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Environmental Adaptations: The Otomi Indians of the Mezquital Valley

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There was a trend in anthropology, between 1920 and 1950 to view culture as isolated from the biological aspects of man and the physical nature of the world around him. Most anthropologists followed the lead of Franz Boas who had reacted strongly against the evolutionary and environmental determinists of his day — determinists who held that the Western European race was more advanced because the invigorating climate of Europe caused the race to rise farther along the evolutionary scale. From Boas' time until the late 1950's when Julian Steward put forth his theory of multilineal evolution and Coon, Garn, and Birdsell related inherited anatomical and functional variations in man to selection by the physical, biotic and cultural system, few anthropologists viewed man as part of an ecosystem (Baker 1966: 19). During the last few years, however, anthropologists have become more concerned with man's responses to the environment in which he lives and the effect of these responses upon his culture.

The current view is that each environment offers to human occupation a different set of challenges. Therefore a different set of cultural responses, whether they be technical, social or religious may be expected. In facing the challenges, these responses tend to take the path of greatest efficiency in the utilization of the environment (Sanders 1966: 34). This paper describes the utilization of the environment for the collection and production of food and drink by the Otomi Indians of the Mezquital Valley, Mexico.

During the summers of 1969 and 1970 I spent several weeks engaged in ethnographic fieldwork in the Mezquital, a valley which comprises two million acres of the northwest portion of the state of Hidalgo. Situated to the northeast of Mexico City, it is actually a high, arid plateau lying 5000 feet above sea level, enclosed on the north and east by the Sierra Madre Oriental mountain range, on the south by the Sierra de las Cruces and the Valley of Mexico (in which lies Mexico City), and on the west by the Rio Moctezuma (Mendoza 1950-51: 473). Although a small portion of the southern part of the Valley has long been well-watered by natural flows from the higher (6000-7000 feet) Valley of Mexico, the bulk of the Mezquital is extremely dry with several small rivers such as the Rio Actopan and the Rio Tula failing to implement measurably the less than 12 inches total annual rainfall.

The city of Ixmiquilpan, 150 miles northeast of Mexico City on Federal Highway 85, is the heart of the arid northeastern section of the Mezquital. Situated on the Rio Tula, it is an oasis compared to the dry countryside. On the irrigated land close to the city, trees and flowering bushes border fields of alfalfa and vegetables. Most of the inhabitants of the irrigated zone are "Mexicans" and mestizos as opposed to Otomies. Around 85,000 Otomi inhabitants of the Mezquital live in small farming communities outside the irrigated zone. Here cacti and brushy xerophytic plants dot a hilly landscape, white with dust and cut by *barancas*, the deep, dry stream beds

which occasionally carry the runoff water from the escarpment of the Sierra Madre Oriental at the foot of which this portion of the valley lies.

Mesquite trees, after which the Valley is named, and thornless willow-like trees called *pirules* are the only real trees away from the river banks. The abundant cacti, agaves and yuccas often resemble trees, sometimes growing to a height of 10 to 12 feet. These xerophytes include Joshua trees (*palmas*), an agave called *maguey*, several varieties of large prickly pears (*nopal*), an agave resembling sisal called *lechuguilla*, barrel cactus (*biznagas*) and other cacti including *garambullo*, *choconoxtle* and *candeleria*. The hillsides are covered with white and light-colored rocks and the valleys are floored with deep alluvial soil which has washed down the *barancas* and is close to neutral in acidity-alkalinity (pH) (Coleman 1969: 63).

The fauna of the area includes jackrabbits, cottontail rabbits, ground squirrels, a few deer, rats, mice, skunks, opossums, lizards, and prairie rattlesnakes as well as golden eagles, black vultures, redtailed hawks, turtle doves, mourning doves, quail and roadrunners. Toads and insects abound, especially flies, grasshoppers and scorpions (Coleman 1969: 63).

Although the Mezquital teems with plant and animal life, the lack of water away from the few small rivers presents a major challenge to human occupation. Just how long the Otomies have lived in the more arid portions of the Valley is unknown. It is probable that early hunters and gatherers roamed the river banks and that later permanent agricultural villages were established along the rivers. Then, sometime well before the coming of the Spaniards, the Otomies dispersed out into the arid hinterland. This move would have been impossible had not the Otomies had the knowledge of the production of *pulque* from the sap of the *maguey* plant.

Pulque is still today virtually the only drink available to some communities. It is also the major source of vitamin B in the Otomi diet. One man may consume several gallons of *pulque* in a day, so large quantities must be produced to fill the needs of a typical household made up of an extended patrilocal kin group (6 to 15 people). Every family owns the rights to the produce of a number of *maguey* plants, either on their own land or someone else's. At least one plant is ready to be tapped at all times. After from 7 to 11 years growth, the *maguey* plant will put out a stalk which often grows as high as 20 feet with blossoms on top. Just before this event occurs, the Otomies remove the heart from the plant. This is done by cutting some leaves out of the plant and cutting the spines from others to gain access to the center of the plant. The cavity from which the heart is removed is enlarged and scraped with a curved metal tool (*raspa*) to form a bowl. This cavity will fill with from 1 to 3 gallons of sap for as many as 90 days in the larger plants. The person in the family whose chore it is to gather the *agua miel* (as the sap is called)

merely has to carry a large pottery jar to the plant every day and fill it with the sap. This is done by sucking the sap into a capsule-shaped gourd which has a hole in each end. Stopping the top hole with a finger, the gatherer can transfer the *agua miel* to the jar. When the jar is full, the gourd is used as a stopper in the jar mouth. The cavity of the plant is scraped again to induce a new flow and several leaves are folded over the opening and secured by means of the leaves' sharp points so the insects and animals cannot drink the *agua miel*.

At this stage the *agua miel* is almost pure glucose. In this form, before it is fermented, it is fed to babies and to people who are ill. To ferment the sap to make *pulque* a small portion of starter consisting of some already fermented *pulque* is added to the jar of *agua miel* and fermentation takes place overnight. The alcoholic content of *pulque* is low, said to be less than 3%. *Pulque* is sweet and palatable if stored in a cool place; if allowed to become too warm it quickly turns to vinegar. Sometimes *pulque* is used to dampen corn flour to make tortillas or tamales. Oral history states that *pulque* was used to make the mortar for the construction of at least one church because of the lack of water.

Maguey plants are found both wild and domesticated. Cuttings are set out near homes and fields for the sake of convenience, but wild plants are also tapped. Several other wild plants contribute to the Otomi diet. The berries of the *choconoxtle* and *garambullo* cacti are eaten as well as the larger fruit, called *tunas*, of the various prickly-pears (*nopal*). The *tunas* of the small wild *nopales* are red or yellow and taste somewhat like plums. Those of the larger *nopales*, which are often found domesticated, have white flesh and taste much like pears. The pads from both kinds of *nopales* are eaten, often chopped with meat in a stew (*caldo*). Several types of greens, varieties of amaranth called *quelite*, have traditionally added greenery to the Otomi diet. When food is scarce the beans of the mesquite tree may be eaten raw or roasted, although they are most commonly used as food for livestock.

In the villages observed, wild animals are just as important to the diet of the Otomies as wild plants. Almost every family owns a percussion can rifle. The men and older boys hunt cottontail rabbits, jackrabbits, ground squirrels, dove, quail, roadrunners and large edible lizards. The meat is always chopped and made into a stew with red or green chili sauce. Although the Otomies of the area have domesticated animals — a few sheep and goats, some turkeys and chickens, and perhaps a pig — none of these animals are killed for food, except on the special occasion of a wedding or funeral when a chicken may be cooked or a goat barbecued. The domestic animals have been said, rather, to form a faunal bank account. They are used almost exclusively to sell for cash which is then used to purchase items of food not able to be gathered or raised by the family.

Besides these animals themselves, eggs and wool are taken to the weekly market at Ixmiquilpan and sold for cash.

Thus, the Otomies of the Mezquital still hunt and gather as many kinds of foodstuff from the environment as possible. But the type of environment in which they live has shaped the means by which they raise food plants as well. The portion of the Mezquital with which this paper is concerned lies at the base of the Sierra Madre Oriental. Many highland fingers jut out from the escarpment into the valley below. The Spanish term for this piedmont area, *faldas* (skirts), is a good descriptive term. Between the fingers (the fringe of the skirts) lie small fertile valleys which are actually flat alluvial fans created at the mouths of the *barancas* down which the rushing waters of the rainy season (principally June and July) bring soil eroded from the sides of the mountains. The water coming down the *barancas* soaks into the ground when it reaches the valleys, so that the stream bed which runs down the center of each small valley seldom has water in it even during the rainy season. The soil, a brown silt as much as 200 feet deep with few rocks except those in the stream bed, becomes dampened by the underground water flows. The family fields, called *milpas*, lie in the small valleys; the homesteads are on the rocky cactus-covered sides of the fingers above the small valley.

The floor of each small valley is divided into square plots belonging to separate families. After the revolution of 1910 the Otomi farmers were allotted 5 hectares (each hectare contains 10,000 square meters) for each head of a household. These 5-hectare allotments have been subdivided by inheritance by sons until few men in the observed communities own more than a hectare today. The men of a patrilineal kin group hold inherited *milpas* adjacent to one another. The *milpas* of separate extended families may be said to be separated by "edible fences". Besides mesquite trees, the sweet beans of which may be eaten, the fences are made of *nopales*, *maguay* plants and occasional peach, fig, mango, avocado or pomegranate trees. Squash and gourd vines are planted along the fence and often beehives are set nearby. The family *milpa* inside the large fence is subdivided by smaller fences of *magueyes* and fruit trees into the individual land holdings of each adult male of the extended family.

In July after the rains have come, all of the members of a family go to the *milpa* to plow. Two oxen, owned by the family or rented for the occasion, are yoked together by means of a beam lashed to their horns. A tow chain connects this yoke to the clevis of a wooden plow having an iron moldboard and plowshare. Plowing is difficult work, usually requiring two people to hold the handle of the plow and keep the plowshare underground. The oxen are apt to be quite unpredictable and there is generally much hilarity as the men of the family (and women, if they are needed) attempt to plow a straight furrow and turn the oxen at the end of each row.

After the ground has been broken and plowed into rows, corn and beans are planted. Some men prefer to make a hole in the ground with a metal digging stick for the seeds, others simply drop the seeds on the ground and kick a little dirt over them. Seed corn and beans are planted alternately in the furrow, not on top of the row. In this manner they are able to take full advantage of any water which might stand in the furrows after a rain. When the corn is a foot or two high, usually in about two months depending upon how much rain there is, the oxen are again brought to the *milpa* and the plow is run between the rows of plants. The earth is plowed from what was the top of the row into what was the furrow. In other words, the field is reversed and the young corn and bean plants now stand on the tops of the rows. This process not only eliminates weeds between the rows, but places extra dirt over the roots of the plants, providing a better shield against the drying out of the soil around the roots.

By August the rains are over and for four more months the corn and bean plants grow slowly in the constant sunlight, their roots growing deeper to reach the receding moisture. Crops mature in December — six months after planting. The whole family—men, women and children—helps pick and store the corn and beans which have already dried in the field. Most families in the observed villages use all that they grow so that there is no surplus and none of the crops are sold. The cobs and stalks of the corn are fed to the livestock; the bean plants are later plowed under.

In February, although no rain reaches the valley, water comes down the *barancas* from rainfall high in the mountains. Wheat (*trigo*) and broad beans (*habas*) are planted for livestock feed and, if enough water comes down for the crops to survive, are harvested in April. Winter crops are very often lost because of the lack of water.

Most of the protein in the Otomi diet comes from the consumption of beans, meat being eaten only when a hunter is successful or on festive occasions. It might be noted, however, that several kind of grubs (*gusanos*) which are high in protein are eaten by the Otomies. The favorites are large white *gusanos* found in the *maguay* plants, which taste like walnuts when roasted, and smaller *gusanos* eaten with the ears of corn in which they are found, either boiled or roasted.

Thus it can be seen that all parts of the environment are exploited by the Otomies to the extent of their technical ability in order to provide the family with adequate food and drink. Every centimeter of the fertile valley floor is covered with edible plants. The dry hill-sides are combed for game and *tunas*, berries and *quelite* greens when in season. Domesticated animals are fed cornstalks and cobs and mesquite berries. They are then sold to provide money for the purchase of vegetables not able to be raised outside the irrigated zone. The families observed buy tomatoes, onions, garlic, chilis

and coriander to make sauces for the stews or to eat on beans or tortillas. Rice has been bought by the Otomies at the weekly market in Ixmiquilpan for many years and recently some have begun to buy various forms of pasta to prepare with the same sauces. Often the family's supply of corn and beans does not last until the next harvest and additional corn and beans must be bought.

Although the Otomies depend upon the environment for other materials (houses are constructed of stone, organ pipe cactus and maguey provide thatch, and fibers from magueyes and lechugillas are woven into items of clothing, for example), it is in the exploitation of the environment for foodstuff that the greatest amount of time is spent. Much of the day is spent by the family members in collecting, producing and preparing food and drink. Hence this one response to the environment controls the organization of daily life, the division of labor and the routine of the seasons. Ultimately it affects settlement and residence patterns, inheritance rules and the law and judgements concerning land and gathering rights — in short, the entire political arrangement of villages.

Otomi culture, considered apart from the environment in which it operates might be seen as a backwards, tradition-bound culture, stubbornly resisting change.

When viewed as a patterned response to a harsh environment and technical limitations, it appears to be an efficient utilization of the available resources.

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Historical Archaeology In Arkansas

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Any discussion of historical archaeology today must begin with a treatment of the definition of the term "historical archaeology" and of the scope of the problems and goals of this field. A detailed discussion of this sort is beyond the range of the present paper and is dealt with at length elsewhere (Dollar 1969; Jelks 1968; Schuyler 1970; South 1967, 1968; Walker 1968), so I hope to present merely a brief outline of the definition, problems, and goals of historical archaeology and to introduce you to some of the work that is presently being done in Arkansas.

Historical archaeology has "come of age" in this country only in the last few years and as such has not yet built up a comprehensive and generally accepted body of method and theory. In general, however, we can say

that historical archaeology is a combination of the excavation techniques of field archaeology with some of the theoretical methods and assumptions of anthropology and history in order to present a thorough interpretation of sites occupied during the historic period. This is to say that we, ideally at least, not only retrieve information from the ground in the form of artifacts and features, but also use historical documents to identify these artifacts and features and use the theoretical background of anthropology to relate our findings to broader areas of social interaction, such as the evolution of technology, trade, and settlement patterns. These sorts of activities can be used to achieve a wide variety of ends, among them guidance for restoration, reconstruction, or furnishing of significant historic structures, added insights