

The Stratigraphy of Human Occupation Layers in North Island Coastal Sections, New Zealand

H. W. WELLMAN

(Victoria University of Wellington)

Previous stratigraphic studies have been incidental to excavations at sites of archæological interest. The following is a summary of a purely stratigraphic study in which human occupation layers are correlated by layers of water-borne pumice.

The total period of human occupation in New Zealand is less than 2,000 years and is represented at most places by sediments that are too thin to be studied stratigraphically. Only at favourable localities have sediments accumulated sufficiently rapidly and sufficiently gradually to provide a record worth while. The most favourable accumulations are largely composed of interbedded layers of blown-sand, soil-wash, and midden material, with a total thickness of from four to ten feet. The best exposed and most easily correlated sediments are those at the coast. Many parts of the coast are being rapidly eroded back and provide extensive well-exposed cliff sections that could be artificially rivalled only by the excavation of many thousand cubic yards of sand and soil. Sea walls are now being built along the eroding coasts and in fifty years or so many important coastal sections will be hidden from view. Thin layers of sea-borne pumice are interbedded in many coastal sections and make correlation possible.

The earliest pumice eruption of archæological interest is that from near Lake Taupo at the centre of the North Island, and dated at A.D. 200 by several C¹⁴ samples. It covered 5,000 square miles with over a foot of ash, and at least twice that area with over an inch. The pumice can be distinguished from other pumices without much difficulty. Enormous quantities were washed into the rivers, carried out to sea, widely distributed by wind and currents, and finally thrown up on the beaches to be covered by sand and soil. Some Taupo pumice is still being thrown up, but the earliest deposits are readily identified at most sections by being usually the thickest. Sea-borne Taupo pumice directly overlies Taupo Ash at several sections and the first pumice probably reached the beaches a few years after the eruption. Rounded lumps of charcoal from forests destroyed by the Taupo eruption were washed up with the Taupo pumice at a few beaches.

The other important pumice is darker, more basic in composition, and stronger than the Taupo pumice. It has not previously been described. It came from a volcano in the Bay of Plenty, most probably from Mayor Island, and will be referred to as Loisels pumice. The pumice has not yet been dated by C¹⁴, but is inferred from its average stratigraphical position to have been erupted at about A.D. 600.

The Kaharoa eruption from near Rotorua may be important for dating. No pumice was erupted but its ash is probably interbedded in a few sections at Poverty

Bay and Bay of Plenty. A single C¹⁴ sample gives an age of about A.D. 1050. The age inferred from stratigraphic position is about A.D. 1300.

Human occupation is recorded by shells of edible molluscs, by burnt stones, by flakes of obsidian and chert, and by fish, bird, and seal bones. Charcoal, either as scattered fragments or as a darkening of the soil, has proved to be the most sensitive indicator of human occupation. At old levels that carried a dense population the soil is dark, seemingly greasy, and distinctive. Where the population was less dense the soil is lighter in colour but remains distinctive. Rare small angular fragments of charcoal a few inches below the other definite signs are considered as being the earliest evidence for human occupation. Lower in some sections, and easily recognized from their shape and stratigraphic position, are the rare rounded charcoal lumps of the Taupo eruption.

In all the sections examined only one artifact was found in place, other than the relatively abundant obsidian and chert flakes. It is an oval ornament about two inches long carved from vein-calcite. Artifacts are abundant only where wind or water has destroyed the stratigraphy by concentrating the occupation layers.

About 50 sections have been measured by the writer. They are distributed over representative parts of the North Island coast and probably give a fair idea of the regional stratigraphy. Taupo pumice was found in 20, Loiseles pumice in 27, both Taupo and Loiseles pumice in 18, and ash that is tentatively correlated with the Kaharoa ash in 5. No useful sections were found south of latitude 40° S. Those to the north can be generalized if grouped regionally into: those of the eastern peninsula from Hawkes Bay to the Bay of Plenty; and those to the north-east from Coromandel to the Northland Peninsula.

In the generalization sections below, the thicknesses are average values and the dates approximate.

Generalized sequence from eastern peninsula

A.D.	LAYER	FEET APPROX.
< 1950	Dune sand	3·0
	Upper Occupation layer	2·0
? 1050	Weak Occupation layer with ? Kaharoa ash at places	1·0
	Lower Occupation layer	1·0
? 600	Loiseles pumice, generally as scattered lumps ...	0·1
	Scattered charcoal	0·5
	Barren layer	2·0
200	Taupo pumice	0·3
	Barren layer	2·0

There are no traces of human occupation below or immediately above the Taupo pumice in any section. Rare fragments of charcoal first appear a few inches below the Loiseles pumice and become more abundant at the base of the pumice. The lowest occupation layer, just above the Loiseles pumice, is well defined in several sections and indicates a considerable population on the eastern peninsula at that time. A

layer with few traces of occupation overlies and contains the ash that is tentatively correlated with the Kaharoa eruption of A.D. 1050. By comparison with the definite occupation layer below it indicates either a temporary decrease in population or a more rapid accumulation of sand and soil possibly caused by a climatic change. The upper occupation layer, less well defined than the lower, is overlain in most sections, even in those that are now being eroded back, by blown-sand that is still accumulating.

Generalized sequence for Coromandel and Northland

A.D.	LAYER	FEET APPROX.
< 1950	Dune sand	3'0
	Occupation layer, well defined in all sections ...	2'0
	Weak occupation layer	3'0
? 600	Loisels pumice, scattered lumps	0'1
	Scattered charcoal	0'5
	Barren layer	2'0
200	Taupo pumice, scattered lumps	0'1
	Barren layer	2'0

Being remarkably uniform the 25 sections measured at Coromandel and Northland can be more accurately generalized than those of the eastern peninsula. The earliest charcoal is at the same stratigraphic position as at the eastern peninsula: just below the Loisels pumice and well above the Taupo pumice. It is thus reasonably certain that man did not reach New Zealand until after the Taupo eruption, and that a population large enough to be recorded stratigraphically built up at the same time at all places over at least the northern part of the North Island coast. A significant difference occurs above the Loisels pumice, the well-defined occupation layer of the eastern peninsula being replaced by a layer in which evidence for human occupation is definite but much weaker. The cause of this doubtless important difference is uncertain. The upper parts of the sections are similar to those of the eastern peninsula, except that the occupation layer is better defined and uniformly present at all sections. Actively accumulating dune-sands like those in the eastern peninsula overlie most sections, and may record a considerable and a fairly recent climatic change.

The intensity and thickness of the coastal occupation layers give a fair idea of the distribution of population in the past. The bulk of the population lived north of latitude 39° S (New Plymouth to Wairoa). Provided a stratigraphic record is preserved, all good sites north of this latitude have well defined and extensive evidence of early human occupation. In the southern part of the North Island there are a few thick shell middens, but the occupation layers are far less extensive than those to the north. Extensive signs of occupation in the South Island are confined to particularly favourable localities such as those of the western side of D'Urville Island at the north end of the South Island.

The population distribution inferred from occupation layers is substantially that of the Maori of the eighteenth century and not very different from that of the present-day Maori. It was probably controlled by winter climate, the great bulk of the population living within the region in which frosts are mild or absent at the coast in winter.

The widespread evidence for human occupation just above the level of the Loiseles pumice suggests a population of at least 5,000 at about A.D. 600. The small population of the first hundred or so years of occupation is unlikely to have left traces that will be easy to find, and the presence of man may not be recorded in the coastal sections that are preserved until the total population of New Zealand reached about a thousand.

The traditional date for the arrival of the 'Fleet' is about A.D. 1350. The samples so far dated by C¹⁴ from archæological sites are only a few hundred years older, but they are from the South Island and are unlikely to record man's earliest arrival in New Zealand.

The value of water-borne pumice for correlation of archæological sections in New Zealand has been established, but the dates given above are tentative. Definite dates should be provided in a year or so by the C¹⁴ samples from coastal sections already forwarded for processing. Meanwhile the essential problem is to find the cultural content of the different stratigraphic layers. Much soil will have to be sieved before this is done.