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Barnacles in Maori middens

Brian A. Foster*

The remains of barnacles found in various middens in the North Aotea region are largely of the same species as those still living on the local shores today. Some of the barnacle species are epifaunal on shells of the molluscs that dominate the middens, so their inclusion in the middens is probably incidental. However, one species, *Epopella plicata*, is found consistently enough in the middens, and in a shape that could only have lived on rocks, to show that it must have been deliberately collected by the pre-European Maori people as a diet supplement.

Keywords: barnacles, shells, middens, archaeology, New Zealand

INTRODUCTION

During an archaeological study of Maori midden sites on the Aotea North Head, Waikato (38°00'S, 174°48'), carried out by Richard Cassels between 1972-75 (see Fox and Cassels, 1983), many barnacle remains were found and passed to me for study. Some barnacles are known to settle on the shells of cockles, pipis and mussels, which are the dominant molluscs in the middens; but in the midden excavated from New Zealand Archaeological Association site 25 on map N64 (*i.e.*, N64/25) the remains of other species suggested more deliberate collecting. To investigate further the possibility that barnacles were gathered for their own sake by the pre-European Maori, a more detailed study was made of the area and its middens.

The area of study

The North Head of Aotea Harbour (Fig. 1A) is on the west coast of the North Island, south of Auckland. This area was densely settled by the Maori, and archaeological sites are common everywhere (Fox and Cassels, 1983: fig 2). They range from large pa sites on the hilltops to scattered pit-and-terrace sites in the surrounding country and shell middens conspicuously exposed in the sand dunes and beach fronts.

The main archaeological excavation was carried out at site N64/25, a group of terraces and pits associated with Maori hut clusters above the cliffs south of Taranaki Point. The period of occupation of the site was dated by the ¹⁴C method to the late fifteenth or early sixteenth century A.D. The excavated site seems to have been used mainly for cultivation and storage of crops, and also as a base for fishing and shellfish gathering (Fox and Cassels, 1983).

THE BARNACLE SPECIES

There are five common species on the shores of this region, and remains of all

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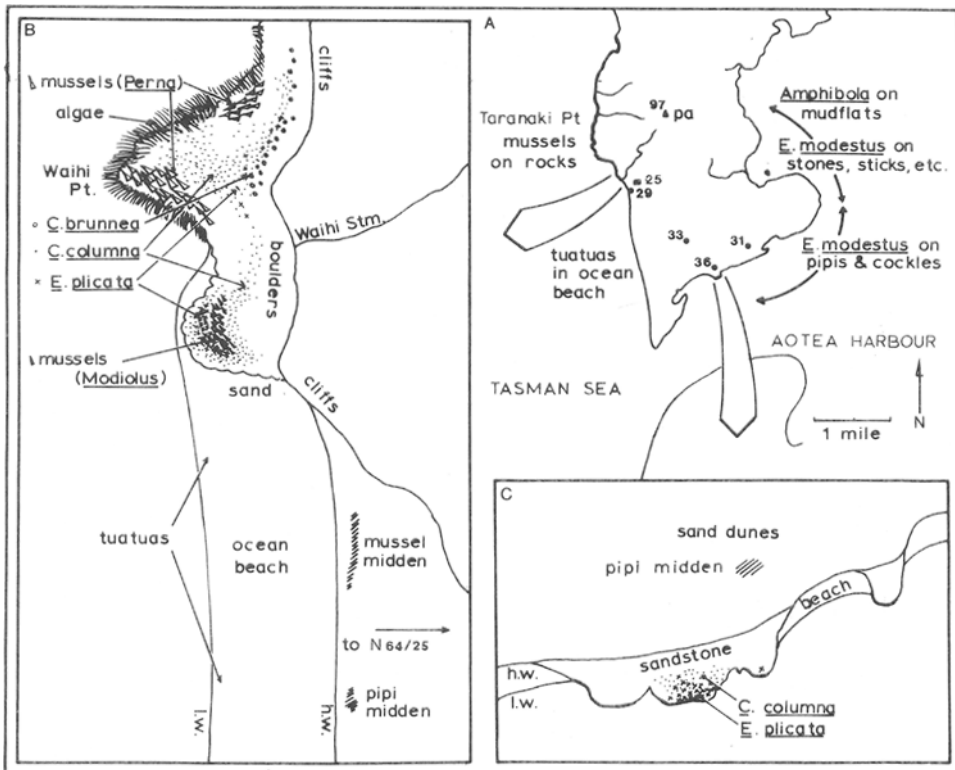


Fig. 1 – Aotea North Head, Waikato. A, Location of sites (New Zealand Archaeological Association site numbers on map N64) and principle midden mollusc species on the shores. The habitat of the barnacle *Elminius modestus* is indicated for harbour shores. B, Detail of Waihi Point region for location of barnacles. C, Detail of harbour entrance shore for locations of barnacles.

of these were found in one or more of the middens. They are all “acorn barnacles” (Cirripedia, Thoracica, Balanomorpha) that attach to rocks and shells. These species can generally be identified from isolated fragments of shell and opercular plates. Both intact shells and remnants from middens are shown in Figs 2 and 3, along with intact reference shells from local shores. Further information on the barnacles of New Zealand is given in Foster (1978). Because isolated pieces of shell can be identified, palaeontological studies of the group (Buckeridge 1983) have advanced by techniques similar in approach to those adopted here.

Distribution of living barnacles at Aotea North Head

The shores of the region were surveyed on the low tides of 18 and 19 January 1973. The few hard intertidal substrata suitable for barnacle settlement are shown in Fig. 1, which also shows the distribution of barnacles and of the dominant midden molluscs. On the rocks of Waihi Point and northwards (Fig. 1b), there are three species common on the exposed surfaces of rocks (*Epopella plicata* (Gray) (Fig. 2A), *Chamaesipho brunnea* Moore (Fig. 2D) and *Chamaesipho columna* (Spengler) (Fig. 2A,D)); another species, *Austromegabalanus decorus* (Darwin) (Fig. 3A) is rare there on rocks protected from desiccation. The green-lipped mussel (*Perna canaliculus*) also lives on the rocks at Waihi Point, and its shells frequently bear attached barnacles of *C. columna* and small *E. plicata*. In my experience, *Perna* shells can also carry small specimens of *A. decorus*; but in northern New

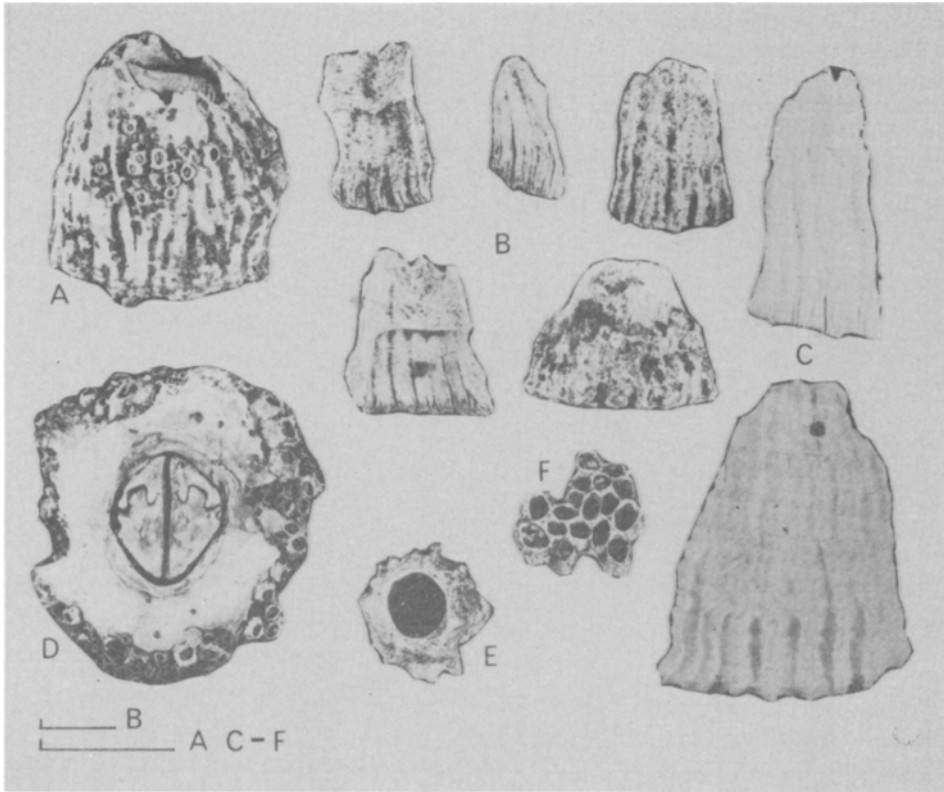


Fig. 2 – Barnacle shells from Aotea North Head. A and D from shores of Waihi Point, others from middens. A, *Epopella plicata*, with *Chamaesipho columna* attached. B, Five shell plates of *E. plicata* from terrace A4, N64/25. C, Two bleached shell plates of *E. plicata* from beach midden N64/29. D, *Chamaesipho brunnea*, with *C. columna* attached. E, *C. brunnea*, and F, *C. columna*, from terrace A4, N64/25. Scales: 1 cm.

Zealand this happens only in winter, because *A. decorus* is mainly subtidal in habitat and unable to withstand the conditions of summer tidal emersion. Intertidal habitat shells of *A. decorus* do not exceed 15 mm maximum dimension, but subtidal specimens can reach 60 mm.

The shape and size of individual barnacles in the local populations of *E. plicata* are bimodal. On full-surf shores north of Waihi Point, individuals are squat, less than 10 mm tall, and sparse. On the rocks between Waihi Point and the beach, tall (20 mm) and columnar individuals grow densely ($>4000/\text{m}^{-2}$) on smooth boulders. Similar shaped *E. plicata* can be found on a small outcrop of sandstone in the entrance to Aotea Harbour (Fig. 1C). The small honey-comb barnacle, *Chamaesipho columna* is abundant on Waihi Point rocks, with and often on shells of *E. plicata* (Fig. 2A) and mussels. It also lives on sandstone and on shells of *E. plicata* in the harbour entrance. The high-tidal surf barnacle *Chamaesipho brunnea* is found only on bedrock at Waihi Point.

Within the harbour, the only barnacle is *Elminius modestus* Darwin (Fig. 3C) which is abundant on small stones, shells and sticks, and on the emergent parts of living pipi and cockles. This barnacle is rare on the surf shore rocks, and absent (with all other barnacles) from the surf beach tuatua.

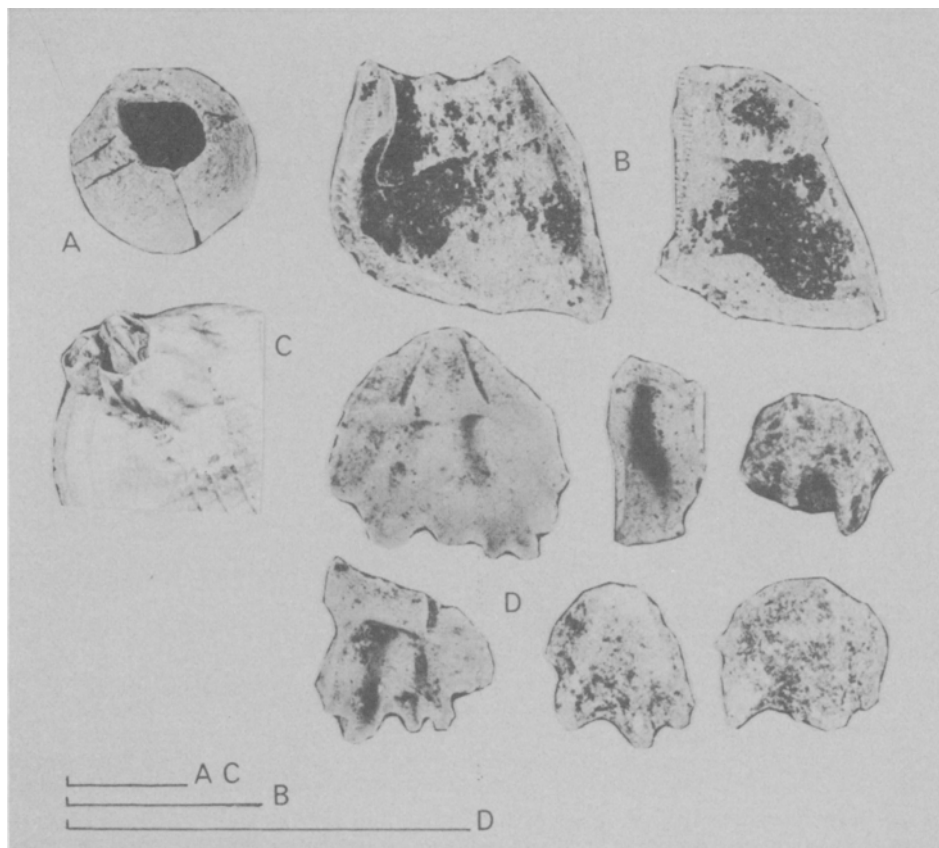


Fig. 3 – Barnacle shells from Aotea North Head. From terrace A4, N64/25 except C from harbour flats. A, *Austromegabalanus decorus*, intact shell. B, Two shell plates of *A. decorus*. C, *Elminius modestus* on cockle. D, Seven shell plates of *E. modestus*. Scales: 1 cm.

Barnacle remnants in middens

Barnacle shell plates were retrieved from sievings during the excavation of terrace A4 at site N64/25 (see Fox and Cassels, 1983). Beach and harbour entrance middens were also searched for remnants lying on the surface.

The excavated site, N64/25 The most obvious barnacle remains were the shell wall plates of *E. plicata* (Fig. 2B). These were found consistently in the parts of the midden dominated by pipi, cockles or mussels. In each bucketful of midden material, about 20 plates were found, which represent roughly 5 barnacles. These shells were mostly between 12 and 20 mm in length, and were of a shape and size consistent with those of the columnar growth form described above. Where the midden contained considerable mussel fragments, an occasional shell plate of *A. decorus* (Fig. 3B) was found, up to 10 mm long.

Shells of individual *C. columna* and *E. modestus* (Fig. 3D) were found by searching the fine sievings from throughout the middens. Occasionally, solitary specimens of *C. brunnea* (Fig. 2E), and honey-comb like aggregations of *C. columna* (Fig. 2F) were found in coarse sievings.

In a detailed analysis of shellfish remains from part of terrace A4, Fox and Cassels (1983, Appendix 2) list 32 species of molluscs, 2 barnacles (*E. plicata* and *C. columna*), and sea eggs. The dominant species were cockles (67%), pipi (13%),

mussels (11%) and tuatua (2%). The barnacle *E. plicata* was eighth most abundant (0.5%).

At terraces A1 and A2, the dominant shellfish were pipi (90%), cockles (8%), tuatua (0.4%) and mussels (0.2%) (Fox and Cassels, 1983, Appendix 1). Here the barnacles *E. modestus* and *E. plicata* were eighth and ninth commonest from a total of 28 shellfish species in the sample analysed; remains of *A. decorus* were common, and *C. columna* and *C. brunnea* were rare. Individual plates of *E. plicata* were up to 19 mm long, of *A. decorus* 15 mm.

Beach middens, N64/29 The northernmost of these middens were exposed along an eroding tideline, dominated by mussels (*Perna*) with shells of the barnacles *Austrobalanus decorus* and *Chamaesipho columna* of form and size like those that occur on mussel shells. About 50 metres south is a pipi dominated midden, and amongst these were scattered plates of *E. plicata* (Fig. 2C) of the columnar form that grow on rocks.

Beach middens, N64/31, N64/33 and N64/36 These middens are dominated by pipi, with a smaller quantity of cockles. The only barnacle remnants that could be found were small shell plates of *E. modestus*, and then only by sieving them out from the sand. A fuller list of molluscs from the southernmost midden, N64/36, is given in Table 1.

Table 1 — Mollusc shells identified from midden N64/36

Harbour flat species	Open coast species
<i>Paphies australe</i> (pipi)	<i>Paphies subtriangulata</i> (tuatua)
<i>Chione stutchburyi</i> (cockle)	<i>Perna canaliculus</i> (mussel)
<i>Amphibola crenata</i> (mud snail)	<i>Turbo smaragdus</i> (catseye)
<i>Crassostrea glomerata</i> (oyster)	<i>Struthiolaria papulosa</i>
<i>Pecten novaezelandiae</i> (scallop)	<i>Thais orbita</i>
<i>Zeacumantus lutulentus</i>	<i>Lepsiella scobina</i>
<i>Micrelenchus huttoni</i>	
<i>Zediloma subrostrata</i>	
<i>Maoricolpus rosea</i>	
<i>Cominella glandiformis</i>	
<i>Cominella maculosa</i>	
<i>Baryspira australis</i>	

DISCUSSION

The long list of mollusc species found in middens (Table 1 and in Fox and Cassels, 1983) suggests that every form of available shellfish was eaten by pre-European Maori. They were collected and consumed both locally and also, apparently, often carried some distance to home sites. In midden N64/31 there were species typical of both harbour flats and open rocky coasts, as in the N64/25 middens analysed by Fox and Cassels (1983). Cassels (1973) recognised that middens near the open coast are often dominated by harbour-flat species, and that harbour middens contain open-coast species; the reasons, he suggested, could include considerations of preference, gathering and transport costs, resource stock size, and availability of other types of food source. The limited stocks of open coast mussels and tuatua, although perhaps preferred because they were nearer, had to be supplemented from the more extensive stocks of harbour-flat cockles and pipi further afield. The value of open-coast species justified their transport to middens away from the coast.

This deliberate gathering and transport of food resources may not have been restricted to the abundant and large species such as pipi, cockles, tuatua, mussels,

scallops and oysters. Some of the individually small molluscs that were found rarely in the middens, e.g. *Micrelenchus*, may have been accidentally gathered with other shellfish, particularly those that live on the shells of the selected species, but also perhaps if some form of dredging method was used. But an unpublished study by Stretton (cited in Fox and Cassels, 1983) concluded from the breakage patterns of the shells that *Thais orbita*, *Cominella* spp., *Turbo smaragdus* and *Amphibola crenata* were gathered intentionally.

Middens containing cockles and/or pipi may be expected to contain shell remains of the barnacle *E. modestus*; likewise middens containing mussels may be expected to include *C. columna* or small shells of *A. decorus* or *E. plicata*. However, shell remains of *C. brunnea*, or of the tall columnar form of *E. plicata*, are unlikely to reach middens dominated by pipi and cockles only as a result of incidental inclusion with other food species, even when other open-coast molluscs are present; these forms grow only on hard rock surfaces, and would not have lived on the stones used in the cooking fires at site N64/25, which are less than 10 cm in diameter. The consistent finding of *E. plicata* points to a deliberate collecting of this barnacle, to about the same level of exploitation as for molluscs like *Turbo smaragdus*, *Cominella adspersa* and *Amphibola crenata*.

The *E. plicata* remains in the pipi midden at N64/29 are particularly interesting because these two are the only species present. The barnacles were apparently eaten along with pipi that had been transported some distance from the harbour entrance. Use of barnacles for food is not unknown: an intertidal species of *Pollicipes* is a delicacy on the Brittany coast, to the point that populations of it are now hard to find. In Chile, a large balanid (*Austromegabalanus psittacus*) is a prized shellfish that can be bought in street stalls and ordered in restaurants. To my knowledge, no New Zealand barnacles are collected for food today, although *E. plicata* has a crustacean flavour, rather like shrimp. This neglect may be because 10,000 specimens with shells the size of those in the Aotea middens would be needed to yield a kilogram of fresh barnacle meat.

There were too few *E. plicata* of the right shape and size in the Aotea North Head region to comprise a significant food source, but at times they clearly formed a dietary supplement. They were probably collected from the rocks on the shore below the excavated site and mixed with the cockles and pipi collected some miles away in the harbour entrance. Horticultural storage pits are present at this site, and Fox and Cassels (1983) concluded that the residents depend mainly on stored field produce supplemented with shellfishing. The remains of the barnacle *A. decorus* found in association with mussels also suggests that the site was occupied in winter, because *A. decorus* is a winter ephemeral on intertidal mussels. This provision of clues to the season of occupation is an unexpected benefit of systematic studies of barnacles in Maori middens.

Since the field work for this study was completed, beach middens in various other parts of the North Island have been casually examined for barnacle remains. It seems that the practice of gathering *E. plicata* for food was not confined to Aotea. Large shell plates of *E. plicata* were found in middens at Whatipu on the north side of the entrance to the Manukau Harbour. Here, three separate shell piles, dominated by mussels and paua, tuatua and pipi, and cockles and mussels, respectively, contained *E. plicata*. Hayward and Diamond (1977) recorded *E. plicata* shells in middens from Te Henga, 10 km further north, comprising 1-5% of a midden at N41/107 near Bethells Swamp, and lesser proportions of others. Dr J. S. Buckeridge (*pers. comm.*) has found plates of *E. plicata* associated with dune middens behind Tokerau Beach, Northland.

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