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Cooking Without Pots: Aspects of Prehistoric and Traditional Polynesian Cooking

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ABSTRACT

Gastronomy, which deals with the anthropology of food and food habits, offers a link between subsistence systems and diet, which can usefully be studied by both ethnographers and archaeologists. By applying a "gastronomic" approach to the problem of why the Polynesians were able to give up making pottery, it can be suggested that because Polynesian staples were root and tree crops which are highly amenable to processing in an earth oven, the impetus for making cooking pots, experienced by almost all cereal and legume producers, declined progressively as the ancestors of the Polynesians moved further away in time and space from cereal-growing areas of island South-east Asia.

Keywords: GASTRONOMY, POTTERY, POLYNESIA, EARTH OVEN.

INTRODUCTION

Gastronomy, as a branch of anthropology which deals with food and food habits, is a comparatively new field. One reason is that ethnographers have not always done justice to recording food preparation and cooking techniques (perhaps because culinary activities are commonly women's work), and have generally failed to comment on the vital linking role that these activities play between food production systems and diet. Similarly, many archaeologists have treated pots as culture markers, horizon markers, vehicles for displaying motifs, anything but containers for particular foods and utensils for particular food processing operations. The purpose of this paper is to draw attention to the importance of viewing culinary activities and the accompanying material culture as a link between subsistence economy and diet. This approach has much to offer the archaeologist and is capable of contributing new insights into old problems such as why the Polynesians were able to give up making pottery.

POTS FOR BOILING

To those people brought up within the cookery traditions of western Europe and their modern overlay of cosmopolitan cooking, the notion of cooking without pots is unthinkable. Without heatproof vessels (be they saucepans, casserole dishes or roasting pans), we could not make soups, stews, or soufflés. We could not boil potatoes or pasta, rice or green vegetables, and among numerous dishes we would be deprived of the joys of porridge, boiled Christmas pudding, and sauces. Dependence on heatproof vessels goes back nearly six thousand years in Britain. In the Near East, which was the source of many economic and technical innovations, it began at least eight thousand years ago. During this great span of time, pots of clay and then metal have dominated western cuisine and allowed the development of a great array of moist, palatable and economical dishes.

One of the reasons for the early development of pottery may have been the desire to boil the primitive forms of wheat, barley and small legumes that began to be domesticated about the eighth millennium B.C. Archaeologists often assume that these seeds were usually parched, then ground into flour to be baked as unleavened

loaves of bread. However, the suggestion has been made that the stone bowls which preceded pottery in the seventh millennium Iranian site of Tepe Ali Kosh "may once have held the gruel cooked up from the ground and roasted wheat and barley; it is worth noting that emmer wheat and hulled barley are largely unsuitable for bread-making . . ." (Hole, Flannery and Neely 1969:349). It is probable that a porridge or cracked wheat type of dish would have been more digestible and nutritious than bread made from these coarsely ground seeds.

THE LOSS OF POTTERY

While heatproof vessels were essential to cultures reliant on cereals and legumes for their major source of starch (and to a lesser extent, protein), groups who obtained starch from root crops had other cooking methods available to them. To the Neolithic Polynesians who moved into the eastern Pacific early in the first millennium A.D., and reached far-flung Easter Island, Hawaii, and New Zealand within a few centuries of adventurous voyaging, earthen pottery did not hold such an esteemed position that it was indispensable. When the Polynesians reached the Marquesas Islands from their Samoan-Tongan area homeland, they abandoned pottery-making and their descendants never again readopted it in any of the island groups to which they later migrated. It was at first believed that pottery was lost because the newly settled islands did not have suitable deposits of clay. Clay was present, however, on the high volcanic islands, though potters would have had to have been prepared to experiment with it, to discover the best types of temper and the proportions in which it should be added. It has also been suggested that the founding population, who may have travelled in just one canoe, did not have a potter on board, and thus the specialist skills of pot making were lost. These factors may have applied in particular cases, but they do not explain why the inhabitants of western Polynesia, in particular Samoa and Tonga, gave up pottery-making early in the Christian era, after making it for over a thousand years. The decline was marked initially by loss of decoration, then increasing coarseness accompanying a declining number of types. Eventually only coarse bowls were made and in Samoa these vessel forms were subsequently manufactured in wood (Davidson 1979:91). Obviously any need for globular vessels (which is the form interpreted as cooking pots) was not felt deeply enough for this shape to survive. Can it be presumed from this that whatever used to be cooked in them could be cooked in other ways, or that they were no longer being used as cooking pots?

POLYNESIAN COOKING

To find an answer to this problem, a familiarity with Polynesian cookery as practised in the early years of European contact is needed. Polynesian vessels, and the uses to which they were put, must be studied, together with the associated cooking techniques.

In the northern Cook Islands (Buck 1927) there were three types of vessel: corresponding to the cup was the half coconut shell; the water container or closed vessel was either a large coconut shell fitted with a wooden or leaf stopper, or a hollow gourd; equivalent to modern bowls were wooden vessels of various sizes. The longest (nearly eight feet) was used for holding large quantities of food for feasts, while smaller ones were employed as mixing bowls for preparing the various compounds of arrowroot (*Tacca leontopetaloides*), taro (*Colocasia esculenta*), and breadfruit (*Artocarpus altilis*). Once cooked, the softer vegetables would be mashed with heavy wooden or stone pounders within the mixing bowl, while the firmer taro was pulped on a flat-topped table with very short legs.

Apart from grilling of items such as fish, all cooking was done in the earth oven, a round shallow hole dug in the earth in the open end of the cooking house. It might be lined with stones to prevent the earth falling in. It was heated with red-hot stones pre-heated in a wood fire adjacent to or within the pit itself. The food was separated from the stones and also covered over by large leaves sewn together. Earth was placed over the leaves to seal in the food while it was cooking. Once the food was done it might be divided into portions and served on woven coconut leaf platters, or in the case of taro and breadfruit, peeled, mashed and mixed to a paste with coconut cream from the grated mature nut and sometimes ripe bananas. The coconut was used in several different forms and stages of maturity, as a grated "sauce", as a cream and as oil. All these processes began with husking and grating. In prehistoric times the grater was often made of rough coral; later, serrated hoop iron was substituted.

FERMENTATION

The northern Cook Islanders also had an important method of preserving surplus breadfruit. The fruit was peeled, cored and placed in pits lined and covered with dry banana leaves. The mass was weighted down with heavy stones, and soon began to ferment under partial anaerobic conditions. The sourness was probably a welcome addition to the rather restricted range of culinary flavours. This method turns up in many parts of Polynesia and can be applied to bananas as well as breadfruit. In Samoa, the mature (but not ripe) breadfruit was peeled, washed and quartered and packed in a pit (*lua'i masi*) ingeniously lined with overlapping leaves, and then covered over with a layer of soil and rocks. A recent observer noted that when the food was uncovered after 34 days, he detected a slightly sweet musky smell coming from the homogeneous dough-like paste in the pit (Cox 1980:182-3). This was put into a bowl and kneaded. Once the seeds had been removed, the mixture was formed into patties and wrapped in leaves previously smeared with coconut cream. These were baked for two hours in the earth oven and came out looking like bread. One that was sampled had "a pungent, slightly fecal smell, somewhat like the smell of old limburger cheese . . . a very strong taste, like a strong cheese with a dash of sauerkraut added" (Cox 1980:182). Fermented breadfruit may be left in a well-prepared pit for over a year, but fermented plantain bananas (*Australimusa* types) do not last so long.

Although the Hawaiians brought the breadfruit with them from their Marquesan or Society Island homeland, they did not continue with this practice of fermentation. Instead they concentrated on short-term fermentation of cooked and mashed taro, sweet potato (*Ipomoea batatas*), breadfruit and plantain banana, products which had the generic term of *poi* applied to them (Buck 1957). All but the taro could be pulped in a bowl. The taro had to be beaten (usually by men) on a special board with a heavy stone pounder (Pukui 1967). *Poi* making with taro was a long process with several stages. As water was added, the mass gradually became more moist, and according to the variety of taro ranged in colour from white, yellow, pink, and light grey to dark grey. When it reached a paste consistency, it was transferred to a bowl, covered to prevent dust from entering and the surface from drying into a crust. In a day or two it began to ferment, and at this stage it was preferred by adults. Because the various types of semi-liquid *poi* were so commonly made, the Hawaiians required many more food bowls than other Polynesian groups who generally served more solid food on woven platters. Hawaiians used deep wooden bowls with lids for storing *poi*, and slightly shallower rounded bowls for serving it. The coconut shell was used for drinking the ceremonial 'awa (kava —

Piper methysticum), but water was drunk directly from the gourd water container. Shallow wooden meat dishes and platters were used for serving, sometimes elaborately carved. A special shallow bowl with sharply inturred rim was designed for salting down meats and sea foods (Buck 1957).

COOKING IN HAWAII

As in other tropical Polynesian islands, several composite dishes were made in Hawaii, employing items such as grated taro, shredded coconut meat, cooked mashed sweet potatoes, breadfruit and arrowroot starch. Some of these were formed into soft cakes wrapped in leaves and baked in the earth oven. The Hawaiian oven followed the basic Polynesian pattern with the stones heated in the pit and covered with leaves and sometimes also with grass. The food, which was chiefly root crops and breadfruit, was packed in and covered with more leaves, and an outer layer of old mats and tapa cloth. In order to cook the meat thoroughly, a pig carcase cooked in the oven might also have red-hot stones placed inside the body cavity. Buck (1957:19) wrote that the final cover of earth, found elsewhere in Polynesia, was omitted in Hawaii, but Ellis noted its use there in the 1820s (Ellis 1963). Broiling or grilling on hot coals was a method applied to breadfruit, unripe bananas, or fish, when only small meals were being prepared or the family was working in gardens some distance from the settlement. The only method of boiling known to prehistoric Polynesians was to drop red-hot stones into a wooden bowl filled with liquid. In Hawaii, fish and greens were sometimes cooked in this way, but not apparently any of the meats or starchy fruits and vegetables which would have required more prolonged cooking (see also Yen 1975:149). Captain Cook was given a pudding in Tahiti in 1777 which was finished by this technique:

It was composed of bread-fruit, ripe plantains, taro and palm or pandanus nuts, each rasped, scraped, or beat up fine, and baked by itself. A quantity of juice, pressed from cocoa-nut kernels, was put into a large tray or wooden vessel. The other articles, hot from the oven, were deposited in this vessel, and a few hot stones were also put in to make the contents simmer. Three or four men made use of sticks to stir the several ingredients till they were incorporated one with another, and the juice of the cocoa-nut was turned to oil, so that the whole mass at last became the consistency of a hasty pudding. (reprinted in Kuper 1977:202)

COOKING IN NEW ZEALAND

New Zealand presented a rather different set of resources to the Polynesians, because it was a temperate landmass. Only in its northern coastal areas could root crops be grown, and of these only the sweet potato was productive. If introduced, the important tree crops of coconut, banana and breadfruit would have been a total failure, and the Polynesians' powers of adaptability were stretched to the limit learning to process new wild plants, some with highly toxic parts. One of these was the drupe of the karaka (*Corynocarpus laevigatus*). It is plum-shaped with edible, though not esteemed flesh, and a rich kernel which contains the poisonous compound karakin. If this is consumed untreated, severe convulsions and death may result. Showing exceptional perseverance, the Maori developed a processing method which involved cooking the kernels for at least 12 hours in an earth oven, then steeping them in water for a long period, and finally drying them for storage. For eating, they were steamed in the oven to soften them (Best 1942:53-8, Yen 1959:326). This method was not a complete innovation because the inhabitants of the tropical Polynesian islands were already familiar with arrowroot processing, which involves soaking the grated raw flesh in several changes of water to eliminate its bitterness. They

were also aware that cooking destroys the "stinging" quality of taro leaves, now known to be caused by needle-shaped calcium oxalate crystals.

A substance that was used in several Maori dishes was the purple juice of the tutu (*Coriaria* spp). Every other portion of this plant contains a strong poison called tutin which has caused fatalities in numerous farm animals and even circus elephants. The Maori devised a finely woven straining bag to ensure that nothing but the juice was extracted. It might be mixed with whitebait, with an edible seaweed, or with the cooked starch obtained from the roots of the bracken fern (*Pteridium esculentum*).

Although they had lost many important plants, especially the versatile coconut, the Maori style of cooking was unmistakably Polynesian. The two chief methods of cooking (grilling/broiling and earth oven steaming) were recorded by early explorers throughout the country. Joseph Banks wrote in 1769 of the Mercury Bay area in the North Island:

A Little before Sunset we went home with the Indians to see them eat their Supper, it consisted of Fish, Shellfish, Lobsters & Birds, these were dress'd either by broiling them upon a skewer which was stuck into the ground leaning over the fire, or in Ovens as we call'd them at Otahite which were holes in the ground fill'd with Provision & hot stones, & covered over with leaves & Earth . . . (Banks in Morrell 1958:73)

The New Zealand earth oven was generally deeper than that used in Polynesia. The stones might be heated within or beside the pit, and the food was pre-packed in baskets before being placed on old mats in the oven. The emphasis on baskets and mats probably reflects the shortage of large leaves in New Zealand. In the tropics the most commonly used leaves were banana, *ti* (*Cordyline fruticosa*), *nono* (*Morinda citrifolia*) which imparted a lemon flavour to fish wrapped in it, coconut, and breadfruit (Orliac and Orliac 1980:67). More mats and a layer of earth sealed over the food in the Maori oven, immediately after a small quantity of water had been poured in to generate steam. The addition of water seems to have been common practice only in New Zealand, though it was recorded in Mangareva (Buck 1938:216). Why this should be so is not apparent, as New Zealand soils were colder and often damper than those of the tropical islands. It is possible that the Maori cooked meat rather more often than Polynesians of the tropics, including joints of seal, whale, and legs of the now extinct giant flightless moa. The steam may have increased heat penetration and thus shortened the cooking time.

The Maori made wooden bowls in a variety of shapes paralleled in Polynesia, though some of their functions necessarily involved different plant foods. Some bowls were used in the extraction of starch from the native bracken fern. The rhizomes were first dried, then cooked over hot embers. Transferred to an anvil stone they were then beaten with the side of a heavy wooden beater to remove the blackened skin. The pounded fernroot was then placed in water in the wooden bowl where it was worked with the hands to extract the starch. When the contents had settled and the water had been decanted off, the starch was formed into flat cakes and cooked (Buck 1952:85-6). Wooden bowls were used as mortars for pounding hinau berries (*Elaeocarpus dentatus*), previously soaked in running water for several days, in order to separate the edible pulp from the hard seeds. This pulp was made into cakes which were cooked in the earth oven (Buck 1952:88, Yen 1959:326).

THE CONVENIENT EARTH OVEN

It is beyond the scope of this study to consider in detail the cooking technology of each of the island groups occupied by Polynesians. The examples given already provide a general picture of what it is like to cook without pots. All Polynesian cooking was based on earth oven baking (which at times might be closer to steaming in its

effects) and grilling or broiling over hot embers. The thicker cuts of meat required the more penetrating heat of the earth oven, while cooks had a choice with items such as fish. If the oven was to be in use for large amounts of root vegetables, fish might well be included, but for casual cooking the grilling method involved far less work. The earth oven was a convenient and effective means of cooking starchy vegetables, especially taro, yams (*Dioscorea* spp), sweet potato and breadfruit. One or other of these formed a staple food in each of the island groups, depending on climatic and soil conditions, and so they were eaten in large quantities at the main early evening meal and as cold left-overs the next morning. Cooking such a bulk of food in hot embers would be difficult because each tuber or fruit would need to be turned constantly to prevent burning. The earth oven was extremely flexible when large numbers of people were being catered for, since its size could be expanded to take up to five or six pigs and theoretically any number of ovens could be prepared.

Variety in the non-meat part of the diet was obtained by preparing combined dishes with several ingredients, by fermenting some of the vegetables and fruits to change their flavour, and by baking food in different leaf wrappers, some of which imparted a particular flavour to the item inside. Textural alteration to a smooth doughy consistency was considered so desirable that the pounding and kneading of plant foods in wooden bowls was widespread in every part of Polynesia. The coconut contributed greatly to this process since its oil thickens on heating, and could thus be used to thicken a blend of mashed cooked vegetables and fruits. Some quite laborious methods were used to extract starch from items such as arrowroot, pandanus and fernroot, for special occasions. The starch would then be formed into flattish cakes, often with other grated ingredients and baked in the earth oven. Sugary foods such as cooked *ti* root (*Cordyline fruticosa*) and raw sugarcane (*Saccharum officinarum*) were normally consumed as snacks between meals and were not mixed with starchy foods. A special oven was always made for the long process of baking the *ti* root, to which several families would contribute labour and materials. This practice highlights yet another advantage of the earth oven method of cooking. Provided good quality stones were used, it was capable of cooking for at least 24 hours (in some cases up to 48 hours), if a thick, fibrous root or tree fern pith was being processed.

Earth oven cooking enabled the Polynesians to process starchy or sugary plant foods in bulk, and to cook meat such as pork, dog, chicken or man, without charring the outside and leaving the inside raw. It was particularly well adapted to cooking for large gatherings. By varying the leaf and grass coverings and individual food wrappers, different flavours could be obtained within an oven-load of food. Without wrappers, bland starchy foods are transformed by taking on flavours from the meats. The earth oven method avoids the constant need for stirring the contents of a pot to prevent them sticking and burning, and thus gives the cook time to complete other tasks. It is ideal for the prolonged cooking of tough or potentially poisonous plant foods. Its disadvantages are the time and amount of fuel needed to heat the stones, though atoll dwellers became adept at running their ovens on coconut husks, flower stalks and other rubbish. For a small quantity of food it might be considered inefficient. It cannot cook dishes with a greater moisture content than a soft paste or dough. Although the inhabitants of the island of Kapingamarangi used coconut shells as "casseroles" for liquid dishes (Buck 1950:12,18-19), this was not a widespread practice. The Polynesians did not miss out on "porridgy" concoctions, however. They cooked the ingredients in the earth oven and then mixed and moistened them with water or coconut oil. When the starchy foods were very fibrous and they wished to prepare a dish from them (rather than

just spit out the fibre), they were at a disadvantage, for whereas the modern cook would boil such foods until soft and then sieve them, they were obliged to go through a complicated sequence involving roasting or steaming, pounding, steeping in a bowl of water, removing the fibres by hand, decanting the water, drying the starch till firm enough to form into cakes, and then re-cooking. Had they possessed cereal crops such as rice, they might have experienced great difficulty in processing it in bulk, for their pounders, beaters and bowls were designed for pre-cooked roots, and the amount of steam generated in the earth oven would probably not be sufficient to swell the grains. Perhaps the only method they could have adopted would be to soak the grain till it began to ferment or germinate, mash it, form it into cakes and then steam it in the earth oven.

DISCUSSION

There is a strong possibility that the ancestors of the Polynesians did at one time have rice. It has been suggested that the economy of the Proto-Austronesian speech community, from whom speakers of Oceanic languages evolved somewhere in the western Pacific, was based on fishing and agriculture, and that the crops included "taro, yams, banana, sugarcane, breadfruit, coconut, the aroids *Cyrtosperma* and *Alocasia*, sago and (probably) rice" (Pawley and Green, 1973:35). In addition, the Proto-Austronesians appear to have possessed pigs and pottery at a date estimated at 4000 B.C. (Pawley and Green 1973:54). The Oceanic branch of this family may have lost rice as they began to settle the islands beyond New Guinea after 3000 B.C. If this contention is correct, that cereal growers must have heatproof vessels, the driving force behind the making of cooking pots in the Pacific islands was removed at the point that rice growing was abandoned, and, like the spring of a clock, the practice began to run down. This was particularly the case where migrants encountered different clays and where more durable wooden vessels could be substituted as mixing, storage and serving bowls.

Exploring the relationships between foods and cooking technology is seldom undertaken by archaeologists or anthropologists. Yet the activity not only has the potential for shedding light on archaeological problems, such as why the Polynesians were able to give up making pots, but can shed some light on that elusive thing called a cooking "tradition" (in a diachronic sense) or "style" (in a synchronic sense). The anthropologist must stand well back from the data in order to discover the broad principles of food mixing, flavouring and cooking that apply in each tradition. It is essential that the component parts are not treated separately, lest we fail to appreciate their significance. The shape of a kitchen tool or pot, the order of operations in a recipe, what foods may or may not be mixed together, and the choice of ingredients are all interdependent factors in the field of gastronomy.

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