

## Prehistoric Settlement on Norfolk Island and its Oceanic Context

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**ABSTRACT.** The likelihood of Polynesian settlement of Norfolk Island was recognized in the eighteenth century, but archaeological remains of a settlement site were only discovered in 1995. The excavation history of the Emily Bay site is summarized, its date put at about the thirteenth to fourteenth century A.D. and its East Polynesian nature, especially its contacts with the Kermadecs and New Zealand, recognized through its artefacts. The faunal remains show a dominance of fish and birds, and low diversity within each. The reasons for ending the settlement are unknown but speculated upon and several future research priorities noted.

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There are two small archipelagos in the northern Tasman Sea. One of them, consisting of Lord Howe Island and Ball's Pyramid, has never produced any evidence of prehistoric human settlement, even by extensive test-pitting, coring and drilling (Anderson, 1996a, Macphail, 1996). In the other, consisting of Norfolk Island, Nepean Island and Phillip Island—the Norfolk Island archipelago—indications of earlier habitation were observed from the beginnings of European settlement. These were, and remained, enigmatic, namely, clusters of bananas growing in Arthur's Vale, the existence of small rats, pieces of wrecked canoes and other wooden artefacts which were ascribed variously to origins in Tonga or New Zealand, and from the interior of the island some stone adzes and chisels. By A.D. 1793 Commandant King, clearly influenced by the fact that two Maori taken to Norfolk Island had recognized the newly-discovered stone tools as Maori "toki" (adzes) from the North Island (New

Zealand), concluded that the various pieces of evidence constituted "a feasible proof" of Norfolk Island having once been settled from New Zealand (King, 1793, cited in McCarthy, 1934: 267).

If this seems a prescient observation now, it was not one that the history of archaeological discovery subsequent to 1793 and prior to the current project would have easily allowed. Many stone adzes and flakes, recovered particularly from Emily Bay and adjacent areas, were of forms regarded as generically East Polynesian, but some Norfolk Island collections were found by Specht (1984) to contain many stone implements, and some of shell, in non-Polynesian forms and materials, Melanesian types especially. Further examples of non-Polynesian implements, not recorded by Specht, occur in the Norfolk Island Museum collection, where they were catalogued by Anderson (n.d.). Since New Caledonia is relatively close to the north and

has been settled for 3000 years, the possibility that Norfolk Island had been reached from there thus seemed very plausible. Systematic field survey in 1976 (Specht, 1984) and subsequent palaeontological and archaeological salvage excavations in the Kingston area up until 1990 (Anderson and White, *Approaching the prehistory...*, this vol.) failed to resolve the issues of when and from where prehistoric occupation had occurred. No prehistoric habitation site was located. It was in this context that the Norfolk Island Prehistory Project began.

### **The Norfolk Island Prehistory Project (NIPP)**

The NIPP had two consecutive phases. From November 1994 to May 1997 it was directed by Atholl Anderson as a project of the Australian Heritage Commission, while from November 1997 until publication of this volume it has been directed jointly by us as one of the case studies in the Australian Research Council project "Understanding the Prehistoric Colonisation of the Pacific" (White and Anderson), and the Royal Society of New Zealand project "Prehistoric Colonisation and Environmental Change in Remote Oceania" (Anderson, as James Cook Research Fellow).

Fieldwork was divided into four seasons. In 1995 the Emily Bay archaeological site was discovered and a small test-pit completed (Trench EB95:06). More extensive excavations occurred in 1996 (Trenches EB96:10 and EB96:11), and were followed by the major field season at Emily Bay in 1997 (focussed on Trenches EB97:23 and EB97:24). A small investigation recovered additional landsnail samples in 1999. Beyond Emily Bay, there were test excavations at Cemetery Bay in 1995 (Trench CB95:01, CB95:02), and in Slaughter Bay (Trenches SB96:01–06). Outside the Kingston area, we inspected and cored various inland localities where adzes had been picked up and other potential site locations at Anson Bay, Rocky Point and Cascade. We excavated small test-pits at Bomboras Bay, Ball Bay and Nepean Island and carried out a surface inspection of Phillip Island (Anderson, Smith and White, this vol.).

While archaeological investigations were proceeding, all swamps inland were investigated by Hope and found to be of historical origin. There were then two seasons of coring at the Kingston Swamp, in 1995 and 1996, aimed at obtaining a record of sedimentary and vegetational change extending to before and through the period of human settlement (Macphail, Hope and Anderson, this vol.). In addition, various natural localities of subfossil bone were sampled, especially in Cemetery Bay. Analytical research was concentrated at the Department of Archaeology & Natural History, ANU, where all material recovered from fieldwork was initially processed and accessioned. Components of it were then allocated to specialists, whose reports comprise the main part of this volume.

### **The Emily Bay site, structural remains and chronology**

Our investigations have uncovered an archaeological site extending over approximately 3000 m<sup>2</sup> at Emily Bay. It lies at 0.5 m to 1.5 m below modern dune sands under a Norfolk

pine (*Araucaria heterophylla*) plantation. Systematic coring over the full site area, and test excavations at the eastern edge of the site, within the eastern swale and throughout the western swale of the site area, show that the cultural stratigraphy is uniformly shallow, generally about 0.3 m thick, internally undifferentiated except by disturbance and for the most part sparsely packed with cultural remains. The site has been removed in the centre of the western swale, it seems by nineteenth century road construction, and the ragged and tumbled southern edge of it elsewhere in that area might also reflect storm-wave action. Bioturbation, largely by muttonbirds, is very common throughout the site, and both historical records of artefact collecting and the discovery of some European-era bone and artefacts in our excavations, indicate that at least part of the site surface has been exposed during the last 200 years.

Nevertheless, remains of some original structures could still be recorded. We found examples of typical Oceanic earth ovens and other small pits or depressions in which cultural debris had accumulated. Postholes in Trench EB97:23, some with *Araucaria heterophylla* branchwood postbutts remaining in them, suggested the former existence of at least one small house, possibly with a porch, facing toward the sea. Several metres to one side of it was a large oven, the structure of which suggested it had been used repeatedly. These features appear to constitute a typically Oceanic unit of house and separate cooking area. More extensive excavation of the site would perhaps disclose the repetition of this pattern as a small hamlet or village.

Approximately 20 m to the east of the domestic structures in Trench EB97:23, and set on a slightly higher sand knoll, was a pavement of calcarenite slabs, several set on edge at the margins and one small upright stone in the centre (Trench EB97:24). This interesting feature is almost certainly a Polynesian religious structure or *marae*. On its seaward edge were the buried remains of an elephant seal cranium, recalling the common association of whale bone with *marae* elsewhere in Polynesia, and scattered across the paving were numerous small flakes of obsidian.

Radiocarbon determinations indicate that the *marae* was constructed at least by the early fourteenth century and possibly somewhat earlier than that, but certainly within the period early thirteenth to early fifteenth centuries A.D. during which occupation had occurred throughout the Emily Bay site (Anderson, Higham and Wallace, this vol.). The wide occupation span, derived through Bayesian analysis of an assemblage of radiocarbon determinations on charcoal samples of short-lived broadleaf taxa, seems inconsistent with the low density of remains. Two propositions might explain this. Firstly, it is possible that variation in the radiocarbon determinations is merely reflecting variation in sources of inbuilt age in the charcoal samples. This might have occurred despite our grouping of the dated samples according to this likelihood (samples on larger broadleaved species were assigned to a second group, and on *Araucaria heterophylla* or unidentified material to a third, neither of which was used in the Bayesian analysis). Secondly, given that occupation occurred elsewhere on Norfolk Island, as we know that it did in Slaughter Bay at least, it is possible that the use of the Emily Bay site was extended but periodic. There is nothing in the stratigraphy or material remains to indicate this, but then neither might have varied sufficiently within 200 years to record such an eventuality.

Several substantial anomalies turned up in the radiocarbon data. One consisted of a set of unusually early results produced by the Rafter Radiocarbon Laboratory, on rat (*Rattus exulans*) bone gelatin. However, it is now apparent that this anomaly is common to results produced in 1995–1996 on that material by the Rafter Laboratory (Anderson, 2000a). Additional rat bone samples from Emily Bay and Cemetery Bay, dated later at the Rafter Laboratory, or in different laboratories, produced results consistent with those on group A charcoal samples. The other example consisted of some very early determinations by the Waikato Radiocarbon Laboratory on *Nerita* shell samples. Additional comparative research showed that these, too, were anomalous. Experimental data suggested that uptake of dead carbon, probably from the calcareous reef, made apparent ages of some specimens about 500–600 years too old.

### Emily Bay artefacts

The most abundant artefactual remains in the Emily Bay site were basalt flakes. All of the basalt appears the same in hand specimen; sourcing studies on a series of samples show that it is local in origin. Since water-rolled cortex appears on some specimens it is probable that raw material was obtained from boulder beaches, at Ball Bay for example, or perhaps from the small boulder beach northeast of Cemetery Bay. Most of the flakes, cores and preforms can be classified as debris from adze manufacture, primarily, and to a lesser extent adze reworking. The predominance of flake types and sizes associated with trimming and other later stages of manufacture suggests that there are sites of the primary shaping of adze blanks yet to be discovered. A range of typical East Polynesian adze types (Duff, 1977) is represented amongst the Emily Bay site assemblage; Types 1, 2A and possibly 2C, probably Type 3 and certainly Type 4A. This assemblage thus helps to anchor the existing collections of unprovenanced East Polynesian adze types, many specimens of which appear to be fashioned from the same local basalt, in an original archaeological context. Many of them have come from the intertidal area at Slaughter Bay, suggesting habitation occurred at Slaughter Bay at the same time as at Emily Bay.

Some of the basalt and obsidian flakes were used as implements, and the former were re-sharpened by grinding. Wear, especially polish, and some traces of residues, show that flakes were used on soft, non-siliceous plant materials, possibly for basketry or clothing and perhaps including plant foods, although none could be specifically identified.

Of 26 pieces of obsidian, 25 were of a very distinctive material which in hand specimen was recognized during excavation as coming from Raoul Island in the Kermadecs, to which it was indeed sourced by PIXE/PIGME analysis. Most of these pieces were small flakes, but one mid-section of a large blade also occurred. Similar large blades, struck in basalt, are known from Raoul Island and New Zealand (Anderson, 1980). The remaining piece of obsidian cannot yet be sourced definitively. In appearance, specific gravity and major elements it fits the Mayor Island, New Zealand, range but some of the trace element data produced by PIXE/PIGME and NAA were anomalous.

Few remains of fishing gear were recovered. The best of them is a small one-piece hook of typical East Polynesian design, which had been fashioned in marine ivory, quite

possibly a tooth from the elephant seal cranium buried beside the *marae*. A broken bone fish hook point has the incurved tip of other East Polynesian types, and there was one drilled tab, indicating the equally characteristic method of manufacture. Similarly typical of East Polynesian assemblages is a harpoon point, made from turtle bone.

Pelecypod shell is scarce in the Emily Bay site, and all of it was examined for evidence of artefactual use. Valves of *Gari livida*, in particular, had been broken and the pieces used as small scrapers, possibly for scaling fish or scraping roots; two of the pieces retained some unidentified starch residues.

### Emily Bay faunal remains

Large mammal remains represented at Emily Bay were confined to the cranium of a sub-adult elephant seal, a human tooth and a burnt carnassial tooth of a dog, excluding here the enigmatic dog mandible recovered from the edge of the site prior to our investigations and a pig mandible from near the surface of the site which was radiocarbon dated as a modern specimen.

Bones of *Rattus exulans* were very common in the site, especially in the vicinity of the probable house. All were recovered within the cultural layer, or in holes and burrows which originated in or passed through it. No rat bones were found in test-pits dug in undisturbed sediments beneath the cultural layer. This adds to similar data from New Zealand indicating that rats were not dispersed prior to the period of demonstrable archaeological evidence (Anderson, 1996b, 2000a). Analysis of mtDNA from some specimens suggests that the rat population on Norfolk Island had diverse origins, though whether it became a population before it reached Norfolk Island, or did so as a result of multiple arrivals on the island, cannot be determined. Origins in central East Polynesia and New Zealand are indicated. Some data suggest additional but currently undetermined sources.

Turtle remains were fairly scarce, most of them pieces of carapace, and none could be identified to species. There were also difficulties in identifying the bird bone, mainly because so much of it consists of broken specimens from petrels, shearwaters and other taxa of Procellariiformes which are very difficult to distinguish osteologically. In addition, some of the bone is almost certainly from natural deposits arising from muttonbirds and other species burrowing through, or nesting on, the Emily Bay dunes.

The data indicate that about 1000 petrels and shearwaters are represented in the Emily Bay material, about 90% of all birds represented in the site. The only other species of much significance were the Norfolk Island Pigeon (*Hemiphaga spadicea*), Masked Booby (*Sula dactylatra*) and Bar-tailed Godwit (*Limosa lapponica*). No previously unknown taxa were discovered in the Emily Bay remains. It is unclear whether the absence in the archaeological avifauna of approximately half of the expected Norfolk Island taxa is a result of archaeological sampling bias, extinction events prior to the archaeologically-recorded habitation, selectivity by the prehistoric inhabitants or rapid reduction or disappearance of some taxa through rat predation contemporaneous with human settlement.

Fishing at Emily Bay concentrated upon Lethrinidae, which dominate all the fishbone assemblages. The species could not be identified but it appeared that all the lethrinid

material belonged to one species. It may be surmised that this is *Lethrinus miniatus* (formerly *L. chrysostomus*), known variously as the Sweetlip Emperor, Trumpet Emperor or Red-throated Trumpeter, which is the most commonly-caught lethrinid on Norfolk Island today. It is a large species which congregates around coral heads and reefs by day in 5–30 m of water (Walter and Anderson, this vol.) and it could have been found, therefore, inside and immediately outside Emily Bay in the past. It is normally taken by baited hook, and the dominance of benthic feeders amongst the fish represented at Emily Bay indicates that this may have been the only method employed. It is notable that the settlement site specimens are considerably larger than those now caught.

A similarly narrow harvest is apparent amongst the molluscs. Intertidal rocky shore taxa are predominant and the small upper shore gastropod, *Nerita atramentosa*, accounts for 73% of the shellfish MNI. Echinoderm test and spine fragments were also quite common in the site, but as a whole intertidal rock platform fauna do not seem to have constituted a significant food category on Norfolk Island. This was almost certainly because of their general scarcity, rather than a matter of choice.

#### **Pre-European Polynesian habitation on Norfolk Island**

Now that we have presented the evidence of a Polynesian inhabitation of Norfolk Island in the thirteenth to fifteenth centuries A.D., we can consider some wider aspects.

Our interpretation of the data is that the Emily Bay settlement was a single event, or perhaps represents repeated occupations by the same population, and that the archaeological record encapsulates its entirety. In this interpretation we can write the following scenario.

The inhabitants of Norfolk Island arrived from Raoul Island in the Kermadecs, about 1300 km upwind to the east. They had probably arrived in a large double canoe, possibly more than one, and therefore might have numbered in the order of 20–50 people, plus at least one dog, and some small rats which had, no doubt, secreted themselves amongst sails and supplies. They brought a core or two of Raoul Island obsidian and probably some potted food plants, although only the banana seems to have survived until the European period. It is possible that they brought also the New Zealand flax, an exceedingly useful fibre plant, and perhaps the sugar-yielding *Cordyline*. It might have been the first arrivals who surprised a sub-adult elephant seal hauled out on the shore, or perhaps they had carried a cranium and teeth from the Kermadecs—such prizes would have been exceedingly rare in either place. The inventory of imported items is modest and no more than might have been expected, indeed perhaps less so in the case of plants and animals, in a canoe provisioned for the eventuality of discovery of a new homeland.

The appeal of the Kingston area above others was, we can imagine, readily apparent. It was the only area of lagoon in the archipelago, it had the best canoe access and it was the largest, almost the only, area of flat land close to the shore. It had a small swampy lake behind the beach which yielded eels and a constant supply of fresh water. Furthermore it was the closest point to the other two islands in the Norfolk Island archipelago. The prime spot in the

area was Emily Bay, with its sheltered beach at the head of the widest stretch of lagoon.

Prior to the modern dune development, the Emily Bay beach seems to have sloped gradually from the shore into a gently undulating surface of sand a metre or so above high water. This was probably covered in a mixed coastal forest with emergent Norfolk pines increasing in density inland. Branches were cut from the pines to frame the first houses, and some canoe spars of *Metrosideros* may have been used as well. The first ovens were dug and basalt cobbles collected as ovenstones and tested for tool manufacture. Soon a small village would have been visible, and there were perhaps some houses also at Slaughter Bay. In the latter case, these must have stood on a high dune bank, now almost entirely eroded away, rather than on the calcarenite and sand ridge north of the present road. Alternatively, the eastern end of Slaughter Bay may have functioned largely as an adze manufacturing area. On grounds noted above, and also the current distribution of archaeological remains, it can be assumed that Emily Bay was the main habitation area, and there are suggestions (Specht, 1984) that a burial area had existed in part of its seaward dunes. In the centre of the Emily Bay settlement a shrine was constructed, its sanctity emphasized by a seal cranium burial.

The Kingston area habitation was established, almost certainly, in an area thickly strewn with muttonbird burrows and seabird nests. The ground-nesting birds were the primary target of human and rat predation alike and within a few years at most the local colonies would have been wiped out and some of the scarcer birds, such as snipe, driven into extinction. Fowling, fishing and shellfishing was doubtless accompanied by the development of gardens. Forest fires, clearing out the underbrush and bird colonies alike, seem to have extended rapidly over the Kingston flat into Cemetery Bay and probably also up the coastal valleys and hill slopes within less than a generation. Forest clearance, however, was probably neither as extensive nor as rapid as in the early European era, the latter marked by mobilization of hill-slope clays that washed out over the Kingston sands in several episodes. It is these clays, with their associated fragments of early European artefacts, which lie above, and in places directly upon, the prehistoric horizon, but never within or below it.

Sustained initially by reserves of easily-gathered resources—the ground-nesting sea birds, nesting turtles which came seasonally to the Kingston beaches, the local schools of sweetlip and the shellfish from lagoon and rocky shore—the Polynesian colony probably increased quite rapidly in numbers, and some families may have established themselves in Bomboras, Ball Bay, Anson Bay and perhaps parts of the interior, not to mention on the other two islands. Within a few generations, several hundred people may have lived in the Norfolk Island archipelago. Yet, the colony did not last and we can only speculate as to when it finally disappeared and why.

The timing is reasonably definable. If the Group A radiocarbon determinations are not substantially in error by inbuilt age, then settlement persisted on some scale in the Kingston area until the fifteenth century A.D. A few later determinations invite the conjecture that the last families, perhaps living somewhere else—possibly at inland plantations—visited Emily Bay at late as the seventeenth century. At any rate, the Norfolk pine forest had re-grown

over the entire Kingston area by the late eighteenth century and this suggests that effective habitation had ceased in the primary settlement location on Norfolk Island several hundred years earlier.

Reasons for colony failure are as numerous as imagination allows, but some which seem more probable are these. Firstly, the simplicity and homogeneity of material culture suggests that there was only one landfall—all of the East Polynesian types from museum and private collections, together with those obtained by excavation on Norfolk Island, amount to less diversity than is apparent at many small, single, sites of early East Polynesian type elsewhere, including in the Kermadecs and throughout New Zealand. Further, since pre-European colonization seems to have failed fairly quickly on the source islands as well, the Kermadecs, the Norfolk Island community may have felt severe social isolation which, within a few generations if not earlier, prompted renewed voyaging in an attempt to re-establish contact with other communities. Secondly, the subsistence base was insubstantial and prone to failure. Shellfish could never form a staple on Norfolk Island; sea fishing, at least for the sweetlip, probably declined quite quickly inshore, as it has done again in historical times, and above all the populations of nesting seabirds were liable to crash disastrously in the face of sustained exploitation (Anderson, 1996c), as was also demonstrated in the eighteenth century. Banana cultivation is a very narrow horticultural base and vulnerable to periodic failure. Norfolk Island thus joins other subtropical islands in Remote Oceania which fell between the richness of tropical horticulture and the abundance of temperate faunas, as an unusually difficult location for long-term habitation by prehistoric Polynesians (Anderson, in press).

What happened at the end? There are a number of possibilities, but no evidence. As vigorous and experienced marine migrants, it is unlikely that the last Polynesian settlers simply faded away on Norfolk Island. Equally, they must have understood the grim fact of their location far to leeward of the Kermadecs. One possibility was that they tried to sail back east and were deflected southeast to reach New Zealand. However, it is just as likely that there was some oral history about New Zealand, since they, or people whom they met on Raoul Island, had already been there (Anderson, 1980). Another possibility is that they sailed north and found New Caledonia or Vanuatu where the Maori word for their only domestic animal (*kuri* = dog) is found. Finally, they may have sailed off to the west, as their ancestors had done before, missed the only other opportunity of an uninhabited island available to them, at Lord Howe, and fetched up in Australia.

### Norfolk Island in Oceanic prehistory

Moving beyond the scenario of Norfolk Island prehistory suggested by the excavated data, there are some wider issues to consider. The first is whether Norfolk Island was settled only within the period of East Polynesian habitation, c. 1,000 B.P. onwards.

The NIPP research has not uncovered any evidence in support of the possibility that Norfolk Island was reached prior to this period or at any time in prehistory by non-Polynesians. We concede readily that this is negative evidence and that the possibility of it being overturned in

future cannot be dismissed. However, it is a much lower possibility now than it was before our project. Our research concentrated on the area of Norfolk Island to which any prehistoric colonization would have been most attracted, as indeed were all historical phases of colonization, and it involved substantial coring, test-pitting and excavation in Slaughter Bay, Emily Bay and Cemetery Bay. These researches penetrated at many points the Holocene carbonate sands which underlie the modern dunes. The only prehistoric cultural remains to be discovered were from, or of the same age as, the East Polynesian colonization. Radiocarbon determinations of significantly earlier age, as on one series of rat bones and some shellfish, have more plausible explanations than cultural visits that are otherwise invisible in the evidence. It is also worth noting that the one non-Polynesian artefact with a reasonably explicit stratigraphic provenance, the shell adze from Cemetery Bay, seems on our investigations of the area to have come from an historical context (Anderson, 1996d). Evidence that some Melanesian artefacts reached Norfolk Island in Pacific collections taken there in European settlement times, along with the long tenure of the Melanesian Mission, and the virtual absence of any archaeological context for material of this kind, adds up to a strong argument against the casual assumption of prehistoric contact. Moreover, the absence of any of the critical artefacts of central Pacific prehistory, most notably pottery which, incidentally, could have been made quite easily on Norfolk Island, adds a further argument against that proposition. The positive evidence is that Norfolk Island was settled in prehistory from only one source area.

Its connections were clearly with other islands in South Polynesia. The particular evidence consists of the following points. First, the Emily Bay and associated material culture is of East Polynesian type. The collections had been recognized by Specht (1984, 1993) as particularly reminiscent of those in the Kermadecs and New Zealand and our excavated material has added to that conclusion. Second, nearly all the obsidian came from Raoul Island where the existence in the Low Flat archaeological site of some pieces from Mayor Island indicates that New Zealand had already been discovered (Anderson, 2000c). The Low Flat site is a contemporary of Emily Bay. It remains possible, too, that the single piece of translucent obsidian from Emily Bay has a New Zealand origin. Thirdly, the discovery of *Metrosideros* amongst the charcoal provides a further tie to the Kermadecs or New Zealand and the pre-1,000 B.P. absence of *Phormium tenax* indicates that flax, abundant at European contact, was taken to Norfolk Island in the prehistoric period, either directly from New Zealand or from the small stands of flax introduced to Raoul Island. Fourthly, while some uncertainty remains about the origin of all the haplotypes recognized amongst the *Rattus exulans* samples from Emily Bay, both a general East Polynesian sequence and one which is otherwise confined to New Zealand can be recognized. Together, these points suggest quite strongly that Norfolk Island was colonized from Raoul Island by people who had come from New Zealand or, if they came directly from somewhere else in East Polynesia, had lived on Raoul Island amongst people who had originated in or visited New Zealand.

The Norfolk Island archipelago, like the Kermadecs, the Chatham Islands and the subantarctic Auckland Islands, was therefore one of the outlying groups discovered at almost

the same time by those East Polynesians who also found the main islands of New Zealand during a phase of secondary colonization several hundred years or more after the discovery of central East Polynesia (Anderson, 2000b). The motivations behind this colonizing pulse are unclear, the more so since its specific origin is unknown but, like the earlier colonization episodes of Remote Oceania, it represents an impressive exploratory venture. In this case Polynesian sailors travelled well outside their normal tropical habitat to find an initial plethora of resources, in New Zealand of almost continental size and diversity. We might surmise that finding New Zealand encouraged a conviction that other equally profitable lands lay over the horizon, and that the discovery and settlement of Norfolk Island and the other outlying archipelagoes was the result. So far, at least, there is no evidence in mainland New Zealand archaeological sites that voyaging occurred in both directions. In the case of Norfolk Island it would have been very difficult to sail back against the prevailing winds to the Kermadecs.

Another important issue is whether colonization arrived as a single event, or over a long period, perhaps across centuries. Several sets of evidence bear upon this matter.

1. While only a single cultural layer can be recognized over most of the Emily Bay site, more complex stratigraphy was uncovered in Trench EB97:24, at the *marae* feature. Anderson and Green (this vol.) identify three successive events: posthole construction, paving which covers some postholes, and flaking of obsidian after the paving was in place. It is possible that these events were separated significantly, possibly representing multiple landfalls, but insofar as we were able to test that proposition, we could find nothing to support it. The postholes are stratigraphically associated with the elephant seal cranium, suggesting a ritual event on the same place as a *marae* was then constructed, and the obsidian flaking is also, plausibly, a ritual activity. In other words, it certainly appears as if all the events are connected to a single activity. Radiocarbon dating of the covered postholes, relative to samples from above the paving, was hindered somewhat by the necessity of using Norfolk pine samples from the postholes, but even so, the dates from above and below the paving are very similar.
2. The fact that our excavation produced almost no extinct birds could be used to argue that the earliest settlement was not found. Considerable reduction in bird species occurred on many Pacific islands following colonization, so the absence of evidence might suggest that an earlier phase of settlement occurred. Its remains could exist in a slightly different location from our excavations or they might have been destroyed by European disturbance. That conjecture aside, it is noticeable that Emily Bay is similar to other probable colonization-era sites throughout East Polynesia in its high proportion of seabirds (Steadman, 1995). In addition, Moniz (1997: 47) describes “early and heavy exploitation of more abundant seabirds, whose extirpation exposed land birds to predation pressures”, implying that middens rich in seabird rather than landbird bone might constitute the more accurate signature of earliest occupation.
3. The diversity of *Rattus exulans* haplotypes might result from a high diversity within a single introduction, or from multiple introductions. The diversity of prehistoric Raoul Island *Rattus exulans* is unknown, but the modern population is highly diverse (Matisoo-Smith *et al.*, 1999). Were that also the case in the past, then it is conceivable that a single introduction from there could account for the Norfolk Island diversity. The same would be true of an origin in New Zealand, where there is even greater genetic diversity in *R. exulans*. In either case the number of female rats needed to produce such diversity cannot be estimated realistically but it may have been considerable, suggesting both that multiple canoes were involved and that the process may not have been totally accidental (cf. White, in press). While it is currently impossible to pin this matter down any more precisely, it is worth noting that the Norfolk Island data demonstrate that end-of-the-line cases in Polynesian voyaging can have diverse genetic signatures as well as the restricted mtDNA signature found in *R. exulans* from the Chathams (Matisoo-Smith *et al.*, 1999).

None of these considerations are definitive. We believe that we have found most of the major remains and that if there were multiple landfalls on Norfolk Island they occurred within the period represented by the Emily Bay settlement site and from the same sources. Compared to other “mystery” islands (those previously occupied but abandoned at the time of European discovery), Norfolk Island has produced a surprisingly small and homogeneous amount of archaeological material. Islands and atolls much smaller than Norfolk, and environmentally much more marginal, such as Henderson in the Pitcairn group (Weisler, 1995) or some of the Phoenix and Line Islands (Terrell, 1986: 92) have widespread evidence of intensive habitation. Pitcairn Island, quite similar environmentally to Norfolk, though smaller, also has more elaborate archaeological remains. It seems probable that both the relative isolation of Norfolk Island, at the western extremity of Polynesia, and the slim horticultural opportunity afforded its prehistoric inhabitants, created circumstances unfavourable to the elaboration of settlement patterns and ultimately inimical to long-term survival.

### Further research

The NIPP investigations have opened a number of avenues of potential research in Remote Oceanic prehistory. There are, of course, some intriguing historical matters that are worth pursuing. One is whether any of the possible East Polynesian adzes that have been found on the east coast of Australia have a Norfolk Island origin, and the possibility of adze movement, as well as the implications of demonstrated obsidian transfer to Norfolk Island, invite further consideration through sourcing studies in the region around Norfolk Island, notably New Zealand, New Caledonia and southern Vanuatu (Anderson, 2000c).

The nature of prehistoric vegetation change on Norfolk Island is another intriguing issue. Our research was not as successful in capturing evidence from across the late Holocene as we wanted, but the Kingston swamp is extensive and that evidence will almost certainly still exist.

Further coring is essential. Amongst other things it offers a means of testing the archaeological conclusions about settlement history. It might also provide some additional data on the suite of prehistoric cultigens and on other plants which might have been introduced. Bananas are one of the few Pacific food crops which are distinguishable by phytoliths and their history of cultivation on the island, at least, may be accessible to study.

The lithic analysis indicates that sites of primary reduction of adze blanks ought to exist somewhere on Norfolk Island, and the intriguing eighteenth century discovery of an unforested, overgrown area in the interior, are other aspects of additional archaeological fieldwork which needs to be undertaken. A more extensive programme of test excavations and coring at Ball Bay, where adzes have been recovered, is worth consideration. The NIPP research has succeeded in creating a first prehistory for Norfolk Island, but there might yet be much to discover.

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