

THE LA VENTA OLMEC SUPPORT AREA¹

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The archaeological site of La Venta, in the northwestern corner of the modern Mexican state of Tabasco, is of great significance to our understanding of Mesoamerican prehistory in general, not just because of the details of structures, monuments, and artifacts, but because excavations have made clear that at the early date at which the central portion of the site was constructed and used (bracketed between 800 and 400 B.C. on the basis of eight radiocarbon samples)² a number of culture patterns, distinctive of later Classic phase Mesoamerican cultures, were already formally structured.³ One pattern which has interested both Heizer and the present writer is that the site was not a "city" or "town" in the usual sense, but rather an extensive center dedicated apparently to religious ceremonialism, with a very small resident population. The populace served by the site, that is, the people whom the religious observances presumably were intended to benefit and from whom the labor force necessary to carry out the construction work must have been recruited, did not actually inhabit the site. This situation was typical of many major Mesoamerican sites of the Classic phase; La Venta is the earliest site at which it has been clearly defined thus far. It is, of course, not just the bare fact of the existence of this "empty city" pattern that is of interest. What is significant is the obvious implication of effective and extensive sociopolitical organization that made this pattern possible. Heizer has discussed this aspect of the problem in two recent papers.⁴

The interpretation that during the period of use of the site there had been only a very small resident population was first made by the present writer on the basis of his preliminary explorations in 1942.⁵ The evidence at that time was principally derived from the very limited horizontal extent of refuse deposits which were searched for particularly. The 1955 work provided corroboration by revealing the magnitude of certain individual construction features which could have been accomplished only by a very large work force.⁶ Massive Offering No. 2, a carefully laid out layer of serpentine blocks on a prepared bed, was deposited in a steep-walled pit 49.5 by 20 feet in a horizontal area, by 16 feet 3 inches deep. This pit of nearly 15,000 cubic feet in volume was dug, the bed of special clay laid, the blocks placed, and the pit refilled in a single dry season, as demonstrated by the complete lack of erosion in the sides of the steep-sided pit. Such a task, performed by workers prying the tough clay loose with sharpened sticks and carrying it out in baskets, manifestly required a numerous crew. Other features similarly indicate that many laborers were involved; the handling of the stone monuments points to the same conclusion. Heizer has offered estimates of work at La Venta in terms of man-days.⁷ The work done in 1955 also indicated the existence of a small but continuously employed caretaker force, evidenced by the frequent resurfacing of floors and structures, and absence of traces of erosion in any part of the structures except those of construction Phase IV, the latest, which, after abandonment of the site and prior to the gradual building up of the wind-deposited overburden, was heavily damaged.

As another check on this conclusion, a brief study was made of modern peasant agricultural practices at La Venta and neighboring regions to make possible an estimate of the size of the population that could have maintained itself by primitive agricultural techniques.⁸ It was concluded that a maximum of 30 families, or roughly 150 souls, could have won a livelihood continuously on the available dry land area adjacent to the site, clearly too small a group to perform the construction work represented by the massive structural features.

The next step was to attempt to define a nearby zone in which the population supporting the site and served by it could have lived. Many Classic phase Mesoamerican ceremonial centers, of course, pose no such problem; their supporting populations simply ringed them. At La Venta, however, the question arises because of the physiographic situation of the site. As has been stated many times, the archaeological zone of La Venta is located on an island ringed by swamps, near the Tonalá River. Northward a few smaller islets of high ground occur between La Venta and the norte-pounded sand dunes of the coast. To the south threads of high ground form the banks of the Río Blasillo, followed by another expanse of swamps through which the Río Zanapa disembouches--its high banks begin some distance upstream from its mouth. To the east is another expanse of swamps at least 30 kilometers wide, once more with a few scattered islets of high ground, but not enough to support anything but the sparsest population. Some 20 kilometers to the east-southeast begins a strip of high ground, followed by the modern highway to Cardenas, Tabasco, which widens to the eastward as it crosses the imperceptible divide into the Grijalva basin. A very few small mounds and thin refuse deposits may be noted along the highway, but once again the habitable area is small for a considerable distance from La Venta. A medium-sized mound group, probably mainly post-La Venta (equivalent to Upper Tres Zapotes, to judge by prevalence of Fine Paste wares), occurs at the ranchería known as San Miguel, some 40 kilometers to the east-southeast. In brief, while there undoubtedly was human occupation north, east, and south of La Venta, there could have been only a small population at best. When one actually observes the landscape surrounding the archaeological zone, this conclusion strikes one very forcibly. It would not be too unreasonable a speculation to suggest that La Venta might have been chosen as a ceremonial center precisely because of its splendid isolation, if there were mysteries to be concealed from the profane view.

To the westward, nearly 4 kilometers of swamp separate La Venta island from the mangrove-lined Tonalá River. Once across the river, however, the character of the landscape changes abruptly. There are swampy strips flanking the left bank of the Tonalá, but high ground begins a short distance inland and continues in a series of low but steep hills and ridges to the Río Coatzacoalos. I do not know the geologic reason for this change in the nature of the terrain; perhaps this tract between the two rivers is a massive fault block--a short distance north of Minatitlán the terrain west of the Coatzacoalcos drops away sharply into an expanse of swamps that extend northward to the edge of the coastal sand dunes. In any case, there is this hilly area, transected by numerous streams, with very limited expanses of swamp extending 30 to 35 kilometers from east to west. On the north it is bordered by the Gulf coast, on the south, 30 kilometers or so inland, it is partially set off by the low ground flanking a bend of the Río Uzpanapa, which here assumes a westerly course. Thus there is formed a roughly rectangular area of 900 or a trifle more square kilometers of

high ground, apparently suitable for human occupancy, the eastern border of which, on the Río Tonalá, is quite close to La Venta. On logical grounds it appeared worth while to examine this area as a possible locale from which La Venta was supported.

Intensive archaeological survey remains to be accomplished in this inter-riverine tract. In 1953 an extensive but shallow sherd area was found centering in a locality known as Los Soldados, on the Tonalá a short distance upstream from La Venta. I am not able to offer exact measurements on the extent of this deposit. It appeared to be more or less continuous, so I regarded it as a single site covering several square kilometers. At no point was the sherd-bearing layer more than a few inches thick. In this region of heavy rainfall and strongly acid soils, surface sherds are likely to be heavily leached and characterless. The material collected could not be identified in the field as definitely belonging to the La Venta ceramic complex, but it probably does. Another fairly extensive sherd locality is that of Arroyo Sonso, where a stone sculpture of Olmec type was found a number of years ago.⁹ Most of the ceramic material here appears to be secondarily deposited in the alluvium flanking the stream. It may be that most of the primary deposits were destroyed in excavating ballast for a narrow gauge railway connecting petroleum explorations; it was in the course of those operations that the stone sculpture previously mentioned was discovered. Sherds and figurines have been reported as abundant in a locality between the rancherías Arroyo Blanco and La Arena, north of Arroyo Sonso and nearly due west of Los Soldados.

One line of attack on the problem, and the one with which the present paper is concerned, was to make a check of the modern peasant agriculture of the region to see what light this might shed on the agricultural potential of prehistoric times. The implicit assumption is that aside from the addition of steel tools, modern peasant agriculture probably differs little from that practiced centuries ago. While this is an unproved assumption, there appear to be no data to indicate that a projection of modern crop production and land use on the peasant level back into time introduces errors of consequence.

Taken as a unit, the interriverine area in question, according to census records, is densely populated, containing in the neighborhood of 50,000 inhabitants. However, a great part of these people are not peasant agriculturists but are connected with the petroleum industry and its ancillary activities. The railway, with its western terminal at Allende in the northwest corner of the tract, accounts for another group of nonfarmers (maintenance personnel at the terminal, section crews, etc.). No occupational breakdown of census figures could be found to resolve the problem. Therefore it was decided to take a sample area, known to consist principally of peasant farmers, as a source from which the agricultural potential of the tract might be estimated. The municipio¹⁰ of Moloacán appeared to fulfill the requirements of the problem, and was therefore made the scene of the field investigation.

Most of the interriverine area we are considering belongs administratively either to the municipio of Coatzacoalcos (in the north) or to that of Minatitlán. Both of the towns, which are the cabeceras or county seats of these municipios, are of recent founding, relatively speaking. Minatitlán seems to have been founded about 1820 or 1830 as a center for mahogany cutting operations;

Coatzacoalcos was an inconsequential rancheria until 1880. Moloacán and its neighboring municipio, Ixthuatlán, however, date much farther back. They were in existence and were utilized as political entities before the adjacent lands were assigned to modern towns, and probably date back to pre-Conquest times as do the other Indian communities, Mexicano and Veracruz Popoluca, west of the Río Coatzacoalcos.¹¹ Ixthuatlán, bordering on the river, has undergone a great deal of change in recent decades. Moloacán, more isolated, has a minimum of modern industrial activities except at two peripheral points. Its inhabitants are for the most part Mexicano (Nahuat) speaking, although they also speak Spanish as a second language and are milpa farmers.

The heart of the municipio is the cabecera of the same name, that is, the town of Moloacán. This settlement is located along the top of a steep, narrow ridge running north-south about 5 kilometers south of the modern Nanchital-El Plan highway. The crest of the ridge is only a few hundred feet high (it is not indicated exactly on maps available to me, whose lowest contour line is the 200 meter curve), but it is the highest point in the vicinity. On fine days one can see the refinery of Minatitlán to the westward and the plain of the Coatzacoalcos beyond, and to the east the installations at Huapacal on the bank of the Río Tonalá--or at least, so I was told; visibility was too limited for such views during my visits. The public buildings of Moloacán, the church and the school of sawed lumber with galvanized iron roofs, stand proud if unbeautiful on the very crest of the ridge. Few of the town's one hundred and fifty dwellings, however, are on the actual crest. Most of them are just to one side or the other, for shelter from the nortes, the rainy season storm winds. The patios are partly excavated and partly terraced little plots that accommodate the house-complexes--kitchens and storehouses are often separate from the "dwelling" structures--with little room to spare. The houses are wattle-and-daub walled, with thatch roofs, as in most Indian villages in the region. Fruit trees, especially mango and orange, surround and partly conceal many patios. Water for domestic purposes is carried for what would seem to most people an inconveniently long distance from the springs on the lower flanks of the steep ridge. The total effect is thus rather unusual. One must walk along the neatly cleared road atop the ridge, peering over the edge at intervals to find the houses. It is worth remarking, to emphasize the steepness of the slopes, that one cannot walk comfortably directly down to a house or back up to the main street; rather one looks for the little trail that branches from the ridge at some distance back, then meanders down at a gentle gradient. However, it is not the picturesque situation that is of importance here but rather the relationship of the town on the ridge to its outside world. The five-kilometer road to the highway is really a trail, suitable only for foot and animal travel. It is level, for the ridgetop is nearly level--a little filling of low spots and digging through slight elevations make it quite traversable. But the ridgetop is so narrow at many points that conversion of the trail into a vehicular roadway would not be practicable because of the likelihood of washouts. This entry to the town is new, dating from the construction of the highway to which it leads, completed in 1945. The other route to the outer world runs southeastward for about 2 kilometers to an oil well to which the national oil company constructed an access road from the industrial town of Nanchital, on the Río Coatzacoalcos. A bus makes one round trip a day, most days, from the well to Nanchital. The distance is short, but the trail from Moloacán, on leaving the ridge, traverses what was described to me as an extremely bad stretch of swampy ground in a stream valley.

Other trails out of Moloacán lead only to farming areas, rancherías of the municipio, and the like. Thus routes of communication may be regarded as underdeveloped, at least for marketing produce. However, it must be remembered that in this region in general there are many communities still lacking modern roads and more remotely situated than Moloacán, which nevertheless annually move large quantities of corn and other produce to market with pack animals. In point of fact, Moloacán men farm at localities farther distant from the town and accept the laborious task of packing their harvests in from the milpas as a matter of course. The isolation of Moloacán is a frame of mind or a habit dating back to times previous to the drilling of the oil well and the construction of the highway. For the town has a definite air of backwardness that one would expect only in a community much more remote from the activity and commerce that typify this region at present. The casual visitor is struck by the fact that in most homes the metate is in everyday use, whereas elsewhere this kitchen implement has been replaced almost universally by the metal hand mill, which is less laborious, more expensive, and less durable.¹² Another symbol of cultural inertia is use of scrub bulls for saddle and pack purposes. There were said to be very few horses in Moloacán. In the course of some hours spent at one of the principal stores in the town, all the purchases I saw made of staples such as sugar, rice, beans, cooking oil, and the like, were for minuscular amounts--not kilos or half-kilos, but forty or fifty centavos' worth, at most a peso's. These observations suggest poverty, but this is not the complete explanation. The industrial town of Nanchital, the nearby market point for Moloacán, is a good market from the farmer's standpoint, for prices offered for produce are often higher than in neighboring towns.¹³ Also, I was told that it is extremely uncommon for men of the town to seek work on regional construction projects, or in the petroleum industry.¹⁴ In other words, there appear to be opportunities at hand for increasing incomes and raising living standards which are not exploited. It is only fair to note that my appraisal of Moloacán economy is based on a brief acquaintance, but I believe it to be accurate and worth stressing in the present connection to bring out the fact that the general pattern seems to be a way of life and scale of production fairly close to the subsistence level.¹⁵

Moloacán agriculture follows the general pattern of peasant farming in the "Southeast" of Mexico,¹⁶ with certain minor variations. It must be noted that since completion of the highway a certain amount of land, chiefly along the highway, has been acquired by outsiders for planting to pasture grasses; this is quite distinct from the local system, which is based on the acagual method of planting followed by fallowing. The same five-year cycle--one of planting, four of fallowing--generally considered in this region as optimum, was reported to be standard practice at Moloacán. At the risk of repetition, the advantages of use of acaguales will be listed:

1. Easier clearing, since four-year-old second growth contains no large trees, and consists chiefly of soft woods.
2. Cleaner burning, and eventual elimination of trunks and stumps of virgin jungle hardwoods, such as guapaque. This makes for easier planting, weeding, and harvesting.
3. Complete, or nearly complete, restoration of soil fertility. While consistent use of shorter fallowing cycles may sometimes result in lowered crop production, there is no indication of lowered productivity after four years of

following. As a matter of fact, an acagual often produces more than the same tract did on its initial clearing from virgin jungle, not because of a difference in soil fertility but because a significant part of the initial clearing cannot be planted, being cluttered with charred tree trunks, stumps, and the like.

4. The second corn crop of each year (the tonamíl or tapachol), which depends on use of second growth debris as mulch, can only be made in acagual.

Disadvantages of the acagual method are the following:

1. Greater weed problem because of weed seeds and shoots from root stocks that survive burning. A milpa in acagual usually must be weeded twice, once at mid-season and again at the dobla (when the corn stalks are bent double just below the attachment to the ears to permit the corn to dry, eliminating the danger of percolation of rain water through the tassel and consequent sprouting and rotting of the corn). A milpa in an initial clearing of virgin jungle often does not require weeding at all.

2. Acagual rotation is an expensive method of fertilizing the soil, since it requires five times the amount of land actually cropped each year.

This may be a convenient place to digress from the main theme of this paper to comment on the question of grass. The theory has been advanced that grass may have been responsible for the decline and fall of Mesoamerican empires, the view being that repeated burning off of the milpas favored the development of dense stands of grass which eventually made the farm land unavailable to digging-stick agriculturists. It may be true that repeated burning produces grasslands in some climatic zones of the world. It definitely does not do so in the Southeast of Mexico. It would be convenient if it did, for production of pastures would thus be easier and far less costly than under actual conditions. There are quite a number of native grasses in this region, including some short grasses collectively known as "grama," many of which are useful as forage and are therefore cultivated when they appear, and others which have no desirable features. Some or all of these may (but do not always) appear scattered among the weeds after an acagual is cut down and burned. They do not persist, however, because of other plants--first nonwoody and then woody--which push up through them and eventually shade them out. The grasses die back for the same reason that the lawn does not prosper under the big maple tree in your front yard: grasses can stand almost anything but shade. The only way that grasslands can be formed in this region is by systematic cultivation, which includes both frequent burning and thorough weeding. Burning alone is not sufficient. Grasses in general come back vigorously after burning, just as they do after moderate grazing or after being chopped off with a machete or a lawnmower. But there are in the local flora a great number of forms that possess this same quality, and these are the plants that come in early in the formation of the acagual. These are plants whose root systems, little damaged by the burning, send up vigorous shoots. Others produce seeds that resist considerable heat, or which perhaps are actually made to germinate more rapidly by heat or by burning short of actual destruction.¹⁷ Consequently burning alone will not eliminate all the nongrasses, and those that survive eventually will kill the grass by shading it. Abandoned pastures, when burned or not burned, eventually go back to acagual. Thus, in this region, farming land definitely does not turn into grasslands unavailable to

primitive agriculture because of burning, no matter how often burned over.¹⁸ in any case, and this is worth emphasizing, the acagual or long-fallowing system, it must be understood, eliminates this problem. Even when some grass comes in during the first year after clearing, by the time the acagual is four years old, it will have been shaded out to the point where, if a few scattered plants of it persist, they are of no consequence to the digging-stick farmer. Finally, the acagual system is universally followed in this region, except where plow cultivation with animal or machine traction has come in vogue. While I can cite no exact figures, there are far more digging-stick planters than plow farmers in the Southeast even at the present day.¹⁹

The acagual method of land use as presently practiced, if not the most efficient of agricultural techniques, is at least a workable one for permanent occupation by an agricultural society.²⁰ This is the justification for the hypothesis basic to the present study: that essentially the same system must have been practiced in the remote past, permitting the long-term existence of a fairly dense and stable population. Bad crop years might cause occasional hardship and even famine, but complete economic collapse due to soil exhaustion, transformation of farming land into useless grassland, and the like, would be out of the question as long as the population did not pass the point where each farmer could have available enough land for his normal milpa, and about four times as much more for his fallowing rotation, plus a small plot for tree crops (cacao, avocado, etc.). While it is not direct proof, common sense suggests that clearing of virgin jungle with Neolithic equipment must have been painfully laborious. Even if such shortcuts as girdling large trees instead of felling them were utilized extensively, the milpas must have been difficult to work for years, until the dead trunks fell and were eliminated by the combined action of insect destruction, decay, and burning. The old clearings, even when covered with second growth from three to five years old, must have been much more easily cultivated, less costly in labor, and more productive (since all the ground could be planted, not just part of it as in newly cleared virgin jungle). Hence it seems proper to project present-day data back into the past, to make demographic comparisons as long as the hypothetical grounds for so doing are clearly defined.

To return to our discussion of Molocacán and its agriculture, maize is the principal crop and is planted in clearings in second growth, or acagual about four years old. I was told that "no one" in the town planted rice or black beans (a white bean called regionally frijol pelón is planted in the milpas in small quantities for immediate use, not for storage). The black beans, it was said, do not do well in local soils; land suitable for rice is scarce. I cannot vouch for the first of these reasons; as for the second, there must be small plots along the streams suitable for rice. The reportedly bad stretch of road to the bus terminal at the oil well must include some rice land. Rice is a heavy producer in terms of yield per acre, and a small plot will provide rice for domestic use for an average family. Yet I saw people buying rice brought by the storekeeper from Coatzacoalos at a time of year when anyone who planted the grain should have his own rice newly harvested. (Black beans were likewise imported, but the regional bean harvest was long past so that fact did not necessarily mean much.) I failed to inquire about yuca (sweet manioc), another heavy producer, but it was not mentioned in discussions of crops so probably it is not extensively planted. Sweet potatoes are a minor crop. Cacao was said to do

very poorly in the locality, although coffee prospers. However, coffee plantings were reported to be small, for home use, not as an important cash crop. Oranges, bananas, pineapples, and mangos do provide some small income, being taken by the sackful to Nanchital for sale. In general, it is obvious that chief reliance, both for subsistence and for income purposes, is on maize.

Average plantings of maize seem to run between 1.5 and 2 hectares, perhaps closer to the lower than to the higher figure. Fields actually seen varied from less than half a hectare in size to one estimated as 1.5 hectares, but this does not tell the whole story, for here as elsewhere in the region most men make two or more milpas del año: a man who clears and plants a total of 2 hectares may make one milpa of about a hectare, another of about a half hectare, and a third of another half hectare. This point was not stressed in the previous discussion of the milpa pattern²¹ because it does not affect total planting, which is 2 hectares of milpa. What it does do is provide some insurance against spells of unfavorable weather--if an unseasonable dry spell damages the freshly sprouted corn in one planting, one of the others may still make a crop--and it also spreads the work load, since in this way all the planting, weeding, and harvesting does not have to be done at once, an important consideration for a man who works alone. A fact that was noted was that many milpas were planted high up on very steep slopes, so steep in fact that they could only be farmed by digging-stick planting--they certainly could not be plowed. The soil seemed to be productive even on such slopes, however, and use of such terrain does not necessarily imply scarcity of farm land.

The pattern of land holding is for each family head to own a considerable number of small plots of ground scattered around the area surrounding the town. It was said that some men had to travel as much as two leagues (about 8 km. to the league) when farming certain of their holdings, but either this is an exaggeration or these are exceptional cases, for except to the east and northeast, two leagues from Moloacán would take one well outside the municipio. Land holdings at considerable distances from the town are owned and used by people who live in the outlying rancherías.

Prior to 1938, according to report, the major part of the population of the municipio resided at the cabecera, the town of Moloacán itself. Many individuals farmed tracts some distance away, camping near or at their milpas during the work periods of clearing, planting, weeding, and harvesting. Many of the present rancherías did not exist at that time. In the year cited there was some trouble that flared into open violence and some bloodshed. People are still reluctant to discuss the cause of the difficulty. Informants said it was "over politics," which could mean anything--or nothing. At any rate, most of the people living in the town moved away, some to avoid involvement, others in fear or revenge, so that the town was nearly deserted. It was thus that many of the new rancherías were founded. A few, like Arroyo Sonso and Cuichapa, had been in existence for a long time. Others, like La Arena and Arroyo Blanco, were completely new. La Arena was actually outside the bounds of the municipio until 1958, when it was added to the unit in an arrangement whereby another tract, unused by Moloacán people, was transferred to the municipio of Minatitlán. This means, of course, that prior to 1938 the lands about La Arena were not used by Moloacán. Subsequently, after the trouble calmed, some families moved back to the cabecera, but many others remained in their new home sites.

According to figures which municipal authorities were kind enough to make available to me, the 1960 population of the municipio comprised 7,486 souls, divided into 1,196 households. This population was distributed as follows:

<u>Place</u>	<u>Population</u>	<u>Households</u>
Molcaacán	992	150
Acalapa	110	18
La Arena	229	35
Cuahtemoc (Arroyo Sonso)	376	66
Cuichapa	2,687	426
El Pajara1	53	9
S. Lorenzo Mescalapa	220	33
Tacuilolapa	1,108	181
La Trinidad	34	5
Popotla	250	41
Nuevo Teapa	433	77
Trancas Viejas	254	42
Pueblo Viejo	158	24
Tacomango	75	10
San Martin	38	6
San Miguel	76	11
Tatesco	11	1
Col. Miguel Alemán	41	7
Soteapa	94	17
Col. Ruíz Cortines	58	8
Col. Nueva Era	154	24
Col. Veteranos de la Revolución	35	5
Totals: Localities, 22	<u>7,486</u>	<u>1,196</u>

Of the foregoing places, two in particular include large nonfarming populations, dependent instead on petroleum operations: Cuichapa and Tacuilolapa. If we deduct them from the totals we get the following:

Total population	7,486	Total households	1,196
Cuichapa and Tacuilolapa	<u>-3,795</u>		<u>- 507</u>
Totals: Farmers	<u>3,691</u>	Households	<u>689</u>

It is true enough that there are peasant farmers at both these localities, which are old rancherías, but their precise numbers are not known to me. Deducting them along with their industrial neighbors probably corrects for a sprinkling of nonfarmers in other localities who cannot be sorted out of the raw counts given above. For convenience, we shall round off the peasant farmer population of Molcaacán to 3,700 persons in 690 households.

I was not able to obtain any exact figures on total land area included in the municipio. It is difficult to believe that this figure has not been computed and is not listed somewhere in the municipio records, but I could not obtain it. On the basis of the latest map of the municipio, I have computed the area as being about 220 sq. km. This figure is not precise, but it probably includes only an inconsequential amount of error. The amount of recently alienated land is another unknown; I have estimated that it runs in the neighborhood of 20 sq. km. although it may actually be a little higher. Using the 20 sq. km.

figure, we have 200 sq. km. of land for the peasant farmer population of 3,700, which gives an average density of 18.5 persons per sq. km. or about 3.5 average families (3.45) of 5.4 persons (5.36) per sq. km. This works out to just under 30 hectares per family.

Like all demographic averages, these require both elucidation and consideration to make them meaningful. First, by way of comparison, it may be noted that the Mexican government colonization program in the region normally allots 50 hectares to each colonist, that is, each family head.²² This amount of land is deemed sufficient to permit adequate plantings of corn, rice, beans, etc., in accordance with the prevalent land use pattern, cultivation of garden plots for domestic use or cash sale, some permanent plantings (tree crops and/or small amounts of pasture for a few animals), and an allowance for waste land, unsuitable for cultivation. Most colonists with whom I have discussed the matter assure me of their opinion that the average 50 hectare tract is ample, being all or more than a man can handle by hand cultivation techniques. The 30 hectare figure we reached for Moloacán (actually 28.5+) may be interpreted in several ways, one being that the colonists' appraisal of their 50 hectare parcels as ample is correct. This is probably true, and it is probably simultaneously true that the colonists use more of their land, planting larger milpas and other crops as well, than do the people of Moloacán. The 1.5 to 2 hectares milpa average as estimated at Moloacán is low for the region in general, but is in line with the slightly lower-than-average standard of living that appears to prevail at the town. It has been mentioned that at the ranchería Cuauhtemoc (Arroyo Sonso), where there is more available land, agricultural production is apparently slightly greater and living standards seem somewhat higher than in the town of Moloacán itself, and this may be true of other rancherías as well. It may well be that at Moloacán town the average milpa is close to the 1.5 hectare figure, and in the rancherías rises to 2 hectares. This would not alter the general 28.5 hectare per family average.

The question as to relative amounts of farming and wasteland is a difficult one to appraise on brief acquaintance. I judge that the quantity of unusable land, that is, unusable by the current farming methods, is fairly small. It has been mentioned that digging stick planting permits cultivation of steep side hills that would not be available to a plow farmer. There were said to be various areas of poor soils, some stony, some swampy, south of the town of Moloacán, but in general such lands were said to be limited in extent. On the contrary, there appears to be some farmable land which is not utilized. There are stands of virgin jungle due south of Moloacán and southeast of it; in proof I saw some mahogany planks reported to have been cut in these areas. It was also reported that there was a good deal of virgin jungle in the Arroyo Blanco-La Arena district, in the northeast corner of the municipio. In fine, it seems clear that the amount of wasteland is so small that it does not significantly reduce the amount of land needed by modern farming practices and standards of living, and that the average 28.5 hectare per family figure is adequate by those standards.

So far as is known to me, the Moloacán area differs physiographically in no important regard from the rest of the interriverine area previously defined. The terrain is a little more gently rounded, although still hilly, to the eastward as one approaches the Tonalá River, and a few patches of savanna soil and

vegetation may be noted in the southeastern corner of the quadrangle, but these appear to be so small as to have little significance. It seems proper to assume that the entire tract would support peasant farmers cultivating the land in the same way as those of Moloacán and maintaining the same living standards at at least the same rate of density. Let us use the figure of 900 sq. km. for the interriverine tract--and it should be noted that this is a conservative estimate that makes a liberal deduction for the sand dune strip along the coast²³ and for strips of uninhabitable swamp flanking the rivers. Applying the Moloacán figures of 18.5 persons and 3.45 families per sq. km. gives a total potential peasant farmer population of 16,500, comprising 3,105 family units. This population, to refer again to the Moloacán data, would not equal or exceed the saturation point for the resources of the area as exploited by digging-stick farmers.

In a previous estimate of land needs at the La Venta time level, the figure of 1.5 hectares of milpa, the same as the lower limit computed for Moloacán, was arrived at as an average amount of planting that would permit subsistence plus a small surplus.²⁴ This does not, of course, mean that present day Moloacán production and living standards are considered identical with those of the prehistoric La Venta horizon, for the La Venta estimate contained two sizeable corrections: one for a higher than present-day per capita maize consumption, based on lack of rice and certain other indigenous foods (provided for at Moloacán by cash sale of fruits, etc.); and another for an assumed lower yield of maize at the early time period (a hypothesis for which there is no direct evidence, but which offers a reasonable safeguard on the side of conservatism). What comparison of the two figures does indicate is that on the basis of evidence adduced La Venta period agricultural production could satisfy needs of that era through use of no more, and even perhaps a little less, land than would be needed to maintain the computed 16,650 peasant farmer population of the interriverine tract. In other words, it appears perfectly safe to assume that at the heyday of La Venta the adjacent habitable area just across the Tonalá River to the westward could have supported a population of digging-stick agriculturists of this size with adequate subsistence plus a modest surplus. It might actually have supported an even larger populace, but there appears to be no need to strain our conservative estimates by guesses. There seems little reason to doubt that a group--nation, tribe, or at least laity--of some 16,000 people, comprising 3,000 some odd households, if efficiently organized and managed, could have provided work crews of several hundred able-bodied males as needed, and food surpluses for their maintenance. That crews of such size were recruited and effectively directed between 800 and 400 B.C. is attested by the systematically planned La Venta structures. It is therefore considered as demonstrated that the native population supporting La Venta, and whose religious needs were serviced by that ceremonial center, could have occupied the area directly to the westward, between the Tonalá and Coatzacoalcos rivers, from the coast 30 to 35 kilometers southward. This group was probably supplemented by a sparse populace inhabiting the small scattered dry land areas in the swampy regions for an equal distance eastward of the site, but these were too few to provide more than a small share of the labor and logistic support. The important support area must have been the interriverine one to the westward.

It is, of course, theoretically possible that the cult centered at La Venta may have had devotees, or vassals, or whatever they were, living in

localities even more distant from the site. There are sherd deposits indicative of some concentration of population, parts of which may have been contemporary with La Venta, along the Uzpanapa, just south of our defined area. We do not know what the social controls were that effected recruitment and procurement at La Venta. However, it seems reasonable to assume that the forces of authority had some sort of effective limits--that, other things being equal, it was more difficult to make a distant Indian come in to do his stint of labor or bring a sonte of maize to feed the workers than one who lived relatively close by. This is not by any means an attempt to formulate a sociological rule making the devotion or manageability of an Indian decrease inversely as his distance. Modern Indians in the area travel some amazing distances in connection with their religious observances. But really effective control must have had some spatial limits. At least partial corroboration may be seen in the existence of another major Olmec site, the Río Chiquito site called "San Lorenzo," in part at least contemporary with La Venta, between 70 and 80 kilometers, air line, distant. Northwestward in the Tuxtla area a host of small and medium sized sites ring what appears to be the third major Olmec center of Tres Zapotes, about 150 kilometers from La Venta. In other words, as small as the Olmec area of the La Venta period was, a single major ceremonial center apparently did not suffice for it, a fact that clearly suggests that communications difficulties of the day may have limited the efficient exercise of authority and simultaneously the benefits presumed to derive from performance of the cult observances. Thus, in regard to its situation as well as in its agricultural potential, the inter-riverine area fits the requirements of the principal support area for La Venta.

NOTES AND REFERENCES

1. Fieldwork on which this paper is based was made possible by assignment of funds granted to Professor R. F. Heizer by the Committee on Research, University of California, Berkeley.
2. Drucker, Heizer, and Squier, 1957; ibid., 1959.
3. See Heizer, 1959; 1960; and n.d. for lists of these traits.
4. Ibid.
5. Drucker, 1952.
6. Drucker, Heizer, and Squier, 1959.
7. Heizer, 1960.
8. Drucker and Heizer, 1960.
9. Nomland, 1932.
10. The municipio is a modern political subdivision corresponding in a rough way to counties in the United States.
11. Foster, 1942. Cook and Borah (1960:79) list Moloacán in their study of native population.
12. Metates are still standard kitchen equipment in the region, but are reserved for preparation of special dishes, such as mole--and for when the mill breaks.

13. Nanchital is cut off from the productive agricultural region up the Coatzacoalcos River by Minatitlan, from that to the westward by Minatitlan and Coatzacoalcos (the city).
14. This industry is unionized on the closed-shop basis, but the company offers a fair volume of work through 25-day contracts, for which union membership is not required.
15. There is probably some variation in this regard in different parts of the municipio. In the Arroyo Sonso locality (now Colonia Cuauhtemoc), directly on the highway, a rancheria of the municipio, surpluses over and above the subsistence level seem to be larger than at Moloacan itself, with a resultant greater prosperity.
16. Drucker and Heizer, 1960.
17. Various cultivates produce seeds whose germination is aided by mechanical or chemical damaging of the hard or tough hulls; one which comes to mind is tropical kudzu, whose seeds must be scarified or acid-treated (soaked in a 50 per cent solution of commercial sulphuric acid) for rapid germination.
18. There are two types of natural grasslands in the region to which these comments do not apply: the so-called savannas, where conditions of soil aridity and soil poverty make certain tough wiry grasses the dominant vegetation; and low areas, potreros, subject to heavy annual flooding, in which a heavy long grass of reclining habit, called camalote, seems to be the only native plant that withstands both the prolonged flooding and prolonged drying of the dry season. (Certain imported grasses, notably Para and Alemán prosper under similar conditions, although they do not stand quite so prolonged flooding.) It should be stressed also that the present discussion refers to the "Southeast," used here in its colloquial sense to refer to southern Veracruz, part of the Isthmus of Tehuantepec, Tabasco, and Chiapas, and excluding the Yucatán Peninsula. I have no data on floral successions in the Yucatán region, nor on the ease with which grasslands can be established there by burning or by any other means. However, if grass were easy to grow in Yucatán, one would expect to find a sizeable livestock industry there. It is my understanding, however, that cattle raising in Yucatán is of negligible importance; on the contrary, Campeche and Yucatán have provided the principal export market for the beef cattle industry of Tabasco and portions of northern Chiapas for many years.
19. Plow-farmed land, of course, is not allowed to revert to acagual because the root problem would make plowing impossible. Foster (1942) reports several successive years of cultivation of milpa land by the Sierra Popoluca; this certainly reflects climatic and soil differences in the mountain area and probably scarcity of good land at convenient distance from the population centers. Otherwise continuous planting is not customary in this region because of both lowered yield and increased weeds.
20. Note the term "permanent occupation." On the basis of my understanding of this system of land management, I regard references to it as "floating agriculture," "migratory agriculture," and the like, as completely inexact and inappropriate. Acaguales are farmed according to plan, not haphazardly; the same tract is rotated between maize culture and fallow for long

periods. I know personally a good many men in this region who have been working the same farms by the acagual system for twenty, thirty, and forty years, which should suffice to keep them out of the migrant class.

21. Drucker and Heizer, 1960.
22. In one instance known to me, the allotments were of 25 hectares, however.
23. This strip is presently planted to coconut palms and is the scene of a thriving copra industry, but until recently it was almost uninhabited except around the estuaries of the two rivers.
24. Drucker and Heizer, 1960.

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