

Prologue

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It is an honour for me to have been invited by Jack Golson to write a prologue to this volume on *Ten Thousand Years of Cultivation at Kuk Swamp in the Highlands of Papua New Guinea*. I became involved in the Kuk Project in 1997, when I began my PhD at The Australian National University under Jack's watchful eye. My PhD research was designed to investigate several substantive problems with the original claims for early agriculture based on the 1970s excavations at Kuk led by Jack with numerous colleagues. In the late 1990s, the antiquity, function and types of cultivation represented by the earliest archaeological phases of wetland manipulation at Kuk were debated. The New Guinea evidence was still peripheral to many discussions of global agricultural origins.

There were several reasons for the lack of acceptance of the Kuk evidence. By the late 1990s, only limited archaeological evidence for the earliest phases of wetland manipulation had been published. These phases represent the earliest episodes for plant exploitation at about 10,000 years ago (Phase 1), mound cultivation on the wetland margin at c. 7000–6400 years ago (Phase 2), and ditched drainage for cultivation from c. 4400–4000 years ago (Phase 3). In the limited publication record over the 20 years since the main fieldwork had been done, interpretations of the archaeological evidence associated with the earliest phases had changed through time, fostering a sense of uncertainty. More significantly, though, there were major gaps in the multidisciplinary record for Phases 1–3 at Kuk Swamp, principally: archaeobotanical evidence for the presence, use and cultivation of major staple crops; palaeoecological evidence for landscape change coincident with early phases of cultivation; stratigraphic evidence for cultivation practices; and high-resolution radiocarbon dating.

These lacunae were a product of the times in which the original work was undertaken. In the 1970s, these diverse fields of archaeological science had not been applied to the investigation of the past of tropical agriculture. Although the original Kuk Project in the 1970s was a state-of-the-art multidisciplinary endeavour, it was effectively constrained by a lack of development or availability of these fields. Consequently, there was a need for renewed investigation.

In the 1970s, the archaeobotanical investigation of tropical agriculture had only just begun. Researchers realised that traditional types of archaeobotanical evidence for agriculture—often focused on charred seeds of cereals and legumes, as well as charred nutshells and fruit stones—were poorly suited to the wet tropics. Most staple plants in the wet tropics are not cultivated for seed, or ordinarily produce seeds under cultivation; rather, plants are cultivated for soft tissues such as tubers, corms and rhizomes, starch-rich pith or sago, green leaves and shoots, and so on. These plant parts are rarely preserved as charred macrofossils, except when waterlogged, desiccated or frozen, and require the application of a relatively new suite of archaeobotanical techniques for detection and identification. These techniques include phytoliths and starch grain analysis, as well as archaeological parenchyma. Such techniques were not well established or widely available in the 1970s, yet phytolith and starch grain analysis have been pivotal for identifying staple crops—bananas (*Musa* spp.), taro (*Colocasia esculenta*) and a yam (*Dioscorea* sp.)—in the archaeological record of Phases 1, 2 and 3 at Kuk.

Palaeoecology, especially pollen analysis, was well established in the 1970s. However, problems had arisen in the extraction of pollen from clay-rich sediments dating from the Late Pleistocene to the mid Holocene at Kuk and other sites in the highlands. Thus there was no clear indication of how environments changed with the emergence, transformation and expansion of agricultural practices. With the advent of new pretreatments, it became possible to reconstruct vegetation history as it pertained to these key agricultural milestones.

The original stratigraphic investigations at Kuk focused on field recording, physical and chemical composition, and X-radiography. These analyses were used to develop sedimentological and pedogenic interpretations of the stratigraphy in terms of depositional and soil formation processes respectively. In my renewed investigations, these stratigraphic frameworks were extended through the application of further X-ray imaging, thin section micromorphology and X-ray diffraction. Together these multiscale and mixed-method investigations enabled major and minor stratigraphic units to be characterised, site formation processes to be reconstructed and some activities associated with early cultivation to be identified.

Archaeologists in the 1970s were limited to the conventional radiocarbon dating of charcoal samples that weighed in grams. The advent of Accelerator Mass Spectrometry (AMS) dating by the time of the renewed investigations made it possible to date charcoal samples weighing milligrams. This allowed the establishment of a more robust chronology of early cultivation using small samples collected from the fills of associated features.

Thus the renewed archaeological excavations and multidisciplinary investigations undertaken by myself and a team of collaborators from 1997 onwards benefited from a range of advances in archaeological science that were not available to the original investigators in the 1970s. When taken together, the results of the original and renewed investigations determined the antiquity and function of features associated with Phases 1, 2 and 3, identified the suites of plants being exploited and cultivated, and inferred associated landscape changes.

The new phase of investigations at Kuk was built on the enormous foundations laid by Jack Golson and colleagues from the 1970s onwards. The results of both sets of investigations are presented in this volume. Together, they provide a robust basis for understanding long-term agricultural history at Kuk that extends from 10,000 years ago to the present. This body of work represents 50 years of research that has established Kuk Swamp as the 'type site' for the investigation of early agriculture in New Guinea, and New Guinea as a globally significant centre of early agriculture and plant domestication. Furthermore, the global, national and local significance of Kuk has been recognised through its successful nomination to the United Nations Educational, Scientific and Cultural Organization (UNESCO) list of World Heritage Sites in 2008.

Despite all these advances, much remains to be done. Our understanding of early agriculture in the highlands of New Guinea is still in its infancy. A new generation is needed to initiate investigations and take this multidisciplinary research to the next level.

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