

the ecological basis for Aztec sacrifice¹

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Recent theoretical work suggests that the growth of population pressure on natural resources may be a major determinant of the regularities found in human sociocultural evolution. Carneiro (1961, 1970) has suggested that population pressure building up early in cases of environmental circumscription explains the locations of the first states. Boserup (1965) theorizes that agricultural intensification is due to the growth of population pressure; and I (Harner 1970, 1975) have proposed that preindustrial economic, social, and political evolution in general can be explained as deriving from increase in population pressure. Other investigators are also starting to adopt the population pressure model to understand the regularities of sociocultural evolution.

At this point in the development of population pressure theory a new challenge arises: not the explanation of regularities in sociocultural evolution, but the explanation of peculiar or unusual cultural developments. If the population pressure approach is as powerful an explanatory tool as I have argued, it should be able to explain the unique among cultural developments as well as the mundane or common; for it is the exceptional case that is the most important and most interesting to confront in terms of an evolutionary theory. On the basis of such a confrontation a theory must be discarded or improved.

It is in this sense that proponents of the population pressure theory of social evolution must confront the major differences between cultures that are otherwise basically at a similar sociopolitical level. If an existing theory can be found sufficient to the task, it is strengthened; if it fails, it does not have the importance previously ascribed to it.

For this paper I have chosen to focus on the cultural distinctiveness of Mesoamerica especially as exemplified by the human sacrificial complex of the Aztecs. Anthropologists such as Kroeber (1959:199) have long pointed to pre-Conquest Mexican human sacrifice as representing an extreme in known cultural behavior. Among state societies in the ethnological record, the Aztecs sacrificed unparalleled numbers of human victims, 20,000 a year being a commonly cited figure.

Yet cultural evolutionists such as Steward (1955), White (1959), Adams (1966), Sanders and Price (1968), and Service (1975) have been silent when it comes to explaining this remarkable and central aspect of Aztec civilization. The nonevolutionists have not done much better, typically attempting to explain the human sacrificial complex

The Aztec emphasis on ritualized human sacrifice and the sheer quantities of victims involved have long been recognized as apparent extremes of cultural behavior in the world ethnographic record. This paper proposes an ecological and evolutionary theory to explain why the peculiar development of the Aztec sacrificial complex was a natural consequence of concrete subsistence problems that were distinctive to Mesoamerica, and especially to the Valley of Mexico.

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on the basis of Aztec religion (e.g., Caso 1958:72; Soustelle 1964:112; Vaillant 1966:208), without suggesting why this particular form of religion demanding large-scale human sacrifice should have evolved when and where it did. I will offer an explanation as to why the peculiar development of the Aztec sacrificial complex occurred at that time and place and how it was a natural result of distinctive ecological problems.

Before further focusing on the particularities of the Aztec situation, it may be useful to review some of the basic ecological assumptions that are involved in the population pressure theory of social evolution. As I have indicated elsewhere (Harner 1970, 1975), human population growth is as much an unmistakable prehistoric and historic trend as the evolution of technology. The long-term increase of human population has led to increasing degradation of wild flora and fauna used for food. The extinction of many big-game mammals by the end of the European Paleolithic and by Paleo-Indians in the New World (see Martin 1967, 1973; Mosimann and Martin 1975) is the first outstanding evidence of this human-caused environmental degradation. The evolution into the Old World Mesolithic with its shift to marine resources and small-game hunting, and the development of a New World cultural analogue, can be seen as continuing and necessary responses to such environmental degradation. The increasing scarcity of wild game and food plants soon made the innovation of plant and animal domestication desirable and competitively efficient in several regions of the planet. With the passage of time and the further growth of human populations, more areas became similarly degraded, and plant and animal domestication necessarily became ever more widely adopted, providing an increasing proportion of the diet.

The need for intensified domesticated food production was especially felt early in such fertile, but environmentally circumscribed localities as the riverine valleys surrounded by less desirable terrain (Carneiro 1961, 1970). Under such circumstances, climate and environment permitting, plants always became domesticated; but herbivorous mammals apparently could not be unless appropriate species existed. The Valley of Mexico, with its fertile and well-watered bottom lands surrounded by mountains, fits well the environmental circumscription model. Population growth increased relatively steadily in this circumscribed area up to the Conquest (Sanders 1972:110-116).

In the Old World the domestication of herbivorous mammals proceeded apace with the domestication of food plants. In the New World, however, the ancient hunters completely eliminated potential herbivorous mammalian domesticates from the Mesoamerican area. It was only in the Andean region and in southern South America that some *Camelops* species, especially the llama and alpaca, managed to survive the ancient onslaught and thus were available in later times for domestication along with another important local herbivore, the guinea pig (*Cavia porcellus*). In the Mesoamerican area the *Camelops* species became extinct at least several thousand years before domesticated food production had to be undertaken seriously. Nor was the guinea pig available. In Mesoamerica, emphasis was on the domestication of wild fowl, such as the turkey, as well as of the dog for food. The Mexican hairless, or Chihuahua, is generally assumed to be the outgrowth of breeding for such a purpose. The dog, however, being by nature a carnivore, was not an efficient converter and additionally was a competitor with its breeders for animal protein.

As population pressure increased in the Valley of Mexico, wild game supplies were decreasingly available to provide protein for the diet, Vaillant (1966:142) noting that "the deer were nearly all killed off" before the Aztec period. The seriousness of population pressure in general in the Valley during the time of the Aztecs has been discussed by many researchers (e.g., Vaillant 1966:136-137). In terms of carbohydrate

production, this challenge was usually met by *chinampa* development and other forms of agricultural intensification (e.g., Sanders 1972:115); but domesticated animal production was limited by the lack of a suitable herbivore. This made the ecological situation of the Aztecs and their neighbors unique among the world's major civilizations. It is the thesis of this paper that large-scale cannibalism, disguised as sacrifice, was the natural consequence of this situation.²

the extent of Aztec sacrifice and cannibalism

The contrast between Mesoamerica and the Andes in terms of the existence of domesticated herbivores was matched by the contrast between the Inca and Aztec emphasis on human sacrifice. In the Inca Empire, the other major political entity in the New World at the time of the Conquest, annual human sacrifices could, at most, apparently be measured only in the hundreds (e.g., Rowe 1947:279, 286, 300, 303, 305-306). Among the Aztecs, the figures were incomparably greater. The annual figure of "20,000" so commonly mentioned is of uncertain significance. As Prescott (1936:48-49n) notes, "Bishop Zumarraga, in a letter written a few years after the Conquest, states that 20,000 victims were yearly slaughtered in the capital. Torquemada turns this into 20,000 *infants*. Herrera, following Acosta, says 20,000 victims on a specified day of the year, throughout the kingdom."

The most famous single sacrifice was at the dedication of the main pyramid in Tenochtitlan, in 1487. Here, too, the significance of the figures given for victims is uncertain: the *Codex Telleriano-Remensis* states 20,000; Torquemada reports 72,344; Tezozomoc, Ixtlilxochitl, and Durán all give 80,400 (Cook 1946:90; Prescott 1936:49n).

A thorough analysis of the early reports on numbers of Aztec sacrificial victims is provided by Sherburne Cook in his 1946 paper, where he (1946:93) estimates an overall annual mean of 15,000 victims in a Central Mexican population estimated at 2,000,000. However, Cook often radically scales down the originally reported figures without really presenting adequate evidence to support his reductions. The conservatism inherent in his 1946 paper, in fact, is made evident by his later unpublished revision, in collaboration with Woodrow Borah, of the estimate of the Central Mexican population in the fifteenth century upwards from his 2,000,000 figure to 25,000,000 (Borah, personal communication).

Furthermore, Woodrow Borah, who is now possibly the leading authority on the demography of Central Mexico around the time of the Conquest, has given me permission to cite his new unpublished estimate of the number of persons sacrificed in Central Mexico in the fifteenth century; *250,000 per year*, or equivalent to one percent of the total population (Borah, personal communication). This quarter of a million annual figure, according to Borah (personal communication), is consistent with the existence of thousands of temples throughout the Triple Alliance alone and with the sacrifice of an estimated one thousand to three thousand persons at each temple per year.

Beyond those numbers is the question of what was done with the bodies after the sacrifices. The evidence of Aztec cannibalism has largely been ignored and consciously or unconsciously covered up. One must go back to Conquest and immediately post-Conquest sources to gain an awareness of its importance in Aztec life. Bernal Díaz (1963), other conquistadores such as Cortés (1962, 1963), and Sahagún (e.g., 1951, 1954, 1970) are among the most reliable. Less reliable but basically in accord with the others is Durán (1971).

While some sacrificial victims, such as children sacrificed to Tlaloc by drowning (e.g.,

Durán 1971:164, 167) or persons suffering skin diseases (e.g., Sahagún 1951:170), were not eaten, the overwhelming majority of the sacrificed captives appear to have been consumed. A major objective, and sometimes the only objective, of Aztec war expeditions was to capture prisoners for sacrifice. While some might be sacrificed and eaten on the field of battle, most were taken to home communities or to the capital, where they were kept in wooden cages until they were sacrificed by the priests at the temple-pyramids. Most of the sacrifices involved tearing out the heart, offering it to the sun and, with some blood, also to the idols. The corpse then was tumbled down the steps of the pyramid, where elderly attendants cut off the arms, legs, and head. While the head went onto the local skull rack, at least three of the limbs were normally property of the captor, who formally retained ownership of the victim. He then hosted a feast at his quarters, of which the central dish was a stew of tomatoes, peppers, and the limbs of the victim. The torso of the victim, in Tenochtitlan at least, went to the royal zoo to feed carnivorous mammals, birds, and snakes. Where towns lacked zoos, the fate of the torsos is not certain. The following material constitutes some of the evidence.

As the practice of cannibalism by the Aztecs and their neighbors was essentially terminated with the Spanish Conquest, some of the best evidence for its existence and extent is provided by the letters of Hernán Cortés addressed to Charles V of Spain (Cortés 1962, 1963); the account of the Conquest by Bernal Díaz del Castillo (1963), a firsthand participant and its most thorough chronicler; in the chronicle of Andrés de Tapia (1963), one of Cortés' captains, and in the memoir of Fray Francisco de Aguilar (1963), who had participated in the Conquest. The accounts are in the approximate chronological order of the expedition's history, beginning with its landings on the east coast of Mexico in 1519 and following through to the fall of Tenochtitlan (Mexico City) in 1521.

Upon landing on the coast of Tabasco, Cortés and his men engaged in battles with Indians and took prisoners. Tapia (1963:22) states, "At camp these Indians told us how they were gathering to give us battle and fight with all their might to kill and then eat us." Cortés sent the prisoners back as messengers to demand the surrender of the Indians. Tapia (1963:23) goes on to relate, "The messengers did not return with an answer, but some warriors moving about in the canals and estuaries were saying to our men that in three days all the warriors in the land would be gathered and would eat us."

After additional fighting, Cortés' forces reembarked in their ships and sailed along the coast to what is now Vera Cruz. There founding a town, he sent one of his captains, Pedro de Alvarado, with a force inland to reconnoiter and obtain provisions. Alvarado first entered some villages that were under Aztec rule. Bernal Díaz (1963:104) reports:

When Alvarado came to these villages he found that they had been deserted on that very day, and he saw in the *cues* [temples or temple-pyramids] the bodies of men and boys who had been sacrificed, the walls and altars all splashed with blood, and the victims' hearts laid out before the idols. He also found the stones on which their breasts had been opened to tear out their hearts.

Alvarado told us that most of the bodies were without arms and legs, and that some Indians had told him that these had been carried off to be eaten. Our soldiers were greatly shocked at such cruelty. I will say no more about these sacrifices, since we found them in every town we came to.

A larger expedition was subsequently led by Cortés to Cempoala, where Bernal Díaz (1963:122) observes:

Moreover every day they sacrificed before our eyes three, four, or five Indians, whose hearts were offered to those idols and whose blood was plastered on the walls. The feet, arms, and legs of their victims were cut off and eaten, just as we eat beef from the butcher's in our country.

Penetrating farther inland, the Spaniards reached Xocotlan (now Zautla). There they encountered evidence of large-scale human sacrifice. Díaz (1963:138) states:

I remember that in the square where some of their *cues* stood were many piles of human skulls, so neatly arranged that we could count them, and I reckoned them at more than a hundred thousand. I repeat that there were more than a hundred thousand. And in another part of the square there were more piles made up of innumerable thigh-bones. There was also a large number of skulls and bones strung between the wooden posts, and three *papas* [priests], whom we understood to have charge of them, were guarding these skulls and bones. We saw more of such things in every town as we penetrated further inland. For the same custom was observed here and in the territory of Tlascalca [Tlaxcala].

The expedition eventually reached Tlaxcala, the stronghold of the archenemies of the Aztecs. Díaz (1963:183) reports:

I must now tell how in this town of Tlascalca [Tlaxcala] we found wooden cages made of lattice-work in which men and women were imprisoned and fed until they were fat enough to be sacrificed and eaten. We broke open and destroyed these prisons, and set free the Indians who were in them. But the poor creatures did not dare to run away. However, they kept close to us and so escaped with their lives. From now on, whenever we entered a town our captain's first order was to break down the cages and release the prisoners, for these prison cages existed throughout the country. When Cortes saw such great cruelty he showed the *Caciques* [chiefs] of Tlascalca how indignant he was and scolded them so furiously that they promised not to kill and eat any more Indians in that way. But I wondered what use all these promises were, for as soon as we turned our heads they would resume their old cruelties.

Cortés and his men then marched on to Cholula, a city hostile to the Tlaxcalans and under Aztec control. There Cortés made a speech to the Cholulans, accusing them of planning treachery, and said to them that “we had done them no harm but had merely warned them against certain things as we had warned every town through which we had passed: against wickedness and human sacrifice, and the worship of idols, and eating their neighbour's flesh, and sodomy” (Díaz 1963:198). Cortés further told the Cholulans (Díaz 1963:199):

So in return for our coming to treat them like brothers, and tell them the commands of our lord God and the King, they were planning to kill us and eat our flesh, and had already prepared the pots with salt and peppers and tomatoes.

The lecture ended with Cortés and his men making a surprise attack and massacring a significant proportion of his audience.

Before ending his description of Cholula, Bernal Díaz (1963:203) says:

I think that my readers must have heard enough of this tale of Cholula, and I wish that I were finished with it. But I cannot omit to mention the cages of stout wooden bars that we found in the city, full of men and boys who were being fattened for the sacrifice at which their flesh would be eaten. We destroyed these cages, and Cortés ordered the prisoners who were confined in them to return to their native districts. Then, with threats, he ordered the *Caciques* and captains and *papas* of the city to imprison no more Indians in that way and to eat no more human flesh. They promised to obey him. But since they were not kept, of what use were their promises?

The Spaniards soon reached the Aztec capital, Tenochtitlan, where they initially were guests of Moctezuma, who allowed them to eat with him and the nobility in his palace on game brought as tribute from all over the Aztec empire. Díaz (1963:225-226) remarks:

They cooked more than three hundred plates of the food the great Moctezuma was going to eat, and more than a thousand more for the guard. I have heard that they used to cook him the flesh of young boys. But as he had such a variety of dishes, made of so many different ingredients, we could not tell whether a dish was of human flesh or anything else, since every day they cooked fowls, turkeys, pheasants, local partridges, quail, tame and wild duck, venison, wild boar, marsh birds, pigeons, hares and rabbits, also many other kinds of birds and beasts native to their country, so numerous that I cannot quickly name them all. I know for certain, however, that after our Captain spoke against the sacrifice of human beings and the eating of their flesh, Moctezuma ordered that it should no longer be served to him.

Among the wonders of Tenochtitlan was the royal zoo, described by Díaz (1963:229):

Let us go on to another large house where they kept many idols which they called their fierce gods, and with them all kinds of beasts of prey, tigers and two sorts of lion, and beasts

rather like wolves . . . , and foxes and other small animals, all of them carnivores, and most of them bred there. They were fed on deer, fowls, little dogs, and other creatures which they hunt and also on the bodies of the Indians they sacrificed, as I was told.

I have already described the manner of their sacrifices. They strike open the wretched Indian's chest with flint knives and hastily tear out the palpitating heart which, with the blood, they present to the idols in whose name they have performed the sacrifice. Then they cut off the arms, thighs, and head, eating the arms and the thighs at their ceremonial banquets. The head they hang up on a beam, and the body of the sacrificed man is not eaten but given to beasts of prey. They also had many vipers in this accursed house, and poisonous snakes which have something that sounds like a bell in their tails. These, which are the deadliest snakes of all, they kept in jars and great pottery vessels full of feathers, in which they laid their eggs and reared their young. They were fed on the bodies of sacrificed Indians and the flesh of the dogs that they bred. We know for certain, too, that when they drove us out of Mexico and killed over eight hundred and fifty of our soldiers, they fed these beasts and snakes on their bodies for many days.

Elsewhere, Díaz refers to the great temple-pyramid of Huitzilipochtli and notes (1963:239):

A little apart from the *cue* stood another small tower which was also an idol-house or true hell, for one of its doors was in the shape of a terrible mouth, such as they paint to depict the jaws of hell. This mouth was open and contained great fangs to devour souls. Beside this door were groups of devils and the shapes of serpents, and a little way off was a place of sacrifice, all blood-stained and black with smoke. There were many great pots and jars and pitchers in this house, full of water. For it was here that they cooked the flesh of the wretched Indians who were sacrificed and eaten by the *papas*. Near this place of sacrifice there were many large knives and chopping-blocks like those on which men cut up meat in slaughter houses . . . I always called that building Hell.

Nearby was the famous skull rack. Two of Cortés' soldiers were assigned the task of counting the number of skulls. One of them, Andrés de Tapia (1963:41-42), has left this account, which is relevant to gaining an impression of the number of sacrifices:

At a crossbow's throw from this tower, and facing it, were sixty or seventy very tall beams set on a platform made of stone and mortar. Lining the platform steps were many skulls set in mortar, with their teeth bared. At each end of the row of beams was a tower made of mortar and skulls with bared teeth, apparently built without any other stones. The beams were a little less than a measuring rod apart, and from top to bottom as many poles as there were room for had been fitted across, each pole holding five skulls pierced through the temples. The one who writes this, together with Gonzalo de Umbría, counted the poles and multiplied them by the five skulls hung between beams, and found that there were 136,000 skulls, not counting the ones on the towers.

Later the Spaniards had to flee Tenochtitlan. Aguilar (1963:153) puts it, "the city was teeming with such masses of people that there was hardly room for them inside or out, and they were all hungering for the flesh of the miserable Spaniards." In the famous retreat of the Noche Triste many of Cortés' men were lost to the Aztecs. Aguilar (1963:155) observes, "As we were fleeing it was heartbreaking to see our companions dying, and to see how the Indians carried them off to tear them to pieces."

After many days of recuperation and prolonged preparation, Cortés' forces finally returned and commenced to make attacks along the causeways to reenter Tenochtitlan. On one of these occasions, at a gap in a causeway, the Aztec warriors shouted to Cortés (1963:70) that "they would eat us and the Tascaltecan [Tlaxcalans]" when they needed food. Some days later the Tlaxcalan allies of the Spaniards reciprocated the insults in this dramatic manner (Cortés 1963:95):

On this day, they [the Aztec defenders of Tenochtitlan] felt and showed great dismay, especially when they saw us in their city, burning and destroying it, and the natives of Tesaico, Calco, Suchimilco, and the Otomí fighting against them, each shouting the name of his province; and in another quarter those of Tascaltecal [Tlaxcala], all showing them their countrymen cut in pieces, telling them they would sup off them that night and breakfast off them next morning, as in fact they did.

During these operations, Cortés also sent punitive forces into the countryside. The *aguacil mayor* of one of these sorties encountered burnt and deserted Otomí hamlets and then found (Cortés 1963:107):

near a river bank many [Aztec] warriors who, having just finished burning another town, retreated when they saw him. On the road, were found many loads of maize and roasted children which they had brought as provisions and which they left behind them when they discovered the Spaniards coming.

Soon thereafter Cortés' forces and their Indian allies began a methodical demolition of Tenochtitlan as they slowly advanced into the city, leveling houses and filling up the canals. During this phase, they caught a large force of Aztecs in an ambush (Cortés 1963:111-112):

In this ambush more than five hundred, all of the bravest and most valiant of their principal men were killed, and, that night our allies supped well, because they cut up all those whom they had killed and captured to eat.

Subsequently in the siege, however, the fortunes of war temporarily reversed, and sixty-two Spaniards were captured in an Aztec counterattack. Díaz (1963:386-387) reports:

When we had retired almost to our quarters, across a great opening full of water, their arrows, darts, and stones could no longer reach us . . . when the dismal drum of Huichilobos [Huitzilpochtli] sounded again, accompanied by conches, horns, and trumpet-like instruments. It was a terrifying sound, and when we looked at the tall *cue* from which it came we saw our comrades who had been captured in Cortés' defeat being dragged up the steps to be sacrificed. When they had hauled them up to a small platform in front of the shrine where they kept their accursed idols we saw them put plumes on the heads of many of them; and then they made them dance with a sort of fan in front of Huichilobos. Then after they had danced the *papas* laid them down on their backs on some narrow stones of sacrifice and, cutting open their chests, drew out their palpitating hearts which they offered to the idols before them. Then they kicked the bodies down the steps, and the Indian butchers who were waiting below cut off their arms and legs and flayed their faces, which they afterwards prepared like glove leather, with their beards on, and kept for their drunken festivals. Then they ate their flesh with a sauce of pepper and tomatoes. They sacrificed all our men in this way, eating their legs and arms, offering their hearts and blood to their idols as I have said, and throwing their trunks and entrails to the lions and tigers and serpents and snakes that they kept in the wild-beast houses Our readers must remember that though we were not far off we could do nothing to help.

The Aztecs added insult to injury by throwing at the Spaniards' Tlaxcalan allies "roasted legs of Indians and the arms of our soldiers with cries of: 'Eat the flesh of these *Teules* [gods] and of your brothers, for we are glutted with it. You can stuff yourself on our leavings.'" (Díaz 1963:387).

Soon thereafter the Spaniards conquered the entire city, and the war in the Valley of Mexico was over. Spanish rule essentially marked the end of native warfare and cannibalism, and it seems likely that the new sources of meat, in the form of introduced Old World domesticates, helped reinforce obedience to the new laws.

Among the conquistadores who remained in Mexico was Aguilar, who later in life became a Dominican monk (Fuentes 1963:134) and wrote a memoir of the Conquest. In it, he (Aguilar 1963:163-164) summarizes his view of the nature of the sacrificial practices:

The natives of this land had very large temples, enclosed by merloned walls, or sometimes a fence made of logs piled one on top of the other, which they took to make fire for the sacrifice. They had large towers with a house of worship at the top, and close to the entrance a low stone, about knee-high, where the men or women who were to be sacrificed to their gods were thrown on their backs and of their own accord remained perfectly still. A priest then came out with a stone knife like a lance-head but which barely cut anything, and with this knife he opened the part where the heart is and took out the heart, without the person who was being sacrificed uttering a word.

Then the man or woman, *having been killed in this fashion, was thrown down the steps, where the body was taken and most cruelly torn to pieces, then roasted in clay ovens and eaten as a very tender delicacy; and this is the way they made sacrifices to their gods.*

Besides the firsthand accounts from the Conquest, the works of Father Bernardino de Sahagún are probably the single most thorough and reliable source on the subject under consideration. Arriving in Mexico less than a decade after the Conquest, and using Aztec nobles as informants, he transcribed their written or dictated information in Nahuatl as a series of books (e.g., Sahagún 1951, 1954, 1970). These volumes have the strength of presenting the upper-class insiders' view of Aztec culture; but this is also a limitation. For example, certain aspects of their behavior which might seem remarkable and significant to a European or to an anthropologist, such as cannibalism, probably were too routine an aftermath of sacrifice normally to deserve comment. Nevertheless, some very interesting details on such practices are provided. For example, Sahagún (1951:47-48), in describing the ceremonies of the month of Tlacaxipeualiztli, states:

And so they [the war captives] were brought up [the pyramid temple steps] before [the sanctuary of] Uitzilopochtli.

Thereupon they stretched them, one at a time, down on the sacrificial stone; then they delivered them into the hands of six priests, who threw them upon their backs, and cut open their breasts with a wide-bladed flint knife.

And they named the hearts of the captives "precious eagle-cactus fruit." They lifted them up to the sun, the turquoise prince, the soaring eagle. They offered it to him; they nourished him with it.

And when it had been offered, they placed it in the eagle-vessel. And these captives who had died they called "eagle men."

Afterwards they rolled them over; they bounced them down; they came tumbling down head over heels, and end over end, rolling over and over; thus they reached the terrace at the base of pyramid.

And here they took them up.

And the old men, the *quaquacuiliti*, the old men of the tribal temples, carried them there to their tribal temples, where the captor had promised, undertaken, and vowed [to take a captive].

There they took [the slain captive] up, in order to carry him to the house [of the captor], so that they might eat him. There they portioned him out, cutting him to pieces and dividing him up. First of all they reserved for Moctezuma a thigh, and set forth to take it to him.

And [as for] the captor, they there applied the down of birds to his head and gave him gifts. And he summoned his blood relations, he assembled them, that they might go to eat at the house of him who had taken the captive.

And here they cooked each one a bowl of stew of dried maize, called *tlatlaolli*, which they set before each, and in each was a piece of the flesh of the captive.

At the feast, the captor's relatives greeted him with tears because they recognized that he, in turn, would eventually be killed in war or sacrificed by the enemy (Sahagún 1951:48). Since this was done within the context of the feasting on the captive, it suggests that there was an implicit recognition that the ultimate fate of the warrior was to serve as food for the enemy. That this fate may have been seen as a reciprocal one may possibly be suggested by the fact that the captor viewed his captive almost as his son. Sahagún (1951:52-53) says:

And when [after the sacrifice] he [the captor] had gone to and reached all the places, he took the insignia to the palace, and he caused [the body of] his captive to be taken to the tribal quarters, when they had passed the night in vigil; here he flayed him. Afterwards he had [the flayed body] taken to his house, where they cut it up, that it might be eaten and shared, and, as was said, to bestow as a favor to others. It hath been told elsewhere how this was done.

And the captor might not eat the flesh of his captive. He said: "Shall I, then, eat my own flesh?" For when he took [the captive], he had said: "He is as my beloved son." And the captive had said: "He is as my beloved father." And yet he might eat of someone else's captive.

Elsewhere, Sahagún (1951:3) gives a supporting account of the disposition of the sacrificial victims' bodies:

After having torn their hearts from them and poured the blood into a gourd vessel, which the master of the slain man himself received, they started the body rolling down the pyramid steps. It came to rest upon a small square below. There some old men, whom they called Quaquacuiltin, laid hold of it and carried it to their tribal temple, where they dismembered it and divided it up in order to eat it.

Likewise, Sahagún (1951:24) mentions cannibalism in a summary account of the feast of the month of Tepeilhuitl:

After they had slain them and torn out their hearts, they took them away gently, rolling them down the steps. When they had reached the bottom, they cut off their heads and inserted a rod through them, and they carried the bodies to the houses which they called *calpulli*, where they divided them up in order to eat them.

Interestingly, in a more extended account of this same feast Sahagún (1951:121-123) does not even mention the cannibalism, but simply states, "And when they had severed the heads from the bodies, then they took [the bodies] to the tribal temples [whence the victims had been sent]." This supports the view earlier expressed here that Sahagún's narrators, as insiders in the culture, probably took the anthropophagic aspect for granted and may have very commonly failed to mention its practice in their descriptions of the different details of ceremonies and rites.

That to be eaten was the common fate of those captured in war is likewise suggested by the description of the hazards and difficulties of being a merchant or member of the *pochteca* traveling in the lands of enemies. Sahagún (1970:42) says:

In case they were besieged, enclosed, in enemy lands, living among others, having penetrated well within, they became like their enemies. In their array, their hairdress, their speech, they imitated the natives.

And if they came to an evil pass, if they were discovered, then [the foe] slew them in ambush; they served them up with chili sauce.

If more than a single Aztec warrior took part in capturing the same person, there were definite rules concerning the apportionment of the meat following the sacrifice. Sahagún (1954:75) states:

And if he took a captive with the help of others—perchance doing so with the aid of two, or of three, or of four, or of five, or of six, at which point came to an end [the reckoning] that a captive was taken with others' help—then the lock of hair [worn by a warrior who had not yet captured] was removed. And thus was the division of their captive: in six parts it came. The first, who was the real captor, took his body and one of his thighs—the one with the right foot. And the second who took part [in the capture] took the left thigh. And the third took the right upper arm. The fourth took the left upper arm. The fifth took the right forearm. And as for the sixth, he took the left forearm.

If a warrior captured a prisoner without help, probably the only apportionment of limbs that had to occur was the setting aside of a thigh for Moctezuma, referred to earlier (Sahagún 1951:47). This would have been consistent with the fact that a captor who had thus acted alone was taken before Moctezuma at the palace and given special clothing in recognition of his deed (Sahagún 1954:76).

When there was an unsettled dispute as to whom should be credited with making a capture, the prisoner "was dedicated to Uitzcalco [or] they left him to the tribal temple, the house of the devil" (Sahagún 1954:53). This seems consistent with the earlier-cited account by Díaz (1963:239) of the building he called "Hell" where butchered captives were cooked especially for the priests.

Sahagún (1954:73), like the Spaniards, speaks of the use of wooden cages to hold war prisoners and gives some independent indication that large numbers of captives were involved:

And there in battle was when captives were taken. When it had come to pass that they went against and conquered the city, then the captives were counted, there in wooden cages: how

many had been taken by Tenochtitlan, how many had been taken by Tlatilulco, and by the people of the swamp lands and the people of the dry lands everywhere. The captives were examined [to determine] how many groups of four hundred were formed.

Those who counted were the generals and the commanding generals. And then they sent messengers here to Mexico. Those who were sent as messengers were seasoned warriors, who informed Moctezuma of the great veracity of the four-hundred count. They brought word of how many groups of four hundred had been made captive.

Although the foregoing excerpts do not exhaust the relevant evidence in Sahagún, they serve to illustrate some of the details of Aztec cannibalism and to demonstrate a consistency with the accounts of Cortés and the members of his expedition. There are, of course, other historical sources that could be drawn upon for evidence, although they are generally less reliable, more derivative, or more removed from the actual time of the Conquest. The sixteenth-century work of Durán (1971), in particular, however, deserves to be mentioned. As Durán was not born until around 1537, his research in Mexico began substantially later than Sahagún's, and his information is derived from written documents as well as from informants. Nonetheless, he is a valuable source of recognized importance. With regard to cannibalism among the Aztecs, Durán (1971:79, 92, 133, 191, 212, 216, 227, 259, 261, 428, 432, 444, 464) repeatedly makes reference to the custom of eating the sacrificed victims. Any reader with a lingering doubt as to the importance of cannibalism in the Aztec sacrificial complex should consult Durán. In one instance he also throws light on the native rationale for eating the flesh of the captive after the sacrifice: that it was considered "leftovers" and was returned to the captor as a reward for having fed the deity (Durán 1971:216). He (1971:216) mentions, too, that in the case of multiple captors of a single victim, the flesh was apportioned among them, although he does not seem to have as accurate or detailed knowledge of the matter as Sahagún (1954:75).

While relatively little archaeology has been done at Aztec sites, it is interesting to note that there already exists some excavated evidence of relevance to the discussion here. As the editors of Durán (1971:79n) observe:

The team of archaeologists working in the Plaza de las Tres Culturas at Tlatelolco, Mexico City, from 1960 to 1965 discovered various deposits totaling more than one hundred skulls which had once been strung on a skull rack such as Durán describes. In the opinion of the archaeologist Eduardo Contreras, of the Mexican Institute of Anthropology, the hair, brains, eyes, tongues, and other fleshy parts were probably removed from the craniums before they were perforated and placed on the *tzompantli* pole for exhibition.

Separate from the skulls, but at the same site, were found headless human rib cages completely lacking the limb bones (Eduardo Contreras, Jr., personal communication). Associated with these remains of torsos were razor-like obsidian blades that presumably had been used in butchering.

Given the long-standing written documentation of significant Aztec cannibalism in connection with the sacrificial complex, one cannot help but wonder why the evidence has been so ignored. Both Vaillant (1966:209) and Soustelle (1964:111), for example, in their classic synthetic works on Aztec culture each only allow one sentence in their texts on the subject of Aztec cannibalism. Specifically, Vaillant states, "Ceremonial cannibalism was sometimes practised, in the belief that the eater could absorb the virtues of the eaten, but this rite cannot be considered a vice."

The apparent defensiveness of Vaillant's statement may be a key to the neglect of this subject. Modern Mexicans and anthropologists probably have tended to be embarrassed by the topic, the former partly for nationalistic reasons, and the latter in part because of the desire to portray native peoples in the best possible light in order to combat ethnocentrism. Ironically, both these attitudes may ultimately represent European

ethnocentrism regarding cannibalism, a natural product of a continent that had relatively abundant livestock for meat and milk.

nutritional aspects

The question naturally arises as to the nutritional role the consumption of human flesh might have played in the Aztec diet. Soustelle (1964:156-157) volunteers that the diet of the commoners included only “rarely any meat, such as game, venison, or poultry (turkey).” He (1964:160) similarly states, “The poorer people ate turkey only on great occasions” and also notes, “Poor people and the lakeside peasants skimmed a floating substance from the surface which was called *tecuilatl*, ‘stone dung’; it was something like cheese, and they squeezed it into cakes; they also ate the spongy nests of water-fly larvae” (1964:159). Cook and Borah (n.d.:5, 7) identify the floating substance as algae possibly fostered by pollution from the dense population. They (n.d.:7) also comment that the peasants or commoners ate iguanas, snakes, lizards, and worms, further noting, “A number of the *Relaciones Geográficas* state emphatically that just about everything edible was eaten.” The nobility and the merchant class, in contrast, normally had a rich diet which included a variety of wild game (see below).

Despite the apparent scarcity of meat in the diet of the commoners, they theoretically could get the necessary eight essential amino acids from their maize and bean crops, the two foods complementing each other in their essential amino acid components (Pimental, et al. 1975:756). One of the problems with relying on beans and maize was that they would have to be ingested in large enough quantities simultaneously or nearly simultaneously in order to provide the body with the eight essential amino acids *in combination* in order for them to be used to rebuild body tissues; otherwise the dietary protein would simply be converted to energy (e.g., Pike and Brown 1967:43; FAO/WHO *Ad Hoc* Expert Committee 1973:61-62; Wohl and Goodhart 1968:113).

Thus, in order for the Aztecs to obtain their essential amino acids from the maize-bean combination it would have been necessary for them to be able to consume large quantities of both plants together on a year-round basis. But seasonal crop failures and famines were common among the Aztecs:

Famines often occurred; every year there was the threat of shortage . . . in 1450 the three rulers of the allied cities distributed the saved-up stores of grain of ten years and more. But still there was always the need for stop-gap foods, animal or vegetable, in an emergency (Soustelle 1964:161).

Under these conditions it is clear that the necessary maize-bean combination could not be relied upon as a source of the essential amino acids. To the reader who may wonder how the Aztecs might have known they needed the essential amino acids, it should be parenthetically pointed out that the human body, like that of other organisms perfected under natural selection, is a homeostatic entity that under conditions of nutritional stress naturally seeks out the dietary elements in which it is deficient. If living organisms did not have this innate capacity, they would not survive.

Another dietary problem for the Aztecs was the scarcity of fats (Soustelle 1964:159; Fuentes 1963:220-221n). While the exact amount of fatty acids required by the human body remains a subject of uncertainty among nutritionists (Pike and Brown 1967:32, 458), there is agreement that fats provide a longer-lasting energy source than carbohydrates, due to the slower rate of metabolism. It is noteworthy that fatty meat, by providing both fat and the essential proteins, assures the utilization of the essential amino acids for tissue building, since the fat will provide the necessary source of energy that

must also be supplied if the dietary protein is not to be siphoned off as a purely caloric contribution (see Pike and Brown 1967:44; FAO/WHO *Ad Hoc* Expert Committee 1973:19; Wohl and Goodhart 1968:119-120). In this connection, it is interesting that the Aztecs kept prisoners in wooden cages prior to their sacrifice and at least sometimes fattened them there (Díaz 1963:183, 203). It should be noted that the prisoners could be fed purely on carbohydrates to build up the fat, since the essential amino acids are not necessary for such production. The confinement to the cages would also have contributed to the rapid accumulation of fat, given enough caloric intake.

If Aztec cannibalism was a response to growing population pressure, one would expect it to increase in frequency through time. There is indeed a numerical rise in the capture and sacrifice of human victims during the three-quarters of a century preceding the Conquest. Cook (1946:83) has summarized the situation as follows:

On the whole it is safe to ascribe the beginning of the sacrifice of captives to the very early fifteenth or late fourteenth centuries. The development of the custom to include huge numbers occurred not much prior to the middle of the fifteenth.

It was precisely at this period that the population density of Central Mexico was reaching its maximum and that the margin of subsistence was becoming somewhat precarious.

Although Cook does not mention the cannibalism connected with Aztec sacrifice, his overview of the rise of sacrifice is completely consistent with the relationship theorized here between rising population pressure in the Valley of Mexico and increasing cannibalism in the absence of suitable herbivores. This situation has its analogue among the Miyanmin of New Guinea, as recently described by Dornstreich and Morren (1974:5). They report:

within the past 50 years among the eastern Miyanmin . . . , cannibalism has become intensified, even to the point of becoming separated from the warfare complex as described. This occurred as a result of external population pressures.

In the eastern Miyanmin area, this resulted in a number of Miyanmin local groups being concentrated in a refuge on the middle May River In the area settled by these groups, game declined rapidly and the ability to compensate for this by dispersing settlements was limited by the necessities of defense as well as the factor of concentration. Some intra-Miyanmin population displacements ensued, but the tempo of raiding, at first against the Telefolmin people, was greatly increased. The movements of the Miyanmin groups to the north meant that the foothill peoples on both sides of the May River also became subject to Miyanmin raids with increasing frequency. Some of this raiding may have initially been in retaliation for attacks on small Miyanmin hunting parties venturing out of their own territory in search of game. However, any pay-back ideology associated with Miyanmin raiding was soon lost, and, according to the Miyanmin themselves, the quest for human flesh became an end in itself [italics mine].³

Dornstreich and Morren (1974:9) also provide evidence that a population of one hundred persons eating five to ten victims per year would receive a significant meat, and thus protein, contribution to their diet, equivalent in its quantity to the amount of meat obtained among New Guinea highlanders from domesticated pig production. They conclude, "Such an addition to a marginally well-nourished New Guinea population would essentially resolve its protein insufficiencies." Turning to the Aztec case, let us propose that 15,000 victims were eaten annually in Tenochtitlan, a conservative figure in light of Borah's new estimate of a quarter of a million sacrificial victims per year in Central Mexico. Then let us consider the estimates of the population of Tenochtitlan at the time of the Conquest. Sanders and Price (1968:151) suggest a possible range of 60,000 to 120,000 inhabitants. Calnek (Sanders and Price 1958:151n) doubles their estimate. Willey (1966:157) proposes a figure of 300,000. Soustelle (1964:32) ranges higher, with an estimate of between 500,000 and 1,000,000 for the cities of Tenochtitlan and Tlaltelolco combined.

If we were to use Willey's estimate of 300,000 inhabitants and postulate 15,000 sacrificial victims annually consumed in the city, the ratio of victims to the consuming population would be five to one hundred, within the range described for the Miyanmin of New Guinea by Dornstreich and Morren as being a significant annual contribution to dietary protein. But there are additional special factors in the Aztec case.

First, the famines and seasonal food scarcities so characteristic of the Aztec economy make it necessary to take into account that the consumption of human flesh was probably not evenly distributed throughout the year or years, but made its most significant contribution precisely at those times when the protein resources were otherwise at their lowest ebb. Thus it seems highly likely that even if only one percent of the population in Central Mexico was eaten in an average year, the timing of such consumption to coincide with periods of hunger would have more than made up for the overall low average annual percentage involved. Furthermore, it must be kept in mind that the members of the Aztec Triple Alliance were the general winners in warfare and thus undoubtedly consumed a higher proportion of victims than their enemies.

Secondly, a minority of the Aztec population seems to have been entitled to eat human flesh. According to Durán (1971:191), "Commoners never ate it; [it was reserved] for illustrious and noble people." Sahagún (1951:179) may be implying a similar restriction when he speaks of the sacrifices at a particular temple: "And when they had cooked them, then the nobility, and all the important men ate [the stew]; but not the common folk—only the leaders." If we were to assume, for purposes of discussion, that the "illustrious and noble people" made up one-quarter of the population, then the annual ratio of victims to consumers would have been twenty per hundred, a very significant contribution to their diet.

The "right to eat human flesh" may possibly have been really the privilege to eat it at one's own volition, i.e., to host a banquet or to buy a slave in the marketplace for that purpose; thus a large segment of the supposedly unqualified population may have had at least occasional access, by invitation, to cannibalistic banquets. At the same time, it is clear from Sahagún's statement above that there were ritual anthropophagic feasts from which the commoners were excluded. But the point of this paper is not to prove that cannibalism made a contribution to the diet of the total population; rather, it is to explain the extremity of the Aztec sacrificial complex. It is not essential for this argument that a majority of the Aztec population had to take part in human flesh banquets. What is essential is to demonstrate that the sacrificed captives typically were eaten; and this already has been done. That the eaters of the flesh may have primarily been the Aztec elite is entirely consistent with the normal inequities of class-stratified society. While, during good times, this source of meat may not have been nutritionally essential for the "illustrious and noble people," the anthropophagic privileges were undoubtedly good insurance against times of famine when they, as well as the commoners, could suffer significantly. For example, "[When] Moctezuma was lord, there was famine for two years, and many noblemen sold their young sons and maidens" (Sahagún 1954:41). As is often the case in human societies, the rules for Aztec cannibalism were probably forged under the extreme conditions of scarce food situations. Not surprisingly, the ruling class made the rules.

some implications

Superficially, it might appear that the Aztec prohibition against human flesh-eating by ordinary or lower class persons would cast doubt upon the potentiality of cannibalism to

motivate the masses of Aztec society to engage in wars for prisoners. Actually, however, the prohibition was, if anything, a goad to the lower class to participate in the wars, since the right to eat human flesh could normally only be achieved by single-handedly taking captives in battle (Sahagún 1954:75-77; Durán 1971:199). Such successful warriors became members of the Aztec elite, and their descending lineage members shared their privileges (Durán 1971:199-200). By hosting cannibalistic feasts to which their “blood relations” were invited and each given cooked human flesh (Sahagún 1951:48), they appear to have effected a distribution of the meat beyond the traditional confines of the hereditary nobility. The distribution of the flesh, in other words, seems to have been done primarily within the framework of kinship and at the discretion of the captor, rather than through the state structure. While the captor could not eat his own prisoner, he could eat of another’s, and we may assume that invitations to banquets were naturally reciprocated. Such reciprocity would have contributed to the reliability of this type of food supply. Beyond this, as in many other societies, such feast-giving would have contributed to the elevation of the host’s status.

By encouraging the lower class to engage in war through the reward of human flesh-distributing rights and elevation in status, the Aztec rulers were able to motivate the bulk of their population, the poor, to contribute to state and upper-class maintenance by participating in offensive military operations. It was in the interests of the ruling class and the state to prohibit the eating of human flesh by the commoners, precisely because they were the group most in need of it. By so doing and also by providing a path, through war service, of obtaining meat, the Aztecs were assured of an aggressive war machine. And underlying the competitive success of that machine were the ecological extremities of the Valley of Mexico.

Incidentally, when a commoner had single-handedly captured an accumulated total of three war prisoners, he became a “master of the youths” and was eligible to dine at Moctezuma’s palace (Sahagún 1954:39, 76). Thereby he became qualified to eat wild game in abundant quantities imported from the far reaches of the empire. In an economy of scarce meat, this seems a most natural reward.

Rich persons, such as the traveling merchants, *pochteca*, could buy wild game in the markets as well as slaves to consume at special feasts that were the equivalents of those held by nobles serving up captives. The merchants also purchased slaves at the fringes of the empire and brought them back for sacrifice and consumption.

The priesthood did more than simply sacrifice victims. When the supply of captives ran low, they demanded more to avoid the wrath of the gods and even exhorted the warriors during battles to seize prisoners. The priests’ opinions carried great weight even with the Emperor, who apparently felt honored to assist them in temple rites (Prescott 1936:50).

The power of the priesthood in Aztec society, it is proposed, was reinforced by cannibalism. When the priests had seemed to fail in their supplications for rain or other weather changes to save the maize crops, they could simply demand sacrificial victims to appease the obviously wrathful gods. Thus, in the guise of satisfying gods, the priests actually were authorizing a hungry population to go forth and seize humans destined for consumption. Given the lack of beasts of burden, the seizure of captives would have also provided bearers to bring back whatever crop stores that may have been looted. Thus even those who might not have directly benefited from the ensuing cannibal feasts would have had their food supply augmented by the taking of captives for sacrifice. In a real sense, the priesthood had a fail-safe system: if the priests failed in their supplications to bring food in the form of local crop harvests, then with the aid of the nobility and the forces under their command, they almost automatically caused food to be brought from

other regions. Either way, the gods could be seen as the benefactors of the population. This kind of homeostatic survival system helps to explain the enduring strength of the priesthood, as well as its interdependence with the nobility, despite great seasonal and yearly fluctuations in local food supply.

The maintenance of the religious myth was thus in the interest of the self-preservation of the upper class. The symbolic key to this situation was perhaps the Great Pyramid of Tenochtitlan itself, upon which stood two temples: that of Tlaloc, the Rain God, and Huitzilipochtli, the War God. They were the two great complementary providers: Tlaloc, through rain, of maize and other locally-grown crops; Huitzilipochtli, through war, of meat and other peoples' crops. Not surprisingly, Vaillant reportedly suggested that Huitzilipochtli began as a god of hunting and "afterwards metamorphosed into the terrible war-god" (Means 1940:432).

With an understanding of the importance of cannibalism in Aztec culture, and of the ecological reasons for its existence, some of the more distinctive institutions of the Aztecs begin to make sense anthropologically. For example, the long-standing question of whether the political structure of the Aztecs is or is not definable as an empire can be reexamined. A problem here has been that the Aztecs frequently withdrew from conquered territory without establishing administrative centers or garrisons. This Aztec "failure" to consolidate in the Old World fashion even puzzled Cortés, who asked Moctezuma for an explanation of why he allowed Tlaxcala to maintain its independence. Reportedly Moctezuma replied that it was done so that his people could obtain captives for sacrifice (Prescott 1936:50). In other words, since the Aztecs did not normally eat persons of their own polity, which would have been socially and politically disruptive, they viewed it essential to have conveniently nearby "enemy" populations on whom they could prey for captives. This kind of behavior makes perfect sense in terms of Aztec cannibalism. The Aztecs were unique among the world's states in having a cannibal empire. For this reason, they often did not conform to models of imperial colonization which were based upon empires possessing domesticated herbivores to provide meat or milk.

Similarly, an institution peculiar to Mesoamerica, the Wars of Flowers, becomes understandable when one considers that it was revived by the Aztecs in response to the severe famines of the 1450s (Vaillant 1966:113). These battles, designed purely to procure prisoners, have been succinctly described by Soustelle (1964:114) as follows:

The sovereigns of Mexico, Texcoco, and Tlacopan, and the lords of Tlaxcala, Uexotzinco, and Cholula mutually agreed that, there being no war, they would arrange combats, so that the captives might be sacrificed to the gods: for it was thought that the calamities of 1450 were caused by too few victims being offered, so that the gods had grown angry. Fighting was primarily a means of taking prisoners; on the battlefield the warriors did their utmost to kill as few men as possible.

Much more than just Aztec culture begins to become understandable when one keeps in mind that the ecological problems of the Aztecs were simply an extreme case of problems general to the populations of Mesoamerica. The pyramid-temple-idol complex found also among the Teotihuacanos, Toltecs, Maya, and Olmec, it is proposed, is very consistent with an emphasis on sacrificial cannibalism necessitated by the distinctive Mesoamerican ecological conditions.

Among those conditions, the uncertainty of maize-crop production contributed to the pyramid-temple-idol complex by providing an urgent and consistent reason for supplication and offerings to deities. Under such circumstances, human captives destined to be eaten were most naturally incorporated into the offerings made to assure crop production. The definition of the gods as human flesh-eaters almost inevitably led to the

creation of the kinds of fierce, ravenous, and carnivorous deities, such as the jaguar and the serpent, that are characteristic of the Mesoamerican pantheons. This, in turn, made it possible to rationalize the more grisly aspects of large-scale cannibalism as being simply a response to the gods' demands. Even such little touches as the steepness of the pyramids' steps become understandable if one keeps in mind the need for efficiency in rolling the bodies down from the sacrificial altars to the multitudes below.

Reevaluation of the function of other architectural features of prehistoric Mesoamerican ceremonial sites, besides the temple-pyramids, may also be in order. Were the temple centers also generally assembly points for captives awaiting sacrifice? If so, were some of the compounds really holding pens? In this connection, it is interesting to note that the "Avenue of the Dead" at Teotihuacan apparently was a series of compounds before archaeologists removed the transverse walls to create an "avenue." Perhaps it is not coincidental that the one other reference Vaillant (1966:76-77) makes to cannibalism in his text concerns remains found in a Teotihuacan period deposit at Azcapotzalco which included "a great red-and-yellow bowl. . . . It contained the remnants of the *pièce de résistance*, the upper legs and hips of a human being, the most succulent portions for festive consumption. There is also other evidence of human sacrifice." In any case, it is hoped that the theory embodied in this paper will be seriously tested by archaeologists specializing in all the civilizations of Mesoamerica.

In the Circum-Caribbean area outside of Mesoamerica there often existed similar problems of high population pressure, wild game degradation, and the lack of a domesticated herbivorous mammal. Here there was what Julian Steward called the priest-temple-idol cult, similarly associated with cannibalism (e.g., Steward 1948:2-3). Of these Circum-Caribbean peoples, the Carib themselves are probably the most famous cannibals of all; our word, "cannibal," is derived from their name (Rouse 1948:549). They did not have the priest-temple-idol cult, which is expectable in terms of the theory here, for their principal crop was manioc, not maize (e.g., Rouse 1948:550-551). Manioc is a remarkably reliable crop, much less subject to weather fluctuations than maize, and thus unlikely to give rise to a priesthood concerned with supplication to gods for crop success. In this connection, one cannot help but wonder if a late adoption of manioc cultivation among the lowland Maya might have thus contributed to the decline of the temple(pyramid)-idol-priest complex there. Certainly cannibalism was practiced there (e.g., Thompson 1954:247) in a manner similar to the Aztecs, although presumably on a less intensive scale. Thompson (1954:247) also provides the interesting note that the victim's "hands, feet, and head were reserved for the priest and his assistants." This detail may throw light on the portions reserved for the Aztec priests as well.

What we can see in the Aztec case, then, is an extreme development, under conditions of environmental circumscription, very high population pressure, and an emphasis on maize agriculture, of a cultural pattern that grew out of a Circum-Caribbean and Mesoamerican ecological area characterized by substantial wild-game degradation and the lack of a domesticated herbivore. Intensification of horticultural practices was possible and occurred widely; but for the necessary satisfaction of essential protein requirements, cannibalism was the only possible solution. That cannibalism, disguised as propitiation of the gods, bequeathed to the world some of the most distinctive art and architecture developed by humanity. The ecological uniqueness of the situation led inevitably to unique cultural products, among them the famous Aztec sacrificial complex. From the perspective of cultural ecology and population pressure theory, it is possible to understand and respect the Aztec emphasis on human sacrifice as the natural and rational response to the material conditions of their existence. Population pressure theory appears

capable of explaining the development of unique cases as well as of regularities in human social and cultural evolution.

Beyond this, upon reflection, one should perhaps explicitly mention what is implicit in this paper: that the materialist or ecological research strategy employed here, and the results achieved, make it unnecessary to attribute to the Aztecs, as Lévi-Strauss (1964:388) has done, “a maniacal obsession with blood and torture” or to call upon psychoanalytic theory, as Wolf (1962:145) seems to suggest, to explain “this fanatic obsession with blood and death.” Lévi-Strauss (1964:388) refers, with some justification, to the Aztecs as “that open wound in the flank of Americanism.” But why have they been an “open wound?” Because given mentalist or idealist research strategies, there can be no explanation of the basic causality involved in the evolution of such a distinctive culture. The causes of the differences between cultures cannot be found in the universal characteristics of the human mind, nor in a theory that they are pathological excrescences of that mind.

notes

¹ Earlier versions of this paper were read at Columbia University and the State University of New York at Stony Brook, in the spring of 1975, and at the annual meeting of the American Anthropological Association, in December 1975, as part of the Symposium on Demographic Factors in Cultural Evolution. I wish to express my appreciation especially to Woodrow Borah, Eduardo Contreras, Jr., Marvin Harris, Robert Heizer, and Cherry Lowman for information and advice in the conduct of this research, as well as to my wife, Sandra Dickey Harner, for her assistance and valued criticisms. None of these persons, however, is responsible for the theories or any errors of fact.

² Several weeks after my presentation of this theory to my students at the Graduate Faculty of the New School for Social Research in the spring of 1975, one of them, Mark Wojnar, called to my attention Keen's book which mentions (1971:447) a very similar hypothesis which was advanced by Edward Payne in 1899 in the second volume of an interesting and neglected work of whose existence I had been unaware (1899:17).

³ While I find Dornstreich and Morren's analysis of the Miyanmin data exemplary, I must object to their (1974:10) general hypothesis that, among high population density groups, cannibalism does not increase under population pressure. Although their hypothesis can indeed apply to highland New Guinea groups which, as they themselves note (1974:8), have pig husbandry available as an alternate subsistence solution, their hypothesis cannot be generalized to those high population pressure societies, such as the Aztecs, which lacked domesticated herbivores.

references cited

- Adams, Robert McC.
1966 *The Evolution of Urban Society: Early Mesopotamia and Prehispanic Mexico*. Chicago: Aldine.
- Aguilar, Francisco de
1963 *The Chronicle of Fray Francisco de Aguilar*. In *The Conquistadors: First-person Accounts of the Conquest of Mexico*. Patricia de Fuentes, Ed. New York: Orion. pp. 134-164.
- Boserup, Ester
1965 *The Conditions of Agricultural Growth: the Economics of Agrarian Change under Population Pressure*. Chicago: Aldine.
- Carneiro, Robert L.
1961 *Slash-and-Burn Cultivation among the Kuikuru and Its Implications for Cultural Development in the Amazon Basin*. In *The Evolution of Horticultural Systems in Native South America, Causes and Consequences*. Johannes Wilbert, Ed. *Antropológica Supplement Publication 2*. Caracas: Sociedad de Ciencias Naturales La Salle. pp. 47-67.
1970 *A Theory of the Origin of the State*. *Science* 169:733-738.
- Caso, Alfonso
1958 *The Aztecs: People of the Sun*. Lowell Dunham, Trans. Norman, OK: University of Oklahoma Press.
- Cook, Sherburne F.
1946 *Human Sacrifice and Warfare as Factors in the Demography of Pre-Colonial Mexico*. *Human Biology* 18:81-102.

- Cook, Sherburne F., and Woodrow Borah
 n.d. Continuity and Change in Indian Agriculture and Diet in Central Mexico, Sixteenth and Seventeenth Centuries. *Memoirs of the XLI International Congress of Americanists*, Mexico City, 1974. (In press.)
- Cortés, Hernando [Hernán]
 1962 *Five Letters: 1519-1526*. J. Bayard Morris, Trans. New York: Norton.
 1963 *The Third Letter of Cortés*. In *The Conquistadors: First-person Accounts of the Conquest of Mexico*. Patricia de Fuentes, Ed. New York: Orion. pp. 51-133.
- Díaz del Castillo, Bernal
 1963 *The Conquest of New Spain*. J. M. Cohen, Trans. Harmondsworth, Middlesex, England: Penguin Books.
- Dornstreich, Mark D., and George E. B. Morren
 1974 Does New Guinea Cannibalism Have Nutritional Value? *Human Ecology* 2:1-12.
- Durán, Diego
 1971 *Book of the Gods and Rites and the Ancient Calendar*. Fernando Horcasitas and Doris Heyden, Eds. and Trans. Norman, OK: University of Oklahoma Press.
- FAO/WHO Ad Hoc Expert Committee
 1973 *Energy and Protein Requirements*. FAO Nutrition Meetings Report Series, No. 52; WHO Technical Report Series, No. 522. Rome: Food and Agriculture Organization of the United Nations.
- Fuentes, Patricia de, Ed.
 1963 *The Conquistadors: First-person Accounts of the Conquest of Mexico*. Patricia de Fuentes, Trans. New York: Orion.
- Harner, Michael
 1970 Population Pressure and the Social Evolution of Agriculturalists. *Southwestern Journal of Anthropology* 26:67-86.
 1975 Scarcity, the Factors of Production, and Social Evolution. In *Population, Ecology, and Social Evolution*. Steven Polgar, Ed. The Hague and Paris: Mouton. pp. 123-138.
- Keen, Benjamin
 1971 *The Aztec Image in Western Thought*. New Brunswick, NJ: Rutgers University Press.
- Kroeber, A. L.
 1955 On Human Nature. *Southwestern Journal of Anthropology* 11:195-204.
- Lévi-Strauss, Claude
 1964 *Tristes Tropiques*. John Russell, Trans. New York: Atheneum.
- Martin, Paul S.
 1967 Prehistoric Overkill. In *Pleistocene Extinctions: the Search for a Cause*. P. S. Martin and H. E. Wright, Jr., Eds. New Haven: Yale University Press. pp. 75-120.
 1973 The Discovery of America. *Science* 179:969-974.
- Means, Philip A.
 1940 The Philosophic Interrelationship between Middle American and Andean Religions. In *The Maya and Their Neighbors*. Clarence L. Hay, et al., Eds. New York: Appleton-Century. pp. 430-440.
- Mosimann, James E., and Paul S. Martin
 1975 Simulating Overkill by Paleoindians. *American Scientist* 63:304-313.
- Payne, Edward J.
 1892- History of the New World Called America. 2 vols. Oxford: Clarendon.
 1899
- Pike, Ruth L., and Myrtle L. Brown
 1967 *Nutrition: An Integrated Approach*. New York: Wiley.
- Pimental, David, William Dritschilo, John Krummel, and John Kutzman
 1975 Energy and Land Constraints in Food Protein Production. *Science* 190:754-761.
- Prescott, William H.
 1936 *History of the Conquest of Mexico and History of the Conquest of Peru*. New York: Modern Library. (Original: 1843.)
- Rouse, Irving
 1948 The Carib. In *Handbook of South American Indians*. Julian H. Steward, Ed. Vol. 4, The Circum-Caribbean Tribes. Smithsonian Institution, Bureau of American Ethnology Bulletin 143. Washington, DC. pp. 547-565.
- Rowe, John H.
 1947 Inca Culture at the Time of the Spanish Conquest. In *Handbook of South American Indians*. Julian H. Steward, Ed. Vol. 2, The Andean Civilizations. Smithsonian Institution, Bureau of American Ethnology Bulletin 143. Washington, DC. pp. 183-330.
- Sahagún, Bernardino de
 1951 *Book 2—The Ceremonies*. In *General History of the Things of New Spain: Florentine Codex*. A. J. O. Anderson and C. E. Dibble, Trans. (from the Aztec). In *Thirteen Parts, Part III*.

- Santa Fe, NM: School of American Research, and Salt Lake City, UT: University of Utah.
- 1954 Book 8—Kings and Lords. *In* General History of the Things of New Spain: Florentine Codex. A. J. O. Anderson and C. E. Dibble, Trans. (from the Aztec). In Thirteen Parts, Part IX. Santa Fe, NM: School of American Research, and Salt Lake City, UT: University of Utah.
- 1970 Book 10—The Gods. *In* General History of the Things of New Spain: Florentine Codex. A. J. O. Anderson and C. E. Dibble, Trans. (from the Aztec). In Thirteen Parts, Part II. Santa Fe, NM: School of American Research, and Salt Lake City, UT: University of Utah.
- Sanders, William T.
- 1972 Population, Agricultural History, and Societal Evolution in Mesoamerica. *In* Population Growth: Anthropological Implications. Brian Spooner, Ed. Cambridge, MA, and London: MIT Press. pp. 101-153.
- Sanders, William T., and Barbara J. Price
- 1968 Mesoamerica: The Evolution of a Civilization. New York: Random House.
- Service, Elman R.
- 1975 Origins of the State and Civilization: The Process of Cultural Evolution. New York: Norton.
- Soustelle, Jacques
- 1964 Daily Life of the Aztecs on the Eve of the Spanish Conquest. Patrick O'Brian, Trans. Harmondsworth, Middlesex, England: Penguin.
- Steward, Julian H.
- 1948 The Circum-Caribbean Tribes: An Introduction. *In* Handbook of South American Indians. Julian H. Steward, Ed. Vol. 4, The Circum-Caribbean Tribes. Smithsonian Institution, Bureau of American Ethnology Bulletin 143. Washington, DC. pp. 1-41.
- 1955 Theory of Culture Change: The Methodology of Multilinear Evolution. Urbana: University of Illinois Press.
- Tapia, Andrés de
- 1963 The Chronicle of Andrés de Tapia. *In* The Conquistadors: First-person Accounts of the Conquest of Mexico. Patricia de Fuentes, Ed. New York: Orion. pp. 19-48.
- Thompson, J. Eric S.
- 1954 The Rise and Fall of Maya Civilization. Norman, OK: University of Oklahoma Press.
- Vaillant, George C.
- 1966 The Aztecs of Mexico: Origin, Rise and Fall of the Aztec Nation. Revised by Suzannah B. Vaillant. Harmondsworth, Middlesex, England: Penguin Books.
- White, Leslie A.
- 1959 The Evolution of Culture: The Development of Civilization to the Fall of Rome. New York: McGraw-Hill.
- Willey, Gordon R.
- 1966 An Introduction to American Archaeology. Vol. 1, North and Middle America. Englewood Cliffs, NJ: Prentice-Hall.
- Wohl, Michael G., and Robert S. Goodhart, Eds.
- 1968 Modern Nutrition in Health and Disease: Dietotherapy. Fourth ed. Philadelphia: Lea and Febiger.
- Wolf, Eric R.
- 1962 Sons of the Shaking Earth. Phoenix Books edition. Chicago & London: University of Chicago Press.

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