Amongst his varied accomplishments, Ralph Bulmer was a co-author of the first substantive article on New Guinea Highlands prehistory, indeed on any aspect of New Guinea prehistory (Bulmer and Bulmer 1964). The study drew on the preliminary results of pioneer excavations by Susan Bulmer during 1959-60, illuminated by a perceptive assessment of the historical implications of the biology, material culture and ecology of Highlands societies whose first contact with Europeans had begun within the previous 30 years. With appropriate qualifications, the Bulmers (1964:73-5) proposed a broad three-phase sequence for Highlands prehistory.

An initial phase of hunter-gatherer populations was succeeded by a phase of technological and economic change characterised by agriculture based on Indo-Pacific plants like taro (*Colocasia esculenta*), banana (*Musa* spp.), yam (*Dioscorea* spp.), *Pueraria lobata* and sugar cane (*Saccharum officinarum*). The final phase was associated with the introduction within the last few hundred years of the tropical American sweet potato (*Ipomoea batatas*), the present staple of Highlands agriculture, which the Bulmers saw as allowing agricultural settlement at higher altitudes than previously. This latter proposition is only one of the issues they raised which have been the focus of much subsequent attention. Those which I wish to take up here are concerned with the initial appearance of agriculture, the subsistence base of Phase II of their sequence.

EVIDENCES FOR AGRICULTURE

The Bulmers inferred agriculture from the appearance in the two excavated rockshelter sequences at Kiowa and Yuku of the ‘polished’ axe-adze blade, ‘the implement that would have made large-scale forest-clearing possible’ (Bulmer and Bulmer 1964:66). They noted for Yuku the simultaneous presence of bones of the non-indigenous pig (Bulmer and Bulmer 1964:67). At the time they wrote no radiocarbon dates were available for any of these events. Ten years and several rockshelter excavations later, three prehistorians, assessing the accumulated evidence in rather different ways, could agree on a date of about 6000 bp (= radiocarbon years before present, by convention 1950) by which agriculture was well established in the Highlands (White 1972:142-8; S. Bulmer 1975:43-6; Christensen 1975:31-5). By this stage pollen-analytical investigations into Highlands vegetation history were providing evidence of vegetation change interpreted as the result of forest clearance for agriculture (Powell 1970; Powell *et al.* 1975:40-52), while direct indications of agriculture had been archaeologically identified in the form of field systems in swamps (Golson *et al.* 1967; Lampert 1967).

At one of these, the Kuk swamp at 1550 m in the upper Wahgi valley near Mount Hagen, large-scale investigations were in progress (Powell *et al.* 1975), which were shortly to result in claims for a 9000 year antiquity for agriculture in the Highlands (Golson and Hughes 1980).

**Wetland agriculture at Kuk**

The Kuk swamp provided unequivocal evidence for five distinctive episodes of agricultural use back to about 6000 years ago, in the form of large water-disposal channels and associated garden systems (Golson 1977). These five systems lie stratigraphically above a grey clay (Golson and Hughes 1980, Figure 2, as revised in Hughes *et al.* 1991, Figure 3). Investigations below the grey clay identified the presence of an earlier channel with characteristics – directness of line between points of abrupt change in direction, one of them in the middle of a low hillock of volcanic ash – indicating an artificial as opposed to a natural origin. At the same stratigraphic level as the channel a variety of features was excavated – stakeholes, basins and hollows, some of the last tentatively interpreted as pig wallows. These disclosed no organisational principle in the limited area then excavated by comparison with the features associated with later phases of swamp drainage but they were all thought to be humanly made, or at least humanly associated, in the absence of any compelling geomorphological or other natural explanation for their formation (Golson and Hughes 1980:299). Extended investigations have been no more successful in discovering organisation in the assemblage of features or revealing their individual functions, though they have added to the tally of associated artifacts of introduced stone mentioned in the original report.

The interpretation of the features as possible evidence of an early phase of wetland agriculture was based on their association with an apparently artificial channel, by analogy with similar associations higher in the
depositional sequence which were clearly the result of swamp management for agriculture. Radiocarbon
dating of organic debris in the infill of the early channel gave the complex an age of about 9000 years bp.

Dryland agriculture at Kuk
The five episodes of swamp drainage for agriculture recorded in the Kuk stratigraphy above the grey clay,
from 6000 bp onwards, took place in the context of continuous cultivation of the dry land of the swamp
catchment, whose operations provided a variable input of mineral sediments into the swamp deposits. The
stratum of grey clay which separated these five episodes from the presumed earlier phase just discussed
warranted attention in this context (Golson and Hughes 1980:296-8).

The grey clay forms the most distinctive component of a fan deposit thickest at the southern margin of the
Kuk site, where the sediment-bearing waters enter, and wedging out to the north. It represents a striking
acceleration of geomorphic processes compared with previous history, whether in terms of rates of sediment
deposition in the swamp or rates of lowering of the land surface of the catchment by erosion (cf. Hughes et al.

A number of possible explanations for this phenomenon was explored and rejected (Golson and Hughes
1980:298): seismic events, changes in vegetation cover resulting from rising temperatures at the end of the
Pleistocene, and human activities other than or short of the bush clearance for swidden agriculture in the
catchment of the swamp which became the preferred explanation. Dryland agriculture was seen as beginning
simultaneously with wetland management, at 9000 bp, though the increased erosional effects to which it gave
rise only began to be manifested within the basin as grey clay when the early drainage channel silted up with
the end of the short-lived first phase of swamp management which it served (Golson and Hughes 1980:298).
Similarly, grey clay deposition ended about 6000 bp when the digging of new disposal channels in connection
with Phase 2 of swamp drainage again allowed the transport of eroded material through and out of the basin
(Golson and Hughes 1980:296, 298). There are a number of radiocarbon dates from different parts of the
swamp to document the build-up of grey clay over the period 9000-6000 bp.

Vegetation histories
If indeed the grey clay in the Kuk swamp was the result of sustained forest clearance in its catchment, the
wider practice of such clearance should be reflected in regional pollen diagrams, a point appreciated when the
proposition was initially made (Golson and Hughes 1980:297). Unfortunately the diagrams for the upper
Wahgi do not cover the critical 9000-6000 bp period, while those from the wider region which do are at too
high elevations to register early agricultural impact (cf. Powell 1982). What the upper Wahgi diagrams show
when they begin in the mid-Holocene is a ratio of woody non-forest to forest taxa which is interpreted as due
to forest clearance for agriculture beginning at some time before 5000-5300 bp (Powell 1982:218, 225).

Discussion
Two of the upper Wahgi diagrams, from Ambra and Draepi, come from sites which preserve late
Pleistocene vegetation records in organic deposits below those producing pollen evidence for the middle
and late Holocene (Powell 1982, Figures 2, 3). At Draepi the gap between the two, of some 15,000 years
(roughly 20,000-5000 bp), is filled with disturbed sediments with a prominent inorganic component (Powell
et al. 1975:43; see Zones H top and I of Powell 1982, Figure 2), while at Ambra, where the gap is one of over
20,000 years (very roughly 26,000-4000 bp), there is a sequence of clays and volcanic ashes (Powell 1982,
Figure 3). It seems not unlikely that these gaps in the organic record are connected with the circumstances of
late Pleistocene and early Holocene climates, the evidence for which is conveniently summarised by

During the pleniglacial, say from 20,000-15,000 bp, the tree line stood at 2000-2400 m, well below its
present limit of 3900-4000 m (Hope et al. 1983:40). Above it there stretched along the spine of the island a
continuous zone of shrub-rich and alpine grasslands, elements of which now exist only as isolated occurrences
surrounding the highest peaks (cf. Hope and Hope 1976:33). Not only were temperatures lower, but also
precipitation, because of lower sea temperatures (Brookfield 1989:315). The tree line rose rapidly with the
climatic amelioration of the late Pleistocene and by 8000 bp had achieved an altitude some 200 m higher than at
present, indicative of a 'hypsithermal interval' which can be broadly dated between 8000/7000 and 5000/4000
bp (Brookfield 1989:308-9). Though the supporting evidence is not strong, there is some possibility that this
interval was not only warmer but wetter (Brookfield 1989:310, 312, 315).

Brookfield (1989:310) has pointed out that the first and second long gaps in the sequence of swamp
management at Kuk (9000-6000 and 5500-4000 bp) cover the whole of the hypsithermal and might be
explained at least in part by changed hydrologic conditions in the swamp, if higher temperatures were
accompanied by higher rainfall. We may push the climatic argument further to ask whether a wet hypsithermal
could have had any part in the formation of the grey clay. This line of reasoning is prompted by a question raised by Walker and Hope (1982:269, 273) as to whether the great intramontane valleys at 1500 m and above, which they suggest must have harboured grassland extensions from higher altitudes as a result of frosts and cold-air drainage during the colder climate of the late Pleistocene when the tree line was around 2300 m, ever became completely forested during the period of general forest expansion. The impact of increased rainfall on a sparsely forested landscape might be offered as sufficient cause for the accelerated erosion represented by the grey clay at Kuk, in place of the original explanation of clearance for agriculture, which argued for a closed forest cover both on climatic grounds (Golson and Hughes 1980:298) and because of the low rates of erosion represented by the grey clay at Kuk compared with rates under grassland (Golson and Hughes 1980:297).

There must be some doubt, however, about the effectiveness of the proposed higher rainfall of the hypsithermal interval, when of course there would have been higher rates of evaporation. The gaps in the organic sequence at Draepi and Ambra, which no doubt were initiated in circumstances of lower rainfall brought on by the onset of the last glacial maximum, nevertheless persisted through the hypsithermal to its very end around 5000-4000 bp, when the character of the climate changed with the appearance of the El Niño/Southern Oscillation phenomenon (Brookfield 1989:311, 312, 315). Moreover, in their recent study reviewing the history of erosion from the southern catchment of the Kuk basin, which incorporates information on current erosion rates and processes as well as much more comprehensive data on the prehistoric situation than that previously provided by Golson and Hughes (1980), Hughes et al. (1991:234-5) claim a direct relationship between intensity of agricultural land use and rates of erosion and stress that the major long-term source of eroded sediments would have been bare or sparsely vegetated garden plots affected by rainsplash and surface wash. Their calculations show a dramatic rise in erosion rates with the beginning of grey clay deposition at 9000 bp, rising by 6000 bp to a level characteristic of the subsequent millennia of undoubted agricultural land use in the catchment (Hughes et al. 1991, Figure 5). The implication is that the grey clay in the Kuk basin is a product of similar agricultural use of catchment land over the period 9000-6000 bp, since only removal of ground cover would permit the processes of rainsplash and surface wash to produce the required erosional effects.

We cannot use the structural evidence for wetland management in the swamp basin at 9000 bp to support the above interpretation of grey clay, because that management is only agricultural by analogy with subsequent systems. Among examples which could be quoted of structural enterprises of some scale and complexity by formally hunter-gatherer societies, the eel canals of western Victoria (Lourandos 1980:251-4) constitute one close to home. There is, moreover, evidence from Papua New Guinea itself of hunter-gatherer impact on vegetation, in the form of increases in the frequency of carbon particles in pollen cores coincident with vegetation changes and reflecting firing of the local vegetation.

Though the three localities in question, Kosipe at about 1950 m in the northern Owen Stanley range (Hope 1982:214-17), Telefomin at about 1500 m near the Irian Jaya border (Hope 1983) and Supulah hill at about 1450 m on the floor of the Bariam Valley to the west (Haberle et al. 1991:30-1), are at comparable altitudes to the suite of upper Wahgi sites we have been discussing, the evidence of human impact they provide relates essentially to activities during the late Pleistocene, before 9000 bp when the Kuk evidence begins. Excavations at Kosipe have recovered stone tools, including large waisted blades, from a horizon dating between 9000 and 26,000 bp (White et al. 1970) and White proposed that this occupation was associated with exploitation of high altitude Pandanus. From preliminary pollen results Hope (1982: 215-16, 217) considers this at best a partial explanation and though he offers none of his own, he leaves it open that exploitation of the plant and particularly animal resources at the forest/grassland ecotone, then only a few hundred metres above the site, was involved (cf. Hope and Hope 1976:43). At Telefomin Hope (1983:30) recognises three periods of high carbonised-particle frequency, from 18,000-15,000 bp, 11,500-8200 bp and 3000 bp to the present, the last related to clearance by recent, agricultural, populations (Hope 1983:32). He raises the possibility that the two earlier phases were due to human fires lit in natural swampy clearings, as a consequence perhaps of the locality being accessible from the late Pleistocene high altitude grasslands of the Star Mountains, at least until about 12,000 years ago (Hope 1983:32). Supulah hill, where burning occurs during the period 25,000-30,000 years ago (Haberle et al. 1991:31), is equally favourably placed with respect to the lowered late Pleistocene treeline.

At Kuk, by contrast, not strategically placed for montane exploitation, the focus is on the swamp and its margins and begins as the episodes of activity at Kosipe and Telefomin conclude. As we know, there is no vegetation history for the upper Wahgi to serve as a basis for comparison. The interpretation of the grey clay at Kuk in terms of agricultural clearance over three millennia implies sustained disturbance of the vegetation, accompanied by fire. This should be clearly registered in any pollen record, heralding the situation around
5000 bp when the upper Wahgi pollen record begins, which is generally accepted as giving a picture of the regional vegetation already modified by agricultural activity.

Recent research in the Baliem valley of Irian Jaya has produced evidence of the kind missing from the upper Wahgi (Haberle et al. 1991). The Baliem has been described as representing the apogee of agricultural intensification in the New Guinea Highlands overall (Brookfield with Hart 1971:114) and the intensive drainage of its swampy valley floor, representing an ethnographic analogue to the prehistoric agricultural systems at Kuk and other Wahgi swamps, makes it an apt and critical case for comparison. The research in question concerns the analysis of a pollen core taken at 1420 m altitude at the Kelala swamp, thought to be an abandoned channel of a tributary of the Baliem river. Except for a hiatus of perhaps 1800 years ending at an estimated date of 5200 bp, the m cored records a continuous vegetation history from beyond 7000 bp to the present, reflecting progressive human impact by way of agriculture through the increasing representation of secondary forest taxa and associated changes. Evidence of early clearance at an unknown date before 7000 bp is provided by clays and silts at the base of the core, representing increased sediment input into the valley drainage network as a result of catchment instability due to clearance, which initiates swamp formation around 7000 bp. By this stage light-demanding taxa are present in the diagram and appear in increased proportions when the record begins again after the stratigraphic interruption ending around 5200 bp.

This new evidence from the Baliem is the strongest independent support for the claims of 9000 year old agriculture based on Kuk. There remains, however, the question of what plants were being cultivated.

THE EVIDENCE FOR PLANTS

For the Bulmers (Bulmer and Bulmer 1964:45-7), the early agriculturalists of the New Guinea Highlands are likely to have relied on crops of essentially Southeast Asian derivation like taro, yam and bananas of the Eumusa series, though they remarked on the claimed status of sugar cane and Australimusa bananas as indigenous cultivars. Discussion of the issue by Golson and Hughes (1980:299-301) in the light of the Kuk evidence was much influenced by S. Bulmer’s (1975:18, 19, 36) claims for the presence of the non-indigenous pig in the Highlands by 10,000 bp. They proposed that the animal was only likely to have made its appearance in New Guinea as a husbanded, hand-fed animal and that its transfer as such raised the possibility that cultivated plants of Southeast Asian origin, some no doubt involved in its foddering, came into New Guinea at the same time. Taro was seen as critical for this argument, since its origin in Asia could be taken for granted. The point was not explicitly made (though cf. Golson 1977:613; Golson and Hughes 1980:301), but taro was a highly appropriate plant for cultivation in the rainforest clearings and swamp-based gardens reconstructed for Kuk.

Golson and Hughes had to deal with the question of cultivated plants in this indirect fashion, because for a variety of reasons no direct evidence was provided by the Kuk investigations themselves (Golson and Hughes 1980:299-300). However, they did conclude (Golson and Hughes 1980:301) that whatever components of the traditional crop roster of Highlands agriculture were implicated in agriculture at Kuk at 9000 bp, none of them was first taken into cultivation there. The most important have various limits on productive growth below a ceiling of 2100-2200 m (cf. Bayliss-Smith 1985:286, based on R.M. Bourke’s long-term studies), except sweet potato, of recent introduction to New Guinea, and taro. Given that 9000 years ago temperatures at Kuk were only just attaining current levels, agriculture began there as soon as it was climatically possible. The implication was that there was an older history of cultivation and cultivated plants in New Guinea at lower altitudes than Kuk.

Golson (1989:678-83) has reviewed subsequent evidence on these matters. Of particular importance have been the writings of D.E. Yen, who in a series of papers beginning in 1971 has, with increasing confidence, argued for the status of New Guinea as more than "an extension of the Southeast Asian centre of domestication in Vavilovian terms, but as an entity of its own' (Yen this volume). This entity is characterised by a suite of indigenous plants comprising basic staples, vegetables, nut and fruit species (Yen this volume, Table 2), which were found useful in the hunter-gatherer economy and were incorporated in a continuing process of domestication (Yen 1982:291). The process itself may have begun 'in the variable ecologies of mid-altitude regions' (Yen 1982:292).

Yen (this volume) argues that even the exotic origin of the taro-yam complex which, with the sweet potato, is dominant in New Guinea and Oceanic agricultural systems can no longer be taken for granted. The wild yams of New Guinea have not been the subject of detailed study, while there are two species in Australia, traditionally used for food (Yen 1990:260). There is also taro growing wild in Australia, used by Aborigines and found in circumstances which preclude it being of recent introduction (cf. Golson 1989:682-3). Recent chromosome studies cited by Yen (this volume) suggest the occurrence of two separate domestications, Asian and Pacific, deriving from a natural and ancient dispersal of the genus from Asia to Australasia and allowing the possibility of New Guinea as the Pacific centre of domestication.
The discoveries at Kuk, taking back the antiquity of New Guinea agriculture beyond the date of the Austronesian introduction once widely accepted (cf. Yen 1982:292), provided the extended time scale required for Yen’s maturing thesis of the independent origins of New Guinea agriculture (Yen, this volume). At the same time his developing arguments were used by Golson to support archaeological claims for ancient agriculture at Kuk (e.g. Golson 1977:614, 618; 1982a:297-300; 1989:682). Both cases, however, are essentially independent; while they are mutually supportive, they do not borrow from each other in any critical sense. New evidence in each field – of early agricultural impact on the Baliem vegetation and of a possible Pacific centre of taro domestication – strengthens each separately and the two together.

The combined picture as seen by Yen (1990:263) is one where the earliest agricultural phases in the Kuk swamp, experimental at 9000 bp and more ordered at 6000 bp, present ‘an archaeological record of environmental manipulation that is part of the domestication process, with the adaptation of plants (taro) already domesticated in other environments as the stimulus’.

THE WIDER ECONOMY

Raymond Kelly (1988:157-66) poses the question, never explicitly raised in archaeological discussions of early agriculture at Kuk, of the wider subsistence economy of which Kuk was a part. There is indeed very little archaeological data bearing on the matter. Such as there is comes mainly in the form of faunal evidence from a handful of rockshelter sites, only two of which have been published in the detail required. These are White’s (1972) sites of Kafiavana and Batari some distance away from Kuk in the Eastern Highlands, of which only Batari has fauna in sufficient quantity to be analytically useful (cf. Kelly 1988:185, note 29). Christensen (1975) has briefly reported on the Manim rockshelter at 1770 m altitude in the upper Wahgi valley, which has a long sequence back to 10,000 bp but very poor preservation of bone. The lower levels contain abundant fragments of the thick drupe shells of Pandanus antaresensis, a species neither common nor much exploited in the main Highlands today. Around 6000 bp the character of site use radically changes, P. antaresensis disappears, ground stone axes make their appearance and Christensen (1975:31-4) considers that the site has been incorporated within the zone of agricultural settlement.

Kelly’s concerns stem from his studies among the Etoro, an ethnic population living at low densities in forested country on the southern fringe of the Highlands between about 750 and 1000 m (though exploiting country above and below), who take as game much the same animals as are reported from Highlands excavations (Kelly 1988:113), the majority of them small (Kelly 1988:158). He argues that with the Etoro, traplines and dogs are important in improving the efficiency of small game procurement and that without them the energetics of small game capture would be marginal even at very low population densities, especially with a stone technology and in the Highlands where because of increased altitude game would be less abundant (Kelly 1988:163). He proposes, therefore, that adequate methods of small game capture were available at 9000 bp to permit residence at fixed locations for the periods necessary for agricultural activities (Kelly 1988:164). This would be more easily accomplished under a system based on bananas, sugar cane and Pandanus than one incorporating taro, which requires extended care to guard against weeds, insects, rodents and especially wild pigs (Kelly 1988:164-5).

On the other hand, a taro-based regime would be more conducive to pig domestication, because of the greater sedentism it allows and the greater opportunities for pig foraging which its cultivation provides through the creation of secondary regrowth, while the domestication of pigs would in turn reduce the pressure on wild game resources and make continuous residence easier (Kelly 1988:165).

There are a number of points calling for comment in this complex argument. While the tools required for the construction and maintenance of traplines would have been available by 9000 bp in the form of edge- or fully ground cutting tools of stone (White and O’Connell 1982:67), it is highly unlikely that the dog was present in New Guinea in the early Holocene, given the consistently later dates for its appearance in the region generally (e.g. White with O’Connell 1982:104 for Australia; Bellwood 1985:227 for Timor). There is some question about the extent to which wild pig populations would be viable at Highlands altitudes, as Kelly (1988:159, 166) himself discusses (cf. Golson and Gardner 1990:406). Furthermore, most scholars do not accept that the pig was in the Highlands before 6000 bp, rejecting Susan Bulmer’s (1982:188) claims for its presence by 10,000 bp because of its failure to cross the then available landbridge to Australia (White with O’Connell 1982:187-9; but see the discussion in Golson and Hughes 1980:300-1). Finally, there is uncertainty as to what crops were in fact being grown in the proposed gardens at Kuk at 9000 bp.

I wish, however, to make a more general comment on Kelly’s propositions. It relates to his thesis of the ‘unfavourable energetics’ of small game procurement (Kelly 1988:164). Though it may be true that small game hunting, even with dogs, is only marginally efficient in energy terms, returning only 1.15 to 1.34 calories to the Etoro hunter for each calorie expended, there is nevertheless a gain of 33.6 grams of protein per hour (Kelly 1988:163, quoting figures from Dwyer 1983:165). Even in the coastal savanna of northern...
Australia, where protein is infinitely more abundant, half the calories come from plants (Jones 1980:136). Jones describes the Aboriginal strategy as the combination of two types of foraging: the high yield/low probability effort undertaken by the men in hunting and fishing and the low yield/high probability labour of the women, collecting shellfish, digging yams and processing cycad bread, over periods four to ten times longer than it takes the men to provide the same amount of food. If we consider the gardens at Kuk as providing for the calorific needs of the population on a daily and year-round basis, small game hunting falls into more logical place as the source of protein, in combination with pigs, wild and/or domesticated, or not.

CONCLUDING REMARKS

Obviously there are many difficulties with the case for 9000 year old agriculture at Kuk which I have reargued in this contribution in memory of Ralph Bulmer. It still relies preponderantly on the evidence from Kuk itself, and the particular interpretations made of it, though the recent pollen diagram from the Baliem valley, discussed above, lends welcome support. We have also seen how Yen’s thesis of independent origins for agriculture in New Guinea is highly compatible with the Kuk case.

Peter Bellwood (1980:69-70) offers the intriguing suggestion that early agriculture in New Guinea gave its inhabitants a demographic advantage when the era of Austronesian colonisation of the Pacific began perhaps around 4000 bp, so that they were able to hold their own against the people who successfully settled virtually the entirety of island Southeast Asia, Micronesia and Polynesia.

That agriculture was well-established in the Highlands by 6000 bp is clear by many lines of evidence. The pollen record is interpreted as recording the fact, while the second phase of cultivation in the swamp at Kuk is not only systematic in structure (Golson 1977:615-16) but has also been found at two other upper Wahgi swamps (Golson 1982b:121; cf. White with O’Connell 1982:178-80). Moreover, excavations at the Yeni swamps in the lower Jimi valley at about 500 m altitude 50 km north have disclosed structural evidence back to 5000 bp thought to register agricultural activity of a type similar to Phase 2 at Kuk (Gorecki 1989:148-150; Gillieson et al. 1985). In addition, as we have noted, pig is accepted as being present in the Highlands by 6000 bp. Finally, around this date there is the change in site use at the Manim rockshelter of which we have previously spoken.

We have little data on which to argue continuity between the two periods characterised above. At Kuk the grey clay is seen as filling the gap, as we have seen, while the development of the organised gardens of Phase 2 in the Kuk swamp out of the disorganised features of Phase 1 has been suggested by Yen to be part of a process of environmental manipulation, as already noted.

At an earlier stage of research both Golson (1977:617) and Yen (cf. 1982:291, 292) were inclined to think that Phase 1 at Kuk could register the cultivation of indigenous New Guinea plants like the Australimusa banana, with Phase 2 representing the introduction of taro and other food plants from Southeast Asia. Nothing is more certain, of course, than that new food plants, and new varieties of old ones, made their way into the island throughout agricultural history, however long this may have been and with whatever crops it started (Yen 1990:264-5).

One possible context for such transfers is indicated by the recent announcement of palaeogeographic and cultural discoveries stemming from the research of Pamela Swadling in the lower Sepik and Ramu basins (Swadling et al. 1989). These concern the confirmation of Swadling’s hypothesis of an inland sea, which infilled during the later Holocene, and the discovery of sites on its former shorelines which may document the appearance of pottery east of the lower Ramu at the unusually early date of 5600 bp, some 2000 years earlier than the existing record. Given the uncertainties attaching to radiocarbon dates, this possible early appearance of pottery in the lower Ramu would be difficult to distinguish chronologically in any decisive sense from the beginning of the Yeni field systems 100 km south along the Yuat from the lower Sepik swamps and from Phase 2 50 km further north in the upper Wahgi, during which so many indications of agriculture occur together.

All our hypotheses must be strongly qualified as long as discoveries like those of Swadling have the potential to change our picture of New Guinea culture history. A quarter of a century later we are still in the speculative stage of reconstruction in which the Bulmers (1964:39) explicitly placed their pioneering paper.

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NEAR AND REMOTE OCEANIA – DISESTABLISHING “MELANESIA” IN CULTURE HISTORY

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Although relationships of people to people and people to their symbolic worlds fascinated Ralph Bulmer, his most stimulating interactions with culture historians such as myself frequently involved people’s relationships with their natural worlds. Biogeography and its importance in understanding the settlement of the Pacific was a subject we often discussed. It was a topic I explored at some length in an unpublished 1973 inaugural lecture.1 Some basic ideas from that lecture have appeared from time to time in a number of contexts (Green 1975, 1977, 1978, 1985a), and one, the distinction between Near Oceania and Remote Oceania (Pawley and Green 1973:4), has proved useful enough in various deliberations on the settlement of the Pacific to be adopted by others (cf. Terrell 1986:14-15; Wickler and Spriggs 1988:706; Spriggs 1989). It is the basis of that distinction and its implications which are further examined here.

While Polynesia, in the 19th century three-fold division of Oceania, has remained a productive category for historical analysis of events after 200 B.C., the other two concepts of Melanesia and Micronesia have proven, particularly for archaeologists, to be fatally flawed (Terrell 1986:15-41; Thomas 1989; Green 1989).2 New entities are required to replace them, at least for those among us interested in defining more productive, if sometimes shifting cultural boundaries which derive from the time and space of prehistory.

Certain conventions established by Brookfield with Hart (1971:xxxii) have proved helpful in referring to geographic regions within Melanesia – Western Melanesia, Eastern Melanesia, New Guinea, New Guinea mainland, Bismarck Archipelago and Island Melanesia – though none of these have turned out to have a particularly significant reality in prehistory. This is not surprising as these entities are not solely geographic, but often involve other considerations. Thus the division between Western and Eastern Melanesia, which