

THE HIGHLAND FRINGES AS A KEY ZONE FOR PREHISTORIC DEVELOPMENTS
IN PAPUA NEW GUINEA - A PROGRESS REPORT.

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The period around 50,000 to 60,000 B.P. is generally accepted as being the earliest date for the colonisation of the island of New Guinea (Golson 1972:391-7). The earliest archaeological evidence found in Papua New Guinea comes from a coastal site on the Huon Peninsula, which could be as early as 45,000 B.P. (Swadling 1981:12). This is the only known lowland site which has such a possible antiquity. Surprisingly, the majority of sites with Pleistocene evidence of human occupation occur in the high valleys of the central cordillera (Table 1).

One is probably confronted with an early and rapid occupation of virtually the entire New Guinea Highlands, presumably from the coastal regions and through the Highland fringes (Gorecki 1984). This assumed coastal-highland migration during the Late Pleistocene may have been continuous, especially if the evidence at Kafiavana for the trade of maritime shells into the Highlands at least 9000 years ago (White 1972:93) is seen as an aspect of more widespread trading activities (e.g. Hughes 1977). Another important aspect of Highland prehistory is the evidence for early agricultural systems found throughout the upper and middle Wahgi valley (with intensive investigation being carried out at the Kuk site), starting 9000 years ago (e.g. Golson 1977:1984). This is a surprisingly early date given that the entire region at this time was only just coming out of climatic conditions significantly colder than the present (Hope *et al.* 1983).

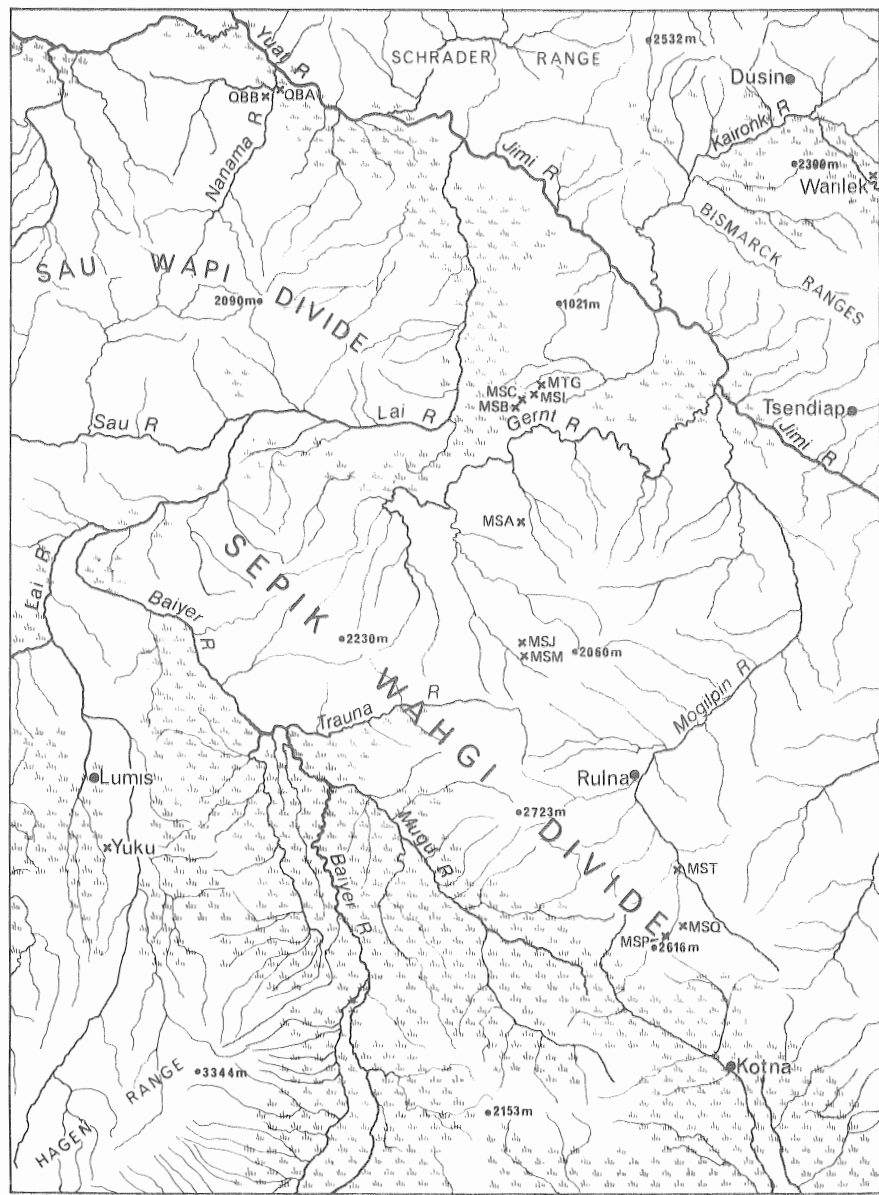
Altogether, we suspect that the warmer and more diversified environments found at lower altitudes in the Highland fringes may have played an important role in the early prehistory of the region, particularly in aspects related to Late Pleistocene colonisation, adaptation, emergence of agriculture and consolidation of trade. These are the aspects we are currently investigating in one of these Highland fringe zones. A summary of the results is presented here, and a final report will be presented by Gorecki (in prep).

THE STUDY AREA

The region under investigation is the lower Jimi basin (see Fig. 1), where from the valley floor (at less than 500 metres above sea level) a wide range of environments can potentially be exploited within a day (from 300 m altitude to above 2500 m). Within this region the environment is complex, from virtually uninhabited grasslands between 300 and 500 m to relatively densely populated

Site	Province	Elevation (m)	Earliest occupation (BP)	Site type	Reference
Kuk	Western Highlands	1550	30,000	open, swamp	Golson and Hughes 1977
Kosipe	Central	2000	26,000	open, swamp	White et al. 1970
Nombe	Chimbu	1700	25,000	rockshelter	Gillieson and Mountain 1983
NFX	Eastern Highlands	1550	18,000	open, dryland	Watson and Cole 1977
Batari	Eastern Highlands	1300	16,000?	cave	White 1972
Wanlek	Madang	1675	15,000	open, dryland	Bulmer 1977
Yuku	Western Highlands	1280	+12,000	rockshelter	Bulmer 1975
Kafiavana	Eastern Highlands	1350	11,000	rockshelter	White 1972
Manim	Western Highlands	1770	10,000	rockshelter	Christensen 1975
Kiowa	Chimbu	1530	10,000	rockshelter	Bulmer 1975

Table 1. New Guinea Highland Sites with Evidence of Pleistocene Occupation.



0 5 Km

- Grasslands
- Town
- x Archaeological site

Figure 1. Location Map for Sites Discussed in the Text.

grasslands between 1000 and 1800 m, passing through all stages of forest regrowth up to primary forest. While the overall landscape is rugged, there is in its centre an unusual large flat zone, the Ruti Flats, which is flanked by two large rivers, the Lai and Jimi. These join to become the Yuat, which drains into the Sepik river to the west. Within this flat zone there is a mosaic of swamplands creating micro-environments which appear to be extremely rich botanically. Thus we selected this region to test the following assumptions:

- (a) the Yuat river and its two major confluents (Lai and Jimi) may have attracted early colonists who settled there prior to the colonisation of higher valleys such as the Wahgi.
- (b) Given the rich and diversified environment, the area could have been a centre of development for both dryland and swampland agricultural systems.
- (c) Since the Late Pleistocene, Highland fringe populations could have played an important role in trading activities and information flow between coastal/lowland and Highland communities.

Archaeological sites

Twelve sites are relevant for the discussion presented here (see Fig. 1). They are as follows:

- QBA: 320 m altitude, rock shelter with black paintings, grassland environment.
- QBB: 340 m, rock shelter, grassland environment.
- MTG, MSI, MSC, MSB: 540 m, open swamps, grassland environment.
- MSA: 800 m, rock shelter with engravings, forest environment.
- MSM: 1000 m, rock shelter with engravings, forest environment.
- MSJ: 1400 m, rock shelter with engravings and red paintings, forest environment.
- MST: 1400 m, rock shelter with black paintings, forest environment.
- MSQ: 1900 m, open swamp, forest environment.
- MSP: 2200 m, rock shelter, forest environment.

SUMMARY OF RESULTS

Early colonisation

The investigation conducted in the lower Jimi region between 1977 and 1984 covered an area of about 600 km². As such the results presented here should be regarded as preliminary. Since the study area lies between three archaeological sites of known Pleistocene antiquity (Wanlek, Yuku and Kuk), it is reasonable to assume that Pleistocene occupation extended to the study area. We do not yet have archaeological evidence for this, since the sites excavated were either too young (rock shelters), or too wet to be fully excavated without pumping equipment.

Nevertheless, two artefacts found on the surface of a disturbed part of a swamp (site MSB) are of interest here. One is a unifacially flaked tanged blade and the other is a unifacially flaked pebble chopper. Both artefacts were found together, have similar patinations, and are large and heavy (772 g and 765 g respectively). They were not found in a dateable context, but their size, shape and patination suggest great antiquity. We are not in a position to claim that these artefacts are of Pleistocene age. We simply note their overall similarities to other lithic artefacts which have been found elsewhere in Papua New Guinea. When found in a dateable context, these artefacts range from the Late Pleistocene (e.g. at Nombe, Yuku and Kosipe) to the early Holocene (e.g. at Yuku).

Environmental change

The environmental history of the region is being reconstructed from geomorphic and palynological evidence, mostly gathered from swamp deposits (sites MTG, MSI, MSC, MSB and MSQ), combined with the record of human occupation gained from archaeology. A wide range of techniques is used in the analysis of the data. Among these are radiocarbon, lead isotope and palaeomagnetic dating, magnetic susceptibility, sediment chemistry, pollen and carbonised particle analysis, phytolith (plant silica or plant opal) analysis and microscopic use-wear analysis of stone artefacts. In addition, a survey of the present fauna, flora and soils of the region was undertaken in 1983 and 1984.

Preliminary results on the environmental history can be summarized as follows. Site MSQ is a small swamp found on the Jimi side of and near the crest of the Sepik-Wahgi divide. Its catchment has been gardened in the past. A six metre long core was obtained and its magnetic susceptibility profile shows at least two tephras and other peaks due to catchment erosion and/or firing. The core therefore may cover the last thousand years of environmental history and will provide a high resolution record for that altitude.

Results from its analysis will enhance interpretation of not only the adjacent Wahgi valley sites but also of the lowland sites which we are currently investigating.

The other swamp sites (MTG, MSI, MSC and MSB) found in the Ruti Flats are even more promising. Pollen, phytolith and magnetostratigraphic analyses of their sediments are currently underway. Preliminary results show major changes in the pollen spectrum coincident with prehistoric features interpreted as 'garden' levels (see below). A range of non-directional magnetic measurements (susceptibility, isothermal remanent magnetisation, quadrature susceptibility) shows peaks consistent with burning and/or erosion of the swamps' catchments at these times.

Overall, we anticipate having a solid environmental history for the region. It is probable that this will be even further refined and extended in time in the course of research we plan to carry out shortly.

Prehistoric agriculture

Open area excavation of two prehistoric garden systems (sites MTG and MSC) has revealed a complex of low mounds, basins and ditches, similar to those excavated by Golson (1977, 1984) at Kuk in the Wahgi valley. The Wahgi garden systems are evidence for some of the earliest intensive horticulture in the world. The features found in the swamps of the lower Jimi are very similar to the second phase (5000 - 6000 B.P.) of the Kuk swamp garden systems. A radiocarbon date of 3400 ± 140 B.P. has been gained from organic clays 30 cm above the stratigraphic level of features in one of these sites (MTG), and a date of 5070 ± 250 B.P. was gained on organic matter overlying gravel which infills the features. The features found in the second garden system (site MSC) are filled in by a known tephra, dated to 1200 B.P. At this stage, it would appear likely that these swamp sites were used for mixed cultivation of plants such as sago, taro and banana.

Two susceptibility peaks in the sediment cores from these swamps are tephtras dated elsewhere at ca. 285 B.P. and 1200 B.P. (the same peaks as those noted for site MSQ). These provide useful temporal markers and indicate an eight-fold increase in swamp sedimentation rates in the last thousand years. This increase is coincident with carbonised wood and edible plant remains (at least sago, gourd and pandanus) recovered from site MSI, indicating a later phase of catchment clearance.

The evidence from the Ruti swamps points towards substantial catchment disturbance, interpreted as indicating a possible dryland agricultural system complementary to the one observed in the swamps. Dryland agricultural systems would be highly suitable for crops such

as yam, banana, sugar cane and greens. Preliminary results from the sediments of a rock shelter deposit (site QBB) suggest that by 3000 B.P. (the basal date at the site), the surrounding environment may have already been dominated by established anthropogenic grasslands.

Further work aimed at extending the horizontal pattern of each system found in the swamps and at pushing back their antiquity will test the hypothesis formulated above. Already the lower Jimi sites described here provide the oldest evidence for lowlands agriculture in New Guinea. They will also provide a detailed record of human impact on lowland ecosystems. In addition, a botanical survey of the swamps, including cultivated plants, has been completed with assistance from the Lae Herbarium.

Artefacts

Besides the two large lithic artefacts reported above, a wide range of other artefacts was found during surface surveys and excavations.

Excavations carried out at site MSP, located near one of the major prehistoric stone axe quarries found in the Highlands (Pukl quarry; Chappell 1966) has yielded a large number of flaked stone artefacts. They all are exclusively the product of stone axe manufacture: not one of the thousands of flakes recovered shows signs of grinding. This part of the axe manufacturing process was obviously carried out elsewhere. Of interest is the relative young age of the earliest cultural deposits (less than 1500 B.P.), and the relative slow increase in flake numbers through time terminates in a veritable explosion of axe manufacture close to modern times.

The other site which has yielded a large number of artefacts is QBB. Here there is a wide range of agricultural remains: stone, marine shell and bone. The basal level has been dated to only 3000 B.P., the time when the shelter ceased to be part of a river bed. Its lowest deposits indicate immediate and intensive occupation. Some shell and stone artefacts confirm the presence of a well-established coastal-highland trading network, of an unknown antiquity but older than 3000 B.P. The site was subsequently abandoned, perhaps a reflection of a wider valley floor abandonment similar to the present situation. Today the valley floor is uninhabited but is exploited during expeditions carried out from settlements located higher up on the mountain slopes.

The stone tools found at QBB are unlike those found throughout the central Highlands (e.g. White 1972; Watson and Cole 1977). Preliminary results on use-wear analysis carried out by R. Fullagar (La Trobe University) indicate that a high percentage of flakes have plant residues and/or polish on their edges. The final results

should provide an unusually detailed insight into the use of these artefacts, and through this, into some aspects of human activities at the site. For instance, it appears that around 3000 B.P. the site was used possibly for casual repair and maintenance work on tools and other implements, including stone axes, bows and arrows. Our next fieldwork in the region should throw further light on not only the lithic technology of this lowland region, but also on its antiquity.

Rock Art

Studies of prehistoric rock art in Papua New Guinea are still at an early stage. Very limited scientific work has been so far carried out throughout the country and the majority of reports available are from casual or amateur observations and/or recordings. In the course of our fieldwork, a number of unexpected art sites were found within and outside the region discussed here.

None of the sites known to local residents are contemporary, and we suspect they are prehistoric. Red paintings were found at site MSJ, black paintings at sites QBA and MST, and rock engravings were found at sites MSJ and MSM. Interpretation of the art is quite difficult since there is little reference material we can use. Concerning sites in the present Melpa-speaking region (MSJ, MSK and MSM, together with other sites from the Wahgi valley), it is possible that there was a specific Melpa rock art style other than its now world-famous body decoration (e.g. Strathern and Strathern 1971). The rock art style, as far as it can be defined with the data available, may follow a dual pattern of ceremonial/religious and casual/daily production. Such duality in art is reported from the Baliem valley in Irian Jaya (Heider 1970).

The sites we interpret as being possibly ceremonial are those covered with old paintings and sometimes engravings, possibly depicting ceremonial dresses, dances, and valuable goods. 'Casual' sites in contrast are drawn with charcoal and depict things such as possums, casowaries and stone axes. It is certainly premature to draw any conclusions at this stage, but it is possible that for the Melpa at least, there was a rich and varied range of rock art. It is possible that this is a specific cultural manifestation, judging by the art style found at QBA (well outside the present Melpa boundaries) which is entirely different (extremely geometric), or by comparing this Melpa style with the adjacent 'Chimbu tradition' (see Wilde 1975).

CONCLUSION

Our preliminary investigations in the lower Jimi have yielded a wide range of archaeological and environmental data. These concern essentially lowland environments for which virtually nothing

is known for the entire island of New Guinea. While we still lack convincing evidence for early colonisation of the region during the Late Pleistocene, there is a wide range of indicators that this was the case. We hope to confirm this in future work.

There is now substantial evidence that prior to 3000 B.P. there were at least two distant agricultural systems in the region (dryland and wetland), as well as a coastal-highland trading network passing through it. Further archaeological, geomorphic, palynological, lithic use wear and possibly rock art studies should confirm the evidence found so far and should test some of the long-range hypotheses proposed here.

It is now clear to us that the area under review offers the best potential in Papua New Guinea for researching the agricultural history of the lowland foothill zone, and for assessing the impact of prehistoric human activity on that environment. Understanding of the dynamics of these extensive lowland ecosystems is an essential base for any proposed land use change consequent on population increase and attendant agricultural expansion. The combination of historical and contemporary environmental data will greatly enhance our knowledge of lowland ecosystems.

ACKNOWLEDGEMENTS

We thank the Government of Papua New Guinea, the Western Highlands and Enga Provincial Government, the University of Papua New Guinea, the National Museum and the Institute of Papua New Guinea Studies for granting us research visas and entry into the lower Jimi region. P.P. Gorecki's research was entirely financed by the Department of Prehistory, Research School of Pacific Studies, Australian National University. D.S. Gillieson's research was supported by grants received from The Faculties, Australian National University and from the Australian Research Grants Scheme.

Invaluable assistance and expertise during the fieldwork and/or analysis of the material collection was received from G.S. Hope (ANU), J. Landsberg (ANU), J.G. Luly (ANU), R. Fullagar (La Trobe), J. Beattie (CSIRO), M. Dallas (Sydney), B. Wright (Sydney), J.C. Pernetta (UPNG), K. Kerenga (Lae Herbarium) and P. Swadling (National Museum). We thank them all for their outstanding contributions to our research.

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