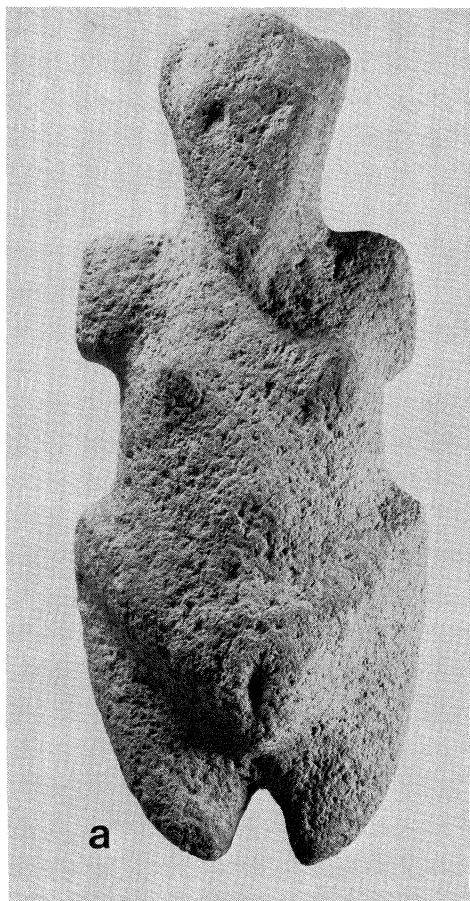


Fig. 7. Long Island: stone figure from Bok, now in Art Gallery of New South Wales, Sydney (reg. No. P2. 1969). Photo by C. Turner (negs. V13282, V13283, V13284). Height: 298 mm.

(b) JCC: No. 209: 5.1 mm d 2.345
 No. 210: 5.7 mm d 2.345

These measurements cannot be converted into ages since there are no thermal equivalent values for the sites (see Ambrose 1976b for discussion of these values). Furthermore, these thickness measurements are much greater than might be expected in view of the ages indicated by the other techniques, and the samples may have been affected by the igimbrite eruptions of the Matapun beds, exposure to solar radiation, and possibly other factors which have influenced the development of the hydration rinds.

APPENDIX II. MISCELLANEOUS FINDS FROM LONG ISLAND

Three archaeological finds reported from Long Island have been omitted from the preceding discussions: a stone female figure reputedly found near Bok village prior to 1966, an alleged 16th century Malay *kris* found about 20 years ago, and a stone clubhead recovered by Hughes in 1972. At this stage none of these finds can be related to the archaeological materials described in this paper.

The stone figure from Bok is now in the Art Gallery of New South Wales, Sydney, which purchased it from J. P. Hallinan in 1966. Hallinan had obtained the figure on Long Island from a villager who stated that it had been found near Bok while a garden was being prepared. The figure (Fig. 7) is 298 mm high, made from basalt. It represents presumably a human female figure, with the limbs very schematically delineated. This piece currently appears unparalleled on the mainland of Papua New Guinea.

A *kris* is said to have been dug up on Long Island together with a human skull (see Ball 1982) about 20 years ago. According to R. Caesar, Madang, the *kris* was identified at the British Museum, London, as dating from the 16th century and probably of Malay origin. The present location of this item is not known. While there are many ways in which this *kris* could have reached Long Island, its age as identified on stylistic grounds would place it roughly contemporary with the human occupations of the Biliau beds. Hughes (1977:10ff.) argues that goods of south-east Asian origin may have been reaching New Guinea long before the arrival of Europeans, and specifically notes contacts with Chinese traders in the 15th and 16th centuries. The Long Island *kris* may thus have been brought to the island well before Dampier's passage. At present it is the most easterly known artefact indicative of such possible contacts.

In 1972 Hughes collected a stone clubhead from just north of Kaut village. This clubhead, in a four-pointed star form with central perforation, was found on the ground surface. Its present location is unknown and we are unable to illustrate it.

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