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## ARCHAEOLOGY IN NEW ZEALAND



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# HANGI, HANGI PITS, HANGI SCOOPS, UMU, SCOOPS, FIRE SCOOPS, HEARTHES, SCOOP HEARTHES – SORTING OUT WHAT WE ARE TALKING ABOUT

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A variety of terminology is being applied by archaeologists to a diversity of scoop features in New Zealand Maori archaeological sites. These features are usually interpreted as indicating cooking in earth ovens. Some greater degree of consistency is needed if the terminology is to be more rigorous. This paper discusses the variety of forms of scoops and earth ovens found in the field and attempts to arrive at a terminology applicable in field application.

## **Introduction**

I have recently had the occasion to read many site records and reports by archaeologists undertaking field surveys, mitigation excavations or monitoring in the Bay of Plenty.

The experience of reviewing the reports left me somewhat exasperated at the use of terminology about some scoop features, terminology which was often used without a detailed description and which seems to me to be rather imprecise. All of the terms in the title of this paper are used, sometimes more than one in the same report, without it being clear if the things they are applied to are the same thing or not.

Over 30 years ago Doug Sutton (1971) produced a BA Honours dissertation which reviewed cooking methods recorded ethnographically from New Zealand and reviewed what archaeologists said about cooking structures they excavated. Regrettably for a nice piece of work, no publication resulted. It is a particular regret that the material on terminology used and the description of these structures did not get wider circulation.

Sutton concluded in respect of earth ovens:

“The practice of substituting pseudo-descriptive terms for an adequate description of the evidence recurs throughout the literature. The result is that potentially significant variability is frequently not recorded as the common practice is to describe features only as ‘hangi’, ‘umu’, ‘firepits’.” (Sutton 1971: 70).

One can only say amen to that, for the position seems no better today.

Helen Leach (1982) has reviewed Polynesian cooking with some particular emphasis on New Zealand. She too emphasises earth ovens were far from the only method used in New Zealand, if an important one. Scoop features, round or oblong typically up to 1 m in greatest diameter (and occasionally greater) and 100 to 300 mm deep are commonly found in New Zealand archaeological sites. I am excluding from this discussion umu ti, large ovens used for processing cabbage tree (*Cordyline australis*) roots and stems to extract sugar (see Carson 2002). Sometimes earth ovens have evidence of having had fires in them, in that the base of the scoop in the material they are dug into has been altered by heat, such as the reddening of clays exposed to heat, or the calcining of shell in sand is often observed. Others have fills of shell midden often containing fire broken stone. Others have blackened or discoloured or fire broken stone forming a basal layer in the scoop.

Some scoops lack these fillings but rather have adjacent material, credibly contemporary, of shell or other midden often associated with charcoal and blackened or fire broken stone. This is often referred to as hangi rakeout.

Sometimes the content of the scoop is part of an overlying layer. In other places the content is capped by a layer of different material. This records if either the scoop was infilled as a particular event filling the scoop only, or if there was a more general area deposition taking place.

We should not assume all the features that come within the scope of this paper are cooking features. Helen Leach’s review of hearths (1972) showed they are varied in form, the simplest being small ash filled scoops, certainly within the scope of this paper. Nor is the distinction of hearth: no food earth oven: food absolute. She notes several archaeological cases where small quantities of food remains are associated with hearths within houses.

## Earth ovens

In New Zealand, ethnographically recorded earth ovens all appear to be built in pits. Elsewhere in Oceania they have been known to be built on the ground surface and devices of the same function are recorded constructed in hollow wooden cylinders, devices beyond the title of earth oven. The key feature of earth ovens is that heated rocks provide the source of heat for pro-

longed cooking. They cook predominantly by convection by steam at 100° C. Boiling at a temperature above 100° C can only occur if there is pressure above normal atmospheric pressure, but this does not occur in an earth oven. While initially there may be an element of radiative cooking from the hot rocks if the food is exposed to that (and most descriptions of green leaves between the rocks and the food make that unlikely), more generally water saturated atmosphere in the oven will be at the temperature of boiling point of water, limited by the steam condensing onto the cooler periphery of the oven. The steam in the oven will be what is termed saturated; in contact with its liquid form. The surface of the rocks will quite rapidly become close to that boiling temperature also, so after a short radiative stage is over, cooking is likely to be by steaming. Steam cannot become superheated above boiling temperature unless there is both a source of heat hotter than that and there is no free water. The heat goes into evaporating the free water rather than further raising the temperature. The energy necessary to vaporise boiling water is 6.73 times the energy needed to raise water from 20° C to 100° C. This energy step puts a natural cap on the temperature of an earth oven. Hence neither of these states, of elevated boiling temperature, or superheating exist.

We should not exclude the possibility that there may have been surface built ovens in New Zealand.

There seem to be five different ethnographically recorded methods of heating a pit oven in New Zealand:

1. Lining the pit with stones and building a fire over it
2. Building a fire in the pit with the stones placed over the fuel
3. A combination of the two above
4. Heating the rocks in a fire beside the pit and after they are heated, pushing them into the pit and arranging them (umu kanao, Best 1922: 419). The stones may be arranged under the food. Best records that sometimes some rocks were arranged on top of the food. Helen Leach (2007: 55) draws attention to 18th century records of the stones being arranged only over the food.
5. As the last but with the pit pre-heated by a separate fire.

The fourth method is the one I have observed used by modern Maori, but then modern means are also used including: concrete lined pits, iron rather than stones as heat sources, wire food baskets and sacking for covers. These are all non-traditional practices so we should not be surprised if the heating methods have also changed.

As well as the stone some of the “coals” of the fire may have been deliberately introduced with method 4 (Leach 2007: 55).

Some of the methods occur archaeologically. Method 1 certainly occurs. Some oven pits certainly have signs of burning in the pit base as one would expect with methods 2 and 5, but the absence of burning may not be evidence of the lack of use of these methods, as the base material may not be susceptible to showing change through heat.

Charcoal is often present with the rocks suggesting method 2 but pushing rocks to a pit in method 4 or 5 might also transport some charcoal so its presence may be equivocal evidence of the method. In short, archaeological evidence is not going to distinguish between the five methods. As Table 1 shows, there is no combination of features which leads unequivocally to any of the types. These methods of umu construction then are not useful as an archaeological terminology.

Archaeological feature	Umu construction type				
	1	2	3	4	5
Stones carefully placed as pit lining	√		√		
Burning in pit base	√ (if susceptible)	√ (if susceptible)	√ (if susceptible)	X (if susceptible)	√ (if susceptible)
Pit empty of stones		√ (if cleared after use)		√ (if cleared after use)	√ (if cleared after use)
Charcoal in with the stones	√	√	√	√ (if dragged in with the stones deliberately or accidentally)	√

Table 1. Archaeological evidence for different umu construction types.

This discussion of ovens is entirely focused on what might be seen archaeologically. The ethnography of oven use is a much larger subject. Orliac and Orliac (1980) provide an analysis of Tahitian earth ovens with linkage to the local archaeology. There are some strong similarities with New Zealand.

**Oven pits**

Why have a pit? It seems earth ovens can be operated quite satisfactorily on level ground. A number of reasons could be considered for the common use of a pit. Firstly digging an oven pit provides the cover material. Secondly the base of a pit being below the more organic rich surface soil holds

less moisture so is less of a heat sink and thirdly if a fire is lit in the pit the pit may provide some shelter from the wind in lighting and making the best use of the fuel by avoiding wastage in an excessive draft.

Are oven pits found always the result of intentional excavation? It is the author's experience that fires lit repeatedly on some light soil surfaces reduce the soil surface to a powder. If the practice was to drag ash away from a fire before relighting it then a scoop could develop progressively without any prior intent.

Are all scoops earth ovens? This too seems problematic. A fire for heating or other forms of food preparation may have been built in scoops or may have developed scoops through repeated ash removal. Some may be hearths with no cooking function.

### **Oven stones**

Heat shattered stones are a common find in New Zealand archaeological sites. Maori had a preference for water rounded stones from rivers or beaches. The reasons are not hard to see. Firstly stone which survived the rounding process without shattering was obviously a fault free tough piece of rock. Secondly a round stone is more resistant to heat shattering. When a fire heated stone is placed in the saturated steam environment of an oven, that is at boiling temperature, then the surface of the rock will be at close to that temperature while the interior of the rock will be at more elevated temperature. The interior will be more expanded compared to its natural state than the exterior – the interior will be in compression, the exterior in tension. Any sharp incursion into the exterior surface will be a stress raising point in greater tension again and the point from which a tensile failure will originate. Nicely rounded rocks will be more resistant to that failure. Smaller rocks have a greater surface area to mass ratio, hold heat for a shorter time and are hence less desirable for earth ovens. Against that they will have smaller temperature differences from the exterior to the inside – because from their size there is less thermal mass and as well a shorter distance for the heat to be conducted. Hence smaller rocks will be less prone to heat fracture. The natural selection that will apply to oven stones in repeated use will be for the smaller ones to survive and the larger shatter. Maori selection would favour larger rounded rocks for they would hold the heat longer.

In places remote from sources of ovenstone it is likely that ovenstones would be conserved for reuse even after they had broken. There is evidence that in places without suitable local stone, ovenstone was transported for use. Petchey (1993) for instance has documented the sources of rock transported

onto Matakana Island, a location entirely built of sand-sized Pleistocene and Holocene sediments, lacking any suitable rock for ovens.

Other parts of the Bay of Plenty have a like deficiency; they are lithically challenged. Some locations were renowned as sources of ovenstone. Moutohora Island is one still used (Anon 2003). Reed (1958: 100) mentions a beach on Lake Rotoiti “famous for its boulders”, “round and convenient in size” but does not locate it any more precisely. Stafford does not appear to cover this source but inspection of his maps shows a point at the eastern end of the lake where wave fetch would be most effective in creating waves and producing a bolder beach, with the suggestive name of Te Umutahanganui (Stafford 1996: 155). The name could be translated as large bare oven. Motiti is recorded as a source of round stones for net weights (Papakura 1938: 222) so a parallel use of the islands as a source for ovenstones would not be surprising.

But is all heat shattered rock necessarily from earth ovens? Maori are recorded as using fire heated stones to boil water in wooden containers for cooking and other purposes. This has Polynesian parallels so is presumably ancient in New Zealand. These stones suffer the same stresses as ovenstones and would shatter the same way. As well, Maori are recorded as broiling some foods on fire heated rocks. These too could suffer shattering. Heat shattered stone, then, is not necessarily an indicator of earth ovens. A clump of ovenstones in a site is not necessarily an oven. As noted one practice is to heat stones outside an oven pit, so it is conceivable that stones awaiting use might be in a clump outside an oven and, if not reused, remain in this form in a site. Nor can the absence of ovenstone mean a pit is not an earth oven. In many places stone would have been conserved – and hence an earth oven pit may have all the stones removed for reuse at another location.

This excursion on ovenstones is not particular to the matter of creation of a typology for field use but to indicate that the particulars of ovenstones can merit closer inspection and description.

### **The Maori terminology for ovens**

The Maori terms *umu* and *hangi* have specific meanings in Maori. To quote the Williams Dictionary (1971):

Hangi	Earth oven, contents of the oven
Kopa	Native oven
Umu, imu, oumu	Earth oven, or oven

These terms are not defining of the archaeological evidence we will find. They do not tell us for instance if there will be evidence of fire in the pit, or of placed stones in the pit. *Hangi* too has two Maori meanings, as above.

Hangi has been borrowed into New Zealand English. The Oxford Dictionary of New Zealand English (1997) gives the following

- Maori earth oven, the contents of such an oven, communal meal cooked in an earth oven.
- Food cooked in a hangi, a communal meal of such food, an occasion or party at which hangi food is cooked.

The meanings in New Zealand English of a communal meal and an occasion or party seem to be modern additions to the original Maori meaning.

We could as archaeologists borrow the terms and give them a more precise archaeological definition, but the terms will always have their own meanings in the living Maori language and as hangi has been borrowed into New Zealand English, it has a meaning there too, or actually several meanings including the usages extra to the original Maori meaning. The Maori terms are best left to the living languages, rather than used as defined archaeological terminology.

Umu as a term has a respectable age in Oceania, coming through Proto Oceanic *\*qumun* and Proto Polynesian *\*qumu* (Kirch and Green 2001: 150),



*Figure 1. A typical earth oven, excavated in half section, containing burnt shell, charcoal and oven stones. Although not visible in black and white, the sand base has been burnt red. From site R11/859, Mangere.*

PPN	PPN probable gloss	Eastern Polynesian	Maori
* <i>paito</i>	Cookhouse over oven	* <i>fale umu</i>	whareumu
* <i>tao</i>	To cook in an earth oven	–	tao
* <i>faka-qafu</i>	Prepare an earth oven for lighting	–	Possibly retained as <u>Volcanic activity</u> : ngawha, but not associated with cooking, other than at Rotorua in the use of hot springs.
* <i>uru</i>	Arrange hot stones in an earth oven	–	uru
* <i>fuke</i>	Cover/uncover an earth oven	–	<u>Dig up</u> : huke <u>Cover</u> : tapuke
* <i>hiko-fi</i>	Tongs for moving hot stones	–	Possibly cognate: pinohe <u>Sticks used as tongs for moving hot stones</u> .

*Table 2. Comparisons of Proto Polynesian terms relating to cooking and modern Maori equivalents and derivatives. Here ‘q’ is used for the sound rendered as ‘ng’ in modern Maori and the leading ‘\*’ indicates a reconstruction in a past language.*

and of course earth ovens are a feature of ancient archaeological sites in the areas where Polynesians originated. Hangi seems not to be as old, lacking recognised cognates elsewhere. There are other Proto Polynesian terms we might expect to see here associated with earth ovens (Kirch and Green 2001: 150).

The Maori term above for cooking house (there are others as well) is consistent with Eastern Polynesian names, but the PPN term seems to have been lost. The term for tongs refers to tongs for handling stones for both ovens and for boiling. Such tongs in tropical Polynesia can be doubled over coconut frond midrib or Pandanus root (Kirch and Green 2001: 149). Neither were available in New Zealand. Best gives rorerore and kapekape as names for

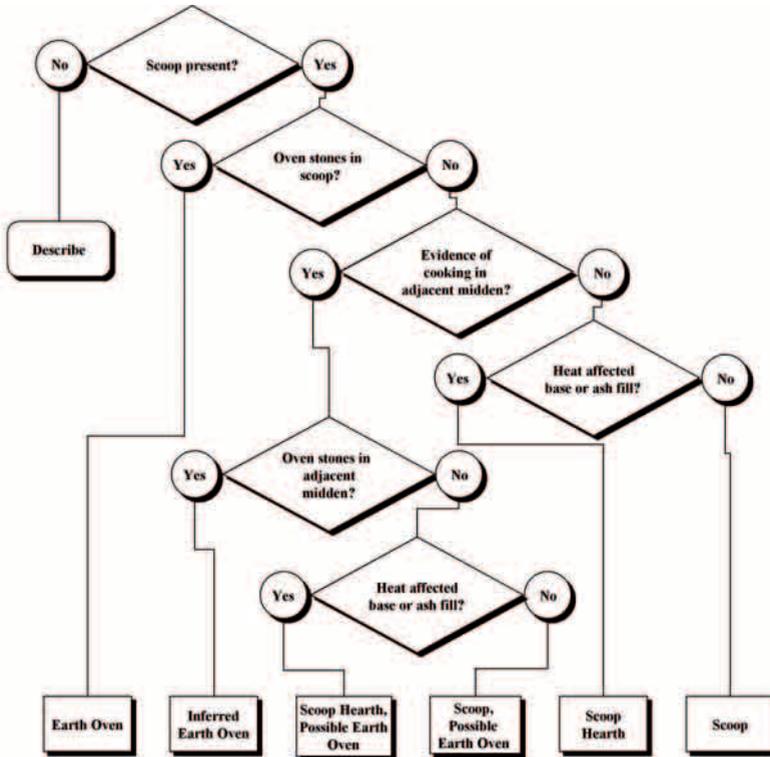


Figure 2. A logic diagram for use in classifying field evidence to the scheme in Table 3.

sticks for moving the hot stones. Rore is a snare or a trap, or to ensnare which may hint at the same tong function. However the dictionary word for tongs, pinohe, is just possibly derived from the PPN term, but it has rather too many irregular sound shifts. Certainly if stones are being placed on top of the food a single plain pole would not readily suffice for this task, as the stones have to be lifted. While of considerable interest the comparative linguistics do not help with a typology of archaeological application.

### An archaeological terminology

Oven stone: stone in an archaeological context which suggests it was used or was intended for use in an oven, through size/shape selection, evidence of being fire affected, surface addition of charcoal.

Form	Suggested term
Scoop with ovenstones in place, with or without a fire affected base.	Earth oven*
Scoop without ovenstones, with or without a fire affected base, but with adjacent evidence of cooking including ovenstones (oven rakeout).	Inferred earth oven
Scoop without ovenstones, with a fire affected base or ash fill, with adjacent evidence of cooking in midden but not including ovenstones.	Scoop hearth / possible earth oven
Scoop without stones, without a fire affected base or ash fill, with adjacent evidence of cooking in midden but not including oven stones.	Scoop / possible earth oven
Scoop without stones, with a heat affected base or ash fill, but no adjacent evidence of cooking, or ovenstones.	Scoop hearth
Earth oven or hearth-like scoop, without other evidence.	Scoop
Fire affected stones, with or without charcoal / midden, no scoops.	Describe – it is not necessarily evidence for the local presence of earth ovens.

*Table 3. An archaeological descriptive terminology for Maori earth ovens. \*Using 'earth oven' as a term runs somewhat against the objective of a descriptive classification, but at this end of the classification the function is also clear.*

Fire affected oven stone: fire broken or otherwise heat affected

Oven rakeout: mixed charcoal and ovenstone, which may include shell and bone midden.

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