

The Acorn in North American Indian Diet

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Many foods are indigestible or poisonous in their raw condition and must be processed before they can be eaten in quantity.¹ One of the best known examples is the tapioca plant (*Manihot utilissima*), which was the staple food of tropical South America (28). The roots of this plant, which were the part eaten, contain a considerable quantity of hydrocyanic acid which must be removed before they can be consumed. This was done by grating the roots, soaking the pulp in water, and finally squeezing out the acid-bearing water with a woven cylindrical container made for the purpose. There is no single poisonous species in North America which was as indispensable to native diet as was tapioca in South America, but the acorn, which is normally unpalatable without special preparation, was widely eaten. It was probably of greater importance in Indian diet before Christ when farming was little known than it was after Christ when about half of the tribes farmed.

There are some 60 species of oaks in North America, most of which are grouped under a single genus, *Quercus*. Of these, acorns from 27 species are known to have been eaten by Indians (43). Acorns from all these species are known to contain tannic acid in varying amounts. The majority contain enough of this acid to prevent large quantities being eaten without first removing at least some of it. The main nutritive elements of acorns are starches and fats, with the former predominating in most species.

In aboriginal central California the acorn was a true staple, being eaten in greater quantity than the product of any other genus, animal or vegetable. The acorns were first cracked open with the aid of a small elongated stone for a hammer and a heavy flat slab of stone for an anvil. The nut meats were then ground with a mortar and pestle. The majority of mortars were hollowed out of stones of convenient size, but others consisted of man-made holes in the outcroppings of bed rock so common in the foothills of the Sierras. Still other mortars were made from a short section of oak log, while a few consisted of holes in a fallen oak log. Pestles were always of stone, roughly cylindrical, but with considerable variation in size and details of shape.

When the meal was ground sufficiently fine, it was taken to the bank of a stream where there was a handy water supply for the leaching process. Most frequently the meal was placed directly on the sand in a shallow depression or basin which had been prepared for the purpose. In southern California, however, the meal was placed in a porous basket. Then water was dipped from the stream and poured over and through the meal as in our manner of making drip coffee. Sometimes the water was heated by placing hot stones in a closely woven basket filled with

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the liquid. Warm water dissolved the tannic acid more readily, but if too hot carried away some of the fat which was a desirable nutritive element. Cold water took longer, but washed away none of the food value. This leaching process was repeated until the bitter taste of the tannic acid was eliminated. The meal was then ready for cooking.

The most frequent cooking method was boiling to form a mush or gruel. The majority of California tribes boiled by placing hot stones, previously heated in a wood fire, into the water-tight basket containing the mixture of meal and water. This was a laborious process requiring frequent renewal of hot stones as well as stirring to prevent their burning the bottom of the basket. Tribes in the southern half of California boiled by placing a pottery vessel directly on or over a fire, just as we do in the modern kitchen. Acorn meal was also made into an unleavened bread, baked either beside the fire on a hot stone or in an earth oven similar to our fireless cooker. Red earth or ashes were sometimes added to the dough, the purpose being to neutralize any acid still remaining in the mixture. Such bread was dry enough to keep longer than the mush and also, because of its lighter weight, was commonly taken on journeys.

In northern California, western Oregon, and western Washington, the whole acorn, with or without the hull on, was buried in mud or immersed in a stream from a few weeks to a few months before eating. This eliminated most of the acid but was not as efficient as the central California method. The leached kernels were then boiled whole or roasted for eating. Boiling removed what acid may have remained after leaching, because the water was poured off and not drunk.

In a sizable area in northern California both of these leaching methods were known and used. It is significant, however, that where the acorn was a staple food, pulverizing before leaching was everywhere practiced. In western Oregon and Washington, where only the whole kernel was leached, it was not an important food. These two processes are also correlated with the frequency of oaks and hence the quantity of acorns available to the Indians. Pulverizing before leaching corresponds almost exactly to the area of greatest frequency of oaks. North of the Umpqua divide in southern Oregon, oaks are much less common (15).

There is another area, comprising roughly the northeast quarter of the United States, where the whole kernels were leached by boiling in water to which lye had been added. The lye was derived from wood ashes, and its alkaline character neutralized the tannic acid in the acorns. Species containing the most acid were boiled in several solutions of lye. After neutralizing the acid, the whole acorns were dried or roasted and stored in that condition. They were ground in a wooden mortar with a wooden pestle, a few at a time as needed, and added to boiled messes which also included meat. The wooden mortar and pestle were the same ones used to grind maize. Acorns were not much eaten in this area in historic times, except when the maize crop failed or was destroyed by enemies. However, in pre-agricultural times, before Christ, they were probably second only to wild rice as a vegetable staple. Wild game, however, was certainly a larger factor in the diet here than wild plants, and fish even outranked game in a few localities. Acorns, therefore, never attained the important place in the diet that they held in California.



Fig. 1

In the Southeastern United States, acorns were second only to hickory nuts as a source of vegetable oil. They were most often boiled whole in water and the oil skimmed from the surface. Apparently the kernels, which were automatically leached in the process, were also eaten, although this is not always reported. The majority of tribes also made some kind of acorn bread although we are not always told whether the nuts were first leached. Acorns were added to other foods, most often boiled dishes, and one gets the impression that they sometimes served as much as a

condiment as a true food. Under such circumstances the tannic acid was at least diluted, if not leached out. We are rarely told specifically that acorns were leached with lye, but because lye was used in the hominy-making process it may also have been used for acorns more often than reported. Pulverizing before leaching is reported for three tribes: Choctaw, Creek, and Shawnee. Creek data on this point come from Erminie Voegelin's Twentieth Century Shawnee informants, who claim that they learned the process from the Creeks. Earlier Creek sources, which are very brief, do not mention pulverizing before leaching. Therefore we have split Creek territory arbitrarily so as to show both processes on the map. More of this leaching method below.

Acorns were eaten without true leaching in the Southwest, the southern Great Basin, and a few other isolated localities. They were eaten raw, roasted, boiled whole, or ground into a meal which was made into mush or added to other boiled dishes. Although some of these cooking techniques leached out some of the tannic acid, or at least diluted it, there was no separate leaching process. Some species are much "sweeter" (contain less acid) than others and can be eaten, at least in moderate quantities, without leaching. While figures on the tannic acid content of the various species of acorns are not available, one gets a strong impression that the vast majority of species had to be leached in some manner before they could be eaten in any quantity. Whether or not Southwestern species average less acid is unknown. However, our best source for the Western Apache states that unleached acorns were the most important single wild plant food eaten by that tribe. Wild plants furnished about a third of the total diet among Western Apache, with wild game accounting for another third, and domesticated maize the remaining third. The exact quantities of various wild plants consumed are unknown, but we will hazard a guess that unleached acorns provided 5-10 per cent of the total diet. While this figure is lower than that for central California, it is probably higher than that for any other area in North America in early historical times. In other words, it appears that the Western Apache used relatively more acorns than tribes of the Northwest, Northeast, or Southeast, in spite of the fact that they did not leach them. Other Southwestern tribes, however, made much less use of acorns.

Before we speculate on the historical relationships among the various acorn processes in North America, let us turn briefly to the Old World. Because acorns are not eaten at all from about the Canadian border north through British Columbia, Alaska, and Siberia to Japan (15), there is no indication that any kind of acorn eating or processing spread by diffusion over this route. Oaks are either absent or scarce in these northern regions, which adds to the improbability of knowledge of acorn preparation diffusing in either direction over this route. It therefore seems likely that all Old World forms of acorn preparation developed independently from those in North America.

These historical speculations differ from those of Gifford (15). He leans toward accepting a single origin for acorn eating not only for North America but for the whole world. He believes the knowledge that acorns were edible and some method of preparing them may somehow

have spread by diffusion or migration across Bering Strait from one hemisphere to the other.

Most types of acorn preparation employed by North American Indians are also reported in the Old World. In Japan, acorns were boiled whole before eating. In Persia they were first pulverized, then the meal was soaked in running water for several days, and finally it was shaped into flat cakes and baked. Around the Mediterranean Sea acorns were widely eaten without leaching. However, in Sardinia they were boiled, pulverized, mixed with earth to neutralize the acid, and either eaten as mush or baked into a cake which was sometimes sprinkled with ashes before eating. Acorns have been found in the Swiss Lake dwellings, dating from about 2500 B. C., where they appear to have been eaten. Their consumption is also reported for the Pythians by Herodotus around 500 B. C. There are many other references to acorn eating in Persia and around the Mediterranean from ancient times down to the present century.

If parallel methods of acorn preparation developed independently in the Old and New Worlds, why could they not also have developed independently in North American areas? Although such speculations are never subject to final verification, we suggest that acorn eating in eastern North America may even be independent of that in western North America. While there is also a geographical gap on our map between the Northeast and Southeast, this is probably due to lack of information rather than to absence of acorn consumption in the blank area. It is therefore suggested that acorn processing in eastern North America had a single origin somewhere within the area.

Historical relations of our phenomenon in western North America are far from obvious, but diffusion of each of the three major types from a single point of origin somewhere within the area where each is found seems acceptable. Whether these three types of preparation have a common origin in some earlier period is problematical. Certainly the mere eating of unleached acorns could have arisen independently of the leaching methods.

Pulverizing before leaching occurs both in California and in the Southeast. The parallel here is more apparent than real. The South-eastern process resembled more closely that applied to hickory nuts in the same area than that used for acorns in California. For example, the Shawnee and Creek leached the acorn meal by placing it on a board and pouring warm water over it. The leached meal was then boiled and the oil skimmed off. It was not made into a mush or bread after leaching, as in California. We therefore believe that there was no historical connection between pulverizing before leaching in California and in the Southeast.

Acorn preparation apparently illustrates the operation of the principle of limited possibilities in cultural history. This has been recently stressed by Murdock (25, pp. 115, 116, 200). When there are only a limited number of solutions of a problem, the same solution tends to be arrived at independently by peoples in different parts of the world. This appears to have happened in the case of acorn preparation in the Old versus the New World and perhaps even in western versus eastern North America.

Literature Cited

Note. References not cited in the text were used to compile the map. The 47 references given by Gifford (15) have not been repeated. All Old World information is derived from Gifford (15).

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 BAE-B Bureau of American Ethnology, Bulletin.
 BAE-R Bureau of American Ethnology, Report.
 PMCM-B Public Museum of the City of Milwaukee, Bulletin.
 UC-AR University of California, Anthropological Records.
 UW-PA University of Washington, Publications in Anthropology.

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