INTRODUCTION: TRANSITIONS TO AGRICULTURE IN THE PACIFIC REGION

Jack Golson*

By virtue of the plants on which it is based and the vegetative reproduction by which many of them are propagated, the agriculture of New Guinea, and of the wider Pacific world of which it forms part, has a special character (Yen 1982:283-286, 288; 1990:261-262). As described by Yen, it is dominated by the field cultivation of root crops like *Dioscorea* yams and *Colocasia* taro, in important, if variable, association with a variety of trees and tree-like plants, some of them with the capacity to become staples, like sago (*Metroxylon* spp.), coconut (*Cocos nucifera*), breadfruit (*Artocarpus altilis*) and banana (*Musa* spp.).

The belief that the Pacific agricultural complex had its origins in Southeast Asia has come under increasing reassessment over the past 30 years, since botanical research indicated that Australimusa bananas and sugarcane (*Saccharum officinarum*), two important elements of the complex, were New Guinea domesticates (Yen in press; cf. Yen 1982:281,285,286). Ethnobotanical investigation of the rich economic flora of the island, associated with the names of Barrau (1958; 1963; 1965a,b,c), Yen (1971; 1973; 1974; 1982; 1985) and Powell (*et al.* 1975; Powell 1976), has not only extended our appreciation of the contribution of New Guinea to the Pacific agricultural complex overall but raised the possibility of independent origins for agriculture there (Yen 1982:286-292; 1990:259-262). Yen (see especially 1982:288, 291, 292) makes two points in this connection: that indigenous plants were taken into domestication in New Guinea over virtually the whole environmental range met with within the Pacific and included a suite of produce comprising starch foods, vegetables, fruits and nuts with the potential to sustain broadly based agricultural economies. Meanwhile, investigation during the 1970s of a sequence of agricultural systems in the Kuk swamp dating back to 9000 years ago (reviewed in Golson 1989; 1990; cf. Golson and Gardner 1990) provided evidence that could be used to support a thesis of independent origins of agriculture in New Guinea (Yen 1982:291-292; 1990:262-263).

The Kuk site, however, at 1550 m, lies in the Highlands zone of the island, a zone which has made a very limited and essentially local contribution to the register of domesticates (Yen 1990:261). It has been presumed that the major crops under cultivation there were brought up from lower altitudes as temperatures improved at the

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* Prehistory RSPacS, Australian National University, Canberra ACT 2601, Australia

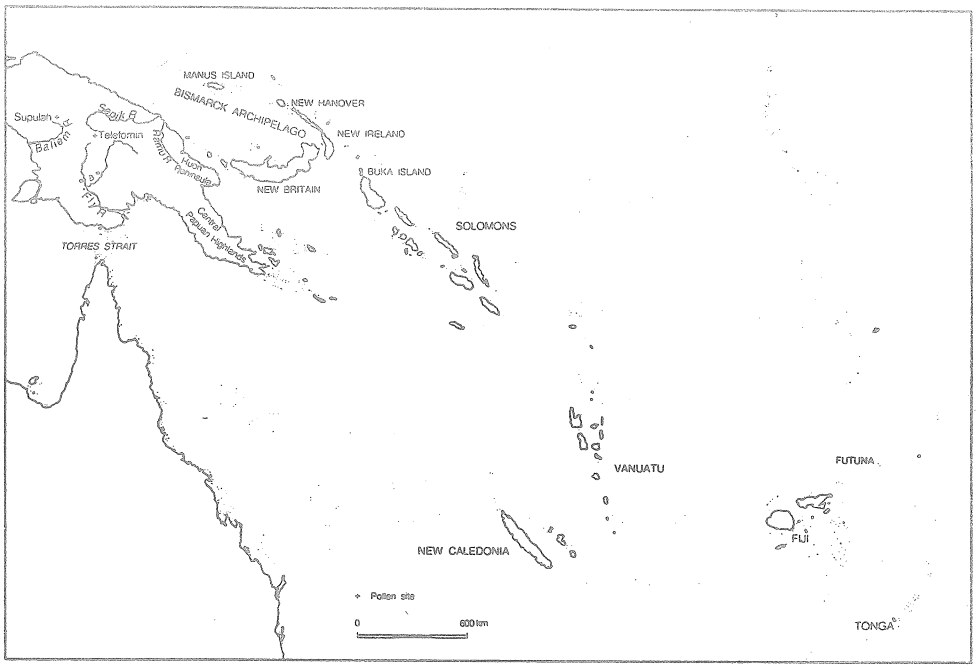

FIGURE 1: GENERAL LOCALITY MAP OF THE SOUTHWEST PACIFIC

end of the Pleistocene (Golson and Hughes 1980:301). There is no relevant evidence from such lower altitudes: the single agricultural sequence known from the Highlands fringe (c.500 m altitude) does not begin before 5000 years ago (Gillieson *et al.* 1985; Gorecki 1989:148-150) and there has been no equivalent record at all from the coast. At none of the agricultural sites is there direct evidence of what was being grown and we must draw our inferences from the ethnobotanical record.

We must also be aware of the possibility of later plant introductions into the island, similar to the late prehistoric case of the tropical American sweet potato (*Ipomoea batatas*), which has come to be the staple of the New Guinea Highlands. The appearance of Lapita pottery in the Bismarck Archipelago about 3500 years ago (Gosden *et al.* 1989), plausibly associated with the advent of Austronesian languages, could have been associated with plant transfers. Related languages may have appeared appreciably earlier (5500 years ago?) in west New Guinea (Tryon 1985:153). These events have been seen as representing the meeting of two agricultural streams (Yen 1990:264; cf. 1982:291).

Yen (1990:260, 264; cf. 1982:284, 289) thinks that the two dominant yams of New Guinea and Oceanic agriculture, *Dioscorea alata* and *D. esculenta*, are almost certainly of Southeast Asian origin, but there are wild yams of different species in New Guinea, som-

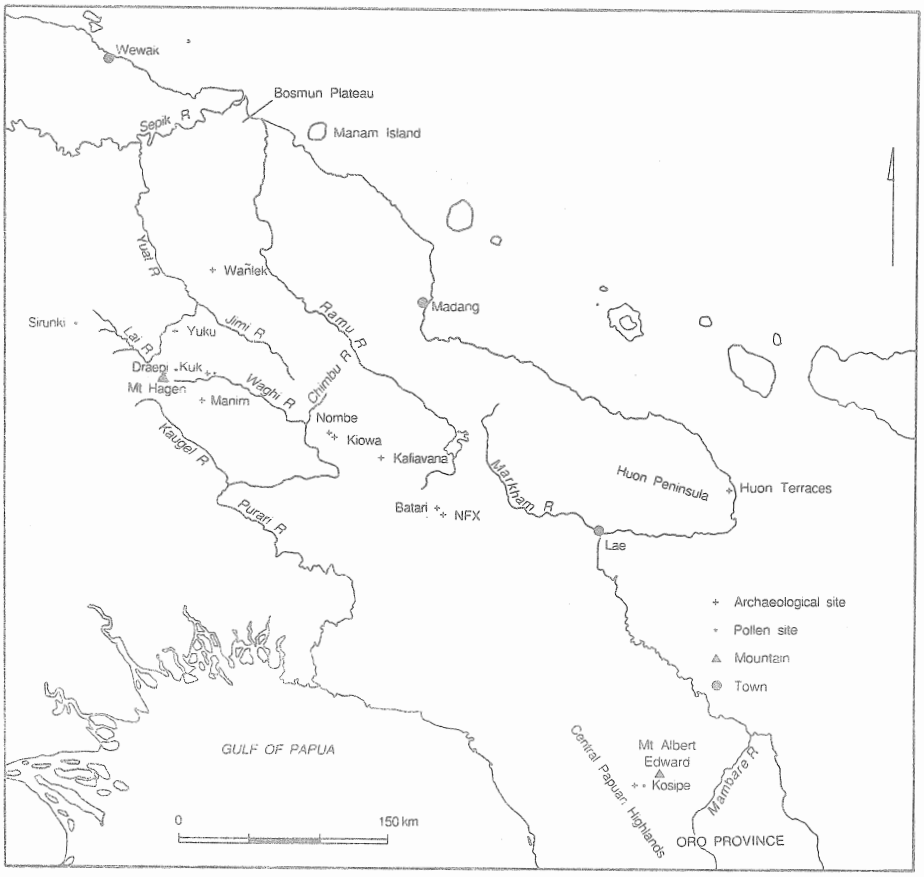

FIGURE 2: LOCALITY MAP FOCUSING ON THE CENTRAL HIGHLANDS OF PAPUA NEW GUINEA

Pacific islands and Australia, some of which could have been early taken into cultivation in New Guinea, as they are today. A question has been raised as to the Asian origin of *Colocasia* taro, the other prominent Pacific root crop, often proposed for the claimed early wetland gardens at Kuk, which is found wild and cultivated from India to New Guinea and wild in Australia (Yen 1982:284; cf. Golson 1989:682). The results of recent chromosome studies raise the possibility of two separate domestications, Asian and New Guinean (Coates *et al.* 1988; Yen 1990:260-264). There is a problem too about the origin of Eumusa bananas, given that New Guinea has the greatest known diversity of the type (Yen 1990:264).

Typically in New Guinea and the Pacific the agricultural complex is associated with three domesticated animals, pig, dog and chicken, all of them unequivocally of Southeast Asian derivation. In the present context we can ignore dog and chicken, which make a

late appearance on the New Guinea scene (Bulmer 1975:23-24, corrected by White with O'Connell 1982:104 for the age of dog in Australia). Unfortunately the antiquity of pig in New Guinea is a matter of dispute (cf. Golson and Gardner 1990:406): most scholars would accept its presence back to 6000 years ago and reject Bulmer's claims for the terminal Pleistocene (White with O'Connell 1982:187-189). Should the pig, however, prove to have been in New Guinea by 10,000 years ago, it must have almost certainly been introduced as a hand-fed animal by people, given the water crossing that would have had to be made. In these circumstances, as Golson and Hughes (1980:301) have argued, there is a possibility that cultivated plants involved in foddering pigs and also feeding people would have been brought along. There is, however, no evidence as yet for cultivation in Southeast Asia at the time depth claimed for New Guinea (Flenley 1988; cf. Golson 1985).

In the context of so many problems and uncertainties, it is not to be expected that the papers which follow will have any final answers to give. Each of them, however, has a definite contribution to make.

Mary-Jane Mountain speculates about human activities in the New Guinea rainforests in the late Pleistocene, as essential background to the appearance of cultivation practices of the sort allegedly exemplified at Kuk. Peter Matthews discusses the wide distribution, from Asia into New Guinea and Australia, of a wild variety of taro from which, through a transformation of a stoloniferous to a tuber-forming habit, the cultivated form must have been derived. Jack Golson looks again at the evidence for 9000 year old agriculture in the New Guinea Highlands in the context of the regional evidence for both agriculture and hunting and gathering.

Moving onwards in time, Pamela Swadling, Nick Araho and Baiva Ivuyo describe rich botanical finds from a lower Sepik midden, which show essential features of Pacific arboriculture to have been in place nearly 6000 years ago. In another essentially lowland situation in the Mambare basin, Nick Araho discusses the relationship to food processing of the local representatives of the widespread and enigmatic New Guinea stone mortar complex.

Finally, on the island of Futuna in the southwestern Pacific, Anne di Piazza and Daniel Frimigacci describe the archaeological and ecological investigation of field systems associated with the settlement of a small but diversified island and discuss their socio-political implications.

Figures 1 and 2 are general locality maps serving all contributions, supplemented by more detailed maps in individual articles. They have been prepared by Ian Faulkner, Department of Prehistory, Research School of Pacific Studies, Australian National University. Gabrielle Braun of the same Department has reformatted all contributions.

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