PRO CALIMA

Archäologisches Projekt im westlichen Kolumbien/Südamerika

Periodische Publikation
der Vereinigung
Pro Calima, Basel, Switzerland

December 1985

4/1985

Vorstandsmitglieder Pro Calima 1985

Dr. med. Rupert Spillmann
  Präsident
Herr Karl-Heinz Heinig
  Vize-Präsident
Herr Willy Thommen
  Kassier
Frau Ursula Kubli
  Aktuarin
Dr. phil. Ernst Müller
  Beisitzer

Participants in the 1982 Field Seasons

Warwick Bray (London University Institute of Archaeology)
Leonor Herrera (Instituto Colombiano de Antropología)
Marianne Cardale de Schrimpff (Fundacíon de Investigaciones Arqueológicas Nacionales del Banco de la República)

Ernst Müller (Solothurn)
Linda Cheetham (Pitt Rivers Museum, Oxford University)
Diógenes Patiño (Universidad del Cauca, Popayán)
Héctor Salgado (Universidad Nacional, Bogotá)
Camilo Rodríguez (Universidad Nacional, Bogotá)
María Eugenia Naranjo (Universidad de Antioquia, Medellín)
María Alicia Uribe (Universidad de los Andes, Bogotá)
Margarita Silva (Universidad Nacional, Bogotá)
Madeline Bray (St. Albans)
María Cristina Moreno (Bogotá)
Germán Gálvez (Universidad del Cauca, Popayán)
Theres Gähwiler (University of Basel)
Judith Strasser (Bonn)
Luis Gonzalo Valencia (Paris)
Pedro Botero (Centro Interamericano de Fotointerpretación, Bogotá)
Robert C. Eidt (State Soils Laboratory, University of Wisconsin-Milwaukee)
Jack Khobzi (Centro Interamericano de Fotointerpretación, Bogotá)
Dolores Piperno (Smithsonian Tropical Research Institute, Panama)
Bill McCourt (Misión Geológica Británica/Instituto Nacional Geológico Minero, Cali)
Fiona Roe (Oxford)
Hernando Delavalle (Cali)
Rodrigo and Nelly Solarte (La Cumbre)
Ovidio Valencia (El Dorado)
Luis Mantilla (El Dorado)

PRO CALIMA

Periodische Publikation
der Vereinigung Pro Calima,
Switzerland

Basel, December 1985

31–34 Gordon Square,
London WC1H 0PY

Druck: Kirschgarten-Druckerei AG
Kirschgartenstrasse 5, 4010 Basel
Telefon 061/23 50 90

4/1985

Contents

Editorial Note

Even by the traditional calculation (that one season's digging generates two years of analysis) this issue of Pro Calima is delayed, and we must apologise to our friends and sponsors. On the credit side, information collected during the 1984 season has helped us to interpret our data from 1982 and has allowed us to present more definitive conclusions in this volume. Inevitably, some uncertainties still remain, and all opinions are the responsibility of the individual authors.

Report on the 1982 Field Season in Calima

By Warwick Bray, Leonor Herrera and Marianne Cardale Schrimpff

1. Introduction

The schedule of operations in 1982 followed the pattern of previous years, beginning in May with a short visit to Calima by Leonor Herrera and Marianne Schrimpff in order to carry out preliminary work and to organise accommodation for the main field season. This lasted from July to September. Excavation during the summer was concentrated in the Valley of El Dorado, in particular at a group of very large platforms on the lower slopes, overlooking a system of drained and ditched fields in the swampy floor of the valley. Pedro Botero visited the excavations to take soil samples for analysis in the laboratory of the Centro Interamericano de Fotointerpretación (Bogotá), and further pollen and phytolith samples were collected to supplement those taken in 1981.

The first results of these analyses are given in the accompanying papers by Botero, Piperno and Monsalve. In addition, our soil phosphate data (see *Pro Calima* 3: 35–39) have been discussed in their wider context in a recent book by Robert C. Eidt: *Advances in Abandoned Settlement Analysis: Application to Prehistoric Anthrosols in Colombia, South America* (Center for Latin America, University of Wisconsin-Milwaukee, 1984).

During the course of the excavations we were visited by three colleagues who have directed their own projects in neighbouring areas: Carlos Armando Rodríguez (Instituto Vallecaucano de Investigaciones Científicas), Julio César Cubillos (Universidad del Valle, Cali) and Vladimir Bashilov (Academy of Sciences of the U.S.S.R.). One of the pleasures of the Calima Project has always been its international character. Since work began in 1979, our collaborators (in the field or in the laboratory) have come from eight different countries: Colombia, Britain, Switzerland, the U.S.A., Germany, the Netherlands, Venezuela and Panama. After so many years it is often impossible to say where a particular idea or line of investigation originated, but the comments of all these colleagues have contributed to this report, as to all our previous ones, in ways that defy proper acknowledgement.

2. Research on the Ilama Phase

This phase was originally called 'Early Calima' but, as our studies advanced, it became necessary to change it. Since the available evidence (Dussán de Reichel 1965/66) had suggested that elaborate gold work was associated with the incised style of pottery, the label 'Early Calima' was applied to both these components. However, further research indicated that, although a few gold objects are found with incised pottery, the more complex pieces characteristic of the so-called 'Calima style' belong to the later, Yotoco phase. At the same time it appeared increasingly unwise to retain the term 'early' since it is by no means sure that the incised pottery style represents the earliest inhabitants of the area.

We took the name Ilama from an area lying to the south-east of Restrepo where numerous cemeteries with incised ware have been found. Now centred on the Hacienda of this name, Ilama was formerly much more extensive. The earliest mention of it that we have come across dates from the early years of the Colonial period when it is listed (as Ylama) in the Visita of 1552 as a 'pueblo' under the chief Bonba (Romoli 1974: 383 and map 2). Although the word appears to be indigenous, we should perhaps make it clear that we are in no way suggesting that its roots go back any further than the Sonso phase; of both the language and the place names of the previous phases we are totally ignorant.

In 1982 we were able to intensify research into the Ilama phase thanks to a contract with the Fundación de Investigaciones Arqueológicas Nacionales del Banco de la República. It is hoped that the results will be published by the Fundación, and a brief summary has already appeared (Herrera, Cardale de Schrimpff and Bray 1984).

Hitherto, extensive surface collecting, while producing abundant samples of Yotoco and Sonso wares, had brought to light less than a dozen sherds of the Ilama phase, and we had been unable to locate a single habitation site of the period. However, we had an opportunity to make a detailed record of the finds from two Ilama cemeteries and it was decided to concentrate for the time being on this aspect of Ilama culture.

We visited a number of sites where Ilama cemeteries had been found within living memory. Some of these had been discovered quite recently and we were able to record a considerable amount of information about the associated material, not only pottery vessels but also stone tools and ornaments, and some gold items. At the same time we continued to study museum and private collections and gradually built up a reasonably representative corpus of figurative vessels of the Ilama phase. It was not always easy to tell on stylistic grounds whether a particular vessel belonged to the Ilama phase or to the succeeding Yotoco phase. We found that by taking our photographic files to Restrepo and showing them to reliable informants, we could often collect sufficient information about other items found in recurrent association with a particular type of vessel to enable us to place it chronologically.

From our visits to ancient cemeteries (a total of 15) we soon built up a fairly clear idea of the sort of site chosen for Ilama burials. The largest cemeteries are usually on hill tops and may consist of 20 or more graves; smaller cemeteries are often found on the hill sides, usually where the slope is gentler, perhaps as a result of artificial flattening. At these sites there are usually some half a dozen tombs, though isolated graves are occasionally found. One characteristic cemetery, Finca Agualinda, was described in *Pro Calima* 3: 29.

In all the cemeteries for which information is available, there are considerable differences in the number and quality of grave goods from different tombs. Some of the dead seem to have been buried with no goods at all, though the same burial sites were often used again in the succeeding phases and we cannot therefore be sure that these empty graves are of the Ilama period; nor can we rule out the possibility that they once contained perishable goods such as food or textiles. Due to the acid soils, the bones are not preserved and we have no clues as to what sort of people these apparently unfavoured corpses may once have been. Many graves have only a rough, unworked stone, and perhaps a plain cooking pot. Tombs with one, or sometimes two, finely decorated pots are quite common, and just occasionally burials with numerous fine vessels or simple stone and gold jewellery are found.

Virtually all the burial sites have small streams nearby, or now dry stream beds, and very frequently the cemeteries overlook a once marshy valley bottom through which runs a larger stream. These swampy areas must once have been rich in fish and game. Since the cemeteries tend to

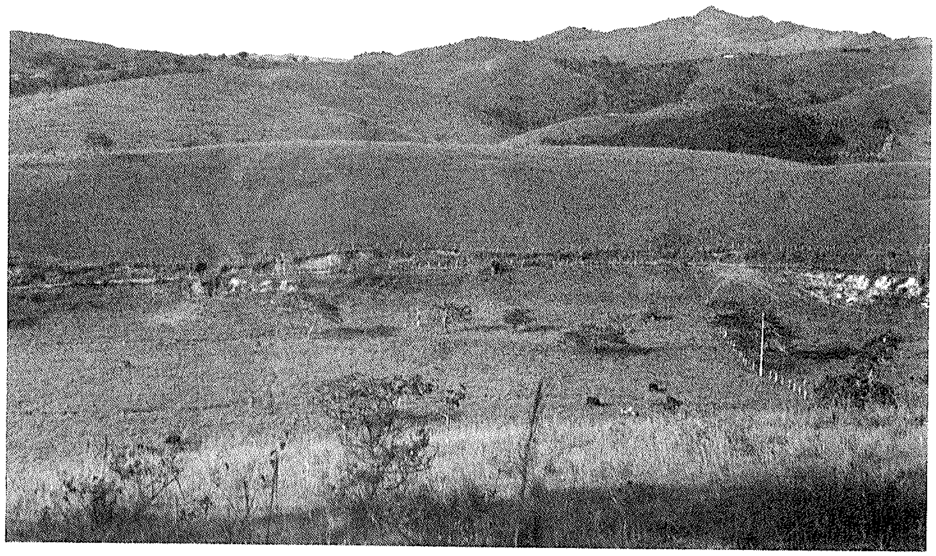


Fig. 1. Los Hispanos. A large Ilama cemetery was found at the right hand edge of the ridge. The prehispanic house platforms and field systems visible on the slopes are probably later.

be situated in places where living conditions are so favourable, we hoped that we would be able to find settlement sites nearby. Most of the localities are covered in grass, so that field-walking revealed few sherds, and we therefore decided to excavate a number of trial trenches in the most promising places. One of these was the hill top at Finca Agualinda, the site of the cemetery mentioned above. Here, as elsewhere, we recovered ample evidence of house-platform construction and other disturbance in the Yotoco and Sonso periods, but all trace of Ilama settlement, if it once existed, had been destroyed. During the Yotoco phase the dead were often buried on the house platforms they had occupied during life, so – in the hope that the Ilama people followed the same custom – areas immediately adjoining the graves were excavated at two more cemeteries (Finca El Recreo and Hacienda Los Hispanos) (Fig. 1). However, no traces of Ilama dwellings were found.

After expending so much time and energy in searching for Ilama domestic sites, we had almost given up hope of finding one when, during a short field trip preliminary to the main 1984 season, we discovered a settlement site at the Hacienda El Topacio in the Municipio of Darién. At this site, to be described in the next issue of *Pro Calima,* the Ilama levels were later covered and protected by Yotoco deposits. Scattered Sonso sherds indicate that this part of the hill side was also inhabited during the last phase of pre-Columbian occupation. The information and experience obtained at El Topacio will undoubtedly make it easier to find and recognise additional sites of this phase. Héctor Salgado informs us that the preliminary results from a site he is currently excavating, down river from the Calima reservoir, suggest the presence of Ilama levels stratified beneath a Yotoco deposit.

One of the greatest difficulties in studying Ilama pottery is due to the enormous numbers of extremely carefully repaired examples in most of the large collections. Since the restorer often supplied a missing limb or other appendage from a different vessel, or sometimes made one himself, the pots must be examined with considerable care. In some cases fragments of pots of totally different periods (such as a Yotoco neck on a Sonso body) have been joined together in such a way that the union is almost imperceptible. There are also considerable quantities of high quality 'reproductions' in circulation.

Anne Legast (n. d.) has recently completed a study of Calima representations of the animal kingdom in all three phases, and in both gold and pottery. She has been able to identify many of the birds, animals and insects etc. at species level, and at the same time she has been able to trace considerable continuity in certain themes from the Ilama into the Yotoco period. In particular, the association between man and snakes, and bat and feline and snake, or sometimes a combination of all these elements, retained their importance, although many other animals represented in Ilama pottery are absent from the Yotoco repertoire. In the Ilama phase these associated beings are known only in pottery, but during the succeeding period advantage was taken of a new medium, gold, for which both an abundant supply and the necessary technical mastery were now available.

Human figures in Ilama pottery

The following section summarises some of our information about representations of human figures in Ilama pottery and it also attempts to extract from these some tentative information on the Ilama way of life.

The anthropomorphic vessels seem all to have been hand-modelled, with no evidence for the use of moulds. Details were added in fine-line incision (especially characteristic of this period) and also by painting, positive and negative, in black (or, less frequently, in white) over a red slip. Highly accomplished examples are found, and also cruder ones. However, in general the well-balanced shapes and carefully executed detail suggest that these pots may have been the work of specialists.

Although one, rarely, if ever, finds two identical figures, they fall into a number of easily recognizable categories. Some of these categories, such as the *canasteros* (vessels depicting a crouching figure carrying a large cylindrical vessel in his back), are found fairly frequently, while other such as the double-spouted pots or *alcarrazas* modelled in the shape of a squatting man are less common; certain others, perhaps because our total sample is still relatively small, are known from only one example. There does not seem to be a single vessel shape of the Ilama period that was not used, on occasion, as the basis for an anthropomorphic or zoomorphic figure. In many cases the figures had clearly seen considerable use before they were buried; often they reached the tombs with half of a foot, a nose, or part of the spout missing. This, together with the discovery at El Topacio of fragments of figure-pots in household refuse, suggests that these vessels were in frequent if not daily use. If this was the case, we should probably classify them in terms of utilitarian criteria, first by shape and possible use.

So far, more than 100 anthropomorphic vessels have been studied, forming 9 main categories. The most naturalistic figures, and those that appear to come closest to representing Ilama men and women, are found on the *alcarrazas* (as they are called locally) i. e. double-spouted vessels with a bridge handle, clearly used as containers for liquid. Related vessels in the succeeding Yotoco phase can be made to produce a whistling sound, but this does not seem to be the case with the Ilama examples.

The plump, kneeling figure with legs tucked under her (Fig. 2) appears to be a reasonably straightforward representation of an Ilama woman. Her well-rounded body and smooth, unlined face contrast with the protruding bones and sunken features of, for instance, the squatting male figures. The hair, parted simply over the forehead, falls straight to the nape of the neck or to mid-shoulder. A general characteristic of these figures is a necklace

a

b

Fig. 2. Ilama vessels in the form of kneeling or squatting women. Private collection. Both vessels are 21 cm. high.

represented by one or more rows of impressed dots that may indicate strings of small beads. Where the hair does not cover it, the necklace ties are carefully depicted as two hanging strings or, in some cases, a pendant rectangle. Ligatures and bracelets, apparently of the same beads, are also worn. Black painted designs on some of the figures suggest a V-necked garment (see for instance Arango Cano 1979: Lam. 26), although we cannot exclude the possibility that body paint is intended.

This V-necked 'garment' is also depicted occasionally on another group of figures, the 'squatting man' category referred to above (Figs.

Fig. 4. Ilama alcarraza in the form of a squatting man. Height 23 cm. Private collection.

Fig. 3. Ilama alcarraza in the form of a squatting man wearing a V-necked 'garment'. Red slip, with details of head, hands and neck area in cream; also resist designs in black. Height 20 cm. Museo del Oro CC 4482.

3, 4). In these figures the backbone is almost always clearly shown with prominent vertebrae, while incised or painted lines on the body may well be stylised representations of protruding ribs. The hair style is characteristic, consisting of a fringe and, sometimes, what appears to be a circular or oblong bald or shaved patch in the centre of the skull. Ears are often pierced, and arm-bands rather similar to those depicted on the plump women are not uncommon. In one case the figure wears an elaborate necklace of radiating components. While this group of figures may represent standard Ilama 'elders', in the Calima region today they are interpreted as hunchbacks, witch-doctors or shamans.

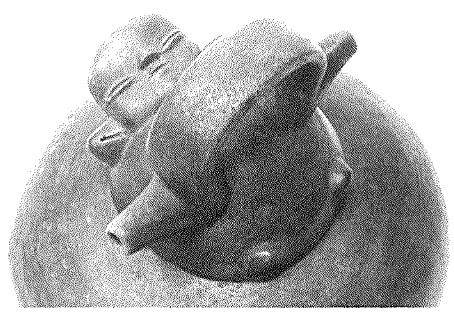


Fig. 5. Detail of an Ilama vessel. A black 'blanket' covers the figure, and the body of the vessel has black resist designs over a red slip. Height 17.5 cm. Museo del Oro CC 4485.

Fig. 6. Ilama vessel representing a woman in labour. Red slip. Height 17 cm. Museo del Oro CC 5609.

An interesting category consists of a recumbent figure covered with a 'blanket' (Fig. 5). In almost all cases the figure's head is pillowed on his or her hands, and the feet stick out at the edge of the cover. While many of these figures, with their calm or expressionless faces, may represent people peacefully asleep in bed, one in the Gold Museum (CC 5609) quite clearly represents a woman in labour, with the midwife supporting her head (Fig. 6). The woman giving birth wears ligatures and bracelets like the kneeling woman described above. The scene is unusual in a number of ways: the 'midwife' (it is not clear whether a woman or a man is represented) appears to wear the hair in a bun and sits on a low stool, the only depiction of Ilama furniture that we have come across so far. The covering seen in other examples of this category is perhaps one of the very few concrete forms of evidence for textiles in the Ilama phase. Although it could be made of skin or a non-woven textile, its size and rectangular shape suggest a woven blanket. In a fine representation in the Museo de Ciéncias Naturales in Cali, the blanket appears to have a border or a fringe represented by incised lines and dots; in other examples (such as CC 4485 in the Gold Museum), the covering is depicted in black paint.

Abstraction reaches its height in the curious 'barrel' figures (Fig. 7). These provide perhaps the only instance in Ilama art of incision used to depict a whole, rather than simply the details, in a modelled figure. The incised figure is highly stylised and at first sight completely two-dimensional. However, in the three vessels of this type the potter has used the barrel shape for a third dimension; on the opposite side of the pot, incised lines in a frame indicate hair and, at the side, a design based on parallel lines may well represent ribs

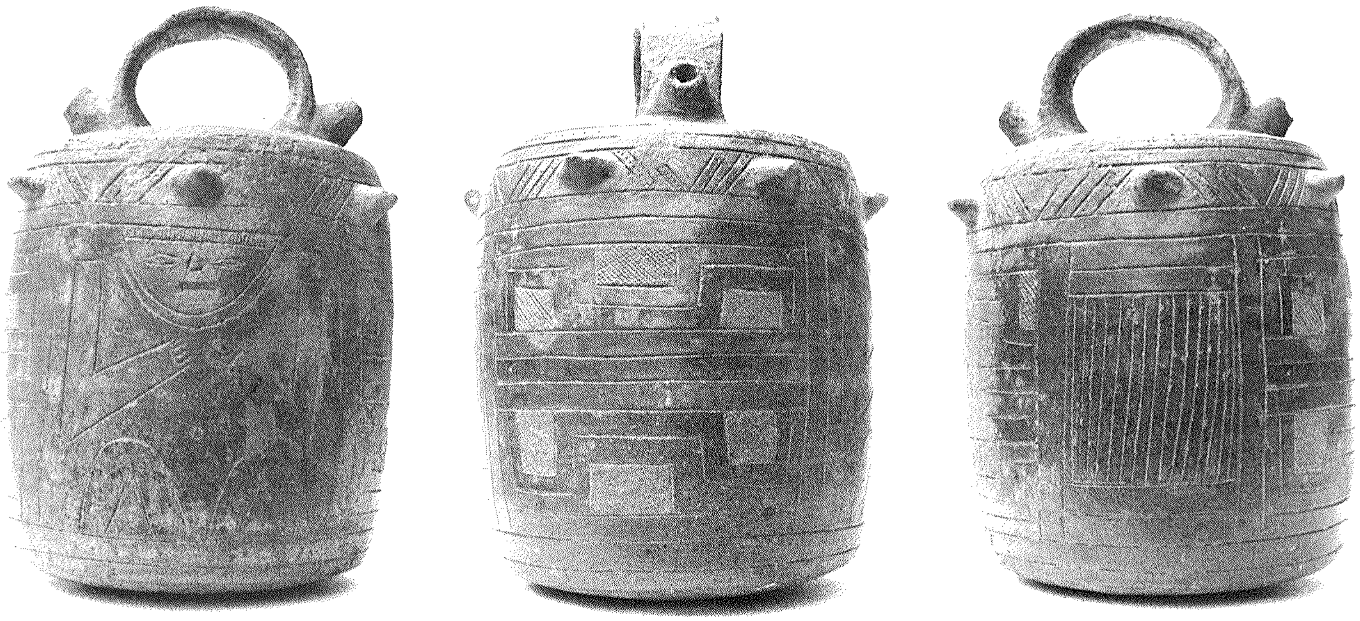


Fig. 7. Barrel-shaped alcarraza of the Ilama period, with a stylized human figure (note the hair in a frame on the back, right hand, view). Red slip with black paint on the area representing hair and on part of the geometric incised design. Height 21.5 cm. Museo del Oro CC 2851.

Fig. 8. Ilama vessel representing a human head resting on a plate or dish. Red slip. Height 21.5 cm. Museo La Merced, Cali, C 10762.

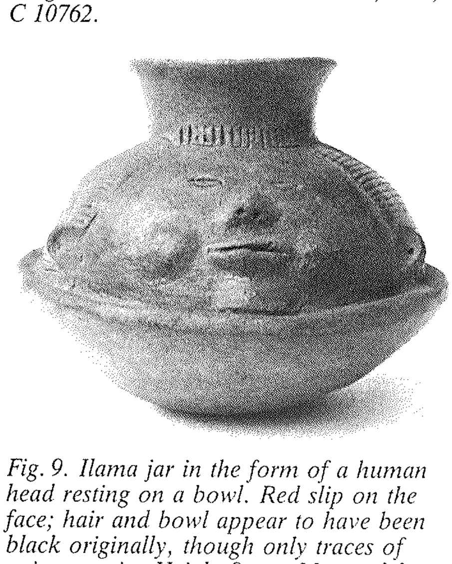


Fig. 9. Ilama jar in the form of a human head resting on a bowl. Red slip on the face; hair and bowl appear to have been black originally, though only traces of paint remain. Height 9 cm. Museo del Oro CC 4517.

in the same way as similar designs on the squatting male figures.

An intriguing group of double-spouted vessels represents heads alone (Figs. 8–10). An example in the Gold Museum (CC 4481) shows a head on a carefully decorated plate, reminiscent of Salome's reward in the Bible. It is not impossible that we are looking at early evidence for the trophy head, a widespread practice in pre-Columbian America, and documented by the early Spanish chroniclers for many groups in Colombia. In the Cauca valley the practice of taking trophy heads was widespread, and the evidence is summarised by Trimborn (1949: 371–2). In this area the heads were usually displayed on poles set up around the houses. Elsewhere, for instance in Peru, the heads are generally shown clasped in the victor's hand or dangling from his belt by the long hair, on their way, perhaps, to form a similar display.

The Gold Museum head has an unexpectedly serene and sublimised expression. However, in at least two cases (Museo la Merced, Cali, no. 10762 (Fig. 8) and Arango Cano 1979: pl. 28) the heads appear to have expressions of extreme sorrow, with downturned, half open mouths and with tears streaming from the eyes. It is interesting that both the tear-lines and the geometric designs covering the hair region are executed in the finely incised cross-hatching which, as we shall see, is often associated with snakes.

Possibly related to the above are several vessels with human heads set on long necks that protrude from the globular bases of double-spout and bridge pots (see the example illustrated in Perdomo 1979: 269). Long-necked heads are also modelled on some jars (Fig. 10), but there is considerable variation in detail, and we need a larger sample before we can understand this group.

Jars are probably the most frequent form in Ilama pottery. They have globular, sometimes rather lenticular, bodies and short necks which are sometimes almost vertical, and are virtually always at an angle of more than 55° to the body. Plain jars encrusted with soot are common in graves, and examples with

Fig. 10. Ilama jar in the shape of a human head. Red slip, with black lines on the cheeks. Height 17.6 cm. Museo La Merced, Cali, C 11730.

burnished red slip and fine-line incision have also been found.

Anthropomorphic examples usually depict the whole body, and occasional specimens seem to show the same plump young woman that we find on the double-spouted vessels. However, the most frequently occurring category of jar consists of slightly grotesque male figures that we have dubbed 'Toby Jugs'. Although the shape is usually that of a jar, in some examples the walls are straighter and the neck junction less marked, so that the vessel is almost a beaker. The figures are naked, with no suggestion of clothes or body paint, and when the genitals are indicated they are always male. Hairstyles are simple, with the hair hanging straight to below the shoulders at the back, while in front it appears to stick up vertically over the forehead. The features tend to be heavier and coarser than on the figures described so far, with large and sometimes rather aquiline noses. The lips are almost always markedly thick, fleshy and unusually protruding, suggesting that they may have been artificially deformed through the wearing of lip plates.

The principal ornaments are a necklace and (in 5 out of the 14 items examined) a pendant of the type usually worn by *canasteros*. Many figures also have bracelets and arm and leg bands. Serpents are closely associated with many of these figures, and in three examples snakes are coiled round the limbs or brow, or are represented by characteristic markings (Fig. 11). The necklace, depicted by cross-hatching identical to that on the bodies of the snakes, may also indicate a serpent or, perhaps, its skin.

Closely related to these figures are the *patones* (a Spanish term referring to the exaggerated size of the feet). Although vessels of this group are still recognizably jars, the shape is subordinate to the figure and the result is closer to a figurine than to a functional pot (Fig. 12). Features, hairstyle and necklace all resemble those of the category just described, but the snake element is more frequent and more explicit.

Another important Ilama form is the bowl. These tend to be plain, and the few examples we have seen with modelled decoration always

Fig. 11. Ilama 'Toby jug'; from 'Vereda de Calimita, Restrepo'. Traces of black. Height 9.5 cm. Museo del Oro CC 80.

Fig. 12. Ilama 'Patones'. Left: red with traces of black; snake markings on the limbs, with two-headed snakes forming the arms. Height 17.5 cm. Museo del Oro CC 5622. Right: note cross-hatched incision, reminiscent of snakes, on arms and belt. Height 13 cm. Museo del Oro CC 5625.

depict animals, particularly frogs and lizards.

The final vessel form is the beaker, a straight-sided, flat-bottomed vessel that may be plain or may bear incised decoration. It is also the basic shape for two familiar categories of Ilama vessels, the *canasteros* (Fig. 13) and the 'snake pots'.

The *canasteros* are named from the Spanish word for basket *(canasta)*, and are generally considered to represent basket bearers. Although we have not come across a single example where basketry is specifically represented, it does seem the most likely material for a receptacle of this size (if the containers are shown in proportion to their bearers, the height would be around 80 cm). The figures vary considerably, from jumbo-sized examples measuring as much as 40 cm. high to small ones of only 6 or 7 cm. The majority are between 9 and 11 cm. in height. The surface is burnished brown, but red-slipped vessels are found quite frequently and black ones also occur occasionally. The incisions are often emphasised by filling with a white, kaolinitic paste.

Fig. 13 a–d. Ilama 'canasteros' in the collection of the Museo del Oro, Bogotá.
From left to right: CC 4533. Height 15.5 cm.; red slip with traces of black.
CC 4534. Height 12.0 cm.; red slip with traces of black.
CC 4535. Height 11.5 cm.; red slip with traces of black.
CC 4536. Height 8.5 cm.; traces of red and black.
Note the zoomorphic elements on nos. 4534 and 4536.

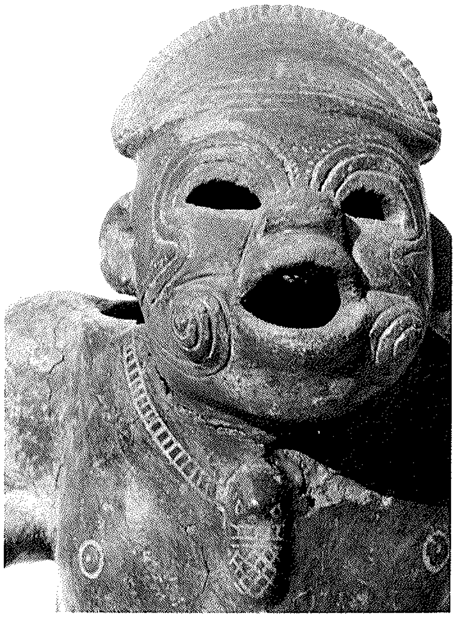


Fig. 14. Detail of an Ilama 'canastero' from Restrepo, Valle . Red slip. Height 24.5 cm. Museo del Oro CC 1843.

Fig. 15. Ilama 'canastero' with a fan-shaped headdress. From Aguamona, Restrepo. Traces of black paint or slip cover the entire vessel. The necklace consists of gold beads cast over clay cores, with a pendant of hammered sheet gold. Height 30 cm. Museo del Oro CC 383.

Fig. 16. Ilama 'canastero' with long hair. From Finca La Estrella, Aguamona, near Restrepo. Height 11 cm. Museo del Oro CC 945.

The 'basket bearers' are the most elaborate of all the Ilama human figures. Although the containers are always plain, the figures themselves wear ornate headdresses and often have their chests covered with painted or tatooed designs. It is also this category of anthropomorphic vessel that is most clearly associated with snakes and other non-human motifs.

The figures are almost always shown squatting, as if resting their heavy burdens on the ground behind them. All the examples we have seen are male, though female *canasteros* are said to have been found on rare occasions. The facial features are similar to those already described for the 'Toby Jugs', rather heavy, with pronounced lines between nose and cheek. With their plump torsos and fleshy chests, the figures suggest middle-aged men rather than lean youths with unlined faces. The facial expressions often seem cheerful, even smiling; the mouths are frequently open as if in speech, and in some examples the personages appear to be shouting (Fig. 14). The figures almost invariably wear a rather broad necklace with a central pendant; some of the more carefully modelled examples suggest that these may have been whistles, like the pottery ones with suspension holes that have been found occasionally in Ilama graves.

On the basis of their ornate headdresses the 'basket bearers' can be divided into four groups. The least common type of headdress (only four examples have been seen so far) is a sort of cap with a tall, fan-shaped crest, made perhaps of basketry and feathers, to judge from the cross-hatching over the crown of the head and the vertical elements forming the crest. An example in the Gold Museum is particularly interesting in that the figure is wearing earrings of thin gold wire and a necklace of gold beads cast over pottery cores; from the necklace hangs a plaque of beaten gold (Fig. 15).

The most common form of headdress (15 specimens so far) is a high, smooth crest that runs from the front to the back of the head, leaving the area above the ears bare (Fig. 13 a). Incised parallel lines suggest that it may be a thick plait of hair. A narrow band or fillet often runs over the brow, above the ears, and round to the back of the head. Only one example of this group has body painting, but on a number of figures the high, smooth crest is composed not of hair, but of snakes.

A curious variety has a series of spiked crests that cross the head from front to back. There are usually three parallel crests, each consisting of three spikes, and, as in the smooth-crested group just described, they are generally contained by a fillet (Fig. 13 c). Virtually all the figures with this type of headdress have their torsos decorated with painted or tatooed designs.

Closely related to this group is one which displayed a similar arrangement of spikes over the crown of the head, but which leaves the hair sufficiently long at the sides for it to fall into two hanks on the shoulders (Fig. 16). In this group, too, a high proportion (5 out of 7) have painted or tatooed chests.

A number of writers have suggested that the *canasteros* may represent traders, travelling with their wares on their backs. If this was the case, the figures' plump and ornate appearance would suggest that they were prosperous merchants of considerable status, not poor pedlars, an interpretation consistent with the position of traders in Andean Ecuador and in protohistoric Mesoamerica.

Although the features of the 'basket bearers' usually fall within the general Ilama range, their headdresses are not found on other Ilama figures, and the type of body painting or tatooing is restricted to the related categories of 'Toby Jugs' and *patones,* where it occurs only rarely. These features can be interpreted in a number of ways. While they could denote particular categories of people within Ilama society or, perhaps, Ilama men dressed up for a special event such as a feast or ceremony, in some cases the figures seem to imitate the features and ornaments of other groups. A well known example is the one in the Instituto Colombiano de Antropología (MN 46-II-6327) collected by Roberto Pineda in the 1940's and reproduced on a number of occasions (Bray 1978: 230; Barney-Cabrera 1977, and also in a much-circulated poster). In this figure the eyes, instead of being half-closed slits in the usual Ilama style, are wide open and almond-shaped, like those on Tumaco figurines. The nose-ornament is also characteristic of Tumaco rather than of Ilama. It is not impossible that some of the 'basket bearers' are merchants from other communities. It would, however, be rash to put too much emphasis on this interpretation, particularly while we know so little about the other contemporary societies of the region.

Representations of burden-carriers are well known among a number of cultures on the western Andean slopes and the Pacific coast of northern South America in Late Formative and Early Post-Formative times. Examples of male figures carrying large receptacles on their backs are found in Tumaco and in various contexts in coastal Ecuador, such as Chorrera (Lathrap, Collier and Chandra 1975: fig. 60) and Jama-Coaque (for which there is a fine example in the collections of the Banco Central in Quito).

The origins of the Ilama phase and its relationships with neighbouring areas

The origins of the Ilama phase remain obscure. We have found nothing earlier in the Calima region. However, the recent identification of maize pollen dating from the 5th millennium B. C. (Monsalve, this volume and personal communication) proves that farming had a considerable time depth in the area. Until we find archaeological traces of these early farmers, we have no means of knowing whether they were related to the Ilama people.

Some twenty years ago, Reichel-Dolmatoff (1965: Chap. 6) compared a number of traits found on Ilama pottery with those of wares he excavated at the site of Catanguero on the lower Calima river. This site, situated in the steamy tropical rain forest, produced radiocarbon dates that place the occupation towards the end of the first millenium B. C. It may well be that this is the area in which we should look for the Ilama origins. Unfortunately, almost no archaeological work has been done here since Catanguero was excavated, and Reichel-Dolmatoff now feels (personal communication) that the extent of the relationship between Ilama and Catanguero can only be evaluated through further field work.

The origins of the Catanguero culture and its relationship with coastal phases further south would also provide a productive subject for research. The greater part of the area is still unstudied. Reichel-Dolmatoff originally considered that Catanguero was part of the same movement of peoples responsible for the contemporary settlements further south, in the Tumaco and Esmeraldas regions. More recently, Bouchard (1984) has suggested that his Inguapi phase of the Tumaco area has its closest links with the indigenous cultures of coastal Ecuador, with little evidence for immigration from outside the region. The exact relationship between Ilama and Tumaco is not, at present, easy to evaluate. The much publicized *canastero* with the exceptional Tumaco features may have had a disproportionately large influence on claims for Tumaco/Ilama similarities. The other area of southern Colombia for which information is available at this time level is San Agustín, but it is difficult to pinpoint clear parallels.

This situation contrasts sharply with that for the succeeding Yotoco phase, which can clearly be shown to form a part of the Southwestern Colombian cultural pool. Evidence for this has been accumulating over the last four decades. Looking south, we find the masked figure (familiar from so many Yotoco gold pins) on a number of San Agustín statues, and Yotoco gold objects are also associated with local items in graves from the department of Tolima and the middle Cauca valley. The subject has been dealt with by Pérez de Barradas (1954: Chap. XXV), Reichel-Dolmatoff (1965: 101), Duque Gómez (1979) and most recently by Plazas and Falchetti (1983, 1985).

While our knowledge of the Southwestern area at the Yotoco time level is still patchy, for the Ilama period it is even more so. Additional information will almost certainly change fairly radically our views of the Ilama phase and its relationship with neighbouring areas during the first millennium B. C.

3. Excavations in the large platforms at the Hacienda El Dorado

The Swedish scholar Henry Wassén (1936) was the first professional archaeologist to visit the Valley of El Dorado, where he did pioneering work in recording tomb collections and petroglyphs. Since his visit, and continuing up until recent times, outstanding gold and pottery artifacts have been found in the valley, and the scarred landscape bears witness to the intensive activity of tomb-looters.

The present owner of this famed hacienda, Señor Náder Calero, has been most understanding with the Pro Calima archaeologists, and showed great patience during our excavations in his pasture lands.

Although we paid our first visit to the Hacienda El Dorado in 1980, it was not until 1981 that large scale work was started there, with the mapping of all archaeological features visible in the landscape of the entire valley (*Pro Calima* 3, Fig. 3). The lower right hand corner of this general map includes the area studied in 1982, and a more detailed map is reproduced as the Centrefold of the present report. These maps show that this particular section of the valley contains the most important concentration of archaeological remains, in terms of number, degree

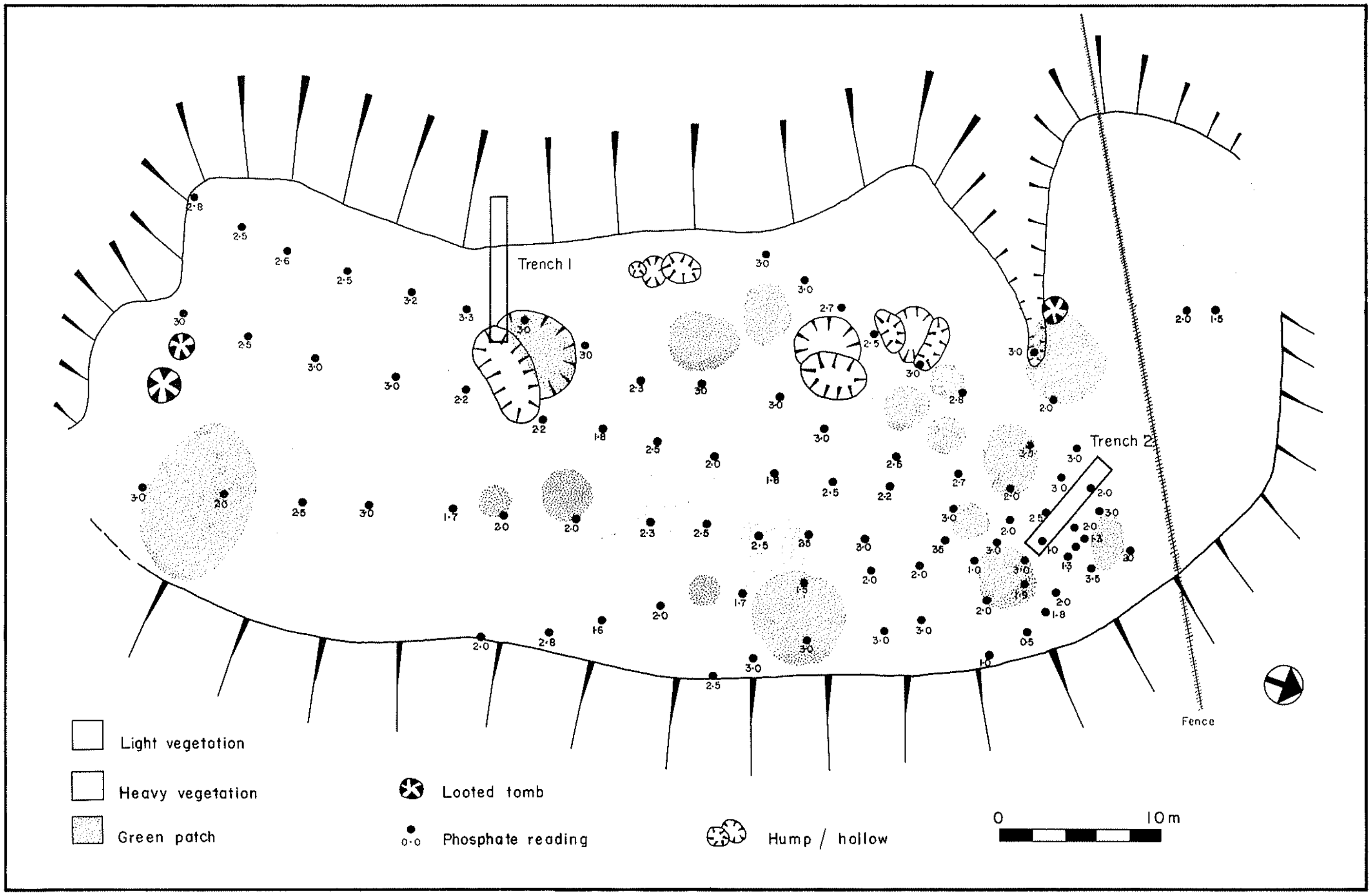


Fig. 17. El Dorado Platform 3, showing superficial phosphate readings, vegetation, surface features and excavation trenches.

of clustering, and sheer size. Seen from the opposite side of the valley it presents an arresting view (*Pro Calima* 3, Fig. 4). Three squareish platforms, in a close cluster, seem to emerge from the valley bottom like monstrous steps. Further uphill other big platforms apparently belong to the same complex, though separated from the main cluster by distances of between 50 and 300 m. Among these upper platforms is a large, ovoid example with a 'mound' towards the back, similar to the Billar at La Suiza, excavated in 1981 (*Pro Calima* 3: 8–14. Smaller platforms are interspersed among the larger ones, and looted graves are numerous.

The adjacent valley bottom has areas of well-preserved field systems, and our excavations in this zone are described in Section 4 below.

Aims and methods of the El Dorado platform study

Field work at the big platforms was designed to obtain information about the types of activities carried out on top of the man-made surfaces, the form and date of platform construction, and the characteristics and age of the palaeosols preserved underneath the constructional fill. The location of the platforms and of our excavation trenches is shown in the Map (v. Centrefold).

Information about the earliest occupation of the locality, represented by the pre-fill deposits, was obtained by augering with a *media caña* (see *Pro Calima* 3: 9) and from deep stratigraphic excavations in Platform 1 (Trench 3/4) and Platform 4 (Trenches 1 and 2). Information on post-construction use was gained from phosphate survey, mapping of features visible on the surface, and excavation of the superficial occupation levels in Trenches 1, 2, 5/6 and 7 in Platform 1 and Trenches 1 and 2 in Platform 3.

The phosphate survey

The first stage of investigation was a phosphate survey of Platforms 1 to 4. The aims of the survey were to provide clues about the functions of the platforms, to distinguish areas of more intensive use, and to guide us in the location of excavation trenches.

The survey was carried out by a series of probes at regular intervals along lines that crossed the platforms. At each point a sample was taken from 10–15 cm. below the surface and was tested on the spot by the ring chromatography method, which gives values on a scale from 1 to 5 (*Pro Calima* 3: 35). Differences in type, height and colour of vegetation (which might indicate human activity) were taken into account when setting out the probe lines, and care was taken to incorporate all categories of surface feature in the list of sample localities.

Platform 3, the furthest uphill, measures 76 m.×28 m. Looted tombs show up as depressions, and there are also hollows associated with low mounds of earth. Vegetation varies from dense bracken in the front part of the platform to short grass at the back. Within this grassy area, roundish patches of light green grass stand out against the darker shade of

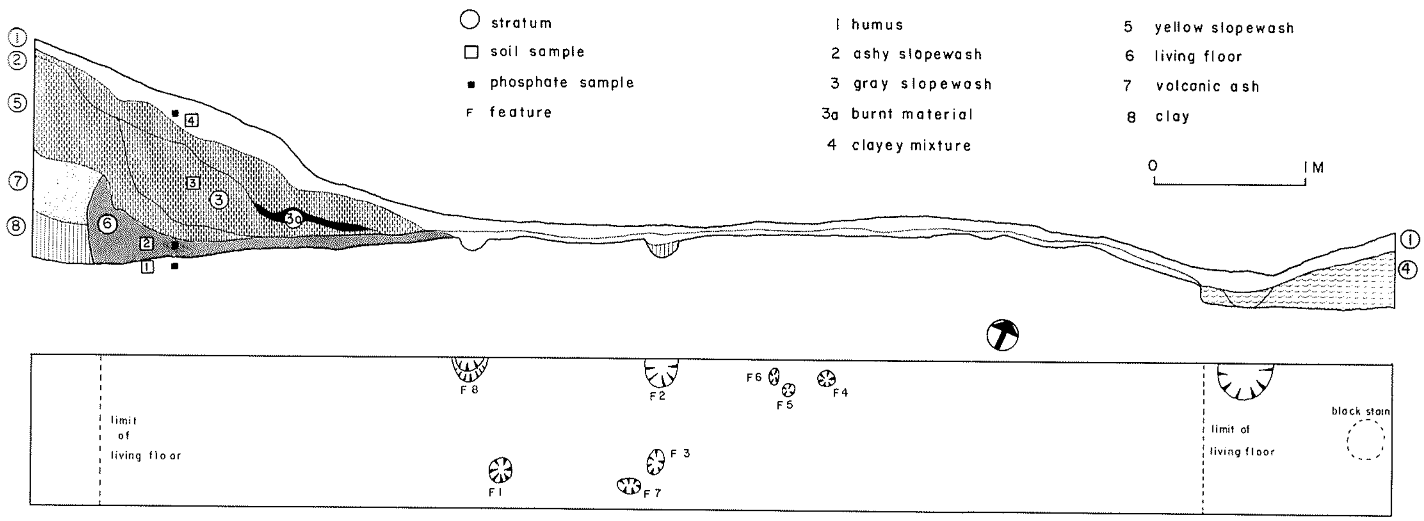


Fig. 18. El Dorado Platform 3, Trench 1. Profile of the north wall of the trench, and ground plan showing features cut into the sterile clay. F1 is a possible post hole.

green which is common on all the slopes (Fig. 17).

The phosphate probes were aligned along radials which stemmed from a point near the edge of the platform. Readings ranged from 0.5 to 3.3, with the majority between 2.0 and 3.0. The values failed to cluster into any meaningful pattern. The inference from this random distribution is that, whatever activity was carried out on the platform, its effects were more or less evenly spread over the surface. There was no marked correlation between phosphate readings and changes in the type or colour of the vegetation. Although values between 2.0 and 3.0 are rather on the low side for a habitation site, Platform 3 showed the highest readings of the four sampled platforms.

Platform 1 lies close to the valley bottom, though (unlike Platform 4) it is far enough upslope to have a firm, dry floor. With the exception of a slight elevation bordering the outside edge, no particular features were evident on the surface at this stage. Close to the back wall, which is 5 m. high, are clumps of bracken.

Four phosphate radials were set out here, with test points separated by distances between 2 and 6 m. The values obtained ranged from 0.0 to 3.0, but the majority were below 1.0. These results were unexpected. From its size (110×37 m.) and commanding location, Platform 1 appears to be the most important construction in the Hacienda El Dorado, and perhaps in the whole valley. If nucleated villages existed during the population climax of the Sonso period, this large platform would be the logical place to find one. Although the excavation of Trench 7 (see below) caused us to modify our image, derived from the phosphate data, of a vast, uninhabited construction, the fact remains that any activities carried out on this platform have left few traces in terms of phosphate or artifacts over most of the surface.

Platform 4 is much the same length as Platform 3, though its width (54 m.) is greater. It is raised only 2 m. above the valley floor, and its front wall has the form of a ramp rather than a steep embankment. Being so close to the valley bottom it shares the same problems of drainage; it becomes waterlogged in the rainy season, and the trampling of cattle in the soft damp soil has produced a hummocky, uneven surface. Even though it may have been dryer when the valley's ditch system was in good repair, or in times of lowered water table, this platform probably never had a suitable surface for human habitation. Two lines of phosphate tests were carried out and gave low values, in the range of 0.5–1.0.

Platform 2 (the last of these constructions to be tested) is located one step higher than Platform 1 and measures 84 m.×40 m. Only one line of probes was laid out here. Readings are within the 0.5 to 3.5 range, though the majority did not rise above 1.0. The two highest readings correspond with an area close to the back wall.

All four platforms gave rather similar results and may have had similar functions. If they had served as dwelling sites, occupation must have been very sparse. Agricultural use is another possibility that is consistent with the low values from the phosphate tests.

The excavations

A total of eleven trenches was dug, divided among three of the four large platforms. During the course of the excavations Robert C. Eidt collected samples for phosphate fractionation (Platform 3, Trenches 1 and 2; Platform 1, Trench 1), and Pedro Botero collected soil samples from most of the trenches. The results of Botero's analyses, with detailed interpretations of the stratigraphies, are included in his article later in this volume, and only summary descriptions are given in the present section.

In addition, soil columns were extracted from some of the profiles, and samples were later taken from these for pollen analysis (by Luisa Fernanda Herrera) and for phytolith analysis (by Dolores Piperno).

Excavations in Platform 3

Trench 1 was opened in a zone with relatively high phosphate values, incorporating also the back wall of the platform, a flat area with grassy vegetation, and part of a small mound (Figs. 17, 18).

At the eastern edge of the trench, furthest away from the bank marking the back wall of the platform, a thin

Fig. 19. El Dorado Platform 3, Trench 1; Sonso pottery and stone items from the excavation. Nos. 1, 2 , 6, 7 from topsoil; nos. 3, 8 from slopewash; nos. 4, 9 from Stratum 4; nos. 5, 10, 11 from the occupation floor beneath the slopewash (Stratum 6).

layer of dark brown humus (Stratum 1) directly overlay a dark red clay. Clearly, in this area the original yellow ash stratum and the old soil had been cut away and dumped elsewhere during the construction of the platform, exposing the red clay derived from decomposition of the diabase, which is the most common bedrock throughout the region.

This end of the trench also cut into one of the small combinations of mound-with-depression, which are characteristic of this platform. The function of the hollow is unknown; its fill was darker than the surrounding clay and contained a few sherds (Fig. 19: 4, 9). The mound was made up of mixed clayey material (Stratum 4), probably derived from the adjacent depression.

At the other end of the trench, where it cuts into the back wall, the stratigraphy was more complex. Below the present day humus is a layer of yellowish ashy slopewash material (Stratum 2), culturally sterile. Below this is a darker slopewash with abundant charcoal (Stratum 3). Underneath this is a third stratum of slopewash, yellow and ashy (Stratum 5), with a a few Sonso sherds and lithics (Fig. 19: 3, 8). Beneath these layers of slopewash, the back edge of the platform is preserved almost intact. The profile clearly shows how the builders cut away the yellow ash and the top of the clay matrix at the back of the platform to create a level floor. On this floor, adjacent to the back wall, are the remains of the archaeological soil (Stratum 6) formed by human activity at the time when the platform was in use.

Preserved beneath the slopewash, which protected it from the effects of weathering and of cattle grazing, this occupation soil is of a rich black colour, with a soft, crumbly consistency and occasional flecks of yellow ash. Towards the outer part of the trench, further away from the back wall and therefore less protected by slopewash, this black soil merges and blends into the recent humus. Sherds, including some Sonso rims, were found in the occupation soil (Fig. 19: 5, 10, 11), and a small quantity of charcoal was collected for dating. An extension on the north side of this trench was excavated to collect soil samples for pollen and phytolith analysis.

On scraping, the floor of Trench 1 revealed various features, cavities which differed in size and content. Some narrow and deep ones (10 cm. diameter) of approximately rounded shape, were most probably *media caña* holes (Fig. 18, features 4–6). Others, of irregular shape, were bigger but shallower (Fig. 18, features 2 and 8). Finally, there was one rounded hole, some 18 cm. in diameter and 20 cm. deep, filled with a large quantity of charcoal. This was possibly a post hole (feature 1). Within the limited extent of Trench 1, the arrangement of these features does not indicate any particular pattern. A considerable amount of sherds of the Sonso type as well as pieces of worked diabase and unworked stone were found in the transition from humus to clay i. e. the original living floor (Fig. 19: 1, 2, 6, 7).

Trench 2, 7 m. × 1 m., was dug on the northern side of the platform in order to test whether there were any differences between areas of low and high phosphate, and between patches of light green and darker vegetation. Here, well away from back wall of the platform, excavation revealed a very thin archaeological layer at the base of the humus, with the transition to natural sterile clay only 20 cm. below the surface.

On the eastern side of this trench, where lighter green grass coincides with a low phosphate value of about 1.0, the earth is harder and there is virtually no cultural material. Elsewhere in the trench sherds were present, though in less quantity than in Trench 1. On scraping the bottom of Trench 2, no features were revealed except for a deep pit, ca. 20 cm. diameter, which was not very convincing as a post hole.

Excavations in Platform 1 (Fig. 22)

Work started here with Trench 1, placed so as to cut the rear bank of the platform at a locality where the prevalent grass is replaced by low shrub vegetation. As at Platform 3, the original soil of the occupation surface was preserved under slope-wash deposits, and contained Sonso sherds.

Trench 2 (1 m.×4 m.) was opened close to the previous trench in a sector which gave the highest phosphate readings (2.0, 2.0, 3.0) for the entire platform. The results were similar in general terms to those from Platform 3 Trench 2.

From the experience acquired during 1981 at El Billar (*Pro Calima* 3) it was reasonable to expect that the El Dorado platforms had been constructed by cutting away a section of the slope and dumping the excavated material at the outer edge of the levelled area, in order to increase its extent. Under this fill, the chances of finding well preserved ancient land surfaces were likely to be good.

To test this possibility, *media caña* probes were made at 2 m. intervals, prolonging the line of Trench 1 diagonally across the platform as far as its edge. For the first 18 m. (measured from the SE end of the trench) the probes revealed the typical stratigraphy of the cut-away zone of the platform, with the humus directly over the red clay. This point marks the transition from the cut-away area of the platform to its built-up outer part. Beyond 18 m. the probes started to reveal a reddish fill, which gradually deepened towards the platform edge. Below this reddish deposit was a stratum which we initially called 'dark fill', and underlying this was the 'natural' profile present throughout the area: a black humic layer developed on top of the yellowish volcanic ash which covers the red clay. At the outer edge of the platform the *media caña,* with its 2 m. handle, was not long enough to penetrate the fill.

To investigate the palaeosols of the old land surface, Trench 3 (1 m×4 m.) was opened at the point

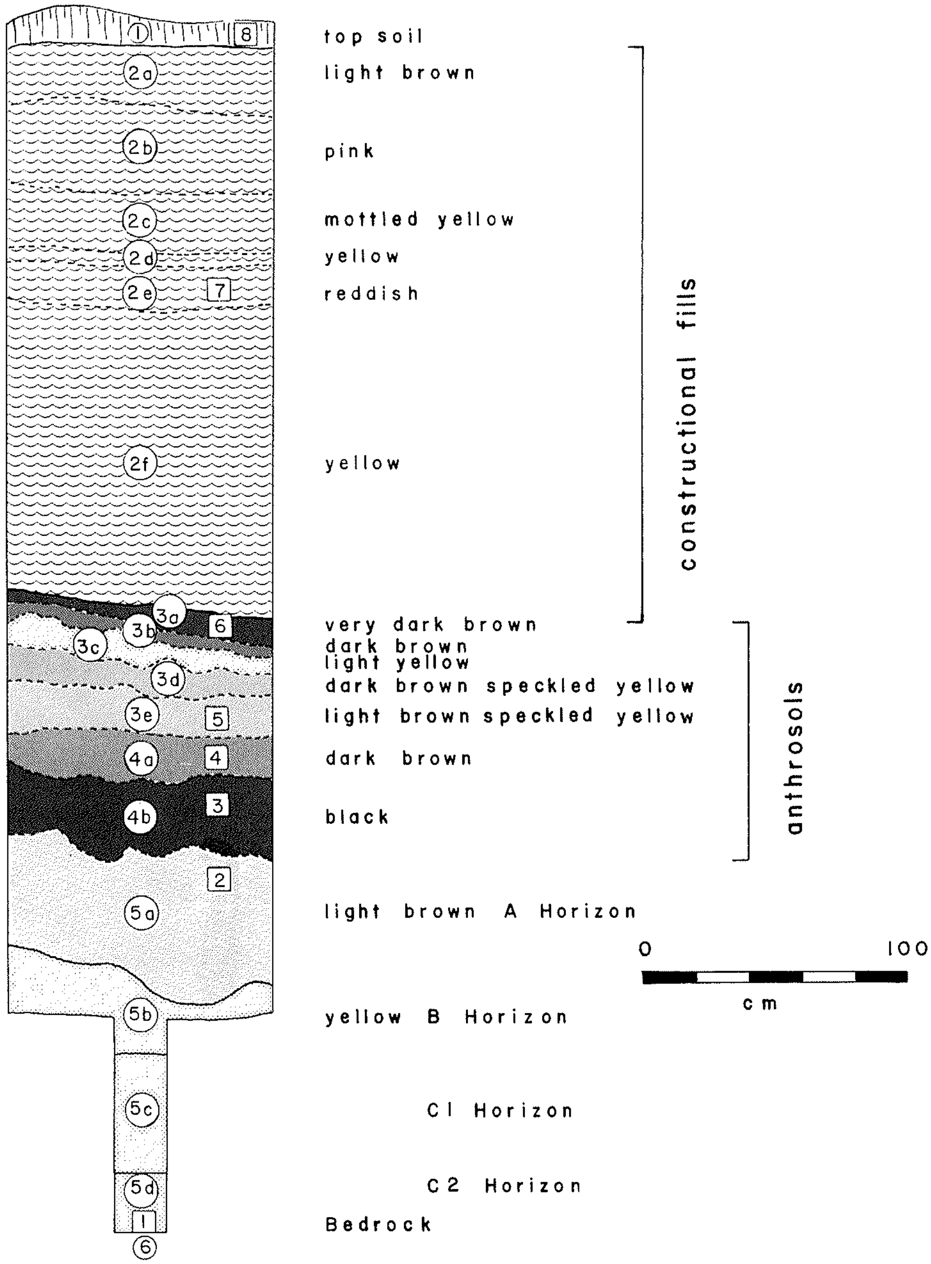


Fig. 20. El Dorado Platform 1; East wall of Trench 4. Stratum numbers are circled; numbered squares are soil samples.

of transition between the cut-away and built-up zones, and Trench 4 was placed on the lip of the platform, where the fill was deepest and was piled up to form a slightly raised rim. *Trench 4* became a very deep cut, for the red clay (B Horizon) was not reached until 3.80 m. below the surface (Fig. 20). Augering below the trench floor revealed decomposing bedrock 1 m. further down (Stratum 6). The ancient A Horizon (Stratum 5 a) was a light brown compacted layer, and laboratory analyses by Botero (this volume) confirmed that it was composed primarily of volcanic ash. Sherds started to appear in this layer, including a few diagnostic Yotoco rims (Fig. 21: 8–12). On top of this, an anthropic soil developed very gradually, perhaps over a period spanning several centuries (Stratum 4 b). Continuous human activity, probably agriculture with some kind of fertilisation, accounts for the soft, fine texture and rich black colour of this soil. Laboratory analysis showed a substantial component of volcanic ash.

On top of this black stratum another dark brown humic layer was formed (Stratum 4 a). Volcanic ash is less important in its composition, though it developed in a similar fashion to the previous level, through a single kind of activity pursued continuously over a long period. This

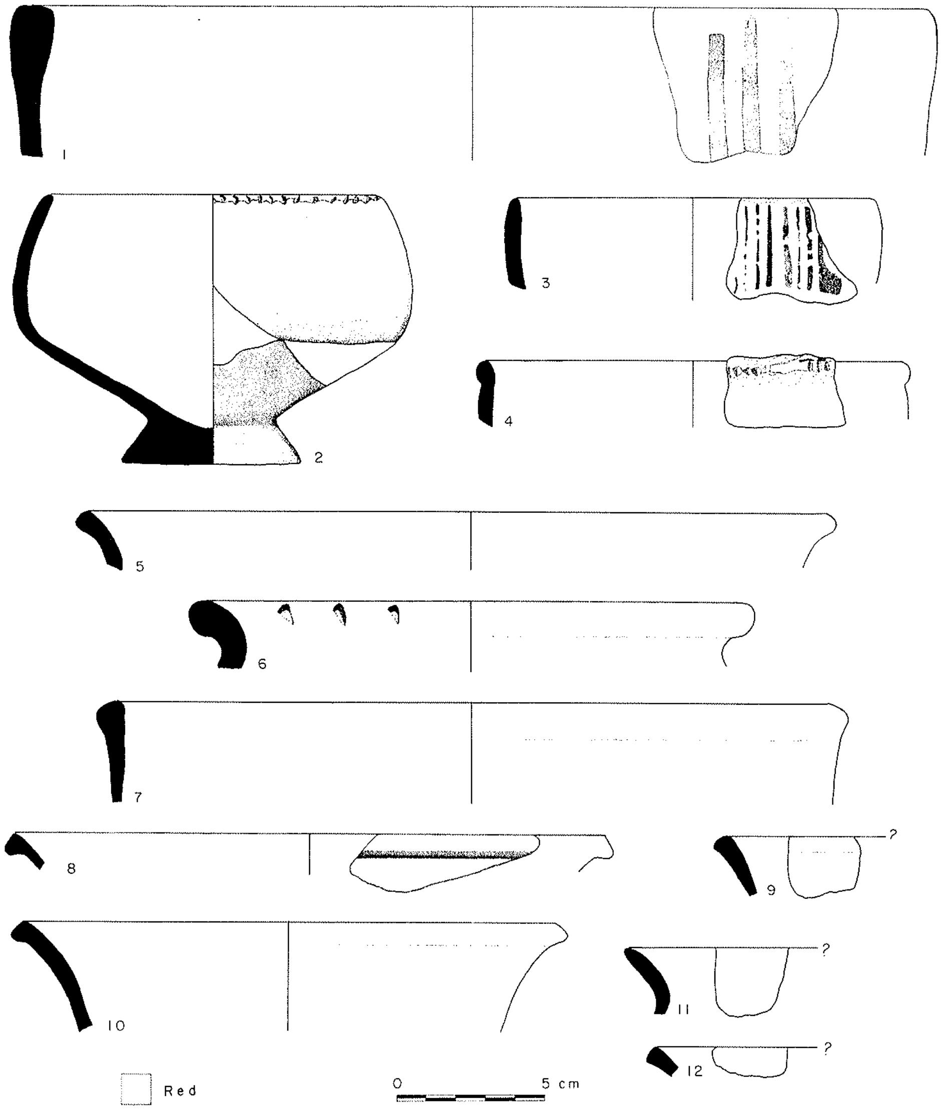


Fig. 21. El Dorado Platform 1; sherds from Trench 4. Nos. 1–4 are Sonso style and come from constructional fill. Nos. 5–7 are from the black palaeosol. Nos. 8–12 are from the original A Horizon (Stratum 5a) corresponding with the Yotoco occupation.

stratum contained Yotoco and Sonso sherds.

Above this, the next five layers have a somewhat mixed appearance and were initially dismissed as constructional fill. Closer analysis made for a change of mind. These layers in fact bear witness to a diversity of activities at the site. It appears that refuse was encroaching onto the agricultural fields, and that small amounts of earth (perhaps from the levelling of nearby areas) were being dumped. The lowest of these strata is light brown streaked with yellow (Stratum 3 e); then comes a dark brown deposit with yellow spots (Stratum 3 d), followed by a light yellow granular level (Stratum 3 c), a dark brown stratum (3 b), and finally another dark brown level with plenty of charcoal concentrated on and near its surface (Stratum 3 a). A sample of this charcoal gave a C14 age of a. d. 1160 ± 50 (Beta-6819), so the main construction of the platform must have begun soon after that date. For detailed soil descriptions of this profile see the article by Botero in the present volume, especially his Table 3.

This last layer has the highest phosphorus value (28 ppm) of all the profile, suggesting that it was an occupation surface immediately before the construction of the platform. In the profile, too, the top of the layer shows up as a clearly defined line, indicating a stabilised surface.

The fill dumped on top of all this shows variations in colour from yellow to dark brown, and is of considerable depth (Stratum 2). On top of this clayey fill developed a humus (Stratum 1). The granular texture of this humus was unexpected, bearing in mind that it formed on top of a fill composed predominantly of clay. Laboratory tests for mineral composition showed that ash, if not dominant, was abundant. One possible explanation for this composition is that volcanic ash was falling in late Sonso times.

Trench 3 (4 m. × 1 m.) was placed so that it crossed the transition between the cut-away and built-up areas of the platform (Fig. 22). The stratigraphy at the south western end of the trench, in the zone of constructional fill, showed a general similarity to that of Trench 4, but with some important differences. For example, in Trench 3 the black humic palaeosol is richer in phosphorus and organic matter, indicating much more intense human activity. It is possible that in Trench 3 this deposit was close to the habitation site (perhaps a kitchen garden), while in Trench 4 the soil derives from agricultural fields further down the slope. With the passage of time it appears that the dwelling zone became more densely occupied, and perhaps extended into the garden area. Above the black humus is the sequence recognised in Trench 4: mixed layers in varying shades of brown, followed by a reddish fill.

Trench 3 was extended for another 7 m. towards the back wall (Trench 5 in Fig. 22). In this area, the levelling of the platform had affected the upper strata but had not removed the black soil, though, as it nears the present day surface, it progressively loses its dark colour and fine crumbly texture, turning into a greyish brown, hard and blocky material. This change is in part the result of exposure to weathering.

To gain further information about the nature of the old land surface and the extent of the fill, another series of *media caña* probes was carried out along parallel lines crossing the platform, from front to back, at 10 m. intervals. Zero point was at the southern extreme of the Platform (Fig. 22).

These tests showed that the original slope made a gentle dip, or gully, towards the middle sector of the platform, as if the prehistoric landscape (like the present one) had consisted of a series of ridges, spread out like the fingers of a hand and

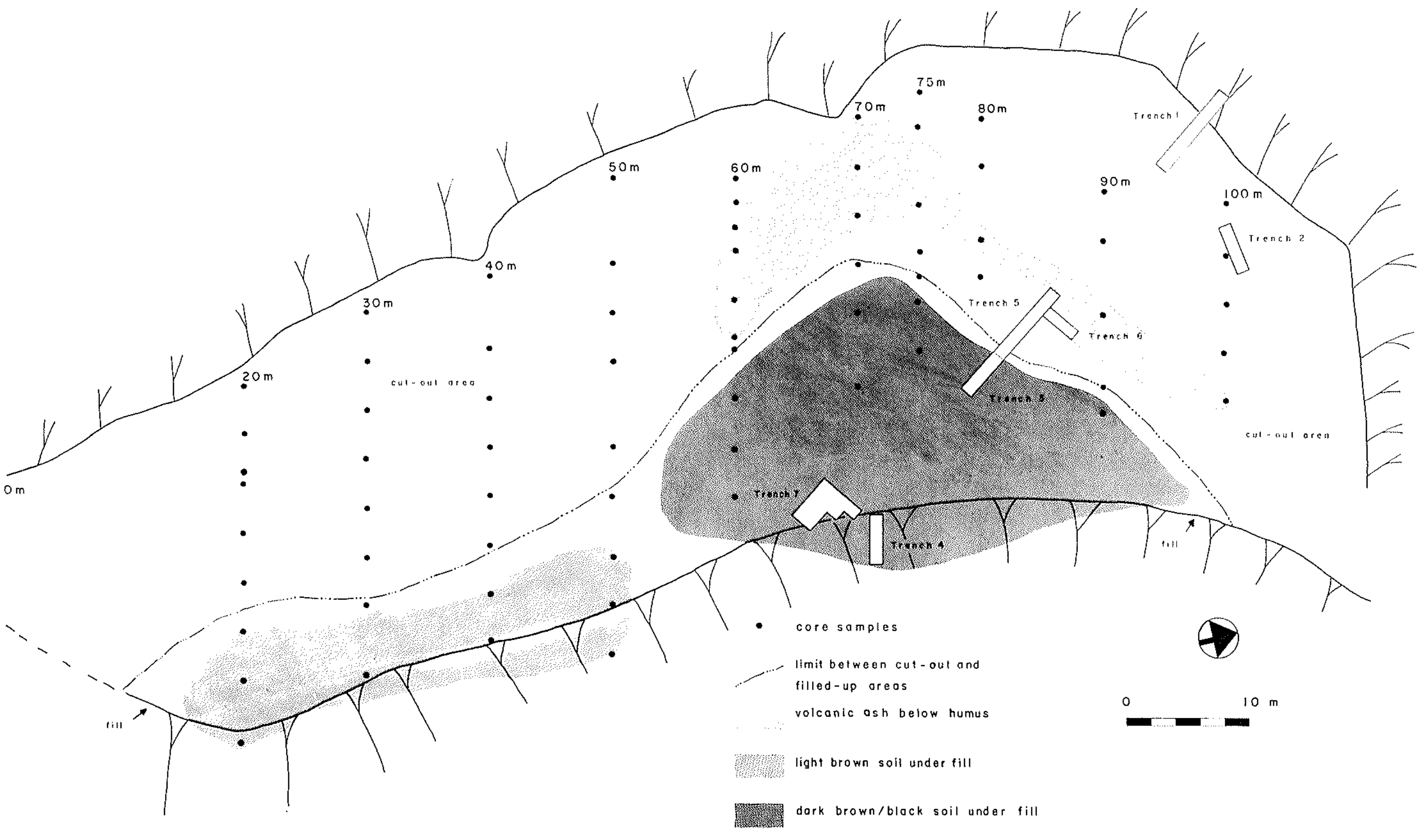


Fig. 22. El Dorado Platform 1. Map showing the extent of various subsoil strata (natural and archaeological), based on data from core samples.

sloping down to the valley floor. Because of these irregularities, some areas of the platform needed more fill than others. In the southern sector, more or less as far as the second 50 m. line, there was more cutting than filling. In the northern corner, at the 100 m. line, the original slope rises once more, since only cutting is evident and there is no fill.

Along the outer (eastern) margin of the platform the rim of fill begins at about 10 m. from the edge. Underneath this fill the test probes revealed a brown soil whose characteristics suggest human activity, habitation or cultivation, but not as intensively as in the corresponding brown palaeosol of Trench 4. Since this brown soil developed on a surface from which the volcanic ash had been removed, presumably by human agencies, it is possible that a small platform once existed here.

Between about 60 and 90 m. from the zero point a dark palaeosol, similar to the one in Trenches 3 and 4, appears below the fill, which is very deep towards the platform lip. Midway between the front and rear margins of the platform, patches of volcanic ash occur below the recent humus, indicating that very little of the original profile had been cut away at this point, since the natural surface more or less coincided with the level desired for the platform floor. Some of the probes in this sector indicated that the dark palaeosol progressively thins out as it approaches the back wall, and dies away approximately where the volcanic ash starts. Very tentatively it is suggested that a small platform once existed here, cut into the volcanic ash, and that agricultural fields (represented by the dark soil) extended downslope from the platform edge.

Trench 7. As excavation progressed, trampling of the grass exposed three relatively large stones half hidden in the vegetation on the bank that forms a slightly raised rim

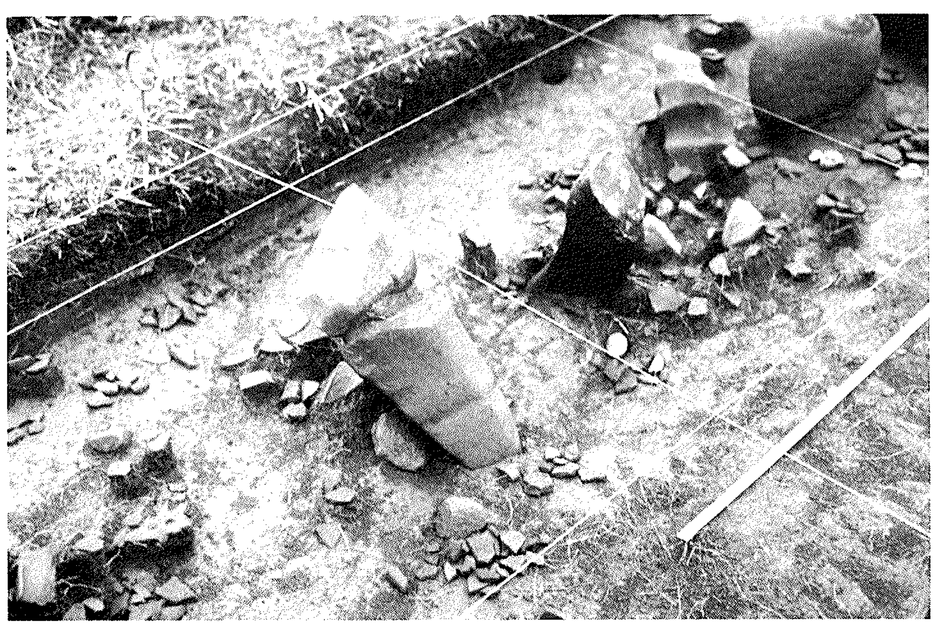


Fig. 23. El Dorado Platform 1, Trench 7. View of the excavation.

to the platform. On closer inspection these stones appeared to have been worked. When the turf was removed the tops of more stones appeared, and also quantities of sherds. At this stage, a formal trench (Trench 7) was laid out. Eight 1 m. × 1 m. squares were demarcated, and excavation proceded by 5 cm. levels. All sherds and stone were left in place until the level was completely excavated when they were mapped, removed and bagged separately. Four such levels were stripped before the clayey surface of the fill appeared, and excavation continued deeper around some of the stones (Fig. 23).

Six of the larger stones were arranged in an irregular line. They have different shapes but most of them are elongated and were buried to about half their depths (20–80 cm.). The biggest stone of all lay outside the line; it is flat-topped and measures approximately 1 m. in length. Around these stones was an unusually dense concentration of Sonso sherds and stone fragments of various sizes, especially in the two upper levels. In places the soil was literally packed with archaeological material.

Excavation on a larger scale was clearly required at this locality, and Trench 7 was therefore reopened and enlarged in 1984. The definitive results of this operation will appear in *Pro Calima* 5.

Excavations in Platform 4

At this structure a single line of *media caña* tests was carried out, crossing the platform from the back wall to the front edge, with the sample points 2 m. apart. Results were rather uniform; in all the borings there was fill below the humus. The nature of this fill was quite variable. Towards the back of the platform a dark brown layer overlay a light yellowish brown one; in the centre the fill was all dark brown; towards the outer edge it was red, with dark brownish below. More or less coinciding with the water table, between 1 m. and 1.5 m. below the surface, a grey clay stratum appeared everywhere in the platform. Boring could not at first be carried down below the water table, but all the evidence suggested that

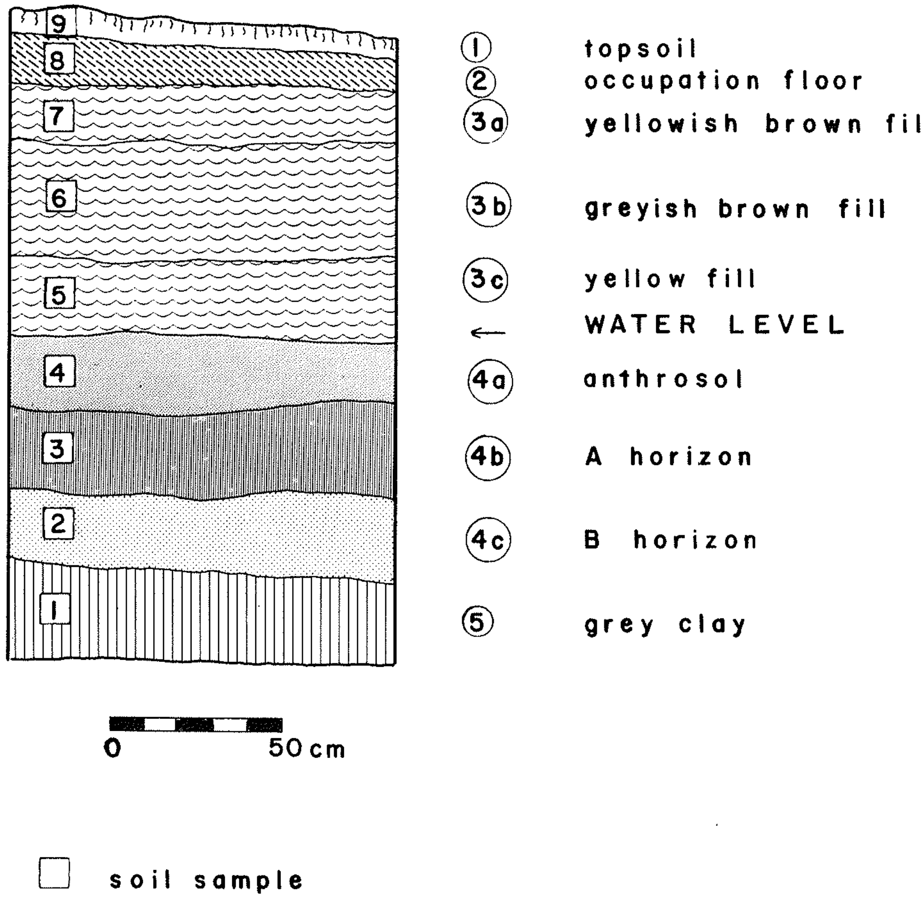


Fig. 24. El Dorado Platform 4. Profile of East wall of Trench 2.

Platform 4 was constructed in a different fashion from the others. Instead of being cut into a hill slope, it was built up entirely of artificial fill dumped on top of the marshy edge of the valley floor.

Trench 1 was opened at the lip of the platform and Trench 2 approximately in the middle, at a point where the probes provided evidence of charcoal, sherds and a possible dark fill.

Trench 2 (Fig. 24). In this, the uppermost stratum is a greyish humic layer, below which is a reddish brown layer of loose damp soil (Stratum 2) containing plentiful cultural material: Sonso sherds, chipped stone and some charcoal. Besides the archaeological evidence (Fig. 25, d) soil analyses indicated human activity on this surface. This deposit is not a typical midden, but it may have been an agricultural area and one can imagine the cultivators purposefully spreading refuse in an attempt to improve the quality of the soil.

Below this occupation layer are three levels of constructional fill (yellowish brown, greyish brown, and yellow). The entire fill (Stratum 3) was characterised by large quantities of sherds (especially large, coarse ones), whole and broken stones, and even fragments of manos (Fig. 26). This archaeologically rich fill is not typical of other platforms we have excavated in the Calima area. Perhaps the cultural debris was purposefully added to the fill to increase the permeability and stability of the platform surface. The fill terminated at the (dry season) water table at a depth of 1 m.

Some days after our initial excavation the weather dried up, the water table was lowered, and we were able to continue downwards with the aid of a water pump. Below the fill was a natural soil, which corresponds with a period of poor drainage, though not extreme enough to cause swamp formation. The lower portion (the C Horizon) of this soil is a clayey, greyish deposit, becoming greener towards the base (Stratum 5). Above this, the B Horizon is also clayey, but of a yellowish grey colour (Stratum 4 c); it contained Yotoco sherds. The A Horizon (Stratum 4 b) at the top of this soil profile is a dark brown soil with a mixture of Yotoco and Sonso

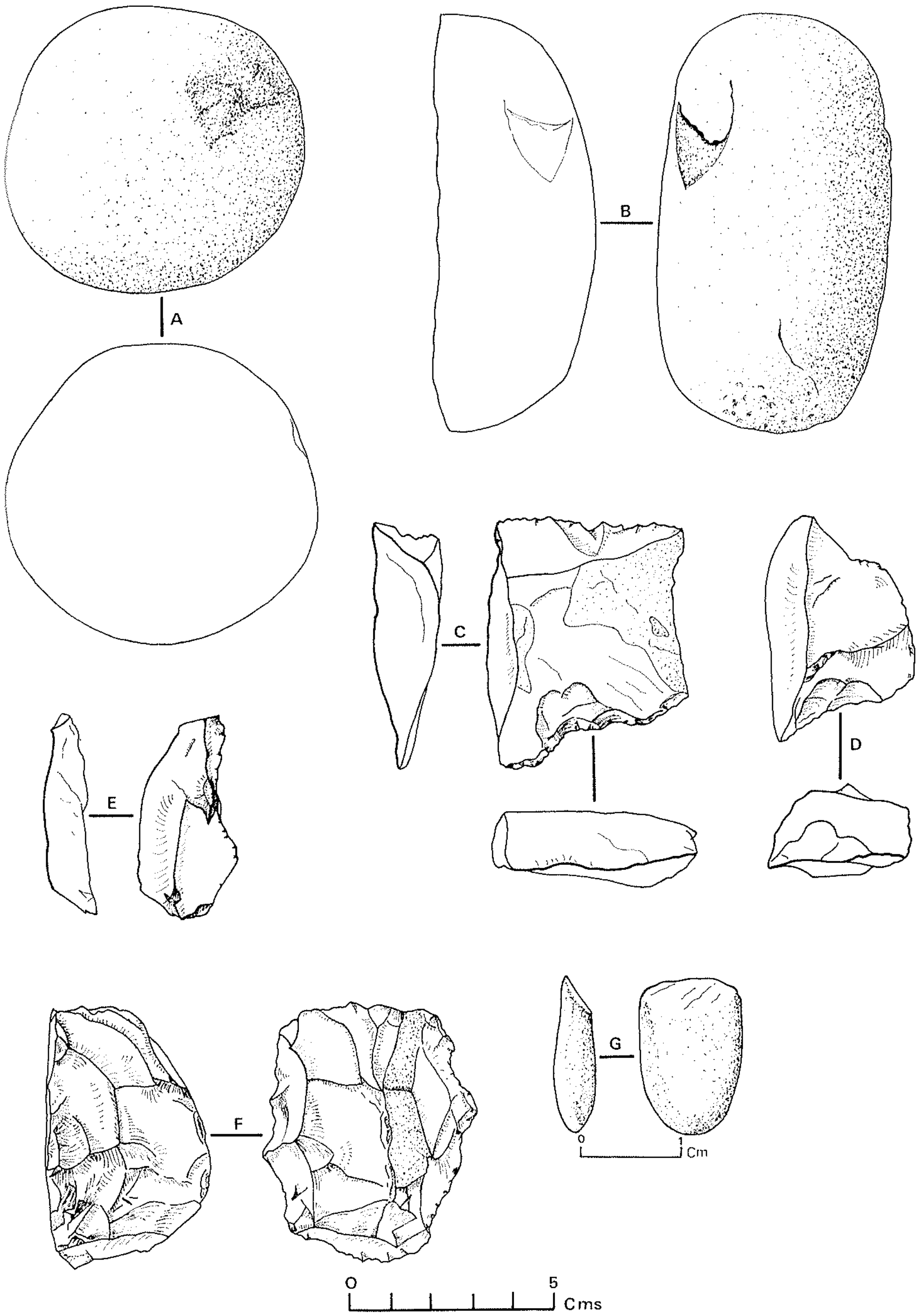


Fig. 25. El Dorado Platform 4; lithic material from Trench 2. Item A comes from buried soil; B, C, E–G from fill; D from occupation floor (Stratum 2).

pottery. The upper 5 cms. or so are darker and have some charcoal (Stratum 4 a). This superficial layer also gave slightly higher values for phosphates and organic matter than the rest of the A Horizon. Laboratory analysis was not conclusive, though there are indications that this was an anthropic soil. Although stratigraphically it appears to be a continuation of the black palaeosol found below the fill at the lip of Platform 1, at the lower elevation of Platform 4 the characteristic texture and black colour are absent, and there is a degree of mixing. There is no evidence for intensive or continuous agriculture in this soil, nor is it compacted. As a former zone of lake shore and marsh, on the edge of the valley floor, this area may have been peripheral to the agricultural and residential activities carried out on the higher platforms.

Trench 1 (Fig. 27) was opened on the lip of the platform, as close as possible to the valley floor. The humic uppermost level contained a few sherds and stone debris. Below this came various layers of fill, of different colours and textures, which continued below the water table at 1 m. below the surface. The original

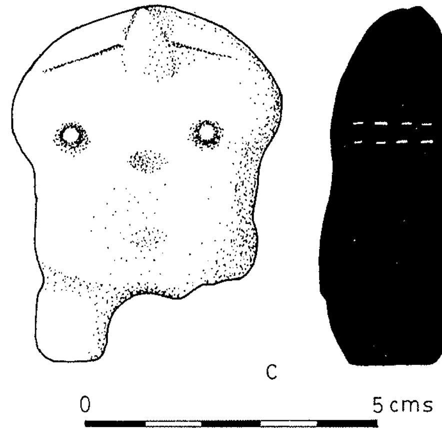


Fig. 26. El Dorado Platform 4, Trench 2. Pottery figurine of Sonso type found in the stratum of constructional fill.

land surface is found at a depth of 2 m. Its A Horizon (Stratum 3 a) is a thin, greyish brown layer, developed on top of B and C Horizons of grey clayey material. The profile indicates a lake soil, formed under anaerobic conditions in the valley bottom, and therefore rather different from the corresponding soil in Trench 2. For a detailed soil description see Botero's Table 4 in this volume. Cultural material, though not very abundant, included a possible Yotoco rim sherd and a 'diadem' fragment from the headdress of an anthropomorphic Sonso vessel (Fig. 28).

Since it was important to establish a correlation between the strata of the valley bottom and those of the platforms and hill slopes, the age of the buried soil in Trench 1 was crucial. A sherd from the transition between the A and B Horizons was therefore submitted for thermoluminescence analysis, and gave a date of A. D. 1422 ± 20% (Alpha-1520).

This date was rather more recent than was expected, considering the presence of sherds which, though not sufficiently diagnostic, have been labelled as Yotoco, and seems to suggest that this particular flooded area was exposed, and subjected to human influence during Sonso times. The suggestion is too, that at least a century had lapsed since the construction of Platform 1 before Platform 4 was filled up.

Figure 29 shows in section an ideal reconstruction, (based on the information from the excavations and from soil augering) of the original land surface in the area of transition between valley bottom and slope,

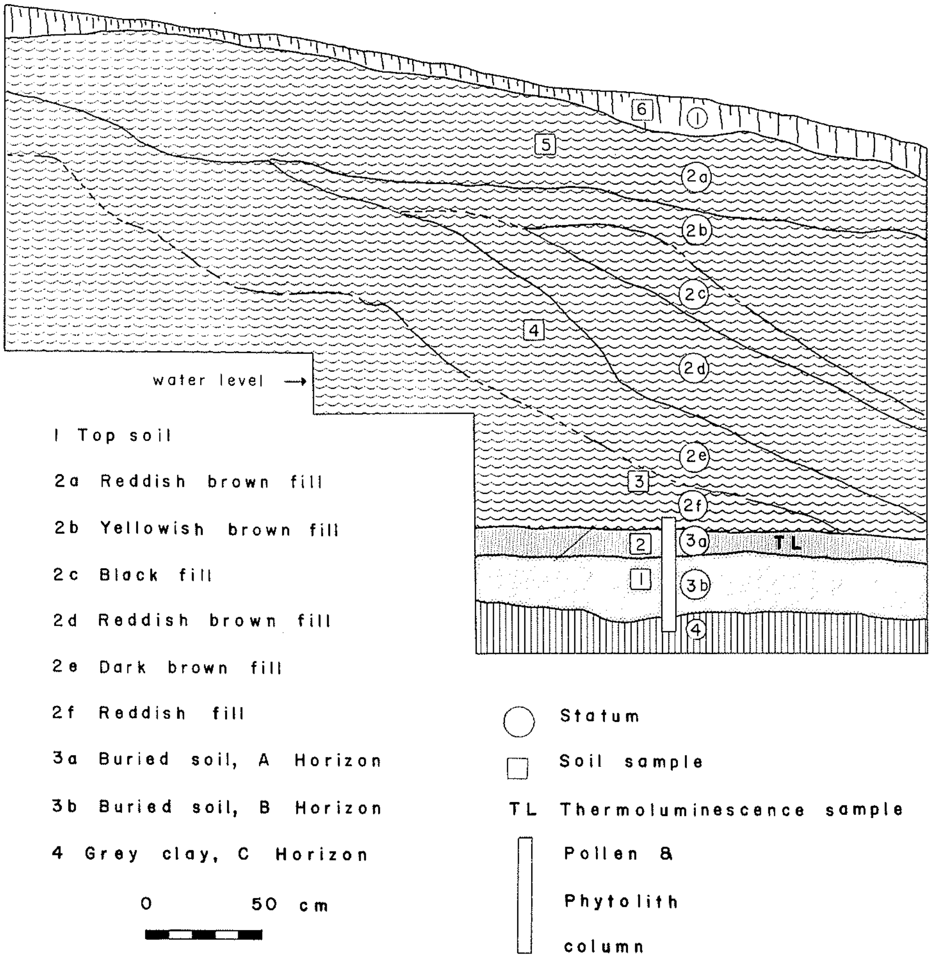


Fig. 27. El Dorado Platform 4. Profile of northern wall of Trench 1.

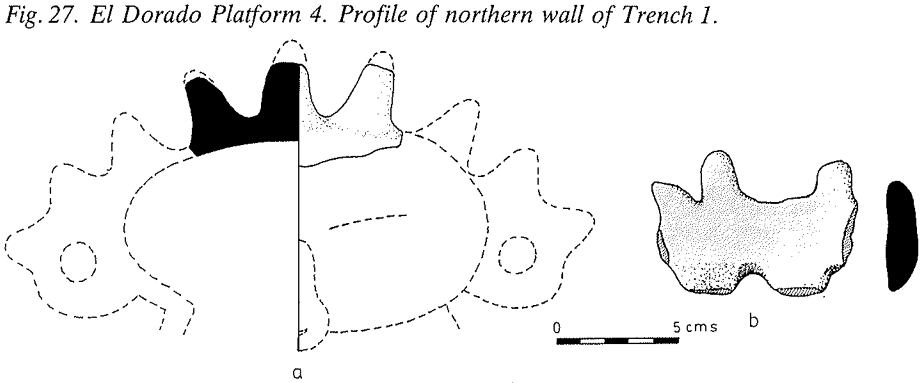


Fig. 28. El Dorado Platform 4, Trench 1; small pottery fragment from the buried soil (Stratum 3a). It seems to be part of the headdress of an anthropomorphic figure, or vessel lid, of Sonso type (v. reconstruction at left).

and the link between the strata as they appear in the different trenches, including those in the agricultural eras of the valley bottom.

4. Excavation of Field Systems in the Valley of El Dorado

The large platforms described in the previous section overlook a system of ancient fields in the valley bottom. Our initial tests in these agricultural fields were described in *Pro Calima* 3: 24–28, and the results encouraged us to return to the problem on a larger scale in 1982, aided this time by a water pump (loaned by the Instituto Vallecaucano de Investigaciones Científicas), which allowed us to excavate below the dry season water table.

The summer of 1982 was particularly dry, and the contrasts in vegetation unusually clear. The silted-up ditches still retained some moisture and were marked by greener and lusher grass than on the ridge tops, where the vegetation was parched and included herb species tolerant of drier and more compacted earth. These conditions allowed us to make a detailed plan of part of the field system, and this information is incorporated into the general map (v. Centrefold), which also shows the position of the excavation trenches.

The valley bottom today shows a palimpsest of ditches and drains of various periods, some pre-European, others belonging to the last 50 years,

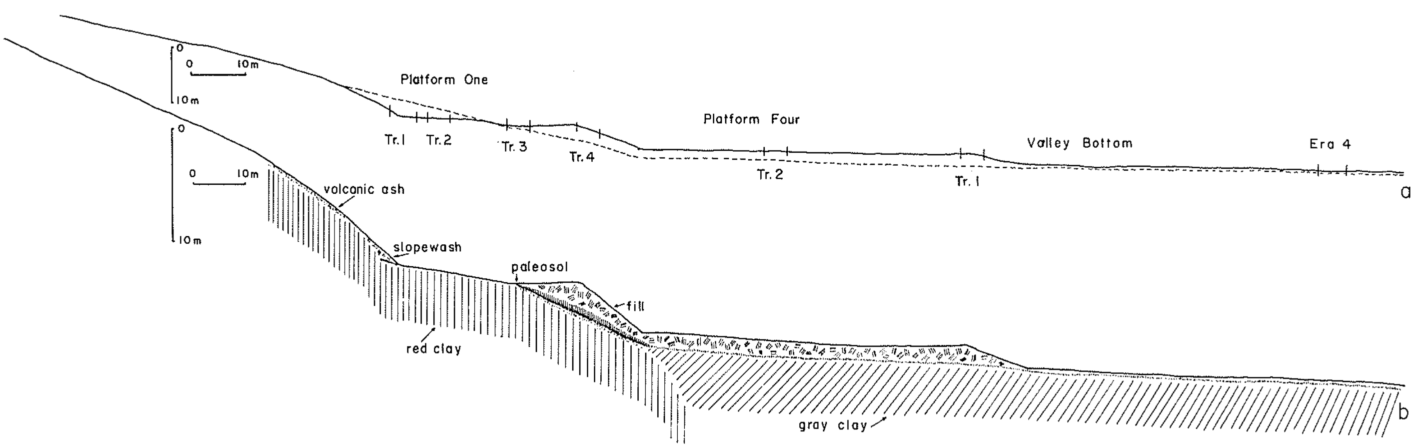


Fig. 29. Valley of El Dorado. Reconstructed transect through Platforms 1 and 4, with the edge of the valley floor and its ditched fields. Diagram (a) is at true scale, and the dotted line shows the original surface profile as it would have been before the platforms were constructed. In Diagram (b) the vertical scale is doubled in order to show the main subsurface strata, based on the data from the excavations and from soil probes.

when the land was cleared and drained for cattle pasture (Fig. 30). Conditions in the bottomland oscillate according to the seasons, as they must have done in the past, with standing water in the wet months (April–May and October–November; v. Fig. 39), and dry conditions at other times. The drainage problems have two main causes: (a) the high water table, which even in the dry season may come to within 50–80 cm. of the surface, and (b) a thick layer of impermeable clay, deposited in the bed of a former lake, which everywhere underlies the cultivation soils.

The modern ditches

Study of the present day ditches gives some clues about how the pre-European farmers might have coped with these problems. The active ditches of today are designed to deal with subsurface water rather than surface runoff. Even in the driest months water continues to flow into the valley, feeding a series of small but permanent bogs at the break of slope where the hills meet the valley sediments. It was these localities that provided our pollen cores in 1981 (*Pro Calima* 3, Fig. 2). A system of small feeder channels carries water from these valley-edge bogs into the larger ditches (themselves often recut ancient ones), and these in turn connect with the Quebrada Aguamona, which drains the valley. The major ditches today are narrow and deep, cut well into the clay so as to reach the water table. The growth of rushes and aquatic plants would soon choke these ditches if not cleaned out, and the presence of earth from the cleaning process is a good indicator of recent age.

In summary, then, the main purpose of the contemporary ditch system is to improve the flow of ground water through the valley and to keep the water table as low as possible.

Ditches and Raised Fields of the Yotoco Period

There are two kinds of prehispanic fields on the valley floor:
(a) rectangular areas delimited by wide, deep ditches and (b) a series of almost obliterated raised fields (*eras* or *camellones*) covering most of the valley bottom (Fig. 30). Three of the

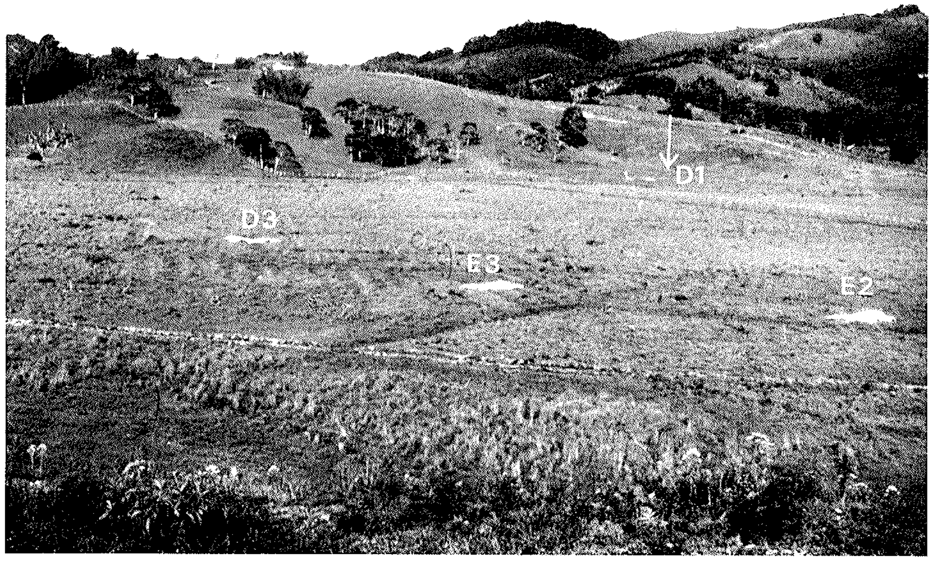


Fig. 30. Field systems in The Valley of El Dorado, viewed from the large platforms (v. Centrefold map). At the lower right are rectangular zones delimited by silted ditches that show up as darker lines. The piles of whiteish clay mark the sites of excavation trenches. The group of parallel lines in front of the left hand excavation (Ditch 3) are the ditches separating a series of raised fields. The arrow marks the locality of Ditch 1, across the valley.

raised fields (E 2–4) and three of the ditched zones (D 2–4) were excavated in 1982 (v. Centrefold map), and at most of these localities the strata below the cultural levels were augered in order to study the history of the sedimentation and to correlate this with the information from the pollen cores (see the contributions by Botero and Monsalve, this volume).

Individual excavations are described below, but the same basic stratigraphy appears in all trenches in this corner of the valley. During the colder and drier Quaternary period El Dorado was forested, with periodic episodes of lake or swamp formation. In Figs. 31 to 37, all levels below Stratum 4 are Quaternary, and are often marked by dark organic soils containing branches and tree trunks. From Stratum 4 to the present surface the sequence of events is identical in all our trenches, and the same numeration is employed in all the profile drawings.

At a date still unknown, the narrow exit from the valley was blocked (perhaps by a landslip), converting the forested valley floor into a lake. This episode is represented by Stratum 4, a heavy, grey lacustrine clay. The lake eventually dried out into a swamp on which a soil developed (Stratum 3). At this point, dated by pot sherds to

Ditch 2

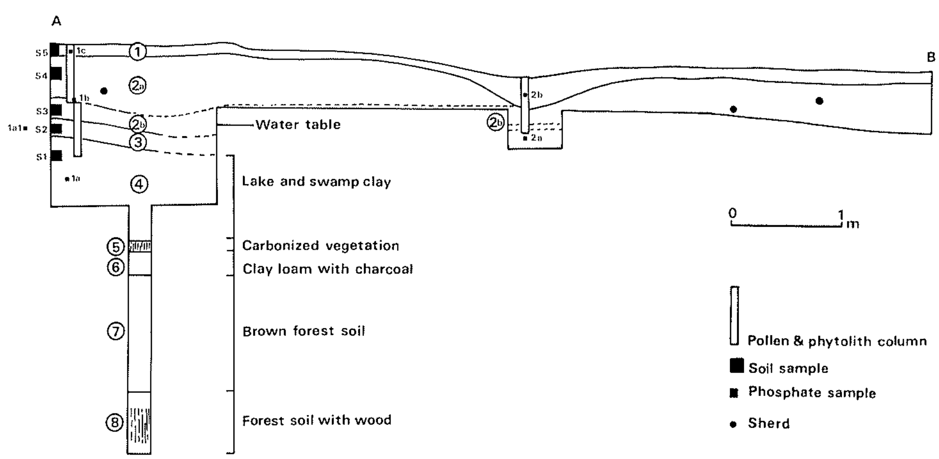


Fig. 31. El Dorado Ditch 2; profile of the excavation. Stratum numbers are circled.

Fig. 32. El Dorado Ditch 3; view of the excavation, showing the original ditch and the level of the dry season water table.

the Yotoco period, the valley floor became available for agriculture, and the first drainage works were constructed. Stratum 2 is the prehispanic cultivation soil. Stratum 1 is a recent (post-Hispanic) soil with a concentration of charcoal at the base of the root layer marking the 20th century re-clearance of the valley for cattle pasture.

Excavations in ditched areas

The prehispanic ditches are the functional analogues of the modern ones described above, reaching down to the dry season water table and designed primarily to deal with subsurface water. Like their present day equivalents, they must have contained water throughout the year and required periodic cleaning to remove vegetation and silt. The material cleaned out from the ditches was not enough to raise significantly the planting surfaces between them, but would have provided a rich organic mulch of plant material and fish manure, with a concentration of phosphorus, potassium and ammonium nitrate.

The ditches form a grid, delimiting squareish fields. At the edge of the valley, where the ground begins to rise, the fields are enclosed on only three sides, so that the upper end remains open and merges into the adjacent slopes.

Ditch 2 (D2 on the map) was the first to be tested, and a single trench was cut across the ditch and into the planting zone. A profile of this trench is shown in Fig. 31.

Stratum 1, the modern soil, is a dark, silty clay loam, with fairly abundant charcoal fragments at the interface with Stratum 2. Signs of periodic waterlogging are present throughout. At some time during the recent (i. e. post-Conquest) period a shallow ditch was cut and then was allowed to silt up. The small size of this ditch seems inadequate to explain the considerable extent of damp soil and bog vegetation visible on the surface. With hindsight, based on our subsequent experience at other localities, it would have been prudent to deepen the excavation at this point, to test the possibility that a larger, prehispanic ditch may exist below Stratum 2 b.

Within the planting zone, at the south end of the trench (A in Fig. 31), excavation and augering were continued down to 3.7 m. in order to study the stratigraphy of the cultivated field and the pre-agricultural sediments. This operation revealed the usual sequence of strata:

Stratum 2 a is a clay loam/silty clay loam, thoroughly mixed and churned, containing charcoal, a few sherds, and pieces of chipped stone. Some of the coarse sherds are probably of the Yotoco period, but the one piece of diagnostic fine ware was of Sonso type. This stratum is the prehispanic cultivation soil and contained maize phytoliths (Piperno, this volume).

Stratum 2 b is similar to the above, though less mixed and altered by human agencies. It probably respresents prehispanic cultivation at this locality.

Stratum 3 is a silty clay, the natural A Horizon of a soil formed on a dried-out swamp. Piperno's phytolith evidence suggests reasonable drainage at this time. The stratum contained charcoal fragments and sherds, among them one possible Sonso piece and a Yotoco rim fragment.

Stratum 4 is the thick layer of clay formed under lacustrine conditions, and very high in aquatic silica (Piperno). Within it, at 91 cm. below ground surface, was a Yotoco body sherd, suggesting that there was human occupation of this period close to the lake shore. Below this, Strata 5 and 6 represent conditions of better drainage. These in turn cover the forest soils which are found at the base of all our valley trenches.

Ditch 3 (Figs. 32, 33) was the next locality to be examined, and revealed much the same sequence as Ditch 2. The earliest strata show alternating periods of drier and wetter soil conditions, caused by changes in drainage patterns, with forest soils (Strata 12–15 and 9–10) separated by an episode of lake and swamp formation (Stratum 11). In the upper part of the excavation, swampier conditions returned (Strata 5–8) and eventually the valley once again became filled by a lake, represented in the profile by the usual thick layer of clay (Stratum 4). This lake, too, dried out to become a swamp and, ultimately, a land surface with a true soil (Stratum 3).

At this stage, while drainage was still a problem, the valley floor was cultivated for the first time, and the earlier of the two ditches was cut. Apart from one probable post hole there was no archaeological material in Stratum 3, but sherds lying on the bottom of the ditch indicate construction during the Yotoco period. The primary fill of the ditch also contained a chunk of stone brought in from somewhere to the west of Lake Calima. Stratum 2 is a Yotoco cultivation soil, with sherds, chipped stone and charcoal, and some of this soil spilled into the ditch, which was allowed to silt up and was then abandoned. At some much more recent date (Stratum 1) a second, smaller ditch was cut into the soft fill of the earlier one and then, like its predecessor, fell into disuse. The 28 sherds from Stratum 1 were mainly undiagnostic, but included one fragment of a Sonso incised cup. The upper ditch may, therefore, belong to the Sonso period, but could equally well be post-Conquest or even very recent.

Ditch 4: This excavation was designed to sort out the chronological relationship between the rectangular ditched enclosures and the system of long, parallel raised fields. It seemed unlikely that two completely different kinds of fields were in use on the valley floor at the same

Ditch 3

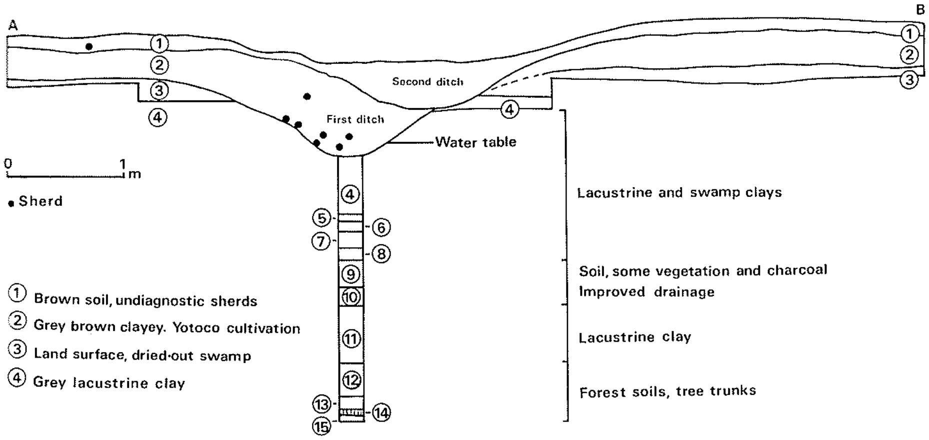


Fig. 33. El Dorado Ditch 3; profile of the excavation.

Ditch 4

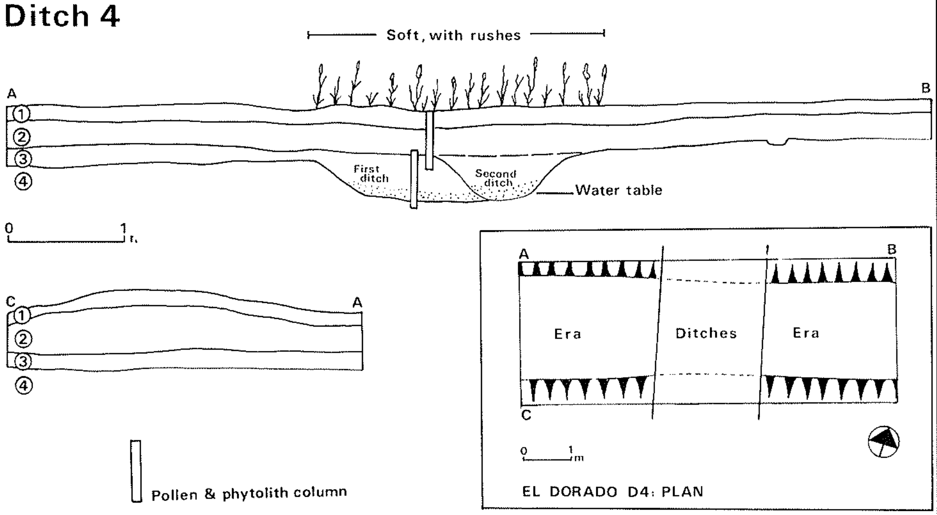


Fig. 34. El Dorado Ditch 4; plan and sections of the excavation. Strata 1–4 (circled) are the same as at Ditch 3, v. Fig. 33.

time, but from surface inspection it was not clear whether the ditches cut through pre-existing ridges, or whether the ridges continued across silted and abandoned ditches. At locality D4 a trench measuring 3×8 m. was opened at a point where the *eras* and ditches were relatively well preserved (v. Centrefold map). This excavation achieved its aims by demonstrating that two consecutive Yotoco ditches were sealed by a later raised field, also of the Yotoco period (Fig. 34).

In the profile drawing, Stratum 4 is the grey lacustrine clay and Stratum 3 the land surface that developed when the lake dried out. While this process was still taking place, the first drainage ditch was cut. Stratigraphically, this is the oldest evidence we have for agriculture on the valley floor, and is dated by a sherd from a Yotoco fine ware bowl in the primary silt just above the ditch bottom. There is a radiocarbon date of a. d. 100 ± 320 (Beta-9758) from this primary silt, and another of a. d. 1020 ± 80 (Beta-9759) from higher up in the ditch fill. Both these dates correspond with the Yotoco period.

After this initial ditch had silted up, a second one was cut, following the line of the first one. The few sherds from the second ditch were undiagnostic, but this event took place at an early stage in the formation of Stratum 2 (for the ditch has cut through, and removed, Stratum 3 at this point). A series of lenses and microstrata indicate the gradual filling up of the second ditch, which is then sealed by Stratum 2 (a mixed cultivation soil containing sherds and charcoal). Here, as in our other *era* excavations (see below), Stratum 2 is also the soil mounded up to form the raised fields (see the transverse profile, CA, in Fig. 34). Although this stratum has subsided and dipped a little where it crosses the ditches, and is softer and darker because of the increased moisture content, the raised field undoubtedly continued across the top of the former ditches (Fig. 35). Most of the sherds in Stratum 2 were of Yotoco coarse pottery, with a possible Sonso fragment close to the interface with Stratum 1. Charcoal from the cultivation soil gave a date of a. d. 790 ± 60 (Beta-9760), which falls well within the Yotoco period.

Stratigraphically this C14 sample is more recent than Beta-9759 from the second ditch, though the latter has yielded a date of around A.D. 1000. This reversal of the expected order may perhaps be explained by the very small size of the charcoal samples, or by the fact that Stratum 2 is an agricultural soil, much churned by cultivation, with the risk that older charcoal has been incorporated. Beta-9760 is probably more trustworthy. In general terms, however, all the radiocarbon dates from D4 corroborate our conclusions from elsewhere – that most of the fields and ditches in the valley bottom are of Yotoco age. Whether ditched enclosures precede raised fields in other parts of the valley is

Fig. 35. El Dorado Ditch 4, at an early stage of the excavation. The ditches have been cleared out in the left-hand strip (marked by the scale). Elsewhere, Stratum 1 (the recent humus) has been removed to expose the soil of the prehispanic era (Stratum 2), which seals the ditches.

Era 2

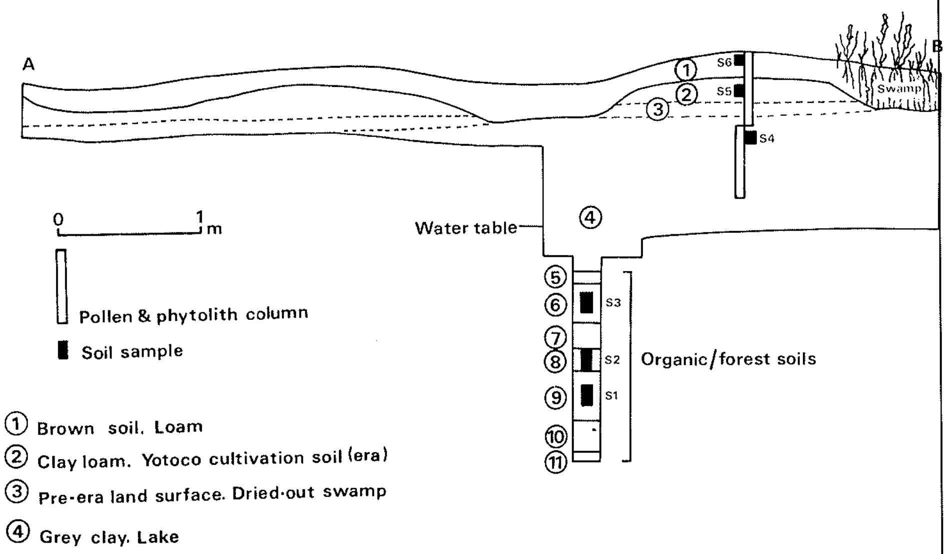


Fig. 36. El Dorado Era 2; profile of the excavation.

Era 3

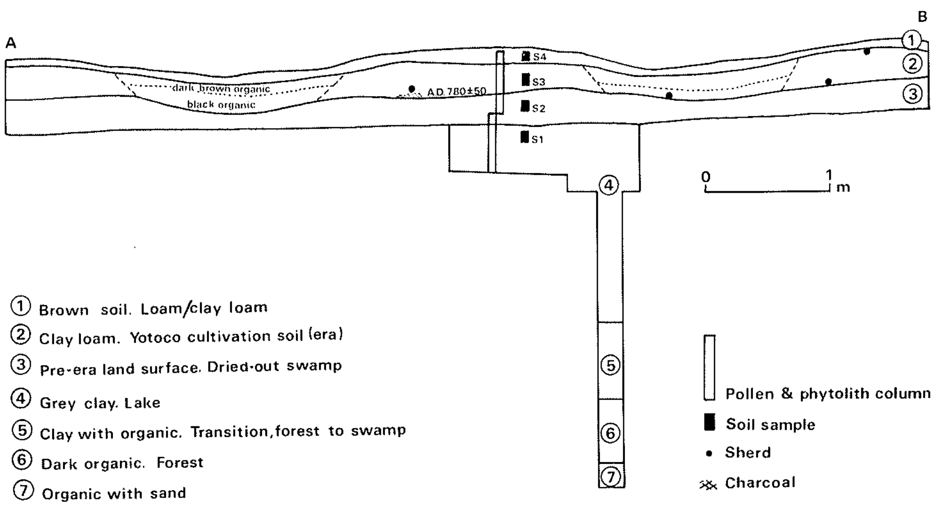


Fig. 37. El Dorado Era 3; profile of the excavation.

still unknown, and it would be dangerous to generalize on the basis of a single case.

Excavations in Raised Fields

These conform to the typical pattern of long, parallel ridges separated by shallow channels. Width is variable, but is never very great. The *era* excavated in 1981, and now labelled Era 1 (*Pro Calima* 3, Fig. 42), was just over 4 m. wide. Eras 2–4, excavated in 1982, are narrower, about 2 m. across, with a 'wave-length', crest to crest, of 3 to 4 m. (Figs. 36, 37). Soil removed from the ditches was piled over the old ground surface (Stratum 3) to increase the depth of the cultivation soil (Stratum 2), thus producing the familiar series of 'corduroy' ridges. Mottling, indicative of alternate waterlogging and drying out, extends to within a few cm. of the present day ridge tops, but the greater elevation of the ridges means that the planting surfaces dry out sooner, and remain dry longer, than the unmodified valley floor.

The ditches are shallow, reaching only to the top of Stratum 4, the lake clay. At present these *era* ditches do not contain water during the dry season, though may once have done so if the water table was higher at the time of use. Until we have more precise information about the water regime during the Yotoco period it will be difficult to evaluate the role of these ditches in controlling ground water levels, rather than simply aiding surface runoff.

Era 2 is one of a group of low ridges at the nothern edge of a bog created by floodwater that has spilled from a breach in the bank of a modern ditch. A profile of the excavation is shown in Fig. 36.

The stratification follows the usual pattern for this corner of El Dorado (see also descriptions and detailed analyses in Botero's contribution to this volume). Stratum 1 is a natural A Horizon of fairly recent age. It covers the old ridges, fills up the ditches, and contains charcoal and some Yotoco sherds. Stratum 2 is not a natural soil, but a man-made one: a fairly porous clay loam (where not compacted by cattle trampling), considerably mixed by prehispanic farmers. Below this, Stratum 3 is the old land surface. Yotoco sherds, from coarse and fine pots, are reasonably abundant in the prehispanic soils, and come from several different vessels.

As always, archaeological material is absent below Stratum 3. Stratum 4 is the grey clay of the former lake. Stratum 5 is an organic horizon, a silty clay loam, representing a stable land surface with some short-term growth of vegetation. Stratum 6 is more clayey, lighter grey in colour, and almost devoid of organic matter. Stratum 7 is a dark grey clay, gleyed, and formed under swamp conditions. Below this, Strata 8–11 are forest soils with a high organic content and occasional large pieces of wood.

Era 3 (Fig. 37). At this locality the ridges are better preserved than at E2. Although the ditches contained no water during the summer, the grass was noticeably greener and more luxuriant, with marked cattle trampling in the softer and damper soil over the ditches. In contrast, on the dry ridge tops the cattle make the soil harder and more compact. These differences were very evident during the course of the excavation; after a couple of days of exposure the soil of the ridges dries to a hard texture and a light colour, while the ditches remain dark and moist. Because of slumping of soil from the sides of the ridges into the ditches, the exact profile of the original field cannot be reconstructed. The stratigraphy in the upper part of the excavation is identical to that already described for E2, and the deposits identified in the core sample are listed in Fig. 37.

Yotoco sherds were found in Strata 1 and 2, in the ditches as well as the ridges. Confirmation of this age comes from a radiocarbon date of a. d. 750 ± 50 (Beta-9755) from a small scatter of charcoal fragments, apparently undisturbed and in situ, at the base of Stratum 2. Piperno's phytolith study (this volume) shows that maize was one of the crops cultivated on the ridge.

Era 4: This proved to be much damaged and, towards the end of summer, had dried to the consistency of cement. Excavation was difficult, and this trench provided no useful information.

The Yotoco-Sonso Transition in El Dorado

All our evidence so far suggests that the ditched enclosures and raised fields in the valley floor were contructed by the Yotoco people after the drying-out of a lake which had previously occupied El Dorado. Our valley floor sites have produced no obviously modern pottery, and very little of the Sonso period. The overwhelming majority of sherds belongs to the Yotoco style, and it seems likely that the field systems in the valley bottom were largely abandoned before Sonso times.

The dividing line between the Yotoco and Sonso periods is fixed by multiple radiocarbon dates at approximately A. D. 1200 (*Pro Calima* 2, Fig. 2). The pollen diagram from the Lusitania core (Monsalve, this volume) shows a cool, dry interlude (his Pollen Zone 5B), which is also recognizable in the core from the Hacienda El Dorado (Monsalve, personal communication). In this latter core, Zone 5B has a radiocarbon date of a. d. 1230 ± 90.

This same colder and drier episode has been identified all over Colombia, from the Laguna de Herrera at 2550 m. to the Magdalena valley at only 20 m. above sea level (Wijmstra 1967). A very dry period has also been recognized in the ice-cores from the Peruvian Andes, datable to the period A. D. 1250–1310 (Thompson et al. 1985) and seems, in fact, to have been a global phenomenon. In Colombia one general characteristic of this dry interlude is a lowering of the water table, and at El Dorado this may have rendered the field systems unworkable.

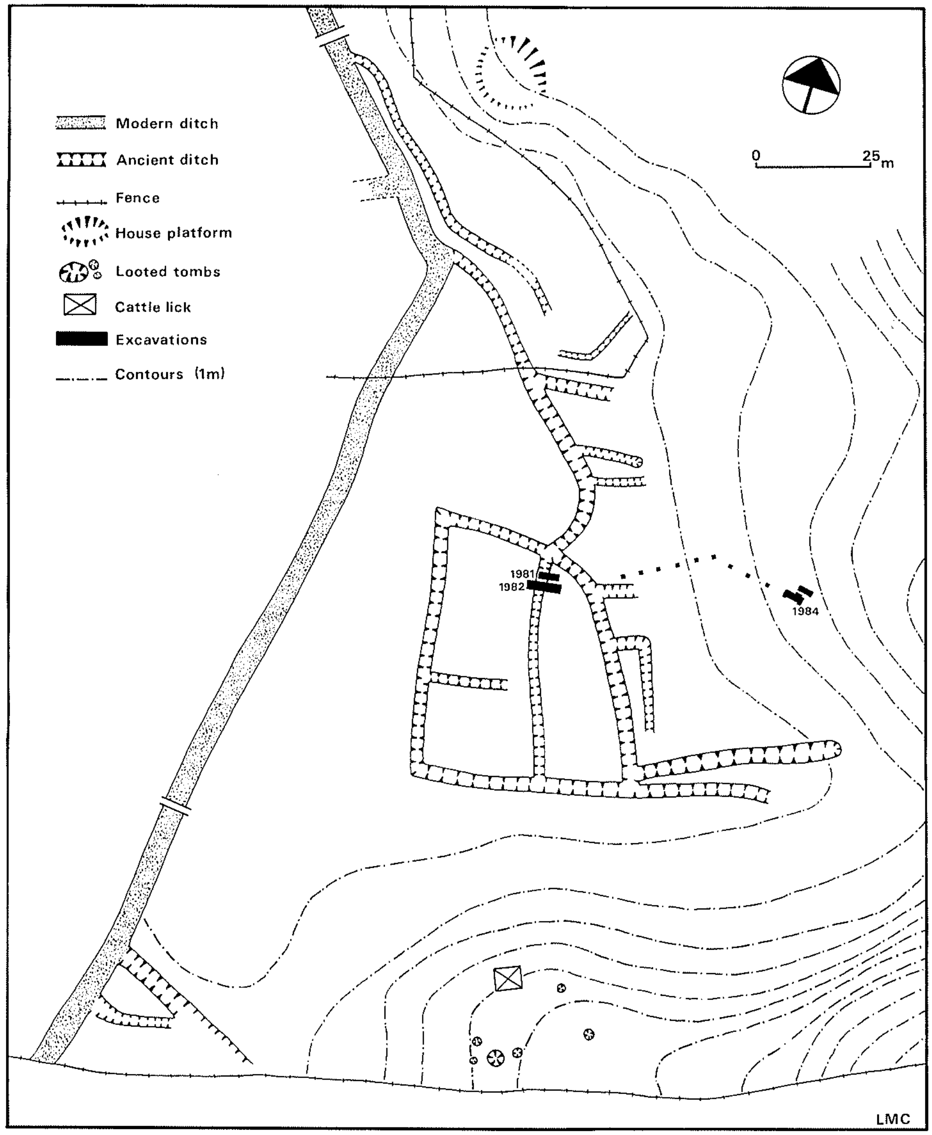


Fig. 38. El Dorado Ditch 1; drainage ditches of the Sonso period, showing the position of the excavations, 1981–1984.

Our pollen diagrams show other evidence for a change in the water regime of El Dorado at this critical time. *Botriococcus* and other aquatic algae suddenly become very abundant during the Yotoco period (an indication of open water) and then disappear, never to return, with the onset of the dry period around 1200. From this time onwards, the main focus of agricultural activity seems to have been the hill slopes and the valley edge. It is precisely here, just at the base of the hill slope, that we have our only unambiguous evidence for drainage works of the Sonso period.

Drainage Ditches of the Sonso Period: El Dorado Ditch 1

This locality was briefly visited during the 1981 season (*Pro Calima* 3: 26–28) and was revisited in 1982 and 1984. The site lies on the valley floor in a little pocket between two ridges (Fig. 30), and consists of a roughly quadrangular group of ditches with an exit channel leading into a modern drain, itself probably a re-cut ancient ditch (Fig. 38). During the dry months the prehispanic ditches do not contain surface water (see the air view in *Pro Calima* 3, Fig. 43) but, even in their silted condition, quickly become waterlogged after heavy rain (Fig. 39).

House platforms, tombs and habitation debris are present all over the slopes to the east and south of the ditches. This occupation, mainly Sonso but with some traces of Yotoco, extends downslope as far as our 1984 trench (Fig. 38). This trench also marks the margin of the clay stratum that represents the maximum extent of former lake flooding. The

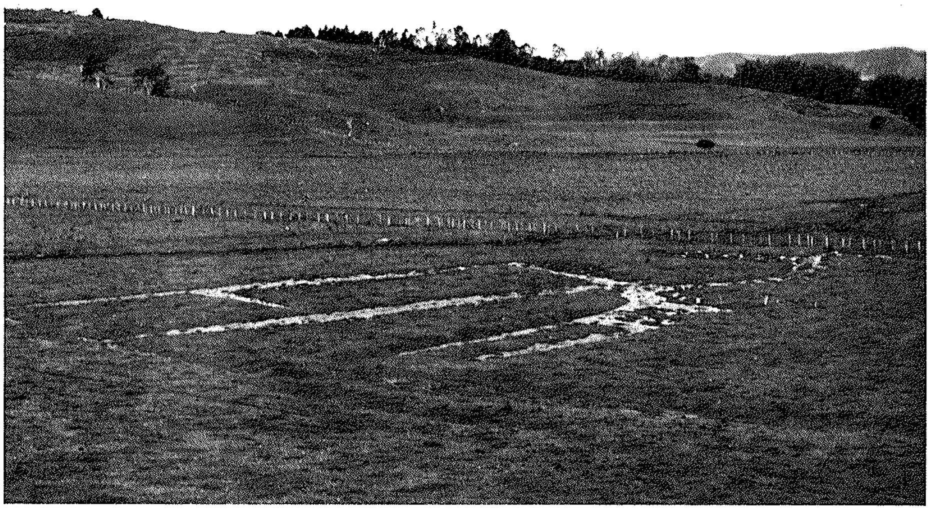


Fig. 39. Ditch 1, with standing water after the first rains of the wet season.

drainage ditches, therefore, are within the area of the old lake bed, but close enough to the valley edge to be affected by slopewash from the adjacent ridges. There are traces of raised fields in the valley bottom to the west of the modern drain, but no signs of these on the eastern side in the immediate vicinity of Ditch 1.

The original intention was to re-open and extend our 1981 trench, but this was so badly deteriorated that a new trench (Trench 2) was opened just to the south of it. The natural and cultural stratigraphy of this trench is shown in Fig. 40. In 1981 we were forced to give up the excavation when the water table was reached, but in 1982 (with the aid of a pump) excavation was carried down to 2 m. At this point, more water was pouring in through the walls of the trench than could be removed by the pump, making the whole excavation unstable and causing the trench to collapse shortly after the profile was drawn. Further excavation was clearly impossible, though the sediments were augered for another two metres.

The sequence is that of the valley floor in general (forest, lake and swamp, then occupation soils), complicated by ash falls and episodes of slopewash.

Strata 10–6 have a complex microstratification but are dominated by Quaternary forest soils interspersed with ashes and slopewash material. Phytolith spectra (Piperno, this volume) indicate an undisturbed humid tropical forest in the lower part of Stratum 7, with a change to more swampy conditions near the top.

Stratum 5 is predominantly volcanic ash, porous and very permeable to water. The admixture of silts and sand indicates a process of gradual and continuous deposition rather than a single traumatic event. There is a C14 date of 21,800 ± 280 b. c. (Beta-9756) from the lower interface of the ash, and another of 23,350 ± 500 b. c. (Beta-9757) from its upper surface.

Stratum 4/2 is a sticky clay C Horizon, formed under conditions of poor drainage. Stratigraphically it should approximately correspond with the lake and swamp clay (Stratum 4) at sites in the interior of the valley. This stratum contains no archaeological material, and Piperno's phytolith data show no evidence of human activity.

Stratum 4/1 is the A Horizon of a soil formed in relatively stable conditions, with some improvement in drainage. It is a silty clay loam and contains Yotoco sherds, maize phytoliths (above 82 cm.) and also evidence for the burning of vegetation. Piperno suggests this burning derives from clearance of the adjacent hill slopes for agricultural purposes.

Stratum 3 is a land surface of the Yotoco period, composed largely of slopewash from the valley side. The relatively high percentage of phosphorus suggests human activity nearby, and the soil structure indicates compaction by human agencies. Maize phytoliths were absent, and the high levels of aquatic silica are a sign of poor drainage. From this land surface a prehispanic ditch was excavated, extending down to the dry season water table and cutting through the clayey soil to the top of the porous ash in Stratum 5.

Stratum 2 has the chemistry and texture of a cultivation soil, with large numbers of maize phytoliths. The high quantities of aquatic silica show why ditching was necessary. The cultivation soil and the ditch fill

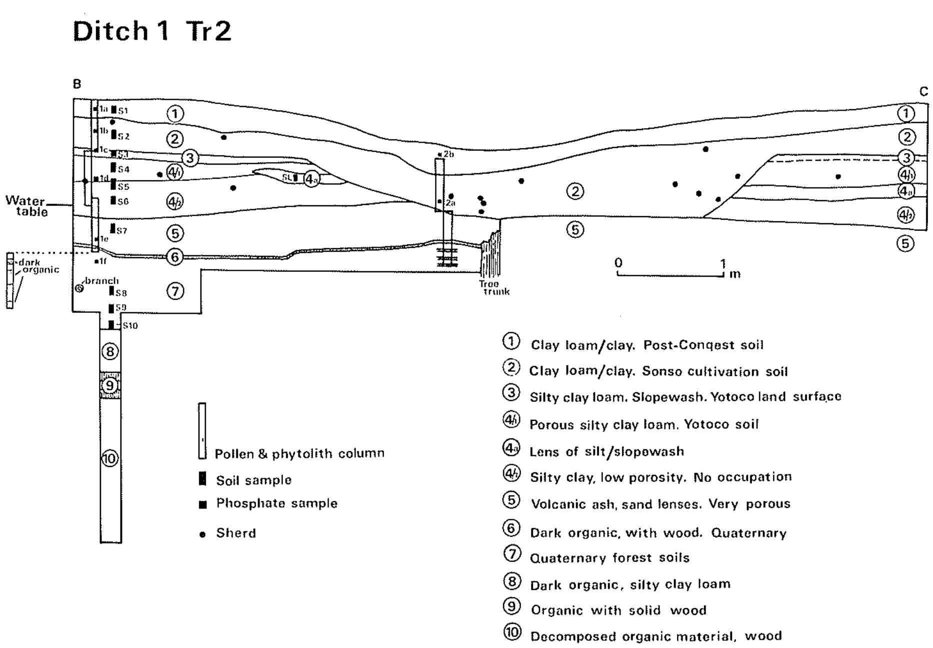


Fig. 40. El Dorado Ditch 1; profile of the 1982 excavation trench.

contain abundant Sonso sherds and other kinds of debris, and there is a radiocarbon date of a. d. 1465 ± 65 (Beta-4906) from a piece of wood just above the bottom of the ditch fill (*Pro Calima* 3). Whatever the precise date of construction, this ditch was open, and still functioning, during the late Sonso period.

Stratum 1 is the recent soil that formed after the ditches were abandoned at the time of the Spanish Conquest or soon after. The charcoal at the base of the root layer is found throughout Calima, and derives from 20th century clearance for pasture. The phytolith spectrum contains a high proportion of aquatic silica and is dominated by grasses (though *without* maize), corroborating the evidence from Zone 5 C of Monsalve's pollen core from La Lusitania.

Fig. 41. San Rafael (Madroñal). Excavation in progress at a small Yotoco house platform where beans and charred maize were found. The platform is situated on the edge of an ancient field system of unknown date that occupied the gentler area of hillside. Note the 'field lines'.

5. Food Remains from a Yotoco House Platform

Poor preservation of plant remains (a consequence of soil acidity and a fluctuating water table) has been one of the obstacles to the reconstruction of prehispanic environments and agricultural systems. It was therefore with great excitement that we received, from one of our friends in Restrepo, a quantity of carbonized seeds which had turned up in soil samples taken with a *media caña.*

The site of the find is a small, artificial platform *(tambo)* built on the gentle southern slope overlooking the Calima valley in the Hacienda San Rafael. Located just below the crest of a small hill, it lies on the edge of a broad vaga (dry valley) overlooked by slopes covered with old field lines (Fig. 41). In the near vicinity there is also a stretch of Indian road which descends to the Calima valley. Slopewash has somewhat obliterated the once-neat profile of the platform. Two small trenches were dug, in the hope of recovering more seed material and dating the find. The platform proved to have been cut into volcanic ash and, on the original occupation floor, further carbonized vegetal material was found, as well as sherds of the Yotoco period.

Earle C. Smith (Department of Anthropology, University of Alabama) carried out a preliminary identification of this material. The sample, which weighed approximately a quarter to half a pound, was composed mainly of common beans *(Phaseolus vulgaris)* and maize kernels of two varieties, one of them tentatively identified as related to the Pollo-Nal Tel group. There is a residue of legume seeds, still to be identified. In the next issue of *Pro Calima* we hope to present more detailed information on this sample, as well as on two smaller ones obtained during the 1984 field season.

6. The 1984 Field Season

The results of the 1984 field season will be reported in the next *Pro Calima.* One of the main achievements was the excavation of a site of the Ilama period at El Topacio, in the Calima valley, which gave a C 14 date of 150 ± 100 b. c. (Beta-9858) from the top of the Ilama stratum. In addition, further research was carried out on the field lines (v. *Pro Calima* 3: 16–18). Finally, more work was done at El Dorado Platform 1, and also at Ditch 1, where deep borings were taken through the sediments below the cultivation soils.

7. Acknowledgements

Besides our Committee in Switzerland and our generous financial sponsors (listed on p. 67), we must thank many individuals and organizations. As always, the Instituto Colombiano de Antropología gave its fullest support, and we gratefully acknowledge the help of Iván Posada, Roberto Pineda, Alvaro Ayala, Ilduara Berrío and Ernesto Rincón. At the Fundación de Investigaciones Arqueológicas Nacionales del Banco de la República we are indebted to Luis Duque Gómez and Yvonne Hatty. In Bogotá we received help and advice from María Elvira Bonilla, Clemencia Plazas, Ana María Falchetti, Juanita Sáenz and Alec Bright (all of the Museo del Oro), Jaime Sarmiento (Federación Nacional de Cafeteros), Pedro Botero and Jack Khobzi (Centro Interamericano de Fotointerpretación), Alvaro González and Carlos Luna (Instituto Geográfico 'Agustín Codazzi'), and from Byron López, Camilo Rodríguez and María Alicia Uribe.

In Cali we are grateful to Víctor Manuel Patiño, Carlos Armando Rodríguez, and their administrative staff at the Instituto Vallecaucano de Investigaciones Científicas, to Sonia Jarvis (Eternit Pacífico), Julio César Cubillos (Universidad del Valle), Hilda María Caicedo (Museo La Merced), Jeff Aucott and Bill

McCourt (British Geological Mission/ INGEOMINAS), and to Enriqueta de Domínguez and Eduardo León Rivas. Irma de Quintero looked after us in Pavas, and our time in Restrepo was made both pleasant and archaeologically profitable by our many friends in the town: Teresa Ramírez and family, Bernardo and Belsa Rendón, Jorge and Tulia Duque, Bayardo Betancourt and family, Francisco Meneses, Antonio Ochoa, Jorge Enrique Mejía, Luis Angel Sánchez, Gustavo Marín, Octavio Palacios, Erasmo Vivas, Consuelo Illera and family, Misael León, Luis Castrillón, Jaime Barrera, Ernesto Escobar, Luis Eduardo Cardenas, Gilberto Echeverri, Octavio Patiño, Carlos Parra, Harbeth Sánchez, Omar Montoya, Norberto Sánchez and the Noguera brothers.

Among the many landowners whose lives (and cattle) we disturbed during our surveys and excavation we acknowledge the special help and patience of Náder Calero, Joaquín Meneses, José Carlos Hurtado, Adolfo Ocampo and Byron López (who, once again, provided us with accomodation at the Hacienda La Suiza).

We received valuable help from several colleagues and their various laboratories: José Monsalve, Thomas van der Hammen, Luisa Fernanda Herrera, Héctor Salgado, David Millward, Fiona Roe, Dolores Piperno, Theres Gähwiler, Stuart Laidlaw, Christine Crickmore, and the Department of Conservation and Materials Science at the Institute of Archaeology. And, as always, our special thanks go to all those who worked alongside us in the field; their names are listed inside the front cover.

References

Arango Cano, Jesus (1979): *Cerámica Precolombina.* Bogotá.

Barney-Cabrera, Eugenio (1977): 'Calima, El Dorado Prehispánico y Expresiones del Arte Calima'. *Historia del Arte Colombiano* 2: 269–320. Bogotá: Salvat.

Bouchard, Jean-François (1984): 'Excavaciones arqueológicas en la región de Tumaco, Nariño, Colombia'. *Revista Colombiana de Antropología* 24 (1982/83): 125–334.

Bray, Warwick (1978): *The Gold of El Dorado.* London: Times Books.

Duque Gómez, Luis (1979): (Nota sobre un ajuar del Rio Chiquito, Tierradentro). *Boletín del Museo del Oro* 2 (2), May–August. Bogotá.

Dussán de Reichel, Alicia (1965/66): 'Contribuciones al Estudio de la Cultura Calima en Colombia'. *Revista del Museo Nacional* 34: 61–67. Lima.

Herrera, Leonor, Marianne Cardale de Schrimpff and Warwick Bray (1984): 'El hombre y su medio ambiente en Calima (Altos Rio Calima y Grande, Cordillera Occidental)'. *Revista Colombiana de Antropología* 24 (1982/83): 381–424.

Lathrap, Donald W., Donald Collier and Helen Chandra (1975): *Ancient Ecuador: Culture, Clay and Creativity, 3000–300 BC.* Chicago: Field Museum of Natural History.

Legast, Anne (n. d.): *Estudio de la fauna de la zona arqueológica Calima.* Report presented to the Fundación de Investigaciones Arqueológicas Nacionales, Banco de la República. Bogotá.

Perdomo, Lucia Rojas de (1979): *Manual de la Arqueología Colombiana.* Bogotá.

Pérez de Barradas, José (1954): *Orfebrería Prehispánica de Colombia: Estilo Calima.* Madrid.

Plazas, Clemencia, and Ana María Falchetti (1983): 'Tradición metalúrgica del suroccidente colombiano'. *Boletín del Museo del Oro* 14 (September–December): 1–32. Bogotá.

Plazas, Clemencia, and Ana María Falchetti (1985): 'Cultural Patterns in the Prehispanic Goldwork of Colombia'. In Julie Jones (ed): *The Art of Precolumbian Gold: The Jan Mitchell Collection:* 46–59. London: Weidenfeld and Nicolson.

Reichel-Dolmatoff, Gerardo (1965): *Colombia.* London: Thames and Hudson.

Romoli, Kathleen (1974): 'Nomenclatura y Población Indígena de la Antigua Jurisdicción de Cali a Mediados del Siglo XVI'. *Revista Colombiana de Antropología* 16: 373–478.

Thompson, L. G., E. Mosley-Thompson, J. F. Bolzan and B. R. Koci (1985): 'A 1500-Year Record of Tropical Precipitation in Ice Cores from the Quelccaya Ice Cap, Peru'. *Science* 229: 971–73.

Trimborn, Hermann (1949): *Señorie y Barbaríe en el Valle del Cauca.* Madrid: Instituto Gonzalo Fernández de Oviedo, Consejo Superior de Investigaciones Científicas.

Wassén, Sven Henry (1936): 'An archaeological study in the western Colombian Cordillera'. *Etnologiska Studier* 2: 30–67. Gothenburg.

Wijmstra, T. A. (1967): 'A Pollen Diagram from the Upper Holocene of the Lower Magdalena Valley'. *Leidse Geologische Mededelingen* 39: 261–67.

Characterisation and General History of the Formation of the Soils of the Valley of El Dorado

By Pedro Botero

1. Introduction

The Valley of El Dorado is a relatively large (and probably tectonic) depression, oriented S–N and enlarged by processes of erosion during the uplifting of the Western Cordillera at the end of the Tertiary Period. Today it is drained by the Quebrada Aguamona, which leaves the valley by way of a narrow mouth only a few tens of metres wide.

This valley was formed in diabasic rocks of Cretaceous age, which underwent a process of peneplanisation and intense weathering during the Upper Tertiary, in typical tropical conditions, before being uplifted to their present levels.

The process of uplift produced large faults, mass movements and other forms of erosion, which substantially modified the older landscape. In addition, the climate changed from warm to submontane and low-montane. After the uplift came a period of glaciations, during which climatic conditions particularly affected the processes connected with water in the soil (Fölster and von Christen 1977).

As a consequence of these phenomena we find in this zone of low hills and valleys (such as El Dorado) a mass of clayey materials of strong red colour, in which there is generally no evidence (except in valley bottoms) for A1 horizons marked by the accumulation of organic matter. These have been removed by various phases of erosion resulting from climatic changes and falls of volcanic ash (Fölster and von Christen 1977).

The Hill Slopes

After the uplift of the entire region, with the formation of valleys, hills and piedmonts, various episodes of erosion took place, the last of which seems to have occurred around 10,000 years before present, after the final heavy falls of volcanic ash (Fölster and von Christen 1977).

However, not all the ash was eroded away, and much of it remained, covering areas of gentle slope and humid or subhumid climate, such as the hills surrounding the Valley of El Dorado. In this region, thanks to the dense vegetation cover that protected the soil, the ash remained trapped and did not erode. This ash was later transformed into allophane and then complexed with humus, giving the soils their very dark brown colour, high capacity for retention of phosphorus and water, with low apparent density and great stability in the humic fraction.

In the 'dry' hills the ash was eroded and/or was rapidly decomposed and transformed into clays. In this case the present soils do not show ANDIC characteristics.

2. Description of a typical soil from the denuded hills in the humid and subhumid zones of the 'tierra templada'

(from Arévalo et al. 1983)

Soils derived from fresh volcanic ashes: TYPIC DYSTRANDEPTS
Deep and well drained soils; textures medium to fine; relief gentle to moderately steep with slopes (7–12–25–55%).

Soil Profile Number:	PV–4
Air photograph:	010 Vuelo C-1848 (Instituto Geográfico "Agustín Codazzi")
Soil name:	Conjunto Puentetierra
Taxonomic Classification:	Typic Dystrandept (Thapto Oxisol?)
Date of description:	1 September 1983
Locality:	2 km. SE of the caserío of Puentetierra, on the Buga-Buenaventura road.
Altitude:	1495 m. above sea level
Physiographic position:	Denuded hills (Fh)
Relief:	Strongly undulating, with slope of 25%
Form of slope:	Convex, surrounded by hills
Erosion:	Light sheet erosion; frequent mass movements
Natural vegetation:	Herbaceous scrub (*Hypericum*/bracken)
Use:	Extensive cattle grazing
Parent material:	Volcanic ashes with substrate of strongly weathered diabases
Natural drainage:	Well drained. Rapid surface drainage; moderate internal drainage
Human influence:	Great; the natural forest vegetation completely removed.

00–30 cm.
A
Very dark brown (10YR 2/2); loam; well developed fine and medium subangular blocks; friable, not sticky and not plastic; abundant fine roots; macroorganisms average; limit well marked and level; pH 5.6; slight reaction to NaF.

30–41 cm.
BA
Yellowish brown (10YR 5/8) with 20% tongues of very dark brown (10YR 2/2); silty loam; well developed medium subangular blocks; friable; slightly sticky and slightly plastic; macroorganisms and fine roots average; limit well marked and level; pH 5.9; strong reaction to NaF.

41–85 cm.
Bw
Strong brown (7.5YR 5/8); silty loam; moderate fine and medium subangular blocks; friable, slightly sticky and slightly plastic; a few fine roots; some crotovinas; limit gradual and level; pH 5.8; very strong reaction to NaF.

85–137+
2Bo
Yellowish red (5YR 5/8); silty clay; moderate thick and medium subangular blocks; friable, sticky and plastic; a few fine roots; some very thin and discontinuous clay skins; pH 5.6; slight reaction to NaF.

Physical and chemical analyses: see Table 1
Interpretation of chemical analyses: see Table 2

Observations:

The depth of the weathered diabase mantle is variable, and may be either more or less superficial than in the type profile. Analyses performed so far provide no confirmation for the classification of this material within the Oxisols. Limitations on use for agriculture: average level of fertility, high susceptibility to mass movements, strong slopes.

Table 1. Physical and Chemical Analyses of Soil PV-4

Depth (cm.)	*Granulometry* % Sand	% Silt	% Clay	Texture	pH 1:1
00–11	54	36	10	(Sandy loam)	5.6
11–30	54	26	20	(Sandy clay loam)	5.6
30–41	66	28	6	(Sandy loam)	5.9
41–69	62	30	8	(Sandy loam)	5.9
69–85	60	30	10	(Sandy loam)	5.7
85–114	30	22	48	(Clay)	5.7
114–137+	18	16	66	(Clay)	5.6

		Exchange capacity me/100g				*Saturations %*			
CCC	BT	Ca	Mg	K	Na	ST	SCa	SMg	SK
48.9	12.8	6.8	5.0	0.8	0.2	26.2	13.9	10.3	1.7
42.9	8.7	5.4	2.9	0.2	0.2	20.3	12.6	6.8	0.5
40.5	8.6	4.5	3.9	0.05	0.2	21.3	11.6	9.7	0.2
41.7	5.3	3.0	1.9	0.1	0.3	12.7	7.2	4.6	0.3
34.0	2.7	1.1	1.3	0.05	0.3	8.0	3.3	3.9	0.2
15.7	3.0	0.8	2.0	0.05	0.2	19.1	5.1	12.8	0.4
10.7	2.5	1.4	0.8	0.05	0.3	23.4	13.1	7.5	0.5

Organic Material % C	P PPm
6.38	1
4.17	1
2.00	1
1.00	0.5
0.71	0.5
0.41	2
0.28	2

Note
The textures in parentheses indicate flocculation of the ash in the attempt to disperse it. For this reason the textures given by the laboratory analysis are not 'real'.

Table 2. Summary Interpretation of the Analyses of Soil PV-4

Depth (cm.)		Ash 0–30	Ash 30–41	Ash 41–85	Diabase 85–137+
Reaction (pH)		Slightly acid	Slightly acid	Slightly acid	Slightly acid
Cation exchange capacity		Very high	Very high	Very high	Average
Sum of bases		High	Average	Low	Low
Saturation of bases		Low	Low	Very low	Low
Organic carbon		Very high	Average	Low	Very low
Phosphorus (Bray II)	P_2O_5	Low	Low	Low	Low
	Ca	Average	Average	Low	Low
Saturations	Mg	Average	Average	Low	Low
	K	Average	Very low	Very low	Very low
Fertility		Moderate			Very low

3. Generalised description of the denuded hills in zones of dry, temperate-warm climate

Soil Name: Rancho Alegre
Taxonomic classification: Udic Paleustalf
Altitude: 1500 m. above sea level
Physiographic position: Middle part of a colluvio-erosional slope
Slope: 12–25%
Erosion: Moderate sheet erosion; severe gullying
Natural vegetation: *Piper augustifolium, Ficus* sp., chilco, native grasses
Use: Extensive cattle grazing
Natural drainage: Well drained
Human influence: Considerable

00–10 cm.
A
Colour when wet is a very dark greyish brown (10YR 3/2); fine sandy loam; well developed fine and medium subangular blocks; friable, not plastic and not sticky; abundant roots and macroorganisms; limit well marked and level. pH 6.0.

10–18 cm.
Bt1
Colour when wet is a very dark greyish brown (10YR 3/2) with black clay skins (10YR 3/1); clay loam; well developed fine and medium

subangular blocks; consistency very hard when dry, very firm when wet; slightly plastic and slightly sticky; abundant fine roots; abundant macroorganism activity. Limit well marked and level; pH 6.0.

18–38 cm.
Bt2
Colour when wet is a very dark greyish brown (10YR 3/2) with black clay skins (10YR 2/1); clay loam; well developed medium prisms; consistency very hard when dry, very firm when wet; slightly plastic and slightly sticky; few fine roots; limit undulating and gradual; pH 6.0.

38–55+
2Bt3
Colour when wet is a very dark greyish brown (10YR 3/2) with black clay skins (10YR 2/1); clay loam; moderately developed fine and medium subangular blocks; consistency hard when dry, firm when wet; not plastic, not sticky; pH 6.5.

Observations:

Diabase fragments (ca. 40%) are found throughout the profile; some sections have fine gravel, coarse gravel and stones. Fragments of baked clay in the first horizon. Limitations for agriculture: thin soils, sloping terrain, poor drainage and low availability of water; dry climate; great susceptibility to erosion.

4. Construction of platform terraces (tambos) in areas of hill slope

For the construction of platforms in sloping terrain a step-like cut was made into the hillside, removing all material down to the 2Bo (Oxic) horizon. At this level the strata consist of clays, which provide a stable floor surface. The excavated material (and especially the red clays) removed during this process were deposited around the outer edge of the 'step' in order to further enlarge the area of the platform. It appears that the dark soil derived from the volcanic ash was dumped elsewhere, probably in areas used for cultivation.

Tambos have not been found in zones of dry or semi-arid climate where, as described above, soil conditions are very difficult.

Soil profiles were analysed from two of the large platforms in the Valley of El Dorado. The location of these platforms (nos. 1 and 4) is shown in the main map (v. Centrefold).

Platform 1 Trench 4: Pedological Description

The archaeological excavations at this Platform are described in the contribution by Bray, Herrera and Cardale Schrimpff, and the profile of the trench is illustrated in Fig. 20.

00–10 cm.
A1
Very dark brown (10YR 2/2); clay loam; subangular blocks, strong fine and medium; hard and firm, neither plastic nor sticky. No NaF reaction; limit gradual, undulating; pH 6.0.

10–35 cm.
B
Anthropic fill; dark yellowish brown

Table 3. Platform 1, Trench 4. Results of Mineralogical Analysis of Sands (%)

Sample no. (v. Fig. 20)	(2) 320–330 cm.	(4) 275–285 cm.	(8) 00–10 cm.
Quartz	10	7	14
Feldspars	40	38	31
Phytoliths	4	6	10
Volcanic glass	1	tr	
Biotite	2	2	1
Amphiboles	15	16	8
Pyroxenes	tr	1	tr
Opaque minerals	2	4	10
Alteration products	23	23	22
Lithic fragments	3	3	4
Epidote		tr	tr
Zircon		tr	
Muscovite			tr

Remarks
(2) The sodic feldspars (albite or andesine) are in fresh grains and crystals of medium size. The amphibole present is green hornblende, with some smaller quantity of brown hornblende, in very fresh grains and prismatic crystals. What appear as altered grains could well correspond to a condition of sericitation of the feldspars or to clayey globules produced by the incomplete dispersion of the soil sample.

(4) The condition of this sample is the same as Sample 2

(8) The grains of quartz and feldspar appear to have some sesquioxide precipitates on their surfaces. The feldspar is of the sodic plagioclase type and consists of irregular, subangular to subrounded, grains and some tabulate fragments. The amphibole present is most commonly green hornblende, mostly in fresh grains and prismatic crystals.
This sample appears to correspond to a surface horizon, and shows the greatest abundance of organic remains and much evidence of alteration.

Table 4. Platform 1, Trench 4. Results of Mineralogical Analysis of Clay Minerals

Sample no. (v. Fig. 20)	(2) 320–330 cm.	(3) 290–300 cm.	(4) 275–285 cm.	(8) 00–10 cm.
Quartz		tr	tr	
Metahalloysite	+	+	+	tr
Intergrades 2:1–2:2	+	+	+	tr
Kaolinite				++
Halloisite	tr		+	
Gibbsite	+	+	+	+
Amorphous materials	++++	++++	++++	+++
Cristobalite		tr		tr

Remarks
The amorphous minerals reported may correspond to allophane, an alumino-silicate, colloidal, and of high physico-chemical activity.

Dominant	++++	More than 50 per cent
Abundant	+++	Between 30 and 50 per cent
Common	++	Between 15 and 30 per cent
Present	+	Between 5 and 15 per cent
Traces	tr	Less than 5 per cent

(10YR 3/4); loam to clay loam; subangular blocks, weak, medium; compacted by trampling, very hard; gradual and irregular limit.

35–225 cm.
C
Various strata of anthropic fill, not separately described; reddish and yellowish brown, with abundant sherds; textures mainly clays or clay loams; description and analysis were made for a layer between 100 and 115 cm., with the following results: Colours yellowish red (5YR 4/8–4/6), strong brown (15%) (7.5YR 5/8); black stains of organic material; sherds; clay; negative reaction to NaF; limit at 225 cm., abrupt and undulating; pH 4.5–5.

225–250 cm.
A1b1
Anthropic soil, whose surface remained stable for some time; concentration of carbon particles in the first 5 cm., up to 15% to 25% by volume, although these disappear in places; light yellowish brown (10YR 4/4) mixed with dark yellowish brown (10YR 3/4) and dark brown (10YR 3/3), with smaller proportions of brownish yellow and yellow brown (10YR 6/6–5/6); silty clay loam; sticky and plastic; hardened by trampling, though less so than the overlying strata; limit gradual and irregular; pH 6.0–6.5.

250–270 cm.
A1b2
Anthropic soil of mixed materials and colours; very dark brown (10YR 2/2), very dark grey brown (10YR 3/2), dark brown (10YR 3/3) and brown (10YR 4/4), together making up 80% to 90%; silty clay loam; strong brown clays (7.5YR 5/5–5/8) (5%); black, mineralised organic material (10YR 2/1) (10%); subangular blocks, weak, fine; negative reaction to NaF; limit well defined, irregular, undulating; pH 6.5–7.0.

270–290 cm.
A1b3
Anthropic soil; very dark brown (10YR 2/2) with a smaller proportion of black (10YR 2/1); abundant charcoal fragments; silty loam to silty clay loam; very friable, not plastic; subangular blocks, moderate, fine; negative reaction to NaF; limit well defined, irregular; pH 6.0.

290–310 cm.
A1b4
Anthropic soil; very dark brown (10YR 2/2) with smaller proportion of black (10YR 2/1); abundant charcoal fragments; silty loam to silty clay loam; very friable, not plastic; subangular blocks, moderate, fine; no reaction to NaF; limit well defined, irregular; pH 6.0.

310–365 cm.
A1b5
Soil with some anthropic influence; very dark brown (10YR 2/2–2/3); mixed by biological activity; silty clay loam or silty clay; slightly sticky, slightly plastic; the structure has been destroyed by compaction from the overlying strata; slight reaction to NaF; limit gradual, undulating; pH 6.0.

Table 5. Physical and Chemical Analyses of the Soils of El Dorado Platform 1, Trench 4. (For profile v. Fig. 20)

Soil Stratum / Sample No.		1 / 8	2e / 7	3a / 6	3e / 5	4a / 4	4b / 3	5a / 2	5d / 1
		Present surface	Red fill	Old land surface	Agriculture	Agriculture	Agriculture	Original surface	Substrate
Depth (cm.)		00–10	100	225–235	250–260	275–285	290–300	320–330	450
Granulometry	Sand %	72	22	34	36	34	40	42	46
	Silt %	22	24	32	40	40	36	32	26
	Clay %	6	54	34	24	26	24	26	28
Texture		Sandy loam	Clay	Clay loam	Loam	Loam	Loam	Loam	Sandy clay loam
pH (1:1)		5.0 Very acid	4.4 Very acid	4.9 Very acid	5.0 Very acid	5.1 Acid	4.9 Very acid	4.8 Very acid	4.9 Very acid
Exchange capacity meq/100 g	CCC	36.6 Very high	16.3 Average	30.0 High	30.4 Very high	30.0 High	30.5 Very high	28.0 High	22.4 High
	BT	14.6 High	3.5 Poor	10.6 High	12.4 High	11.8 High	9.9 Fair	10.0 Fair	4.3 Poor
	Ca	10.5	1.6	7.7	8.1	8.7	7.4	7.3	2.6
	Mg	3.8	1.6	2.5	3.8	2.6	2.1	2.1	1.3
	K	0.3	0.2	0.3	0.4	0.4	0.3	0.4	0.3
	Na	0.04	0.1	0.1	0.1	0.1	0.1	0.2	0.1
Saturations %	ST	39.9 High	21.5 Average	35.3 High	40.8 High	39.3 High	32.5 High	35.7 High	19.2 Average
	SCa	28.7 High	9.8 Poor	25.7 High	26.6 High	29.0 High	24.3 High	26.1 High	11.6 Fair
	SMg	10.4 High	9.8 Average	8.2 Average	12.5 High	8.7 Fair	6.9 Fair	7.5 Fair	5.8 Fair
	SK	0.8 Poor	1.2 Average	1.0 Poor	1.3 Average	1.3 Fair	1.0 Poor	1.4 Fair	1.3 Fair
Organic Carbon %		5.82 Very high	0.48 Very poor	1.78 Normal	1.78 Normal	1.81 Normal	1.72 Normal	1.15 Poor	0.43 Very poor
Phosphorus PPm		10 Very poor	4 Very poor	28 Fair	3 Very poor	5 Very poor	5 Very poor	5 Very poor	2 Very poor
Aluminium meq/100 g		0.4	0.8	0.2	0.2	0.2	0.2	0.4	0.2
Fertility		Moderate	Very low	Moderate	Moderate	Moderate	Moderate	Moderate	Very low

Bb5
Not described. Transitional.

C1b5
Not described. Transitional.

+450 cm.
Yellowish brown (10YR 5/6); silty clay loam to silty clay; friable; slightly sticky and plastic; slight reaction to NaF; pH 5.5–6.0.

Mineralogical analyses:
see Tables 3 and 4.
Physical and chemical analyses:
see Table 5.

Interpretation: This profile includes various horizons which apparently represent periods of intensive agriculture (nos. 3, 4, 5, 6). This is seen most strongly in Horizons 3 and 4, though Horizon 2 also indicates agricultural use, albeit in less intensive form. It is interesting to note various facts relevant to these horizons: (a) They show a mixture of materials, probably caused by some kind of fertilisation, with the addition of organic or mineral materials, and also by some form of preparation of the ground for cultivation plots. Because of the limited area of the excavation, the nature of these plots remains unknown. (b) The agricultural soils are very uniform in their fertility, texture and pH characteristics. Cation exchange capacity is high, as is the sum of bases; saturation of bases is average; organic carbon is present in normal quantities for agriculture. Less favourable characteristics are the very high acidity and the low levels of available phosphorus. These indicate the need for soil enrichment with ashes, dung, vegetation etc.

However, if one imagines the cultivation of plants specially adapted to conditions of acidity and low phosphorus, it can be said that these soils are 'made' for intensive horticulture and are among the most fertile lands of the hilly zone, without the problems of drainage that affect the soils of the flat terrain of the valley bottom.

With time, intensive agriculture became less important, until (Stratum 6) the ground surface no longer received additional mineral or organic materials and became stabilised for a period. This land surface received abundant charcoal.

Later the area was buried under two metres of fill, corresponding with the construction of the platform. There are no signs of intensive agriculture on the platform. The activities carried out on this new surface may have been quite varied, including perphaps limited agriculture and stock-raising after the European Conquest. There is clear evidence for a greater accumulation of organic matter in this horizon (5.82), which may be due to the large amount of such material derived from grasses. The figure is not characteristic of agricultural soils (c.f. the typical 'agricultural' readings of 1.78, 1.81 and 1.72), and the platform does not seem to have been forested, since the soil is too thin (0–10 cm.) and shows no sign of large roots.

On the basis of the mineralogical analyses one may conclude that:

Table 6. Physical and Chemical Analyses of the Soils of El Dorado Platform 4, Trench 1. (For profile v. Fig. 27)

Soil Stratum Sample No.		1 6	2a 5	2d 4	2f 3	3a 2	3b 1
Depth (cm)		Present surface 00–10	Yellow-red fill 20–30	Dark coffee fill 100–110	Red fill 160–170	Buried lake soil 200–210	Substrate 210–225
Granulometry	Sand %	66	24	46	26	34	36
	Silt %	20	22	24	30	34	28
	Clay %	14	54	30	44	32	36
Texture		Sandy loam	Clay	Sandy clay loam	Clay	Clay loam	Clay loam
pH (1:1)		4.9 Very acid	4.6 Very acid	4.5 Very acid	5.1 Acid	4.9 Very acid	5.0 Very acid
Exchange capacity meq/100g	CCC	35.8 Very high	19.2 Average	26.6 High	14.6 Average	11.7 Average	14.3 Average
	BT	13.9 High	5.2 Fair	5.5 Fair	6.7 Fair	5.9 Fair	10.2 High
	Ca	8.8	2.5	2.2	4.2	4.0	6.5
	Mg	4.6	2.5	3.0	2.1	1.6	3.3
	K	0.4	0.1	0.1	0.3	0.2	0.2
	Na	0.1	0.1	0.3	0.1	0.1	0.2
Saturations %	ST	38.8 High	27.1 Average	21.1 Average	45.9 High	50.4 High	71.3 Very high
	SCa	24.6 High	13.0 Average	8.3 Poor	28.8 High	34.2 High	45.5 Very high
	SMg	12.8 High	13.0 High	11.3 High	14.4 High	13.7 High	23.1 Very high
	SK	1.1 Average	0.5 Very poor	0.4 Very poor	1.1 Average	1.7 Average	1.4 Average
Organic Carbon %		5.40 Very high	0.71 Very poor	0.79 Very poor	0.14 Very poor	0.67 Very poor	0.13 Very poor
Phosphorus PPm		3 Very poor	2 Very poor	2 Very poor	1 Very poor	4 Very poor	3 Very poor
Aluminium meq/100 g		0.2	0.2	1.1	0.2	0.2	0.4
Fertility		Moderate	Very low	Low	Very low	Low	Low

(a) The soils of samples 2, 3 and 4 are formed by the same type of material, with a predominance of unweathered volcanic ash. (b) The present surface soil (8) was formed by a mixture of materials washed down by superficial water erosion; in it are found products derived from volcanic ashes and from the weathering of the diabases.

Platform 4 Trench 1: Pedological Description

The location of this platform is marked on the map (v. Centrefold) and the profile of the trench illustrated in Fig. 27.

00–20 cm.
A1
Very dark grey brown (10YR 3/2); loam; subangular blocks, moderate, fine and medium; hard; friable, not sticky, not plastic; intersticial porosity; fine ferrous gravel; abundant fine roots; no reaction to NaF; pH 5.5.

20–50 cm.
C1
Yellowish red (5YR 5/6); anthropic fill consisting of clay, much contaminated by fresh organic material which has penetrated down cracks in the clay; roots also penetrate to the underlying stratum; a few hard, ferrous fragments; slight reaction to NaF; pH 5.5–6.0.

50–65 cm.
C2
Yellowish brown (10YR 5/6); anthropic fill; clay loam; abundant fragments of weathered rock.

65–85 cm.
C3
Reddish brown (5YR 4/8); anthropic fill; clayey, with many fragments of weathered rock; contaminated with organic material distributed in lenses.

85–135 cm.
A1b(p?)
Very dark brown (10YR 2/2), dark greyish brown (2.5YR 4/3), dark yellow brown (10YR 4/4); mixed and in bands from 7 to 10 cm. thick; silty clay loam; friable; slightly sticky, slightly plastic; slight reaction to NaF; pH 5.5.

135–197 cm.
C1b
Anthropic fill, reddish, with abundant fragments of very weathered diabase rock; intercalated lenses of organic material.

197–210 cm.
A1b2
Grey (N5/0) with dark grey (10YR 4/1) on the walls of the peds; charcoal particles; clay enriched with organic matter; abundant pores; no reaction to NaF; pH 7.0. Is a dried-out lacustrine soil.

210–232 cm.
Bb2
Light greenish grey (10GY 7/1), N5/0) on the walls of the prisms; sandy clay; abundant fossil roots; abundant fine pores with iron precipitation; no reaction to NaF; pH 7.0.

+232 cm.
Cb2
Greenish grey (7.5GY 6/1); clay.

Physical and chemical analyses: see Table 6.

Interpretation: This profile shows an incipient soil of lacustrine type, buried by anthropic construction fills.

The original 'lake' soil has A and B horizons of clay-loam texture, demonstrating that these are not strictly lacustrine clays, but rather alluvial materials washed down by the streams which entered the original lake. This soil shows an incipient pedological development (low biological activity and low content of organic matter), and it appears to have been buried very rapidly before or during the drying-up of the lake.

The fills that buried this incipient soil are composed of highly weathered and washed materials, most of them derived from the diabase. In one of these (Sample 4) there seems to have been some plant growth. This stratum has the characteristics of a fill prepared for cultivation purposes, with a mixture of materials derived from ashes and from diabases.

The superficial horizon (6) is composed of more sandy materials than those of the underlying red fill. This indicates that it is not derived from the diabases, but from a mixture of materials washed down from the hill above, or perhaps resulting from human activity. It seems never to have been a cultivation soil, except for grasses; nor has it the compaction of a habitation floor.

5. The Valley Floor

Recent history, as revealed by our profiles in the valley floor, begins with a forest soil (brown to almost black), formed under humid, though not swampy, conditions, and with a high accumulation of organic matter. This soil overlies materials derived from the diabase. The bottom of the valley gradually filled up by the accumulation of sediment and organic material, and during this period sand was also washed into the forested area by water action. The accumulation of these materials probably lasted for thousands of years, for in some localities the deposits are more than 2 m. thick. These woodland conditions were rapidly terminated when the natural drainage of the valley was blocked. This blockage might have been caused by falls of volcanic ash which led to a period of erosion, with mass movements and land slips that blocked the narrow exit through which the waters left the valley. These lacustrine conditions were not permanent. From time to time the dam that blocked the mouth of the valley was breached and, for short periods, the floor of the valley reverted to swamp, until new landslips blocked the exit once more and created another lake. These lakes may have had different heights and different extents, as shown by the lack of correspondence of the lacustrine strata in our borings at the edges of the valley.

The lake was finally filled by sediments, and the margins upstream of the valley mouth became stabilised. At this time there was a return to almost swampy conditions, with the growth of vegetation and the formation of soils exploited by the first cultivators of the valley floor. Human presence there during the Yotoco period is proved by the construction of *eras* (ridged fields) containing sherds of pottery and evidence for maize agriculture. This episode roughly corresponds with the development of the fertilised cultivation soils on the adjacent slopes, as described above.

These cultivation systems, with anthropic soils enriched by the addition of organic matter and minerals, were maintained for a long time, and practically without interruption, until the *eras* were abandoned and large, artificial platforms were built on top of the adjacent hill slope fields. The final blow came with the Spanish Conquest, which caused much of the area to be deserted.

6. Anthropic Soils of the Valley Floor: A Generalised Description of the Soils of Eras 2 and 3

The excavations are described in the contribution by Bray, Herrera and Cardale Schrimpff. Profiles are illustrated in Figs. 36 and 37. The basic stratigraphy is the same at both localities. Stratum 4 represents the final lake deposit; Stratum 3 is the soil which formed as the lake dried out; Stratum 2 is the cultivation soil of the *eras;* Stratum 1 is the recent soil covering the abandoned prehispanic fields.

Stratum 1
00–20 cm.
A1
Recent soil; very dark brown (10YR 2/2), very dark greyish brown (10YR 3/2); loam to sandy clay loam; formed by slopewash and superficial transport by water from the hill sides; fill of the prehispanic ditches.

Stratum 2
20–50 cm.
Apb1
In the *eras* is fill obtained from the ditches in order to raise the planting surface; compacted by trampling (including present day cattle); very dark grey (10YR 3/1) mixed with yellowish grey (2.5Y 5/1); clay loam.

Stratum 3
50–80 cm.
Apb3
Original land surface, on top of which were constructed the cultivation ridges. This horizon barely appears in Era 2, where it was truncated by the process of ridge construction. Very dark grey (5Y 3/1); clay loam; fluvio-lacustrine materials forming the first agricultural soil.

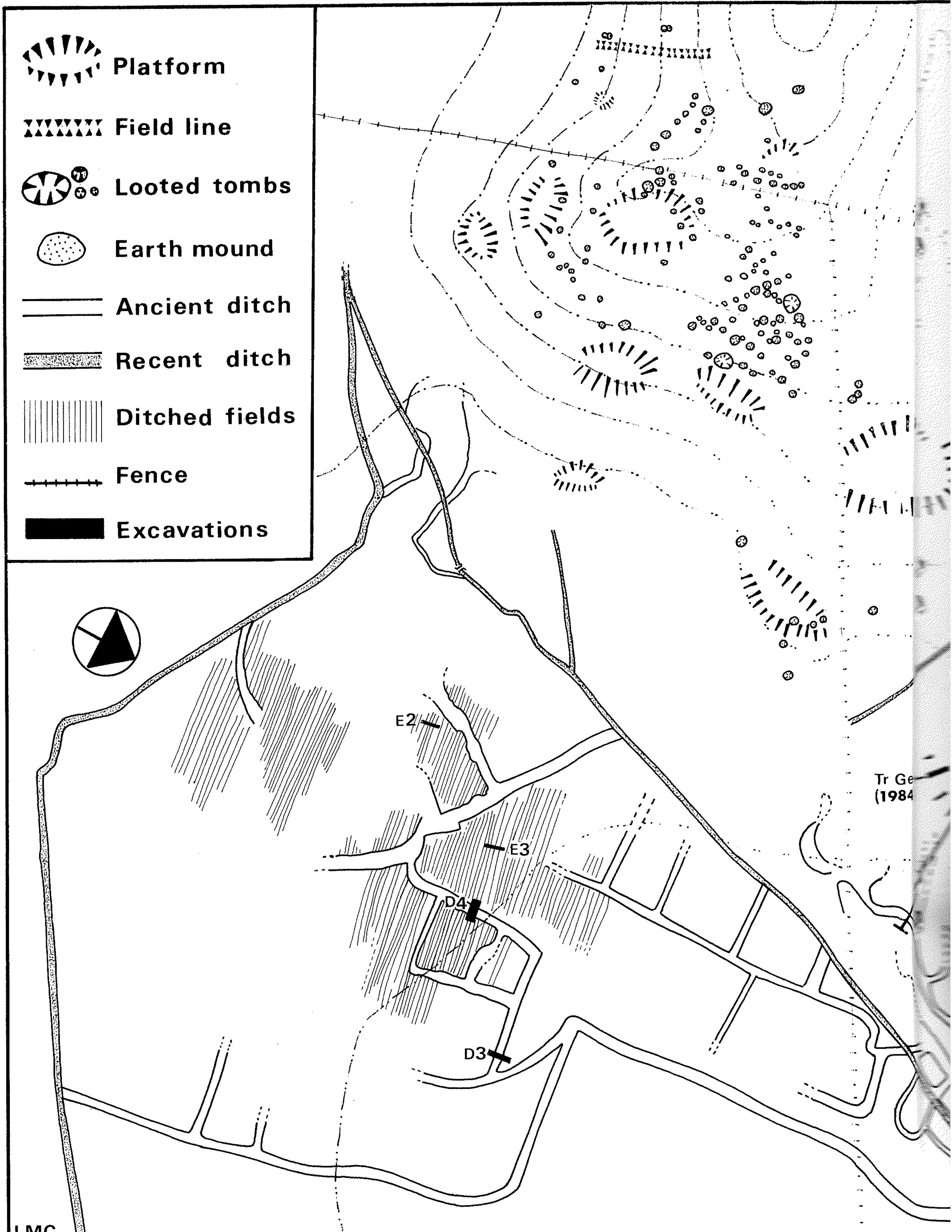
Stratum 4
80–240 cm.
2Cg
Lacustrine clay; blue grey (5BG 6/1); contains thin strata of intercalated swamp soils, consisting of silty clay loam of dark grey colour (5YR 4/1); abrupt limit with woodland soils.

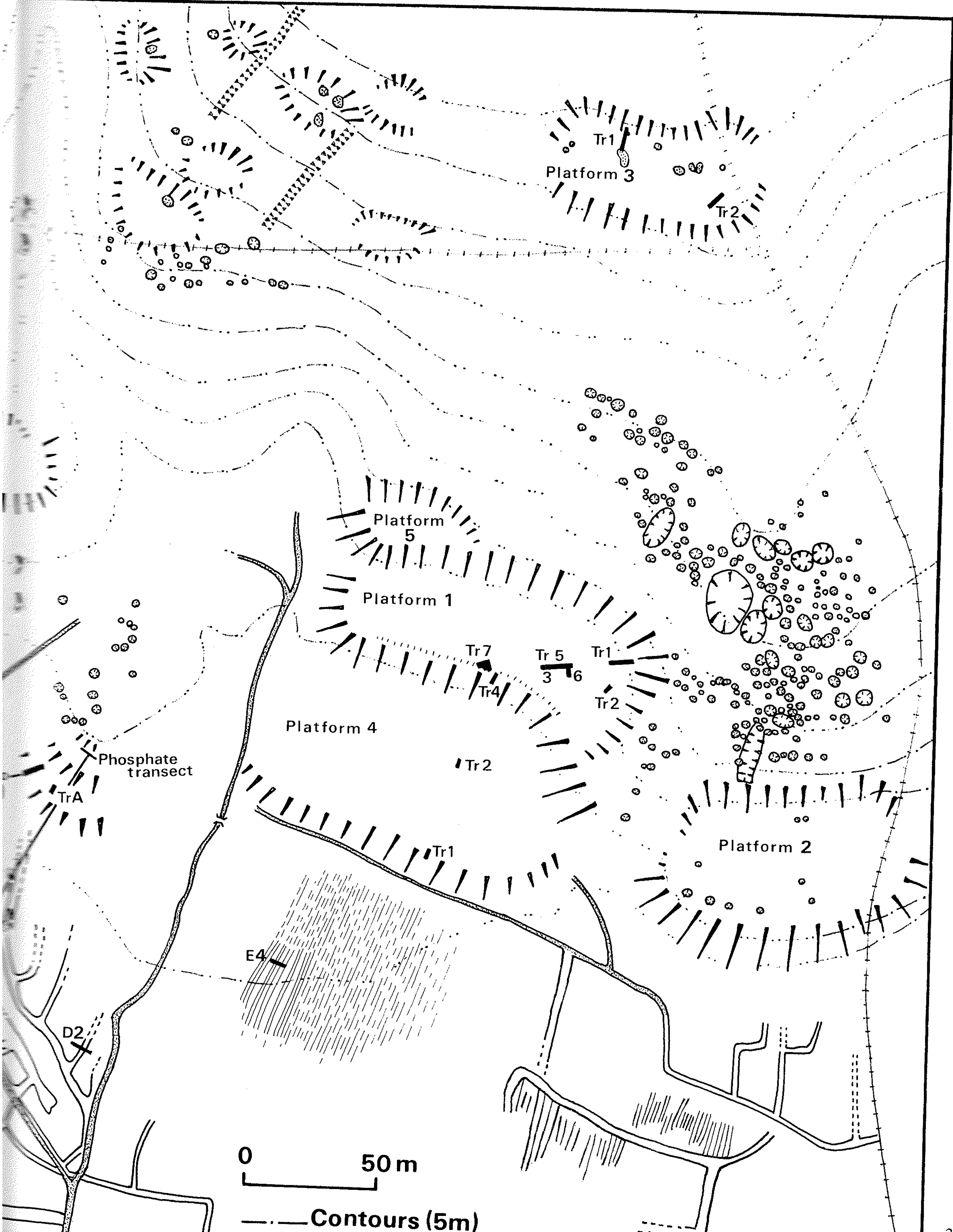
Forest soils
240–360+ cm.
3A1b
Various superficial horizons in forests which grew in humid, but not swampy, conditions and were buried by lake clays. High content of

Table 7. Physical and Chemical Analyses of the Soils of Era 2. (For profile v. Fig. 36)

Soil Stratum Sample No.		1 S6	2 S5	4 S4	6 S3	8 S2	9 S1
Depth (cm.)		Present surface 00–10	Eras 25–35	Lake 55–65	Lake 170–185	Lake-Forest 210–225	Forest 235–250
Granulometry	Sand %	48	32	14	14	44	Organic
	Silt %	40	36	26	22	12	Organic
	Clay %	12	32	60	64	44	Organic
Texture		Loam	Clay loam	Clay	Clay	Clay	–
pH (1:1)		4.9 Very acid	5.5 Acid	6.1 Slightly acid	5.4 Acid	5.2 Acid	4.4 Very acid
Exchange capacity meq/100 g	CCC	19.2 Average	10.2 Average	13.1 Average	15.3 Average	31.9 Very high	38.3 Very high
	BT	6.6 Fair	8.9 Fair	10.0 Fair	11.60 High	18.4 High	15.9 High
	Ca	4.1	5.7	4.0	5.9	12.6	10.8
	Mg	2.0	2.8	5.2	5.5	5.5	4.8
	K	0.2	0.04	0.04	0.04	0.04	0.04
	Na	0.3	0.4	0.8	0.2	0.3	0.3
Saturations %	ST	34.4 High	87.3 Very high	76.3 Very high	75.8 Very high	57.7 High	41.5 High
	SCa	21.4 High	55.9 Very high	30.5 High	39.6 High	39.5 High	28.2 High
	SMg	10.4 High	27.5 Very high	39.7 Very high	35.9 Very high	17.2 High	12.5 High
	SK	1.0 Poor	0.4 Very poor	0.3 Very poor	0.3 Very poor	0.1 Very poor	0.1 Very poor
Organic Carbon %		4.28 Very high	0.48 Very poor	0.20 Very poor	0.64 Very poor	7.50 Very high	13.0 Very high
Phosphorus PPm		4 Very poor	3 Very poor	2 Very poor	8 Very poor	2 Very poor	3 Very poor
Aluminium meq/100 g		0.4	0.2		0.2	0.2	No sample
Fertility		Low	Low	Low	Low	Moderate	Moderate

Hacienda El Dorado. Platforms, field systems & excavati




Tr1
Platform 3
Tr2
Platform 5
Platform 1
Tr7
Tr 5
3
6
Tr1
Tr4
Tr2
Platform 4
Tr 2
Phosphate transect
TrA
Tr1
Platform 2
E4
D2
0
50 m
Contours (5m)

organic matter, with abundant trunks and branches; silty clay loam with some sand lenses.

Physicial and chemical analyses: see Tables 7 and 8.

Table 8. Physical and Chemical Analyses of the Soils of Era 3. (For profile v. Fig. 37)

Soil Stratum Sample No.		1 S4	2 S3	3 S2	4 S1
		Present surface	Era soil	Old land surface	Lake
Depth (cm.)		00–10	20–30	39–50	66–75
Granulometry	Sand %	48	26	26	18
	Silt %	26	40	40	32
	Clay %	26	34	34	50
Texture		Sandy clay loam	Clay loam	Clay loam	Clay
pH (1:1)		5.1 Acid	5.1 Acid	5.4 Acid	5.6 Slightly acid
Exchange capacity meq/100 g	CCC	30.0 High	14.8 Average	13.5 Average	9.0 Low
	BT	17.2 High	7.7 Fair	12.3 High	7.4 Fair
	Ca	9.2	6.2	6.5	2.8
	Mg	3.3	1.2	5.3	4.1
	K	0.4	0.04	0.02	0.1
	Na	0.3	0.3	0.5	0.4
Saturations %	ST	57.3 High	52.0 High	91.1 Very high	82.2 Very high
	SCa	30.7 High	41.9 Very high	48.1 Very high	31.1 High
	SMg	24.3 Very high	8.1 Fair	39.3 Very high	45.6 Very high
	SK	1.3 Fair	0.3 Very poor	0.1 Very poor	1.1 Very poor
Organic Carbon %		5.14 Very high	1.51 Normal	0.41 Very poor	0.20 Very poor
Phosphorus PPm		2 Very poor	3 Very poor	2 Very poor	4 Very poor
Aluminium meq/100 g		0.4	0.4	0.2	
Fertility		Moderate	Low	Low	Low

Observations: The earliest cultivation soils (Stratum 3) are characterised (as are the platforms, microterraces and *eras*) by an undulating surface which has the effect of improving the moisture content of the root zone. These undulations are not found naturally in any other kind of level surface, past or present, and for this reason it is thought that they were made deliberately for agricultural purposes.

References

Fölster, H. and von Christen H., (1977): The influence of Quaternary uplift on the altitude zonation of mountain soils on Diabase and volcanic ash in humid parts of the Colombian Andes. *Catena* 3: 223–263. Giessen.

Arévalo, H., Buendía, H. and Díaz, H. (1983): *Estudio general y semidetallado de suelos del sector Calima-Buga.* Unidad de Suelos y Agricultura, Curso Regular de Especialización. Reporte interno. Centro Interamericano de Fotointerpretación. Bogotá.

Soil Survey Staff (1975): *Soil Taxonomy. A Basic System of Soil Classification for Making and Interpreting Soil Surveys.* USDA Washington.

Instituto Geográfico Agustín Codazzi (1979): *Métodos analíticos del Laboratorio de Suelos.* Bogotá.

Phytolith Records from Prehistoric Agricultural Fields in the Calima Region

By *Dolores R. Piperno*

Some plants, through genetically controlled factors, have the ability to take up a soluble form of silica (called monosilicic acid) from groundwater and to transfer it from their roots into the aerial organs. Here, it polymerizes to form solid deposits within and around plant cells, and when the plant dies, and its organic matter decays, left behind in the soils are very durable and faithful silicified replicas of once-living cells. These are called phytoliths. Not all plants produce phytoliths and some, when they do, contribute shapes that are duplicated in non-related plants. However, diagnostic shapes are formed in a sufficient number of domesticated and wild species to enable the construction of a reliable and highly informative palaeo-botanical record.

Phytolith analysis of ancient agricultural fields in the Valley of El Dorado, Calima, was carried out to pursue three primary objectives: (1) to generate information about the economic activity within the field systems themselves: i. e. to specify, where possible, what crops were grown on cultivation surfaces and to evaluate the roles of these crops in the agroeconomy, (2) to study the environmental contexts of the Calima region during the period of field construction and maintenance, and also before the swampy valley bottom was converted into fields, and (3) to provide palaeo-botanical information that could be correlated with other palaeo-ecological and stratigraphic data relating to the origins and usage of the field systems (see also the contributions by Botero and Monsalve, this volume).

In the flat bottomland of El Dorado there appear to be two types of field systems: ditched fields and raised fields. Ditched fields consist of cultivation zones (usually more or less rectangular) delimited by, and drained by, ditches on three or four sides. The planting areas are not significantly raised by the piling up of earth, and crops were grown on what was virtually the natural soil of the valley bottom. In the case of the raised fields (*eras* or *camellones*), earth removed from the flanking ditches was piled between these to produce the characteristic pattern of long, parallel ridges composed of mounded earth.

The soils analyzed for phytoliths come from columns taken from the cultivation zones adjacent to the canals of ditched fields and *eras*. If, as available evidence indicates, the transfer of soils from outside of the field system into the agricultural plots can be ruled out, a number of problems of interpretation are simplified. Foremost among these is that one can state with confidence that remains of crops found in cultivation strata represent the plants actually grown in the fields, and not artificially incorporated into cultivation soil during field construction and maintenance. Taphonomic characteristics of phytoliths also add confidence to the evaluation of results. Unlike pollen grains, phytoliths are not usually susceptible to long distance transport by wind, and hence are a product of a highly localized, *in situ,* deposition of plants. One can be reasonably certain that phytoliths recovered from old cultivation contexts resulted from an in-place decay of plants and were not blown in from somewhere outside. Since phytoliths are not uniformly produced by the plant kingdom, some discussion should be presented of the kinds of plants that can be expected to occur in a prehistoric phytolith record.

a) Phytolith Production and Taxonomy

Of the major tropical plant domesticates from the New World, only maize (*Zea mays* L.) and squash (*Cucurbita* spp.) have diagnostic phytoliths. The identification of maize, a procedure that has been described in detail elsewhere (Piperno 1984), is made on the basis of several attributes of a phytolith type called 'cross-shaped'. Cross-shaped phytoliths are found only in the Panicoid (tall grass) sub-family of grasses, and in a few bamboos. They occur in the vegetative structures of these grasses. Maize cross-shapes are larger and have three-dimensional structures different from those of wild species. Another criterion for discrimination takes advantage of the fact that several different phytolith shapes often occur in grasses. Maize has very low ratios of dumbbell to cross-shaped phytoliths, in contrast to wild grasses, which often have high ratios. In combination, these characteristics provide a reliable method to identify maize in archaeological soils.

The rinds of squash (*Cucurbita* spp.) produce phytoliths that appear to be identifiable to genus. All other domesticated species tested, including manioc (*Manihot esculenta* L.), otoe (*Xanthossoma* spp.), peppers *(Capsicum annuum),* and sweet potato *(Ipomoea batatas)* produce either phytoliths found also in wild plants, or no phytoliths at all. Although the phytolith record for the presence of crops will be somewhat limited, the presence or absence of maize and squash are very important for determining whether or not agriculture was practised.

A larger number of wild species produce identifiable phytoliths, including palms (many of which, of course, were domesticated or tended prehistorically), members of the Marantaceae (arrowroot family), Compositae (sunflower family), Cyperaceae (sedges), Moraceae (elm family), and Uritaceae (nettles).

b) Results of Analysis of the Soils of Field Areas: Ditch 1

A total of 23 samples was taken from two ditched fields (Ditches 1 and 2) and from one raised field (Era 3).

Table 1. Percentage Frequencies For Some Major Phytolith Categories Present in Ditch 1, Trench 2. (v. Fig. 40).

Depth cm.	Stratum	*Grass* Panicoid Dumb-bell	*Grass* Panicoid Cross	*Grass* Chlori-doid	*Grass* Festucoid	*Grass Total*	*Palm*	*Aquatic*	*Nondescript Carbon Occlusions*
5–10	(S1)	27	2	2.5	0.5	37	2.5	9	3.8
20–25	(S2)	9.5	1.5	1.5	1	19.5	7	16	4.7
30–35	(S2)	1.5	1 (Maize)	2	–	12	5	10	1.9
35–40	(S2)	4.5	1 (Maize)	4.5	2	25.5	9	13	1.0
46–50	(S3)	2	1	3	0.5	12	12	11	5.2
62–72	(S4/1)	4.5	1	4.5	1	18	20	6	11.8
72–82	(S4/1)	6	2.5 (Maize)	2.5	3	26	15	6	13
92–100	(S4/2)	2.5	0	2.5	1	6	28	11	2.4
100–108	(S4/2)	0	0	1	–	1	30	3	0
120–131	(S5)	3	0	7	1	13.5	15.5	4	10.7
140–149	(S7)	1	1	3	0.5	6.5	7	13	0
156–162	(S7)	3.5	0	3.5	0.5	9	16	0	0
				(*Chusquea* present)					
170–180	(S7)	0	0	1	–	2	33	0	2
				(*Chusquea* present)					

Note: 200 phytoliths were counted from each sample

Table 2. Cross-shaped Phytoliths Sizes, Three-dimensional Structures, and Dumbbell to Cross-shaped Phytolith Ratios in Ditch 1, Trench 2. (Fig 40).

Depth cm.	Stratum	*Cross-shaped Phytolith Size* Small	Medium	Large	Extra-large	n	*Three-dimensional Morphology*	*Dumbbell to Cross-Shape Ratios*
5–10	(S1)	16 32%	32 64%	2 4%	0	50	42 out of 50 are Variant 1	14 to 1
20–25	(S2)	6 50%	6 50%	0	0	12	9 out of 12 are Variant 1	6 to 1
30–35	(S2)	13 26%	29 58%	6 12%	2 2%	50	40 out of 50 are Variant 1. 5 out of 6 large crosses, and 2 out of 2 x-large are Variant 1.	1.5 to 1
35–40	(S2)	4 14%	22 73%	4 13%	0 0%	30	29 out of 30 are Variant 1. 4 out of 4 large crosses are Variant 1.	4.5 to 1
46–50	(S3)	1	3	0	0	4	4 out of 4 are Variant 1	2 to 1
62–72	(S4/1)	15 38%	21 52%	4 10%	0 0%	40	33 out of 40 are Variant 1. 2 out of 4 large crosses are Variant 1.	4.5 to 1
72–82	(S4/1)	11 28%	21 53%	7 17%	1 2%	40	30 out of 40 are Variant 1. 6 out of 7 large, and 1 out of 1 x-large crosses are Variant 1.	2.4 to 1
92–100	(S4/2)	None observed out of 10,000 phytoliths scanned						
100–108	(S4/2)	None observed out of 5,000 phytoliths scanned						
120–131	(S5)	None observed out of 5,000 phytoliths scanned						
140–149	(S7)	7 58%	5 42%	0 0%	0 0%	12	11 out of 12 are Variant 1	1 to 1
156–162	(S7)	None observed out of 5,000 phytoliths scanned						
170–180	(S7)	None observed out of 2,000 phytoliths scanned						

Note: The identification of maize combines characteristics of size and three-dimensional structure. Of 50 wild tropical Panicoid-grasses and 40 races of maize studied, only maize combines cross-shaped phytoliths whose frequencies of large and extra-large types exceed 7% and whose three-dimensional morphologies are predominantly Variant 1. In addition, only maize has extra-large Variant 1 cross-shapes and large-sized crosses which are predominantly Variant 1.

Phytoliths occurred in copious amounts in almost all samples. The most informative results were obtained from Ditch 1 Trench 2, part of a small group of ditched fields in the valley bottom of El Dorado. This excavation is described in the paper by Bray, Herrera and Cardale Schrimpff (this volume), and the profile is illustrated in their Fig. 40. Seven different strata were identified from excavation of the zone delimited by the ditches. Apparent prehistoric cultivation surfaces were underlain by soils resulting from a number of depositional and environmental events, including possible slopewash from the side of the valley. Beneath this stratum, and considerably below the present day water table, soils were uncovered containing large tree trunks and sizeable branches lying horizontally and vertically. This material yielded a radiocarbon determination of more than 23,000 years before present, placing the horizon firmly within the Late Pleistocene.

Table 1 lists percentage phytolith frequencies for some major phytolith and other types of biogenic silica recovered from the fine silt (5–20 micron) fraction of the soils in this excavation. Stratum 1 (S 1 in Fig. 40) is a brown soil which probably built up after the silting and abandonment of the ditch. The phytolith profile is marked by an abundance of phytoliths from the Panicoid sub-family of grasses, which includes maize, but the sizes of cross-shaped phytoliths are small and do not indicate the presence of maize itself (Table 2). The very high dumbbell to cross-shape phytolith ratio (Table 2) also indicates wild grasses, including probably *Panicum purpurascens,* called pará, an introduced African species in which the valley bottom pasture land is planted today. Biogenic silica from aquatic species, primarily fresh water diatoms, makes up a significiant percentage, 9%, of the diagram, and indicates the poorly drained nature of the soils in the valley bottom in recent times. More importantly, this figure provides a benchmark value with which to assess the drainage characteristics of terrain near Ditch 1 over the sequence of field usage and beforehand. Phytolith frequencies from Stratum 1 also indicate a small input from palms, whose significance is unclear.

Stratum 2, a darker grey and clayey soil, was thought to be the prehistoric cultivation soil, a conclusion borne out by the presence of maize phytoliths, which occur in levels from 30 to 40 cm. in this unit. Cross-shapes from the top of S 2 at 20–25 cm. were too small to identify as maize, and this, coupled with the still high (6.3 to 1) dumbbell to cross-shape phytolith ratio, indicates that superficial levels of S 2 are a mixture of S 1 and S 2 soils. Low dumbbell to cross ratios in the remainder of S 2 soils are clear evidence that old cultivation strata are not infiltrated with more recent material.

S 2 samples also contain high percentages of aquatic silica, an indication of the waterlogged conditions of the terrain existing when the valley bottom was converted into fields. Maize phytoliths were present in high numbers, suggesting that it was a major crop grown in the agricultural system. No squash phytoliths were observed, not too surprising a result, because this crop requires well-drained conditions. We can say nothing else about other crops that may have been grown on field surfaces. Root crops such as manioc, and other major domesticates, would not leave behind a phytolith record. We will have to look to subsequent pollen results for other information concerning the economic use of the field systems.

The Chloridoid, Festucoid, and a few of the dumbbell-shaped Panicoid grass phytoliths probably are the remains of field weeds. Phytolith values for graminaceous weeds are much lower than those from contemporary maize and yuca plots in Panama, where percentages of Chloridoid grasses range from 18 to 32%, and those of dumbbells from 24 to 35% (soils of three modern fields were studied). It appears that Yotoco and Sonso agriculturalists allowed only a very small weed component to exist in the fields, an activity that probably required a high labour investment.

The genesis of Stratum 3, a blackish silty clay loam, is unclear. It may mark the position of the land surface at the time when the ditch was constructed, and its dark colour probably derives from some kind of human action. Cross-shaped phytoliths were fewer in number and too small to identify as maize. Overall frequencies of grass phytoliths decline, but levels of aquatic silica remain high, indicating similar conditions of poor drainage.

Stratum 4 was divided into two units 4/1 and 4/2. The former contains Yotoco sherds and the latter shows no sign of human activity. It was felt unit 4/1 possibly represented slopewash from the side of the valley, and phytolith evidence indicates that this may well be true. Levels of aquatic silica decline by one-half in 4/1, pointing to a soil originating in part from better drained terrain. Maize phytoliths are present in the level 72–82 cm. Since during the deposition of Stratum 4 the valley bottom was not artificially drained, these phytoliths probably derive from outside of it. Another feature of S 4/1 is that nondescript and identifiable phytoliths with carbon occlusions double in number. These phytoliths are a result of the burning of plants, a process whereby silicified cells survive intense temperatures, but are left with a residual coating of carbon. It is highly unlikely that the burning of vegetation would have occurred in the valley bottom, and I suggest that the presence of maize and the evidence for burnt vegetation in 4/1 indicates that hill sides were cleared, burned, and planted in maize before this sector of the valley bottom was converted into fields. It is possible that ditched and raised fields were constructed in swampier terrain as a response to decreasing availablity of better drained soils on the slopes.

In Stratum 4/2, which is devoid of cultural material, the phytolith picture changes markedly again. Levels of grass decline. Maize is absent: in fact, *no* cross-shaped phytoliths were observed among 10,000 phytoliths scanned from this unit. Indications of burning decrease markedly. Levels of aquatic silica rise at the beginning of 4/2 and drop at the end of the unit, a pattern which continues into Stratum 5, and which may indicate somewhat better drained soils in the valley. Palm phytoliths increase dramatically in number, and one might envision a kind of natural vegetation consisting of a palm-swamp formation. Phytoliths of a kind that occur in both the Palmae and the Bromeliaceae are found in large numbers here for the first time (they are not listed in Table 1, but percentage frequencies were over 20%), and one wonders if terrestrial bromeliads such as *Aechmea,* which grows well in swampy conditions, contributed some of this silica. The pollen records should provide more details of other plants comprising the landscape of this period.

Stratum 5 is a very porous, yellow-grey deposit containing a high proportion of volcanic ash mixed with some loam and with occasional sand lenses. Percentages of aquatic silica are lower in the only sample examined from S 5, and indicate a somewhat poorly drained environment, but one probably less waterlogged than those from more recent time periods. Analysis of more samples from S 5 is needed to substantiate this view. Palm phytoliths remain high in number, as do Palmae/Bromeliaceae types, and Chloridoid grasses achieve their highest values. Again, no maize is present and no cross-shaped phytoliths were observed on scans of thousands of phytoliths.

Stratum 6, a thin layer marking the interface between S 5 and S 7, was not studied. Stratum 7 is marked by a complex micro-sedimentary pattern in which several thin organic layers are interspersed throughout a generally fine and granular soil. Large tree trunks and big branches were found lying both horizontally and vertically throughout this unit, indicating a forested environment. Radiocarbon dates revealed its age to be about 23,000–24,000 years before present. Soils below the top of Stratum 7, at 156–180 cm., indeed presented phytolith spectra entirely typical of undisturbed humid tropical forest. They are very similar to patterns found in surficial soils underneath mature tropical forest on Barro Colorado Island in Panama which I have recently analyzed. Grass levels are low, palm levels are high, and phytoliths from *Chusquea,* a forest bamboo, are present for the first time. Aquatic silica disappears, another indication of a fully terrestrial pattern. A number of phytoliths from presently unidentified dicotyledonous species either appear or increase in number in S 7. These also occur commonly in the modern forested soils on Barro Colorado Island. Expansion of the modern comparative collection will allow their assignment to taxa, probably to at least the genus level, because they appear to be highly distinctive. This will enable some resolution of the species composition of the Late Quaternary forest in the Calima Region. It is significant that no evidence for climatic aridity appears in S 7, since palaeo-botanical records from elsewhere in Colombia indicate that Late Pleistocene climates started to dry out after 20,000 years ago.

The phytolith spectrum from the very top of S 7 revealed an interesting pattern. Values for aquatic silica are high, and levels for palms and grasses are low. Cross-shaped phytoliths are present in low numbers and of sizes much smaller than in maize. There is pedologic evidence that the forest of S 7 was at the edge of a lagoon or swamp, which would explain the high levels of aquatic plants at the top of S 7, but the absence of diatoms, etc., in middle to low S 7 deposits does not correlate with the presence of adjacent waterlogged environments. Alternatively, the profile found at the beginning of Stratum 7 may indicate the period when the hydrological regime began to change from well-drained to swampy conditions.

c) Analysis of other ditched and raised fields

Discussion of phytoliths recovered from other field contexts will be brief in this first report. Five samples each were analyzed from Ditch 2 and Era 3 (v. Figs. 31, 37). Maize phytoliths were recovered from prehistoric cultivation contexts (Stratum S2) from both sites, but were present in far fewer numbers in Era 3 than in either Ditch 1 or Ditch 2. Strata 2 and 3 in Ditch 2, and even more so in Era 3, showed lower frequencies of aquatic silica than Ditch 1, (0 to 1% in Era 3, and 2% to 5% in Ditch 2). Aquatic silica then increased to 13% of all biogenic silica in Stratum 4 of Ditch 2. It appears that maize was grown throughout the complex of field systems in the Valley of El Dorado.

In summary, the samples from agricultural fields yielded a rich and diverse assemblage of biogenic silica which documented, in part, the nature of the agroeconomy in the Calima region, with the shifts in land usage and environments over a considerable period of time. We can look forward to the results of pollen analysis to add more species to the inventory of crops grown in the agricultural system, and we can confidently add phytolith analysis to the arsenal of palaeo-ecological techniques used in such reconstructions.

Acknowledgements

This research was funded in part by a post-doctoral fellowship from the Smithsonian Tropical Research Institute, Balboa, Panama.

References

Piperno, D. R. (1984): 'A Comparison and Differentiation of Phytoliths from Maize and Wild Grasses: Use of Morphological Criteria'. *American Antiquity* 49: 361–383.

A Pollen Core from the Hacienda Lusitania

By José G. Monsalve

The core on which this study is based is one of two taken by Thomas van der Hammen during a visit to the El Dorado Valley in the 1981 field season. Both cores were taken from marshy areas of the valley bottom, using a Dachnowsky auger which permitted the recovery of a continuous sample of sediments to a depth of approximately 5 m. A series of small samples was taken from these cores and prepared for pollen analysis at the Hugo de Vries Laboratory in Amsterdam, where this study was completed. The following article consists of a brief description of the Hacienda Lusitania section and the corresponding pollen diagram.

Detailed diagrams have been prepared (and were utilized in the interpretation of the core), but, for reasons of space, only a simplified version can be presented here, concentrating on the principal taxa or groups of plants which demonstrate changes in vegetation and environment.

Stratigraphy

Although every effort has been made to achieve precision, the depths and percentages presented here are approximate averages. Starting from the base of the core, the principal sediments are as follows:

500–410 cm. Clay is the main component; some fine sand is also present.

410–374 cm. The percentages of clay and fine sand diminish gradually and are replaced by peat.

375–20 cm. Peat is the main component.

20–0 cm. Peaty soil with vegetable matter in different states of decomposition.

a) Peat

This is found between approximately 415 and 20 cm. below the surface. Between 410 and 385 cm. the peat content increases gradually from 15% of the total, the rest being 80% clay and 5% sand. From 385 to 312 cm. the peat content, now 60%, continues to increase while clay decreases to 35% and sand continues to account for 5% of the total. Between 312 and 210 cm. the percentage of peat rises to about 85% of the total and is mixed with approximately 10% of sand, falling between 210 and 160 cm. to 70%. Above 160 cm. it rises again to form 95% of the total sediments.

b) Sand

Small quantities of fine sand are

found principally at three levels, forming a thin layer at 35 cm. below the surface and thicker deposits between 500 and 350 cm. and between 190 and 85 cm. At the lowermost of these levels, sand forms between 15% and 20% of the whole, and at 190 cm. it comprises 15%.

c) Clay

This is found at three main levels, at 500–360 cm. where it is gradually replaced by peat, decreasing from 85% to 5%, at 210–130 cm. (reaching values of 25%–30% in the lower 35 cm.) and at 85–60 cm. (5%).

d) Vegetal remains

These consist mainly of small fragments of leaves and wood in various stages of decomposition. They form between 5% and 10% of the sediments and are found principally from 485 to 450 cm., 405 to 170 cm., 120 to 180 cm. and 55 to 30 cm.

e) Stains

Black or grey stains, probably organic in origin, are found at three levels. The lowest is between 490 and 405 cm. with two smaller concentrations, some 10 cm. thick, at 375 and 280 cm. Yellow and orange stains, possibly due to iron oxides, are found between 500 and 375 cm.

Vegetation

A glance at the accompanying pollen diagram reveals that the dominant vegetation was Andean forest. The principal taxa represented are: *Hedyosmum, Weinmannia,* Melastomataceae*, *Myrica, Rapanea,* Polygalaceae, Guttiferae, Urticaceae, Moraceae, *Podocarpus,* Ericaceae*, Compositae, Gramineae, Piperaceae, Alchornea and Cyatheraceae*. Other taxa, present in smaller proportions are: *Symplocos*, Viburnum*, Juglans*, Alnus**, Malphigiaceae*, *Acalypha*, Cecropia,* Meliaceae*, Sapotaceae* and Caryophyllaceae*. (Taxa marked with an asterix do not appear on the simplified diagram.)

The bog and aquatic plant communities consist principally of Cyperaceae and Pteridophytes. There are also small and varying proportions of *Ludwigia,* Pontederia-type and algae (*Botryococcus, Spirogyra* and Zygnemataceae). Various fungoid remains appear to be associated with the bog community. There is also a percentage of unidentified pollen grains of widely varying forms, principally tricolporate type C3P3.

The cumulative pollen diagram demonstrates that the vegetation is principally Andean or Sub-Andean forest, at times dominated by oak *(Quercus).* Two other important groups consist of the Gramineae and of species that are exclusive to the Sub-Andean forest and which are not found in the Andean forest.

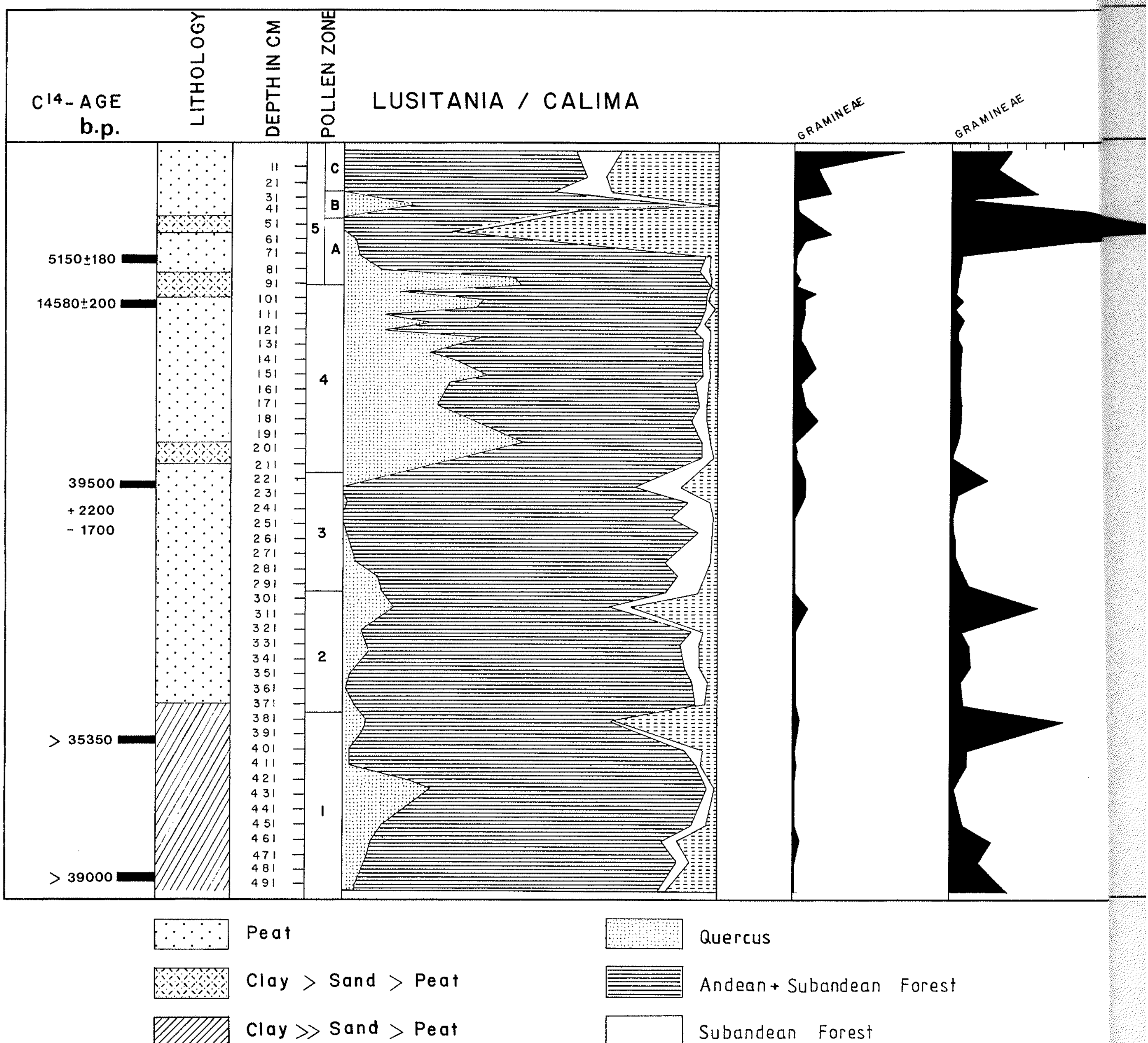
The part of the full diagram corresponding to the 'pollen sum' indicates that the rate of sedimentation has varied considerably through time. Initially there was a period of rapid sedimentation (between approximately 500 and 230 cm.) after which the rate slowed considerably (230–80 cm.). Between 80 and 35 cm. the sedimentation rate increased again, slowing down from 35 cm. to the present surface.

Pollen Zones

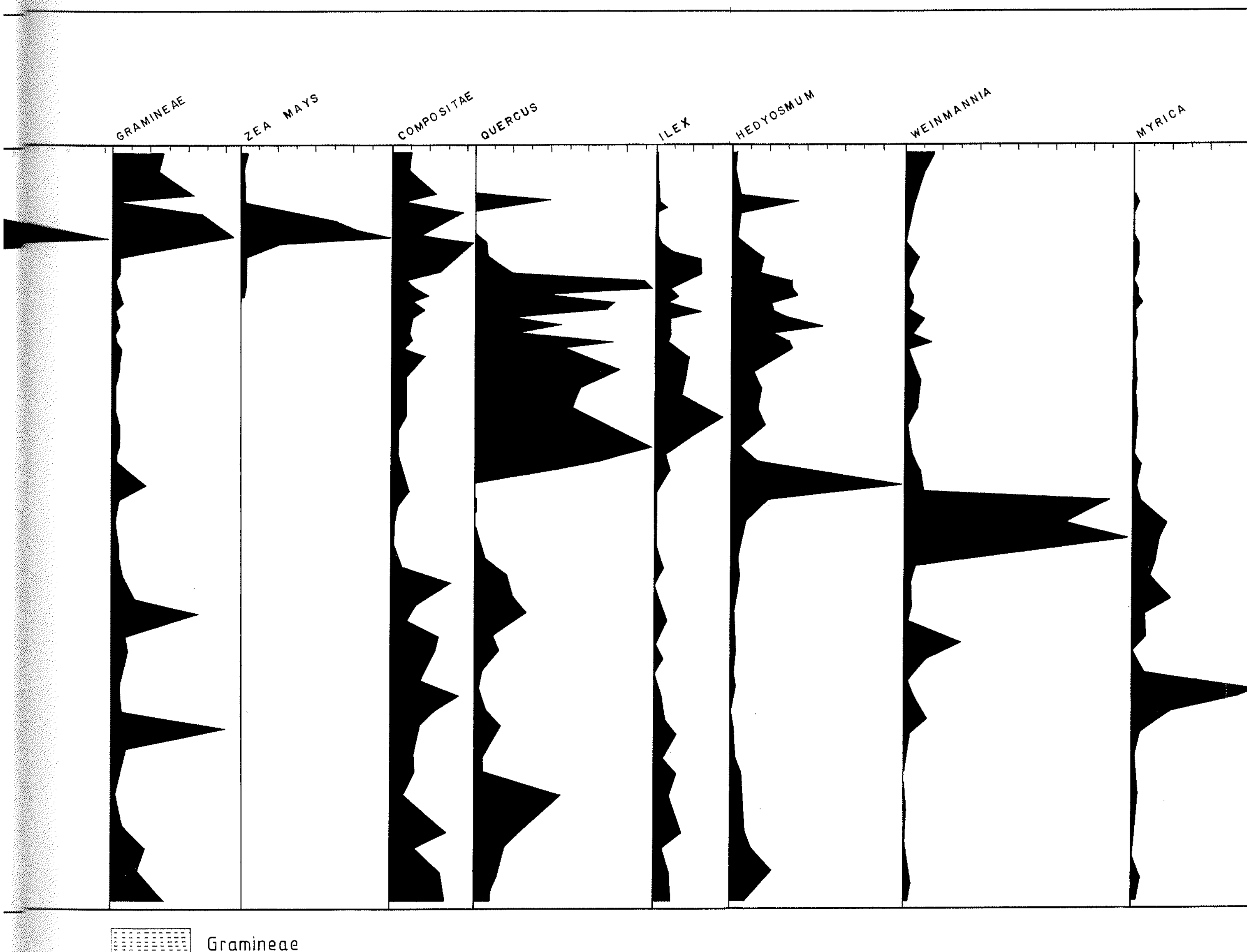
The varying proportions of the main taxa or groups of plants allow us to follow the principal changes in vegetation through time, documented by five major pollen zones:
a) Pollen Zone 1 (approx. 500–380 cm.). The dominant species are Guttiferae, *Quercus, Ilex, Hedyosmum,* Palmae, Ericaceae and some unidentified species.
b) Pollen Zone 2 (approx. 380–295 cm.). The most important species were Gramineae, *Myrica, Rapanea,* Polygalaceae, the Urticaceae-Moraceae group, *Weinmannia* and *Quercus.*
c) Pollen Zone 3 (approx. 295–210 cm.). The dominant species are *Weinmannia, Hedyosmum,* the Urticaceae-Moraceae group, Polygalaceae, Melastomataceae and *Myrica.*
d) Pollen Zone 4 (approx. 210–90 cm.). *Quercus, Ilex,* and *Hedyosmum* are important; there are also some unidentified species.
e) Pollen Zone 5 (90–0 cm.). In this zone woodland species diminish considerably, while Gramineae and Piperaceae are abundant. At the same time Malvaceae, Caryophyllaceae, *Alchornea* and *Cecropia* appear in the record. All these elements, taken as a whole, indicate disturbance. At the same time open swamp vegetation becomes important: the *Cyperaceae* increase once more, and we find considerable amounts of *Botryococcus* algae and, to a lesser extent, *Spirogyra* and Zygnemataceae. This pollen zone reflects the considerable changes to the original vegetation of the area induced by man. This zone has been divided into 5A, 5B and 5C.

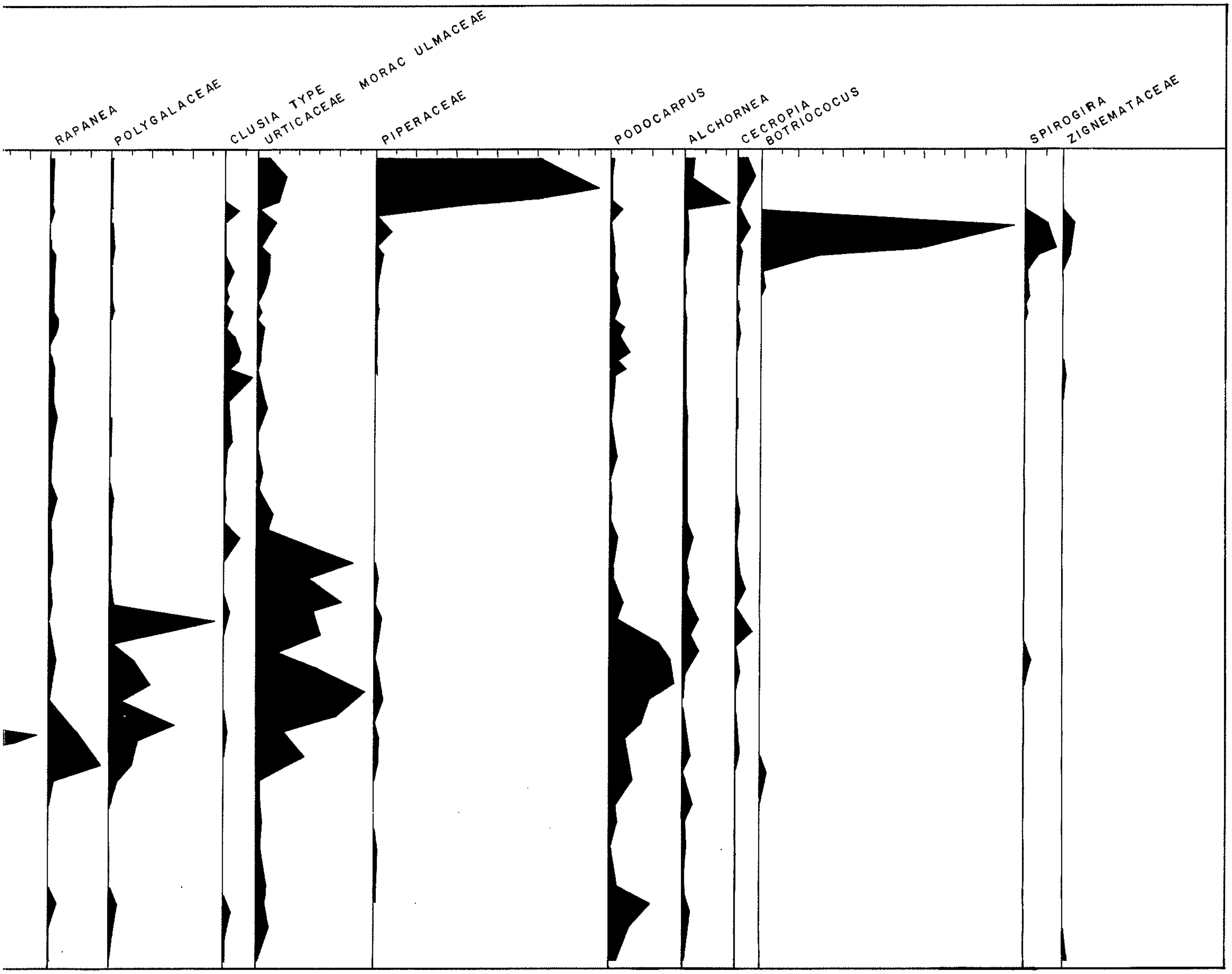
Pollen Sub-zone 5A (90–50 cm. approximately). The principal characteristics of this zone are the sharp decrease in the pollen of *Quercus, Ilex* and *Hedyosmum* and the increase in the Compositae, Gramineae, Malvaceae, Caryophyllaceae and some unidentified families. At 90 cm. large pollen grains of a Gramineae measuring between 90 and 120 microns and with a large annulus, appear for the first time; these can confidently be identified as *Zea mays,* then being grown by the prehispanic inhabitants of the area. Initially the quantities are small, increasing gradually to reach a maximum at 60 cm. At this stage there was also a rise in the water table in the marsh, due probably to deforestation. This is indicated by a rather high percentage of *Botryococcus* alga and the presence of *Spirogyra* and Zygnemataceae. This pollen zone appears to correspond to the first period of farming in the region.

Pollen Sub-zone 5B (50–35 cm. approximately). This section of the core appears to represent a period when the impoverishment and destruction of the forest ceased, perhaps even as a result of man abandoning the area. This is indicated by the lower percentages of Gramineae pollen and also of Malvaceae and Caryophyllaceae. *Botryococcus, Spirogyra* and Zygnemataceae also diminish while the percentage of unidentified pollen rises; part of the latter may perhaps be from secondary vegetation which invades abandoned fields. At the same time there are small increases in *Quercus, Ilex, Hedyosmum,* Myrtaceae, Melas-



C14- AGE b.p.
LITHOLOGY
DEPTH IN CM
POLLEN ZONE
LUSITANIA / CALIMA
GRAMINEAE
GRAMINEAE
5150±180
14580±200
39500
+ 2200
- 1700
> 35350
> 39000
Peat
Clay > Sand > Peat
Clay >> Sand > Peat
Quercus
Andean + Subandean Forest
Subandean Forest


GRAMINEAE
ZEA MAYS
COMPOSITAE
QUERCUS
ILEX
HEDYOSMUM
WEINMANNIA
MYRICA
Gramineae


RAPANEA
POLYGALACEAE
CLUSIA TYPE
URTICACEAE
MORAC ULMACEAE
PIPERACEAE
PODOCARPUS
ALCHORNEA
CECROPIA
BOTRIOCOCUS
SPIROGIRA
ZIGNEMATACEAE

tomataceae, *Clusia,* Guttiferae and *Weinmannia,* indicating the partial recuperation of the woodland.
Pollen Sub-zone 5C (35–0 cm.). Human activity is again well marked in the area, and the woodland is cleared once more. *Quercus, Ilex,* Myrtaceae, *Myrica, Viburnum, Clusia* and Malphigiaceae are no longer found and there is an increase in species that characteristically invade cleared forest such as Gramineae, Piperaceae, *Alchornea, Cecropia* and *Selaginella.* The Gramineae reach a maximum at the beginning of this subzone, decreasing towards the middle at about 20 cm.; the Piperaceae, possibly secondary regrowth in an area of cleared woodland, increase considerably. *Zea mays* appears only in small quantities. This phase seems largely to correspond with the recent clearance of the area for cattle pasture.

Swamp Vegetation

Although plants characteristic of open swamp appear throughout the pollen core, there are two periods when these plants were particularly abundant. The first of these was between 500 and 240 cm. approximately, and the second between 80 and 40 cm. The period during which these plants are least represented (240–80 cm.) coincides largely with the maximum extent of the woodland in the area. The second period with abundant pollen from bog plants may be due indirectly to the activity of man in cutting down the forest and inducing local swamp conditions (including ditched fields), as well as to the presence of a lake or swamp which did not completely dry out until the Yotoco period.

Conclusions

1. In the area under study there were local woodland communities (consisting principally of species characteristic of the Andean and Sub-Andean forest) and swamp vegetation which was restricted to the valley bottom.
2. Both the forest and the swamp vegetation underwent considerable change through time due to local conditions and to climatic and environmental changes.
3. The rate of sedimentation has fluctuated considerably. An initial phase of rapid sedimentation is followed by a period of slow sedimentation. Later, the rate increases once more, but slows down again towards the end of the sequence.
4. The local climax forest was considerably disturbed by the indigenous inhabitants of the area. Later on, the greater part of this forest was cut down.
5. At the point where human influence on the vegetation can first be detected, the natural forest was no longer dominated by oak *(Quercus)* but by *Ilex, Hedyosmum* and other unidentified taxa. This forest was partially destroyed and in its place maize was cultivated fairly intensively. Maize appears to have been most abundant during the first occupation period, diminishing markedly in the later periods. At the same time there is an increase in other types of grasses (Gramineae) and plants indicative of tree felling and other forest disturbance.
6. Subsequently agricultural activities, and particularly the cultivation of maize, gradually diminished and, as far as can be observed, there is no evidence that it ever recuperated; this is indicated by the local peaks of *Quercus, Ilex Hedyosmum* and *Piperaceae.* Although grasses (Gramineae) are present, the majority are not *Zea mays,* which shows that it was little cultivated locally.
7. This regeneration was followed by another period of intensive deforestation in which *Quercus* and *Ilex* disappear almost entirely and *Hedyosmum* pollen falls sharply. This must reflect the reoccupation of the area, even though maize was no longer cultivated, nor were other crops grown on a large scale in this area. This is suggested by the increases in species such as *Alchornea, Cecropia* and *Piperaceae* that indicate disturbance and clearance of the forest. This phenomenon seems to correspond with the recent arrival of colonists from Antioquia in search of new lands for cultivation.

Summary and Discussion

The present article constitutes a preliminary report on sediments and their pollen and spore content from a 5 m. deep core taken in a marshy area of the El Dorado Valley, Calima (Western Colombia).

The results, in general terms, demonstrate a series of changes in the vegetation through time and also in the rate of sedimentation in the swamp area. The latter is deduced from the pollen count per cubic cm., of forest species. While from 500 to 375 cm. the sediments consist principally of clay with small quantities of fine sand, from 375 cm. to the surface the principal component is peat with minor amounts of clay and fine sand.

On the basis of the relative frequency of the different taxa or groups of vegetation, five pollen zones have been defined, (one of them with three subdivisions), indicating that the local forest suffered seven major changes through time. Some of these are probably due to climatic change, although the final three are chiefly the result of man's effect on the forest in both pre- and post-Columbian times.

These three final sub-zones appear to reflect three successive periods of occupation and at least partial abandonment of the area, with the consequent disturbance and later, the partial regeneration of the natural vegetation. Zones 5A, 5B and, perhaps, the lower part of 5C represent prehispanic occupation, and the bulk of 5C can be equated with 20th century recolonization.

The uppermost two metres of a second 5 m. core taken from the opposite extreme of the same swampy area in the El Dorado Valley are now being studied. At first sight the sequence appears fairly similar to the Lusitania core studied here, and radiocarbon dates support the correlations proposed above. Fuller results of this analysis will be published on a future occasion.

Petrological Analysis of Calima Pottery: a Preliminary Report

By F. E. S. Roe

In March 1982 a pilot study was initiated to examine the potential of Calima pottery for petrological analysis. Seventeen sherds were selected, four each being chosen from the Ilama and Yotoco periods, and nine from the Sonso period, the aim being to provide a representative sample of the various fabrics (Fig. 42). A complete list is given in Table 1.

An essential preliminary to the work was to strengthen the samples, to ensure that they did not disintegrate during the preparation of the thin sections, and to this end the sherds were first impregnated with Lakeside 70. The main method of analysis was by examination under a petrological microscope, backed up by scanning electron microscope and electron microprobe work to answer specific questions.

Initial inspection of the thin sections showed that some of the sherds contained relatively greater quantities of ferric nodules, while in others the predominating inclusions were pieces of quartz and feldspar; additionally rock fragments could often be distinguished, together with smaller amounts of other minerals. This suggested that good tangible material was available for assessment, needing only the choice of a suitable method of study that would differentiate clearly between the ferric tempered and the quartz and feldspar tempered fabrics, and

Table 1.

	locality	coarse/fine	clay	quartz plus feldspar (i)	ferric	lakeside and lenses (ii)	hornblende	biotite	epidote	anthophyllite	red/brown altered mineral	GROG	granular plagioclase (iii)	yellow/brown altered mineral	chlorite	pyroxene	clouded plagioclase	SED	isotropic glass (?), other	totals %	count	larger grains	rock fragments	rock
Ilama																								
C1	*El Recreo El Porvenir*	C	41.125	42.00	3.125	7.875	0.25	0.625	3.25	–	–	–	–	–	–	–	–	–	1.75	100	800	10.375	15.5	T
C2	*El Recreo El Porvenir*	F	62.3	19.8	12.3	1.8	1.2	0.5	–	1.0	–	–	–	–	–	–	–	–	1.1	100	1000	3.7	3.2	T
C3	*La Iberia, loc 4*	F	50.05	27.79	8.58	9.66	0.87	1.30	–	–	–	–	–	0.43	–	–	–	–	1.30	99.98	921	3.357	5.65	T
C4	*La Iberia, loc 4*	F	48.81	29.72	6.61	11.19	0.18	1.28	–	–	–	–	–	1.65	–	–	–	–	0.55	99.99	545	2.57	5.14	T
Yotoco																								
C5	*El Dorado, Hda Lusitania*	F	63.90	18.64	8.28	0.30	1.78	–	–	–	2.96	–	–	–	1.48	0.30	0.29	–	2.07	100	338	0.89	–	D
C6	*Rio Bravo, Hda la Palmera*	F	66.74	17.32	6.92	0.92	2.30	0.23	0.23	–	–	–	–	–	0.23	0.46	1.15	–	3.45	99.95	432	1.61	0.69	D
C7	*Rio Bravo, Hda la Palmera*	C	57.4	15.4	8.7	4.7	1.2	0.2	0.4	–	4.8	–	–	–	–	3.1	2.3	0.8	1.0	100	1000	11.1	12.3	D
C8	*Restrepo, Finca Oscar Gonzalez*	C	50.1	22.6	14.6	4.2	3.6	0.3	0.1	–	–	–	–	–	–	–	–	–	4.5	100	1000	15.1	13.9	T
Sonso																								
C10	*El Recreo El Porvenir, tambo*	F	57.51	35.16	1.83	2.55		–	–	–	–	0.55	–	–	–	–	–	–	2.38	99.98	546	2.56	–	T
C11	*Calimita, Yucal 2*	C	52.2	31.5	7.6	6.6	0.6	0.1	–	–	–	–	–	–	–	–	–	–	1.4	100	1000	8.0	0.3	T
C15	*El Recreo El Porvenir*	C	53.0	27.5	3.7	5.1	0.4	0.1	–	–	–	8.9	–	–	–	–	–	–	1.3	100	1000	13.7	–	T
C16		C	54.7	27.0	4.3	9.1	1.0	0.1	–	–	–	2.5	–	–	–	–	–	–	1.3	100	1000	8.8	1.8	T
C13	*El Recreo El Porvenir*	C	51.1	29.9	2.4	7.1	0.8	0.6	–	–	–	–	–	–	–	–	–	–	8.1	100	1000	15.2	19.5	T
C9	*El Dorado, valley*	C	54.4	11.5	26.6	3.3	0.6	1.2	0.1	–	–	–	0.3	–	–	–	–	–	2.0	100	1000	20.9	–	–
C12	*El Recreo El Porvenir*	C	56.8	11.4	24.4	4.1	1.0	0.1	0.1	–	–	–	0.2	–	–	–	–	–	1.9	100	1000	13.1	–	–
C17	*El Recreo El Porvenir*	C	53.60	18.65	18.75	4.03	1.48	0.09	–	–	–	–	0.78	–	–	–	–	–	2.55	99.93	1013	9.2	1.6	T
C14	*El Recreo El Porvenir*	C	46.15	11.19	28.77	8.18	1.4	–	–	–	–	–	–	–	–	–	–	1.6	2.7	99.99	1001	15.3	1.65	S

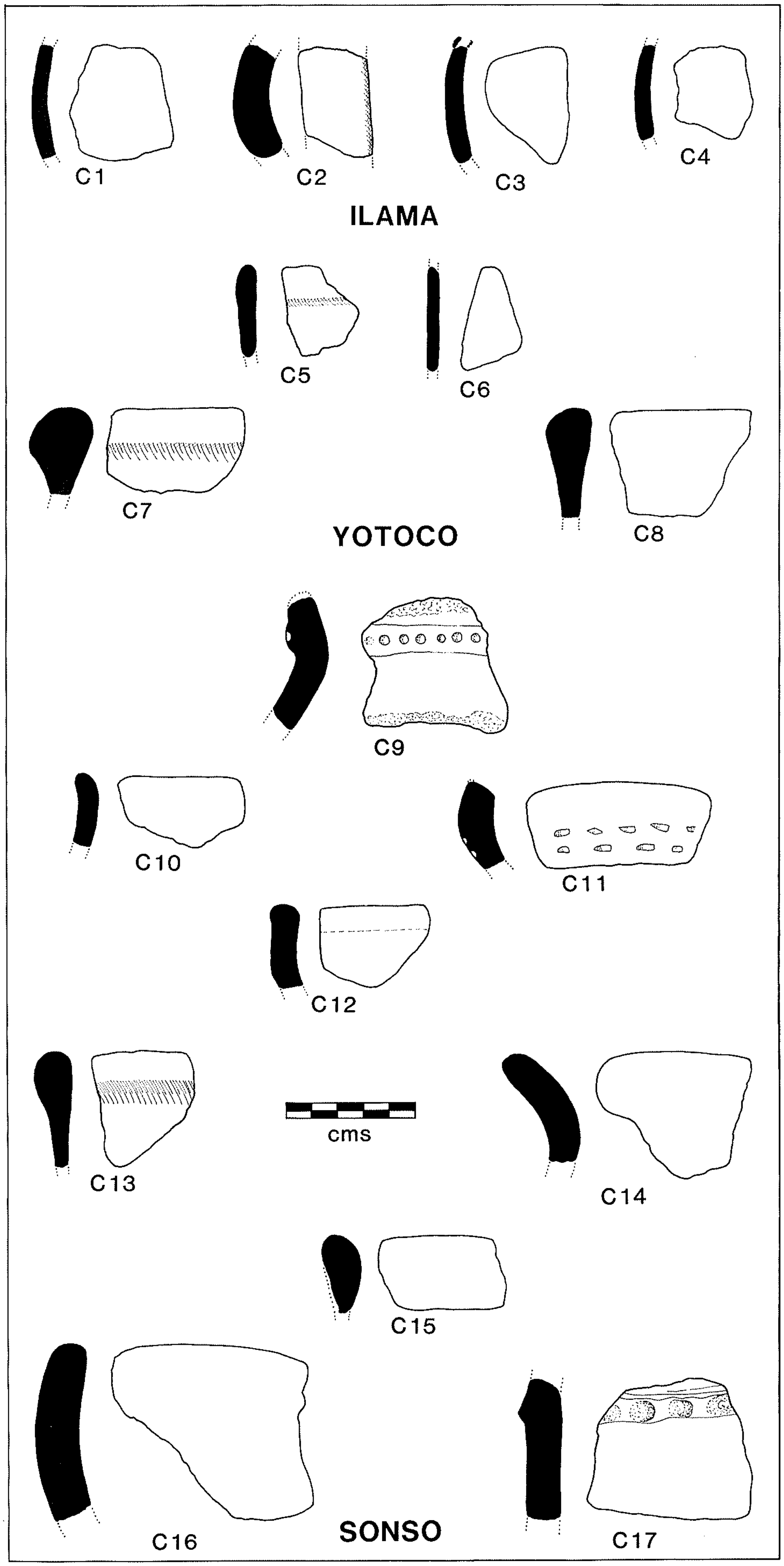


Fig. 42. Diagnostic sherds of Ilama, Yotoco and Sonso pottery.

indicate other possible differences between the sherds. In order to quantify the proportions of each material present, a point counter was used to scan the slides and provide up to 1,000 counts of the various components. The data obtained in this way are summarised in Table 1. This shows that there are various minerals which occur in small amounts, but only five items that occur in any quantity. These are described below.

1) *Clay* accounts for the largest proportion of material in each thin section, though not perhaps as much as might be expected, since the relatively large quantity of inclusions means that the average percentage of clay in these sherds is only 54.11. This amount is low compared, for instance, with some English Medieval pottery with a clay content of around 80–82% (Vince 1977, Table 1). It seems probable that many of the smaller impurities in the Calima clays may have occurred naturally, but it is assumed that the larger inclusions were added deliberately.

2) *Rock fragments* have been defined as pieces including two or more minerals, excepting ferric materials, which, being ubiquitous, are not helpful as pointers; therefore the numerous fragments of quartz mixed with iron were not counted. Quantities of rock fragments in the sherds are variable, but in some they form a substantial part of the total count.

Two main types of rock have been found. The most common is *tonalite,* an intermediate igneous rock consisting of quartz, plagioclase and alkali feldspar, hornblende, biotite and some iron. This rock is of late Tertiary date (Barrero-Lozano 1979: 63), and occurs locally in the form of stocks, though detailed information and maps are not yet available. The secound rock type is *diabase* or dolerite, of Upper Cretaceous date (Barrero-Lozano 1979: 16), and is widespread locally, though tending to lack fresh surface outcrops other than in stream beds (Nelson 1957, Fig. 25). The mineral content of this diabase is plagioclase (usually altered), clinopyroxene and chlorite with other alteration products and iron.

3) *Quartz and feldspar.* Quartz and both potassium and plagioclase

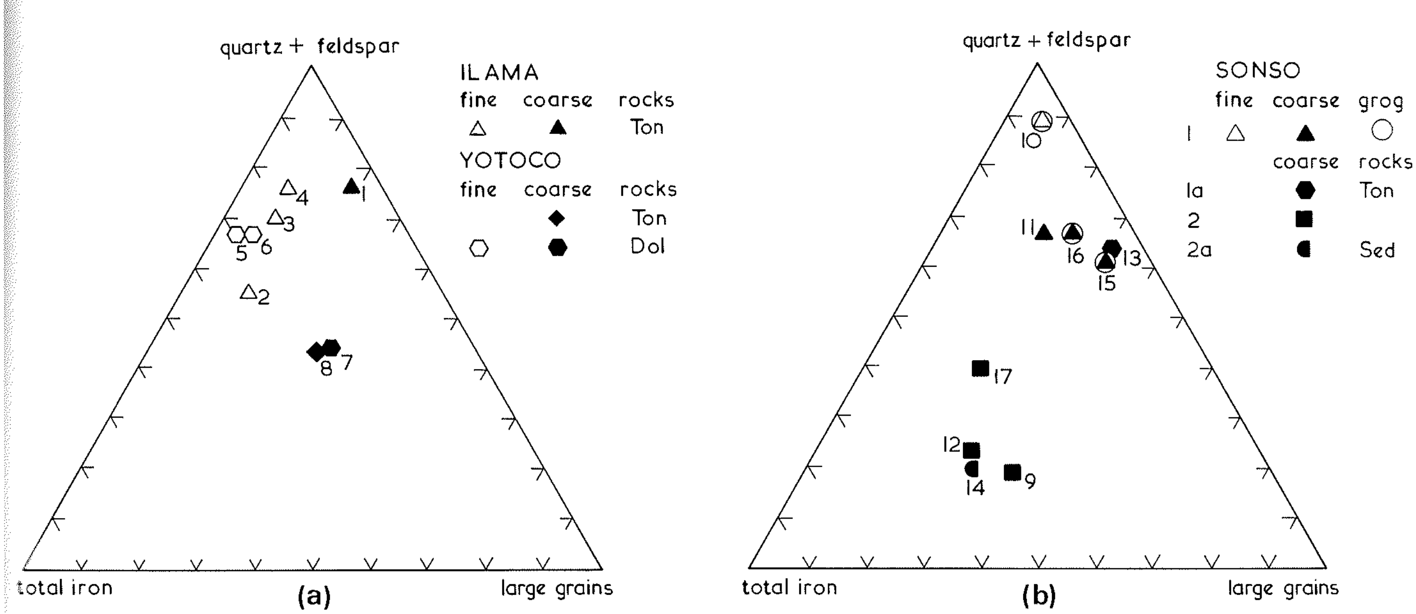


Fig. 43. Paste composition of Calima pottery; (a) Ilama and Yotoco periods, (b) Sonso period.

feldspar occur throughout the sherd sample. Plagioclase from the diabase can usually be distinguished by its heavily clouded appearance. Most of this material, however, comes from the tonalite, and mild metamorphism has produced quartz that is strained, while the plagioclase is often zoned, but may not exhibit twinning, with the result that fragments of either look much alike. With the point counter in operation it did not prove practical to distinguish between them.

4) *Iron.* Much of the iron takes the form of small ferric nodules. These occur naturally in certain soils (Federación Nacional de Cafeteros de Colombia, 1972: 33), a fact which was also noted independently by Linda Cheetham while trying out different clays for experimental pot making. This could explain the presence of a few nodules of iron (around 1.3%) in nearly all the sherds principally gritted with other materials. It seems a possibility that such nodules were picked out of some clays by hand during a process of levigation in preparation for making the finer wares; this could have provided the Sonso potters with a convenient collection of nodules with which to temper some of their other, coarser wares.

5) *Grain size.* The size and number of larger grains varies considerably between the sherds, and grain size has been quantified by counting the number of grains measuring more than an estimated 0.6–0.8 mm. in maximum diameter. It was found that in this small sample the finer wares contained between 0.89% and 3.7% larger grains, while the coarser sherds contained between 8.0% and 20.9% larger grains. On this basis a convenient (though possibly temporary) division could be made between fine and coarse wares.

Having considered these five major factors, the data from the point counter can be grouped together under three main headings:

(i) The greater part of each pottery thin section was found to consist of the same four items: clay, quartz, feldspar and iron. These together account for between 81.5% and 94.5% of the total content of each sherd.

(ii) A further proportion of the material in each slide was found to be taken up by non mineral items, such as isotropic lenses in the fabric, which appear to be natural pores in the clay, together with holes, occasional air bubbles and gaps caused by shrinkage round larger pieces of temper. Such non mineral items account for a further 1.8% to 11.19% of the material examined under the point counter.

(iii) Therefore the remaining materials found in each slide add up to only a very small percentage of the total, but they nevertheless include useful diagnostic minerals, essential as aids towards distinguishing one variety of pottery from another. For instance, clinopyroxene (probably augite) occurs in only three of the thin sections. Hornblende occurs in small amounts in all of them, and similarly biotite occurs in lesser amounts in nearly all the slides. Small, rounded grains of isotropic material, which look glassy, and which could be pieces of volcanic ash, are also almost universal.

The differences between the seventeen sherds are shown in diagrammatic form in Figures 43a and 43b, where three selected variables (total iron, quartz plus feldspar, and grain size) are plotted against one another on ternary diagrams. Coarse and fine wares are further indicated by differing symbols, while the presence of rock fragments is also taken into account, thus allowing five variables to be assessed together. The Ilama wares (Fig. 43a, C1–4) seem to plot as a group, while the Yotoco fine wares (C5, 6) contain some different minerals. The Sonso sherds which were intentionally tempered with iron nodules (C9, 12, 14 and 17) stand out as a group in Fig. 43b, while the sherds that are quartz and feldspar tempered (C10, 11, 13, 15 and 16) form a group that is clearly separate. However, differences do exist between individual sherds, as can be seen when the pottery is examined in more detail.

Ilama period

These four sherds have an average clay content of 50.57%. Basic similarities include abundance of quartz and feldspar (29.82%), moderate amounts of iron (6.9%) and the presence of small quantities of hornblende and biotite, all suggesting the involvement of tonalite, which is confirmed by the rock fragments. Nevertheless, differences amongst other minerals suggest that minor variations within the pottery may be distinguished.

(1) C1 *El Recreo.* This sherd stands out because it contains 3.25% epidote. A few pieces of this could be seen with the naked eye in the sherd, and examination by X-ray diffraction confirmed the identification. Some grains of epidote occur in the rock fragments, suggesting that these belong to a slightly metamorphosed tonalite in which the hornblende has mostly changed to epidote. The coarse character of C1 derives from the high proportion of quartz, feldspar and rock fragments measuring up to 1.0 mm. in diameter.

(2) C2 *El Recreo.* By contrast this sherd is made from a fine fabric, plotting rather differently from C1 on the ternary diagram. Under the microscope another difference is the presence of a mineral which, because of its altered appearance, was not readily identifiable. Analysis by Scanning Electron Microscope suggested that this was anthophyllite, and confirmation came from further analysis by electron microprobe. Evidence from rock fragments in the sherd suggests that this too is an alteration product from hornblende in the tonalite.

(3) C3, C4 *La Iberia.* Two sherds from this site match one another reasonably well. Again the basic ingredients suggest tonalite, while differences from C1 and C2 include a rarity of fresh, twinned plagioclase and the presence in small quantities of an altered yellow/brown mineral with affinities to biotite.

Yotoco period

These sherds, two of coarse ware and two of fine, can be differentiated clearly both from the Ilama and the Sonso sherds. It is only amongst these Yotoco sherds that traces of diabase occur. A further three fabrics can be described.

(1) C5 *El Dorado;* C6 *Rio Bravo.* These two sherds appear to match. Used for thin walled vessels, they comprise the finest wares in this survey, demonstrated by their high clay content (65.3%), the absence of lenses, and the rarity of rock fragments and of larger grains. Inclusions, apart from a few iron nodules, only measure up to 0.3 mm., and appear to include material both from tonalite and from diabase, the evidence for the latter including pyroxene, chlorite, an altered red/brown mineral and clouded material which is probably altered plagioclase. It may be noted that, while outcrops of diabase are uncommon in the Calima area, some large boulders exist at the western end of the El Dorado valley (Bray, Herrera and Schrimpff 1983: 6). The impression given by the temper in these sherds is of a mixed sand, such as could have been obtained in a stream bed and then crushed to a finer texture before being added to the clay.

(2) C7 *Rio Bravo.* This coarse sherd has been tempered with rock fragments of diabase up to 3.0 mm. in diameter, together with a few sedimentary pieces including some chert. The diabase appears to have been in a decomposed condition, since only 3.1% pyroxene was counted; instead a red/brown altered mineral was found, together with chlorite and highly altered, cloudy plagioclase (cf. C5 and C6).

(3) C8 *Restrepo Waterworks.* This second coarse Yotoco sherd plots near C7 on Fig. 43a, but the added rock is of a different character, consisting of altered tonalite fragments up to 3.5 mm. in size. A pale greenish hornblende accounts for 3.6% of this fabric, together with sheared quartz and altered oligoclase – andesine (plagioclase) twinned with narrow lamellae. It seems possible that the basic recipe for these two coarse sherds could have been much the same except for the different rocks used for the additions.

Sonso period

These sherds are all, with the exception of C10, coarse wares from thick-walled vessels. Quantities of actual rock fragments are low, except in C13, though the minerals present suggest tonalite again. The sherds divide into two groups, those gritted with quartz and feldspar, and those gritted with ferric nodules.

(1) C10 *El Recreo;* C11 *Calimita;* C15, 16 *El Recreo.* This group of sherds is characterised by a quartz plus feldspar content averaging around 30%, while iron is correspondingly low (4.35%). C10 appears to be a fine version, and shares with C15 and C16 an additional feature, the inclusion of occasional pieces of pottery grog.

(1a) C13 *El Recreo.* This sherd may at present be regarded as belonging to a subdivision of the quartz and feldspar gritted group, the difference being that these minerals occur here in rock fragments of an altered tonalite which accounts for 19.5% of the fabric. Unlike that seen in C8, this tonalite consists of polycrystalline quartz with altered plagioclase that is mostly untwinned; little hornblende was observed. This thin section also includes an isotropic, glassy looking area, occupying 8.1% of the slide, and this could perhaps be volcanic ash.

(2) C9 *El Dorado;* C12, 17 *El Recreo.* In this contrasting group of sherds the iron content averages 23%, while the quartz and feldspar drops to 13.85%. Rock fragments are rare.

(2a) C14 *El Recreo.* A sherd that may belong to a subdivision of the previous group has a high iron content (28.8%), but also contains a mixture of rock fragments, in the form of both rounded and sub-angular oval grains of sedimentary and altered igneous rocks up to 1.7 mm. long; these look like a moderately coarse sand which has been deliberately added.

Conclusions

The results presented in this report are based on a small sample of seventeen sherds, and therefore any comments made here could be liable to modification following the examination of further pottery. However, it has been possible to show that the component elements of Calima pottery are well suited to petrological analysis.

One point to note is that there are some variations within the paste of sherds of the same phase and from the same site; for instance the two differing Ilama sherds at El Recreo, and, again at El Recreo, Sonso sherds from the two main groups and two sub-groups. Thus the question arises as to whether any of this pottery, or even some of the ingredients for it, could have been imported to El Recreo from elsewhere. Looking at the same question from a different viewpoint, it may also be observed that a matching ware has been found at more than one site, instances being the sherds of fine Yotoco ware at both El Dorado and Rio Bravo, iron tempered ware at El Dorado and El Recreo, and quartz plus feldspar tempered ware at Calimita and El Recreo. This suggests that there may be a possibility of establishing areas of interaction, or perhaps trading patterns, within the Calima area.

Acknowledgments

This work could not have been carried out without the generosity of the Department of Earth Sciences at Oxford in providing facilities. I am also very grateful to Dr. N. Charnley for assistance with electron microprobe work, Dr. G. Cressey (S.E.M.), Mr. C. Fagg (S.E.M. and X.R.D.), Mr. P. Jackson, who made the thin sections, and Mr. S. Wyatt for assistance in the chemical laboratory.

References

Barrero-Lozano, D. (1979): *Geology of the Central Western Cordillera, West of Buga and Roldanillo, Colombia.* Bogotá. Instituto Nacional de Investigaciones. Geológico-Mineras.

Federación Nacional de Cafeteros de Colombia (1972): *Estudio de Zonificación y Uso Potencial del Suelo en la Zona Cafetera del Departamento del Valle del Cauca.* Bogotá. FEDECAFE.

Nelson, W. F. (1957): 'Contribution to the geology of the Central and Western Cordillera of Colombia in the sector between Ibagué and Cali'. *Leidse geologische mededelingen* 22: 1–75.

Vince, A. (1977): 'The medieval and post-medieval ceramic industry of the Malvern region: the study of a ware and its distribution'. In D. P. S. Peacock (ed): *Pottery and Early Commerce:* 257–305. London. Academic Press.

Archaeological Excavation in a Prehispanic Cemetery in Guabas, Cauca Valley, Colombia

By Carlos Armando Rodríguez

A prehispanic cemetery was excavated by the author and Carlos H. Illera (archaeologists of the Instituto Vallecaucano de Investigaciones Científicas, Cali) in October 1981 (Illera 1983; Rodriguez n. d. 2). The site is located in the Hacienda La Margarita (corregimiento de Guabas, Municipio de Guacarí, latitude 3° 45′ 31″ north and longitude 70° 20′ 20″ west of Greenwich), on the eastern side of the Cauca river which, in this region, forms a wide valley bordered by the western and central sections of the Andean mountain range.

The aims of these excavations were to obtain data about the funerary customs of the prehispanic Indian population of the area which might throw light on general social phenomena, and define these peoples' chronological and cultural position.

Although a total of fifteen tombs were excavated, in only three of them could a proper archaeological record be kept. Nevertheless, general information and records of grave goods were obtained from all.

The tombs fall into three categories based on form: rectangular shaft (T1–T2); semi-rectangular shaft with two niches (T3); rectangular shaft and chamber (T4). The shafts were orientated north-south and their length varied between 2.00 m. and 4.25 m., their width between 50 cm. and 2.75 m. Depth was between 2.30 m. and 4.10 m. The chambers averaged 1.50 m. in length and 70 cm. in width.

Individual (T1–T6) and collective (T2–T3) burials were reported (Figs. 44 and 45). The corpses had been placed in an extended position and in some tombs the bones were disarticulated and dispersed.

In the tombs which we excavated the bones belonged to adolescents (T1) and adults of both sexes. Some skulls showed artificial deformation and partial charring.

The funerary goods comprised objects in pottery and bone, as well as lithics and gold items.

The Ceramic Material

Several vessel forms were present: pots (rounded, conical and composite shapes), pitchers (rounded, ovoidal insloping and composite), bowls (rounded, cylindrical, plate-like and composite). Other objects include anthropomorphic figurines (with cylindrical hollow bodies, solid cylindrical bodies, or hollow cylindrical bodies with solid legs and hands), spindle whorls (rounded, simple conical and composite shapes). Decorative techniques included impression, appliqué, paint and white fill. Decorative motifs were basically geometric (triangles, squares, circles, rhombs, etc.). Anthropomorphic motifs included nose rings, eyes of the coffee-bean type, ears and hands. Frogs and birds were the most common zoomorphic representations (Figs. 46–49).

As regards shape as well as decorative techniques and motifs, the Guabas pottery resembles other ceramic complexes of the Cauca Valley region, including the valley floor and the Central and Western Cordilleras. Direct relationships are noticeable with the Sachamate area (Cubillos 1984), Palmaseca (J. C. Cubillos, personal communication) and the Buga area (Bray and Moseley, 1976: 70–72; Rodríguez n. d., 3) as well as with the Calima region, and especially the Bitaco-La Cumbre area (Bray, Herrera, Schrimpff 1981: 19–20; Gähwiler

Fig. 44. Guabas, Tomb 3; general view of the excavated burials and offerings.

Fig. 45. Guabas, Tomb 3; the burials.

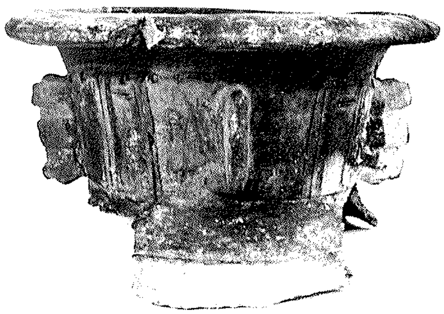


Fig. 46. Guabas, Tomb 4; neck of a possible funerary urn, decorated with a human face modelled in relief. Height 17 cm.

Fig. 47. Guabas; cup decorated with two animals. From a looted tomb. Height 12 cm.

Fig. 48. Guabas, Tomb 2; decorated cup. The darker areas are covered with a red slip or paint, and the lighter areas left unpainted. This view also shows a stylized human face with modelled nose and nose-ring, and with eyes of 'coffee bean' form. Height 12 cm.

Fig. 49. Guabas, Tomb 2; cylindrical vessel with four handles. Height 17.5 cm.

1983: 43–47). Even further north, links with the Trujillo-Bolívar (Salgado 1984), Rio Las Vueltas (Rodríguez, n. d., 1) and the Quimbaya areas (Duque Gómez 1970; Bruhns 1976) can be found.

Bone Objects

Thirty seven bone objects were present as part of the funerary goods in Guabas. Among them were needles (with a point at each end and no eye, with a point at one end and eye) measuring 8 and 10 cms. in length; musical instruments (a fragment of a flute with rounded holes); daggers decorated with bands of red paint; peccary (?) teeth; necklaces of bird (?) bone beads; seashells with circular perforations, and various rectangular artifacts of unknown function. There was also a fragment of fossilized bone, possibly of the tusk of a mastodon.

Lithic Material

Fifteen stone tools were present in the tombs of Guabas, comprising rubbers, querns and chisels. They were manufactured with locally available materials (serpentinite, dacite, gneiss, gabbro, peridotite, amphibole) and dacite from the Macizo de Ginebra located on the western slopes of the Central Cordillera (Espinosa, in press).

Metal Objects

Thirteen metal objects were found, all in Tomb 2, with the exception of a tiny earring found in Tomb 3. Metals used were native gold, silver and copper in alloys (tumbaga). Most of the objects were nose rings made from solid wire, in rounded or semicircular shapes. Three of the four earrings were made in a similar way, but the fourth, semicircular in shape, was made of cut-out sheet metal.

In general the objects were technologically and formally simple and characteristic of the late metallurgy in the Calima and Dagua valleys and in the upper and middle reaches of the Cauca and Magdalena rivers as has been recently suggested (Plazas and Falchetti 1983: 23).

Chronology

Two of the fifteen graves in Guabas were dated. The first date of a. d. 140 ± 170 (Beta-5925) is from Tomb no. 2 and the second, a. d. 1120 ± 110 (Beta-5926) from tomb no. 3. The first date seems improbably early for the archaeological material it is associated with, while the second is acceptable and appears to belong to the transitional phase between the Yotoco and Sonso periods (Herrera, Cardale de Schrimpff and Bray 1983: 389).

We base this statement on the fact that, while most of the pottery found at Guabas can be considered on grounds of shape and decoration as typically Sonso, some forms and decorative techniques are characteristic of the preceding period. For instance, several carinated vessels with convex walls above the break are similar in shape to the Yotoco funerary urns excavated at the Hacienda La Iberia and dated to 170 ± 65 b. c. (Bray, Herrera and Cardale de Schrimpff 1981, fig. 3). Vessels with concave walls above the carination like those from Tombs nos. 3 and 4 at Guabas were also found as fragments among the Yotoco sherds on a pre-Columbian road at the Hacienda La Lorena (Bray, Herrera and Cardale de Schrimpff 1981, fig. 17: 5). Similar sherds were found on a house platform (no. 4A) we excavated at Jiguales in 1983 (Salgado, Rodríguez and Bashilov, n. d.) for which there is a radiocarbon date of a. d. 1020 ± 70 (Beta-10334). Finally, a cup fragment with two rows of applied pellets below the rim, (a typically Yotoco form of decoration found at the Hacienda La Iberia site mentioned above) (Bray, Herrera and Cardale de Schrimpff 1981, Fig. 4: 8, 9) was present in Tomb no. 4 at Guabas.

General Conclusions

The study of the Guabas graves and their contents allows us to draw several historical and sociological inferences.

Towards the close of the eleventh century and the beginning of the twelfth A. D., the inhabitants of Guabas enjoyed a mixed economy based on intensive maize cultivation. A maize cob with various charred grains found inside an anthropomorphic vessel from Tomb 4, and querns and rubbers, tools associated with agricultural activities, are clear evidence of the importance of this cereal in the diet. Bones of mammals such as the mountain paca *(Stictomys taczanowskii)*, peccary *(Tayassu pecari)* and deer, found in various graves, testify to hunting, although this was of minor importance economically. Although we found no artefacts associated with fishing, we can infer its importance indirectly from the accessibility of rivers such as the Zabaletas, Guabas, the Cauca and the Laguna de Sonso.

Cotton-growing and the textile industry in general must also have been important, to judge from the bone needles and, especially, the spindle whorls. Other important activities were potting, the manufacture of stone tools and gold working, in all of which a relatively high technical level was reached.

Undoubtedly the economic structure of this society presupposes the existence of a surplus, even if only an incipient one. However the existence of this economic surplus did not yet imply the existence of private property or of social classes. An analysis of the form of the tombs and the composition of the grave goods allows us to talk of some stratification in Guabas society. For instance, whereas the greater part of the metal items and particularly elaborate pottery comes from grave no. 2, the grave goods from Tomb no. 6 are limited to five pottery vessels.

Other indications of social stratification are culturally induced modifications such as head deformation and teeth filing found on the skeletons from various tombs, together with the deformation of arms and calves represented on various anthropomorphic vessels. It is probably not mere chance that these traits are found on individuals buried in morphologically complex tombs with rich grave goods. In spite of this, however, Guabas society at this time was still developing within the framework of pre-class or communitarian production relations.

We end with a few words on the ethnic affinities of the Guabas people. If we take the pottery, one of the principal elements of ethnic expression, we see that several writers have made comparisons between the Guabas/Buga material and that from the whole Quimbaya zone. Bray and Moseley (1976: 72) note that this pottery occurs in the Quindío. Bruhns (1976: 102), on the other hand, includes it in her Middle Cauca Complex which has a distribution northwards as far as Medellín.

A comparative study of techniques and decorative motifs on pottery from different complexes in the middle Cauca Valley recently undertaken by the present writer, lends support to the above hypothesis (Rodríguez, n. d. (3), Figs. 35–37). It appears to us likely that during the tenth and eleventh centuries A. D., indigenous groups from the north migrated southwards from the 'Quimbaya' area along the valley of the River Cauca. Towards the end of the eleventh century and the beginning of the twelfth, we find these people settled at Guabas-Buga (Rodríguez n. d., (2) and (3)), Palmaseca (Cubillos 1984: 25) and probably at Sachamate-Tinajas (Cubillos 1984: 154). Their presence was also felt in the Western Cordillera, in the region round La Cumbre and Bitaco (Bray, Herrera and Cardale de Schrimpff 1981: 18–20; Gähwiler 1983: 43–47).

A certain cultural homogeneity among the pre-Columbian dwellers in the vast valley of the River Cauca can also be observed in the stone industry and in metallurgy. A number of traits are common not only to Guabas and Buga, but also to the Rio Las Vueltas area of the Western Cordillera. We find that all the instruments are polished, and that the quern rubbers have signs of use on one, two or three surfaces; there is also a certain relationship between the artifact's function and the raw material it is made from. In the Rio Las Vueltas area, the quern rubbers were made of coarse-grained rocks such as gabbro, dolerite, sandstone and pyroxene. On the other hand, small tools such as axes and chisels used principally for working wood, stone and metal, were made from fine-grained rocks such as basalt (Rodríguez n. d. (1): 84–89). A similar situation is found in Guabas where there are a number of quern rubbers with one, two and three working surfaces, made from coarse-grained rocks such as gabbro, microgabbro, gneiss, olivine and amphibole; for chisels, serpentine was used (Rodríguez n. d. (2)). In Buga quern rubbers were also made from gabbros, microgabbros and coarse-grained basalt, while for tools such as axes, wedges and chisels, fine-grained rocks, especially basalt and serpentine, were used (Rodríguez n. d. (3)).

In metallurgy the gold work of the Cauca Valley at this time belongs both technically and morphologically to a new metal-working tradition that makes its appearance in South-Western Colombia in about the seventh to tenth centuries A. D. Characteristic of the tradition is the widespread use of tumbaga, surface enrichment, and of casting as the main technique (Plazas and Falchetti 1983: 23–5).

On the anthropological level we also find some elements of cultural unity. For instance, head deformation, present on various skulls from Guabas (Rodríguez n. d. (2)), as well as the deformation of arms and thighs and filing of teeth are traits throughout the 'Quimbaya Zone' (Duque Gómez 1970: 139–48). At the same time, a recent study by Dr. José V. Rodríguez of skulls from a number of areas of the South West, using examples from 'Quimbaya', San Augustín, Tierradentro, Panche and Guabas, indicates that the Guabas skulls are most similar to those from the 'Quimbaya' region (Rodríguez n. d. (2) Anexo 1).

Acknowledgements

I am grateful to Carlos H. Illera (co-investigator), Lilian Martínez, María Trinidad Paz, Ramón Ignacio Atehortúa, Guillermo Roa, Jairo Gutierrez, John Jairo Morena, Delio Vaca and Germán Gálvez who took part in our excavation. Also to Julio C. Cubillos, Gonzalo Correal Urrego, Warwick Bray, Leonor Herrera, and Marianne Cardale, who visited our excavations and made useful comments. I would also like to thank the following persons: Drs. José V. Rodríguez, Galina Rykushina, Vladimir A. Bashilov, Armando Espinosa, Alfredo Sánchez Vargas, Clemencia Plazas, Ana María Falchetti and Beta Analytic Inc. for their help with the analysis of the cultural, anthropolgical and organic material from the excavation. Finally, our especial gratitude to Alfonso Jaramillo Racines and Luis Granobles, without whose collaboration our investigation could not have taken place. We are also grateful to Dr. Víctor M. Patiño for his constant support. The photographs were kindly taken by Raúl Giraldo.

References

Bray, W.and Moseley, M. E. (1976): 'Una secuencia arqueológica en las vecinidades de Buga, Colombia. *Cespedesia* 5, nos. 17–18: 55–78. Cali.

Bray, W., Herrera, L. and Schrimpff, M. (1981): *Pro Calima* 2. Solothurn.

Bruhns, K. O. (1976): 'Ancient pottery of the Middle Cauca Valley, Colombia'. *Cespedesia* 5, nos. 17–18: 101–196. Cali.

Cubillos, J. C. (1984): *Arqueología del Valle del Río Cauca: Asentamientos Prehispánicos en la Suela Plana del Río Cauca.* Fundacíon de Investigaciones Arqueológicas Nacionales del Banco de la República. Bogotá.

Duque Gómez, L. (1970): *Los Quimbayas. Reseña Etno-histórica y Arqueológica.* Instituto Colombiano de Antropología. Bogotá.

Espinosa, A. (n. d.): 'El Macizo de Ginebra, Valle. Una nueva secuencia ofiolítica sobre el flanco occidental de la cordillera central'. *Geología Norandina.* Bogotá. In press.

Gähwiler, T. (1983): 'Preliminary Reconnaissance in the Pavas-La Cumbre Area'. *Pro Calima* 3: 43–47. Basel.

Herrera, L., Cardale, M. and Bray W. (1982/83): 'El hombre y su medio ambiente en Calima'. *Revista Colombiana de Antropología* 24: 381–424, Bogotá.

Illera, C. H. (1983): 'Excavaciones Arqueológicas en Guabas, Guacarí, Valle del Cauca'. *Historia y Espacio* 2, no. 48. Cali.

Plazas, C. and Falchetti, A. M. (1983): 'Tradición Metalúrgica en el Sur-occidente Colombiano. *Boletín del Museo del Oro* 14: 1–32 Bogotá.

Rodríguez, C. A. (n. d. 1): *Prospección Arqueológica en el norte del Dpto. del Valle del Cauca.* Manuscript report. Darién.

Rodríguez, C. A. (n. d. 2): *Investigaciones Arqueológicas en Guabas, Guacarí, Valle del Cauca.* Manuscript report. Buga.

Rodríguez, C. A. (n. d. 3): *Investigaciones Arqueológicas en Buga, Valle del Cauca.* Manuscript report, Darién.

Salgado, H. (n. d.): *Asentamientos Prehispánicos en el nor-occidente del Dpto. del Valle del Cauca.* Manuscript report. Fundación de Investigaciones Arqueológicas Nacionales del Banco de la República. Bogotá.

Salgado, H., Rodríguez, C. A. and Bashilov V. (n. d): *Investigaciones Arqueológicas en Jiguales, Darién.* Manuscript report. Darién.

Zusammenfassung

Bericht über die Grabungskampagne 1982

Von Warwick Bray, Leonor Herrera und Marianne Cardale Schrimpff

Untersuchungen über die Ilama-Zeit

Der Stand der Forschungen liess eine Umbenennung des provisorischen Begriffs «frühes Calima» in Ilama als angemessen erscheinen. Es gibt immer mehr Anhaltspunkte, dass die Goldfunde, für die die Calima-Region so berühmt ist, nicht Fundkomplexen der «frühen Calima»-Zeit zuzuordnen sind, sondern in der späteren Yotoco-Periode auftreten.

Seit 1982 haben wir die Erforschung der Ilama-Zeit intensiviert dank der Unterstützung durch die Fundación de Investigaciones Arqueológicas Nacionales der Bank der Republik Kolumbiens. In Kürze wird ein umfassender Bericht erscheinen. Bis 1982 war keine einzige Ilama-Siedlung bekannt, und deshalb mussten wir unsere Anstrengungen auf die Gräberfelder dieser Zeit konzentrieren. Dank der Mithilfe der Entdecker solcher Gräberfelder gelang es, viel Information über diese Fundkomplexe und das dazugehörige Fundmaterial zu sammeln. Dieses umfasst nicht nur Keramik, sondern auch Artefakte und Schmuckobjekte aus Stein sowie einige Goldobjekte. Da sich die Gräberfelder meistens an Orten befinden, die auch für Siedlungen sehr geeignet sind, hofften wir im Laufe der Arbeiten auf eine solche zu stossen. Die Bodenoberfläche war jedoch im Laufe der vielen Jahre und vor allem während der Sonso-Zeit Veränderungen ausgesetzt, was eine Entdeckung sehr schwierig machte. Erst 1984 erfüllten sich unsere Hoffnungen.

Im vorliegenden Bericht beschränken wir uns auf die Beschreibung der Grabanlagen und der darin geborgenen anthropomorphen Gefässe im Bestreben, Aufschluss über das Leben in der Ilama-Zeit zu erhalten. Die Studie stützt sich auf 100 anthropomorphe Gefässe ab, die wir in 9 Kategorien (Abb. 2a, 16) unterteilen. Diese stellen verschiedene Gruppen von Personen dar (Kinder, Alte, Frauen, Männer) oder Personen in verschiedenen Positionen (wie z. B. liegende Figuren Abb. 5, 6), die Schlafende oder Kranke darstellen könnten und in einem Fall eine Gebärende. Jeder Kategorie lassen sich bestimmte Haartrachten oder Halsketten zuordnen. Naturalistischere Darstellungen finden sich auf Gefässen mit Doppelausguss und Bügelhenkel («alcarrazas»). Modellierte Figuren, die den Hals oder andere Partien der Gefässe bilden, weisen zoomorphe Elemente auf, vor allem Schlangen.

Es fehlt noch jegliche Information über die Anfänge oder die Beziehungen der Ilama-Leute zu den übrigen Kulturen. Akeramische Horizonte, die auf dem Fundplatz El Pital von Hector Salgado ausgegraben worden sind, wurden ins 6. Jahrtausend v. Chr. datiert und zeugen von einer frühen Besiedlung dieses Teils der Kordilleren. Ein Jahrtausend später ist der Anbau von Mais im El Dorado-Tal nachweisbar (vgl. Artikel von Monsalve, S. 40). Wir verfügen allerdings noch über zu wenig Daten, um diese Bevölkerung in einen zeitlichen oder kulturellen Bezug zur Ilama-Zeit zu setzen. Während sich die Yotoco-Periode in die kulturelle Entwicklung des südwestlichen Kolumbiens während des ersten Jahrtausends v. Chr. einordnen lässt, ist die Lage für die Ilama-Zeit weniger klar. Dies ist auch dadurch bedingt, dass wir für das erste Jahrtausend v. Chr. nur drei andere Fundgebiete zum Vergleich heranziehen können (Tumaco, San Agustín und Catanguero am unteren Flusslauf des Calima).

Ausgrabung auf den grossen Plattformen der Hacienda El Dorado

Eine imposante Gruppe von grossen Plattformen lässt sich am westlichen Abhang des El Dorado-Tals erkennen. Phosphatproben mittels Ringtest ergaben Werte, die nicht auf eine hohe Konzentration von menschlichen Aktivitäten schliessen liessen. Man muss deshalb annehmen, dass die dort ausgeführten Tätigkeiten wenig Spuren hinterlassen haben und sich gleichmässig über die ganze Fläche verteilten.

In der Abb. 29 sieht man ein Profil jener Stelle, die mit Hilfe der Ausgrabungsdaten und Probebohrungen mit der «media caña» (vgl. Pro Calima 3/1983, Abb. 10) rekonstruiert worden ist, sowie das Profil des Originalreliefs, die Anlage der Plattform, sowie die wichtigsten Befunde der Horizonte, die durch das Aufschüttungsmaterial bei der Errichtung der Plattform zugedeckt worden waren.

Plattform 3. Die deutlichen Unterschiede in Art und Farbe der Vegetation (aufgezeichnet in Abb. 17), lassen sich weder mit den Phosphatwerten noch mit den Daten der Ausgrabung korrelieren. Schnitt 1, dessen Ende den hinteren Teil der Plattform traf, ermöglichte uns, den Eingriff in das Gelände zu beobachten, welcher zur Nivellierung der Plattform ausgeführt worden war. Auf der kompakten Lehmoberfläche fand sich eine Kulturschicht von schwarzer Farbe und weicher, bröckeliger Struktur (Abb. 18). An dieser Stelle ist die ursprüngliche Bodenbeschaffenheit unter einer dicken Schicht von Erosionsmaterial, das sich nach der Aufgabe der Plattform angesammelt hatte, erhalten. Wo der Boden aber durch Klimaeinflüsse oder durch die Nutzung als Weideland verändert worden war, zeigten sich andere Farb- und Strukturmerkmale. Das Keramikmaterial in diesem Horizont ist der Sonso-Zeit zuweisbar (Abb. 19).

Plattform 1. Sie ist die grösste des Komplexes mit einer Fläche von 110×37 m und ist in ihrer Anlage der Plattform 3 ähnlich. Das wenige Fundmaterial ist auf der ganzen Fläche zerstreut. Nur an einer Stelle, in der Nähe des Randes häuften sich grosse Steine und Scherben (Abb. 23). Im Schnitt 4, der im aufgeschütteten Teil der Plattform angelegt worden war, kommt eine Kulturschicht mit Yotoco-Material zum Vorschein, und darüber befinden sich 5 Schichten von unterschiedlicher Beschaffenheit, die aber auf menschliche Einwirkung zurückgehen, was auf eine kontinuierliche, wenn auch unterschiedliche Art der Nutzung schliessen lässt (Abb. 20). Anfänglich hatte der Boden nur dem Anbau gedient, wurde wahrscheinlich gedüngt und enthielt Yotoco-Scherben. Im Laufe der Zeit diversifizieren sich die Aktivitäten, es wird Abfall und Aufschüttmaterial in kleinen Mengen abgelagert. Es findet ein Wandel im Fundgut statt, denn die ersten Sonso-Scherben kommen zum Vorschein, und schliesslich verschwindet das Yotoco-Material. Aus dem letzten Horizont vor der Errichtung der Plattform stammt eine 14C-Probe, die ein Datum von 1160±50 n. Chr. (Beta-6819) ergab.

Die in regelmässigen Abständen mit der «media caña» auf der ganzen Fläche entnommenen Proben ermöglichten die Ausmessung des Paleobodens und die Bestimmung verschiedener Charakteristika im aufgeschütteten wie im abgetragenen Teil der Plattform (Abb. 22).

Plattform 4. Sie wurde angelegt, indem Material in die Übergangszone zwischen Hang- und Talboden abgelagert wurde, d. h. in jene schlecht entwässerte Zone, die einmal Uferzone des ehemaligen Sees war. Obwohl sich Fundgut aus der Yotoco- und der Sonso-Zeit fand (Abb. 25, 26, 27), scheint die Plattform nicht intensiv genutzt worden zu sein. Im Schnitt 2 jedoch gibt es Anhaltspunkte für Veränderungen im Boden, die auf menschliche Einflüsse zurückgehen (Abb. 24), aber von anderer Beschaffenheit sind als im Boden der Plattform 1. Am Rande der Plattform (Schnitt 1) herrschen feuchte Bedingungen vor, handelte es sich doch um einen ursprünglichen Seeboden (Abb. 27). Ein Keramikfragment aus der Übergangszone der Horizonte A und B wurde mit dem Thermolumineszenzverfahren in das Jahr 1422±20% n. Ch. (Alpha-1520) datiert, was auf eine späte Entstehung dieser Schicht hinweist.

Ausgrabung von Feldbausystemen im El Dorado-Tal

Der Talboden leidet unter Entwässerungsproblemen wegen des hohen Grundwasserspiegels und dem Vorhandensein einer dicken Lehmschicht unter der Humusschicht. Die neuzeitlichen Entwässerungsgräben sind eng und tief in die Lehmschicht eingeschnitten, so dass sie bis hinunter auf den ganzjährigen Grundwasserspiegel reichen, selbst in der Trockenzeit. Die Funktion dieser Gräben liegt eher darin, den unterirdischen Wasserspiegel unter Kontrolle zu halten als den Abfluss des Wassers zu erleichtern.

Es gibt zwei Arten von vorspanischen Entwässerungsanlagen: mehr oder weniger rechteckige Felder, die durch tiefe Rinnen voneinander abgetrennt sind und die den gleichen Zweck erfüllten wie die neuzeitlichen Rinnen. b) die *eras* oder *camellones,* eine Reihe von langen, schmalen, parallelen und erhöhten Feldstreifen, die durch Gräben getrennt waren. Die aus diesen Gräben ausgehobene Erde war in der Mittelpartie angehäuft worden, um die Anbaufläche in der Regenzeit vor der Überflutung zu bewahren und um eine tiefere Humusschicht zum Anbau zu erhalten. Ein Teil des Talbodens in der Nähe der grossen Plattformen ist kartographisch erfasst worden (vgl. Mittelseite des Heftes).

An beiden Arten von Entwässerungssystemen wurden Grabungen durchgeführt. Auch aus den darunterliegenden sterilen Schichten wurden Proben entnommen, um die Sedimentation im Tal zu studieren. An allen Stellen war die Stratigraphie ähnlich (Abb. 31–37). Die unterste Schicht bestand aus quartärem Boden mit vorherrschender Waldvegetation, dazwischen gab es kurze Perioden von Sumpf- und Seebildung. Zu einem unbekannten Zeitpunkt war der schmale Taleingang blockiert, und es bildete sich ein See und eine dicke Schicht Seelehm. (Schicht 4 in den Abb.). Als der See austrocknete und zu einem Sumpfgebiet wurde, bildete sich eine Humusschicht (Stratum 3). In diesem Zeitpunkt wurde es möglich, den Boden zu bewirtschaften. Die ersten Entwässerungsanlagen wurden errichtet.

Durch die Grabung konnte bewiesen werden, dass sowohl erhöhte Felder wie Rinnen in die Yotoco-Zeit gehören. Eine 14C-Probe von Feld 3 (Abb. 37) ergab ein Datum von 750±50 n. Chr. (Beta-9755). Bei der Fundstelle Graben 4 (Abb. 34) waren zwei nacheinander angelegte Rinnen (mit einer 14C-Datierung von 100±320 n. Chr. [Beta-9758] von der ursprünglichen Auffüllung des älteren Grabens) durch ein erhöhtes Feld, das aus der Yotoco-Zeit stammte, zugedeckt worden. Ohne weitere Untersuchungen ist es nicht möglich zu sagen, ob diese Sequenz für das ganze Tal Gültigkeit hat. Mais-Phytolithen fanden sich in der Humusschicht von Rinne 2 und Feld 3.

Sonso-Material ist nicht oder nur selten in diesen Feldbausystemen vorhanden, und deshalb scheint es möglich, dass diese Felder schon vor dem Übergang von Yotoco- zur Sonso-Periode verlassen worden waren. Die Übergangszeit wird um 1200 n. Chr. angesetzt, und unsere Pollendiagramme weisen genau in dieser Zeit auf kühlere und trockenere klimatische Bedingungen hin (vgl. Pollenzone 5B im Pollendiagramm von Monsalves Artikel). In anderen Teilen Kolumbiens führten diese veränderten Bedingungen zu einem Absinken des Grundwasserspiegels. Wenn dies nun auch in El Dorado der Fall war, sind die Felder im Talboden unbebaubar geworden.

Der einzige Ort mit einem Sonso-Entwässerungssystem ist Graben 1, ein viereckiges von Rinnen umgebenes Feld, das wir 1981 besichtigten und 1982 genauer untersuchten (Abb. 38–40). Die Stratigraphie ist in Abb. 40 zu sehen. Die ältesten Schichten (Strata 6–10) bestehen hauptsächlich aus quartärem Waldboden, vermischt mit Vulkanasche und Erosionsmaterial. Schicht 5 enthält Vulkanasche, und die 14C-Daten reichen von 24000 bis 21500 v. Chr. Stratum 4/2 darüber ist schmierig und lehmig. Es entspricht wahrscheinlich dem Seelehm in den anderen Gegenden des Tales. Der Boden von Stratum 4/1 entstand durch bessere Entwässerungsbedingungen und weist gleichzeitig auch die ersten Anzeichen menschlicher Aktivitäten in Form von Yotoco-Tonscherben und Phytolithen von domestiziertem Mais auf. Stratum 3 ist die Bodenoberfläche der Yotoco-Periode. Von diesem Niveau ausgehend wurde ein Graben bis in die poröse Aschenschicht reichend freigelegt. Der Aushub dieses Grabens enthielt Sonso-Material und konnte ins Jahr 1465±65 n. Chr. (vgl. *Pro Calima* 3) datiert werden. Phytolithenproben, die den entsprechenden Humusschichten neben dem Graben entnommen worden waren, zeigten, dass an dieser Stelle während der Sonso-Zeit Mais angebaut worden war. Im Gegensatz dazu waren in der heutigen Bodenoberfläche (Stratum 1), die im 20. Jahrhundert gerodet worden war, um Weideland zu erhalten, keine Maisphytolithen nachweisbar.

Speisereste von einer Yotoco-Siedlungsterrasse

Von einer Siedlungsterrasse, die am Nordhang des Tales des Calima-Flusses auf dem Gebiet der Hacienda San Rafael (Fig. 41) gelegen ist, stammt eine Probe von verkohlten Samenkörnern. Diese wurden von Earle C. Smith (Institute of Anthropology, University of Alabama) als gemeine Bohne *(Phaseolus vulgaris)* und als zwei Arten von Mais identifiziert, wobei eine der letztgenannten mit der Klasse Pollo-Nal Tel verwandt ist.

Die Grabungskampagne von 1984

Die Resultate der Grabungskampagne von 1984 werden in der nächsten Ausgabe von *Pro Calima* veröffentlicht. Weitere Grabungen wurden auf der El Dorado-Plattform 1 und Graben 1 ausgeführt sowie weiterhin an den Problemen der Feldmarkierungen an den Hügelabhängen (*Pro Calima* 3: 16–18) gearbeitet. Ein weiterer wichtiger Teil war die Freilegung eines Ilama-Fundkomplexes in El Topacio, Calima-Tal. Der oberste Kulturhorizont konnte ins Jahr 150±100 v. Chr. (Beta-9858) datiert werden.

Beschaffenheit und Entstehungsgeschichte der Böden im El-Dorado-Tal

Von Pedro Botero

Die Böden des Calima-Gebietes lassen sich in drei Gruppen einteilen.

1. Hügelböden in feuchtem und halbfeuchtem Klima, in höheren und tieferen Gebirgslagen, mit ANDIC-Eigenschaften (Dystrandepts).
2. Hügelböden in trockenem Klima, in tieferen Lagen, mit harten undurchlässigen Horizonten, ohne ANDIC-Eigenschaften (Paleustalfs).
3. Schlecht entwässerte, lehmige, graufarbene Talböden (TROPAQUEPTS).

In den Böden der ersten Gruppe lässt sich intensive vorspanische Nutzung nachweisen. Auf diesen Böden befinden sich die Siedlungsterrassen, die grossen Plattformen und die talwärts laufenden Rinnen. Dank ihren physikalischen Eigenschaften sind sie einfach zu bearbeiten und weisen eine grössere Fruchtbarkeit auf als die beiden anderen Gruppen. Diese Gebiete neigen weniger zu niederschlagsbedingter Erosion durch Wegschwemmen der Bodenoberfläche als Gebiete mit Paleustalfs-Böden. Ihre Fähigkeit, Wasser zu speichern, gewährleistet auch eine gute Versorgung der Pflanzenwurzeln mit Wasser. Der hauptsächlichste Nachteil liegt darin, dass sie dazu neigen, abzurutschen, was man mit der Erstellung von talwärts laufenden Rinnen zu verhindern versuchte.

Über die Nutzung der Böden der zweiten Gruppe in vorspanischer Zeit lässt sich wenig sagen, denn Spuren sind nur noch in geringem Masse vorhanden. Doch scheinen auch sie zum Anbau benutzt worden zu sein, da sie einige talwärts laufende Rinnen aufweisen.

Das Vorhandensein von Rinnen in Paleustalfs-Böden, die im ganzen Profil einen hohen Gehalt an Lehm aufweisen, lässt die Erklärung schwer verständlich erscheinen, die wir für die Dystrandept-Böden gegeben haben. Man muss jedoch bedenken, dass diese Rinnen vor 1000 Jahren angelegt worden waren und die Oberflächenbeschaffenheit damals verschieden war. Dieser Boden stellte einen A-Horizont dar, gebildet aus relativ rezenter Vulkanasche, die noch nicht erodiert oder noch nicht in Lehm umgewandelt worden war und folglich ähnliche Eigenschaften aufwies wie die Dystrandepts-Böden der feuchten Zone. Die Talböden sind schlecht entwässerte TROPAQUEPTS, die einen gewissen Grad an pedologischer Entwicklung aufweisen, was auf ein bestimmtes Alter und auf keine ständige Überflutung schliessen lässt.

Im Talboden lassen sich drei verschiedene Phasen verfolgen:

a) Phase mit feuchten Wäldern
b) Phase mit Seen und Sümpfen
c) Jetzige Phase mit schlecht entwässerten, jedoch nicht sumpfigen Böden.

In die letzte Phase fällt der erste Anbau.

Landwirtschaft: Zum Anbau im Talboden wurden sowohl erhöhte Felder als auch Mikroterrassen mit dazwischen liegenden Gräben angelegt, doch ist unklar, ob beide Arten von Anlagen zur gleichen Zeit oder zu verschiedenen Zeiten erstellt und benutzt wurden. An den Abhängen der feuchten und halbfeuchten Zonen wurden talwärts laufende Rinnen ausgehoben. Es scheint, dass das ausgehobene Material nicht auf die als Felder dienenden Zwischenstreifen aufgeschüttet wurde. Mit Sicherheit lässt sich dies nicht bestimmen, ist doch seit der Aufgabe der Felder viel Zeit verflossen, und es wäre denkbar, dass seither das aufgeschüttete Material durch Oberflächenerosion wieder abgetragen worden ist.

Eine andere Art der Bewirtschaftung der Hänge, die älter ist, als die oben erwähnten Systeme, sind kleine intensiv genutzte Anbauflächen (Gärten). In diesem Fall wurden die Böden mit organischen und mineralischen, aus der Vulkanasche stammenden Materialien gedüngt. Die so entstandenen Furchen sind an den Profilwänden der Plattform IV, Schnitt 4 (Proben 3, 4, 5, 6) erkennbar.

Phytolithen-Untersuchungen in vorspanischen Anbaufeldern im Calima-Gebiet

Von Dolores R. Piperno

Diese Arbeit beschreibt die Analyse von Phytolithen in vertieften und erhöhten Anbaufeldern des El Dorado-Tals. Phytolithen sind mikroskopisch kleine Kieselgerüste, die direkt in den Boden eingelagert werden und, wenn sie von den Bodenhorizonten wieder zurückgewonnen werden, einen genauen Aufschluss über die vorgeschichtliche Vegetation und Bodennutzung geben können. Phytolithen waren in allen untersuchten Bereichen reichlich vorhanden. Mais-Phytolithen wurden von vorgeschichtlichen Anbauhorizonten in Mengen geborgen, die vermuten lassen, dass Mais einen wichtigen Bestandteil der Ernährung bildete. Spuren von Kürbis-Phytolithen konnten nicht nachgewiesen werden, obwohl es sich beim Kürbis um die einzig bedeutende Kulturpflanze neben Mais handelte. Kieselsäure von Frischwasser-Diatomeen und Schwammskelettelementen waren ein Indiz für die schlechte Entwässerung des Talbodens in der Zeit, als die Felder angelegt und bebaut wurden. In Schichten unter dem primären Kulturboden geben die Phytolithen Aufschluss über die sich ändernde Landnutzung und Landschaft im El Dorado-Tal während der letzten 23000 Jahren. In Schichten, die durch abgespülten Gehängeschutt von den Talseiten gebildet worden waren, zeigen Phytolithen-Untersuchungen, dass Mais im Brandrodungsbau kultiviert worden war. Es ist deshalb anzunehmen, dass die Abhänge durch Brand gerodet und Mais angepflanzt worden war, bevor man den Talboden zum Anbau nutzte. Die Anlage von Feldern im Talboden wurde möglicherweise deshalb nötig, weil gut entwässerter Boden an den Abhängen rar wurde. Im darunterliegenden Horizont, der mit der 14C-Methode auf 23000 Jahre BP datiert ist, zeigen Phytolithen feuchte Tropenwaldvegetation an.

Pollenanalytische Untersuchung einer Sedimentprobe aus der Hacienda Lusitania, El Dorado-Tal

Von José G. Monsalve

Ein Bohrkern von 5 m wurde in einer sumpfigen Zone der Hacienda Lusitania, El Dorado-Tal im Calima-Gebiet entnommen. Bis 410 cm Tiefe bestand das Sediment aus Torf, Lehm und feinem Sand, zwischen 410 und 500 cm Tiefe aus Lehm und feinem Sand. Das Pollendiagramm zeigt eine sehr dynamische Vegetationsabfolge auf. Im Laufe der Geschichte sind sieben wichtige Veränderungen in der Vegetation zu beobachten. Die letzten drei gehen auf die Einwirkungen zuerst der vorspanischen, dann der modernen Bevölkerung zurück. In der ersten Zeit der Besiedlung wurde der Mais in grösserem Ausmass angebaut. In den folgenden Perioden nimmt der Maisanbau drastisch ab. Es ist jedoch denkbar, dass weiterhin Mais angebaut wurde, aber an Orten, die von der untersuchten Zone weiter entfernt liegen.

Vorläufiger Bericht über die Mineralbestands-Analyse von Calima-Keramik

Von F. E. S. Roe

Im Jahr 1982 beschloss man, die Calima-Tonware auf ihre Eignung für die petrographische Analyse unter einem Mikroskop hin zu untersuchen. Dazu wurden siebzehn diagnostische Tonscherben ausgewählt. Die Keramik erwies sich für diese Methode als geeignet. Ein Pointcounter wurde eingesetzt, und die Ergebnisse sind in Tabelle 1 zusammengefasst. Die wichtigsten Gemengeteile waren: 1. Ton, 54,11% insgesamt; 2. Gesteinsbruchstücke von lokalen Gesteinsarten, meist Tonalit, gelegentlich auch Diabasit; 3. Quarz und Feldspat, die reichlich vorhanden waren, da sie auch in Tonalit vorkommen; 4. alle Gefüge enthalten einige eisenhaltige Knollen; 5. die Korngrösse variiert, ebenso die Anzahl der grösseren Körner.

Die mittels Pointcounter erhaltenen Daten können in drei Gruppen eingeteilt werden: (i) Ton, Quarz plus Feldspat und Eisen, die zwischen 81,5 und 94,5% der ganzen Zählung ausmachen; (ii) nichtmineralische Bestandteile, vorwiegend Hohlräume, die 1,8 bis 11,19% jeder Zählung ausmachen; (iii) Minerale wie Klinopyrexen, Hornblende und Biotit wurden nur in kleinen Mengen gefunden.
Ilama-Zeit. Tonalit, vor allem Quarz und Feldspat war vorhanden, im Mittel 29,82%. C1 enthält zusätzlich Epidot und C2 Anthophyllit, während C3 und C4 wahrscheinlich zusammengehören.
Yotoco-Zeit. C5 und C6 sind die feinsten Scherben dieser Untersuchung und gehören wahrscheinlich zusammen. C7 ist mit grossen Diabasit-Gesteinsfragmenten gemagert und C8 mit verwittertem Tonalit.
Sonso-Zeit. 1. Tonalit ist vorhanden. C10, C11, C15 und C16 enthalten im Mittel 30,0% Quarz plus Feldspat; C13 enthält verwitterten Tonalit und eine glasartige Zone, die Vulkanasche sein könnte. 2. C9, C12 und C17 enthalten eisenhaltiges Material. C14 enthält zusätzlich noch Sandkörner aus Sedimentgesteinen.
Schlussfolgerungen. Das Vorhandensein von verschiedenartigen Tonwaren auf der gleichen Fundstelle, ebenso wie das Vorkommen von gleichartigen Tonwaren an verschiedenen Orten, lässt den Schluss zu, dass mit Tonwaren Handel getrieben wurde.

Ausgrabungen in einem vorspanischen Gräberfeld in Guabas, Cauca-Tal, Kolumbien

Von Carlos Armando Rodríguez

Dieser Artikel berichtet über ein vorspanisches Gräberfeld auf der Hacienda Margarita (corregimiento Guabas, municipio Guacarí) am Ostufer des Cauca-Flusses. Fünfzehn Gräber wurden insgesamt ausgegraben und drei von ihnen vollständig dokumentiert.

Die Tiefe der Grabschächte reichte von 2,0 bis 4,25 m. Die Schachtgrundrisse waren entweder rechteckig, halbrechteckig mit 2 Nischen oder rechteckig mit einer Kammer. Es handelte sich um Einzel- oder Kollektivbestattungen (Abb. 44, 45), wobei sich die Skelette entweder in gestreckter Lage befanden oder gestört und auf der Fläche zerstreut waren. Darunter befanden sich Erwachsene beiderlei Geschlechtes und Kinder. Manche Schädel wiesen eine künstliche Verformung oder teilweise Verkohlung auf.

Als Grabbeigaben figurieren Knochenobjekte (Nadeln, Dolche, Teil einer Flöte), Schmuck aus Knochen, Tierzähnen und Muscheln, Steinobjekte (Läufersteine, Handmühlen und Meissel), ebenso wie Nasen- und Ohrringe aus Metall. Maiskolben und Knochen von Wildtieren (Wild, Pekari, Paka) geben uns Aufschluss über die Ernährung, und die Spinnwirtel aus Ton weisen auf eine Verarbeitung von Baumwolle hin.

Die unterschiedliche Ausstattung der Gräber gibt einen Hinweis auf eine soziale Schichtung, denn die meisten Metallgegenstände und die feinste Keramik kommen aus einem einzigen Grab (Grab 2). Unter den Keramikobjekten figurieren auch anthropomorphe Figuren und Gefässe mit Bemalung, mit Eindruck- und aufgesetzten Motiven wie Fröschen, Vögeln, menschlichen Gesichtern mit Nasenringen und Kaffeebohnenaugen (Abb. 46–49). Diese stilistischen Merkmale stellen den Bezug des Guabas-Fundgutes mit anderen Stilen des Cauca-Tals von der Sachamate-Gegend im Süden bis zur Quimbaya-Zone im Norden her.

Zwei Gräber konnten datiert werden: Grab 2 ins Jahr 140 ± 70 n. Chr. (Beta-5925) und Grab 3 ins Jahr 1120 ± 110 n. Chr. (Beta-5926). Die erste Angabe scheint uns unwahrscheinlich früh, die zweite würde der Übergangszeit von Yotoco zu Sonso im Calima-Gebiet entsprechen.

Résumé

Rapport sur la campagne de fouilles de 1982 dans la région de Calima

Recherches sur la période d'Ilama

L'avancement des recherches nous incita à envisager un remplacement du nom «Calima inférieur» par celui d'«Ilama». Des arguments de plus en plus nombreux tendent à montrer que les découvertes d'objets en or, qui ont rendu la région de Calima si célèbre, ne peuvent pas être attribuées au «Calima inférieur», mais qu'elles appartiennent à la fin de la période Yotoco.

Depuis 1982, les recherches sur la période Ilama ont pu être intensifiées grâce au soutien de la Fondación de Investigaciones Arquelogicas Nacionales de la Banque de la République de Colombie. Un rapport plus exhaustif paraîtra prochainement.

Jusqu'en 1982, on ne connaissait aucun site d'habitat Ilama; c'est pourquoi les recherches se sont concentrées sur les cimetières de cette époque. Grâce à l'aide de ceux qui les ont découvertes, de telles nécropoles ont pu être richement documentées, de même que le matériel qui y fut découvert. Ce dernier comprend, outre la céramique, des objets et des bijoux en pierre, ainsi que quelques objets en or. Comme les cimetières se trouvaient en des lieux souvent propices à l'établissement d'habitations, nous espérions en découvrir lors de nos travaux. Malheureusement, au cours des ans, et surtout pendant la période de Sonso, le sol a subi de fortes perturbations superficielles, rendant les découvertes très improbables. Ce n'est qu'en 1984 que nos espoirs se sont réalisés.

Dans le rapport qui suit, nous nous limitons à décrire les nécropoles ainsi que les récipients anthropomorphes qui y furent découverts, dans le but d'en savoir plus sur la vie à l'époque Ilama. L'étude porte sur 100 récipients anthropomorphes, répartis en 9 catégories (fig. 2 à 16). Celles-ci représentent divers groupes de personnages (enfants, vieux, femmes, hommes), ou différents groupes de positions (par exemple figurines couchées, fig. 5, 6), figurant des personnages malades ou dormant, et, dans un cas, une femme en couches. A chaque catégorie correspondent des coiffures ou des parures bien définies. Les récipients à double versoir et anse courbée comportent des représentations plus naturalistes. Les motifs modelés qui jouent le rôle de goulot comportent souvent des éléments zoomorphes, surtout des serpents.

Nous n'avons aucune information sur les débuts de la culture Ilama, ni sur ses relations avec les autres cultures. Des niveaux acéramiques, fouillés sur le site d'El Pital par Hector Salgado, ont été datés au 6[e] millénaire av. J.-C. et témoignent d'une ancienne colonisation de cette partie de la Cordillière. Un millénaire plus tard, on peut démontrer que le maïs était cultivé dans la vallée d'El Dorado (voir article de Monsalve, p. 40). Nous ne disposons cependant encore que de trop peu d'éléments permettant de rattacher culturellement ou chronologiquement ces colonisateurs au contexte Ilama. Alors que la culture Yotoco fait partie de l'évolution culturelle de la Colombie du sud-ouest pendant le premier millénaire av. J.-C., il est difficile de définir le cadre de la période Ilama. Cela est également dû au fait que nous n'avons pour le premier millénaire av. J.-C. que trois autres sites de comparaison (Tumaco, San Augustin et Catangero, dans le cours inférieur du Calima).

Fouilles sur les grandes plates-formes de l'Hacienda El Dorado

Un groupe imposant de grandes plates-formes est visible sur le flanc ouest de la vallée d'El Dorado. Des déterminations de la teneur en phosphates n'ont pas permi de conclure à une forte concentration de l'occupation humaine. On doit donc supposer que les diverses activités n'ont laissé que peu de traces et qu'elles se répartissaient de manière homogène sur toute la surface.

La fig. 29 représente un profil de l'endroit reconstitué à l'aide des résultats de fouilles et des sondages pratiqués au moyen d'une sonde manuelle, ainsi que le profil du relief ancien, la plate-forme, et les principales structures des couches

recouvertes par les remblais de la plate-forme.
Plate-forme 3: Les nettes variations de la couleur et de la composition de la couverture végétale actuelle (voir fig. 17), ne peuvent être corrélées ni avec les teneurs en phosphates ni avec les résultats de la fouille. La tranchée 1, qui atteint l'arrière de la plate-forme, nous a permi d'observer l'atteinte à la topographie naturelle d'origine, due au nivellement de la plate-forme. A la surface de l'argile compacte se trouvait une couche d'habitat noire, de structure meuble et tendre (fig. 18). A cet endroit, le sol naturel est préservé dans sa structure par une épaisse couche de matériel érodé, accumulé après l'abandon de la plate-forme. Là où le sol était exposé aux intempéries ou exploité comme pâturage, on observe d'autres couleurs et d'autres structures. La céramique de cet horizon appartient à la culture de Sonso (fig. 19).
Plate-forme 1: C'est avec ses dimensions de 110×37 m, la plus vaste du complexe; elle est semblable à la plate-forme 3. Les rares trouvailles sont dispersées sur toute sa surface. Un seul endroit, près du bord, a livré des concentrations de grosses pierres et de tessons (fig. 23). Dans la tranchée 4, pratiquée dans la partie remblayée de la plate-forme, apparaît une couche d'habitat avec matériel Yotoco, surmontée de 5 couches de structure variable, mais toutes liées à des influences anthropogènes, permettant de supposer une continuité de l'exploitation du sol, selon des méthodes changeantes (fig. 20). Au début, le sol n'a servi qu'à la culture; il a dû être engraissé, et il contenait des tessons Yotoco. Au cours du temps, les activités se diversifient, des déchets et des remblais sont accumulés en petites quantités. Un changement s'opère dans la céramique: des tessons Sonso font leur apparition, et remplacent ensuite le matériel Yotoco. Un prélèvement C14 dans la dernière couche précédant la construction de la plate-forme permet de la dater à 1160 ± 50 ap. J.-C. (Beta-6819). Les prélèvements pratiqués à la sonde manuelle (v. *Pro Calima* 3/1983, fig. 10) à intervalles réguliers sur toute la surface, ont permi de mesurer l'étendue du paléosol, de même que de déterminer différents paramètres dans la partie remblayée et dans la partie creusée de la plate-forme (fig. 22).
Plate-forme 4: Elle a été formée par un remblaiement dans la zone de transition entre le flanc et le fond de la vallée, c'est-à-dire dans la zone mal drainée, anciennement zone de rivage du lac disparu. Malgré la présence de matériel Yotoco et Sonso (fig. 25, 26, 28), la plate-forme ne semble pas avoir été utilisée de manière intensive. Dans la tranchée 2 cependant, il existe des indices d'un changement dans le sol, d'origine anthropogène, mais de nature différente de celui observé à la plate-forme 1 (fig. 24). Au bord de la plate-forme, le sol est de nature humide, malgré le fait qu'il s'agit d'un ancien sol lacustre. Un tesson trouvé à la transition des couches A et B a été daté par thermoluminescence à 1422 ± 20% ap. J.-C. (Alpha-1520), suggérant une formation tardive de ce sol.

Fouilles de systèmes agraires dans la vallée d'El Dorado

Le fond de la vallée pose des problèmes de drainage, dus au niveau élevé de la nappe phréatique et à la présence d'une épaisse couche argileuse imperméable au-dessous des sols cultivés. Les canaux de drainages modernes sont étroits et profonds, et traversent la couche imperméable, afin d'atteindre le niveau de la nappe phréatique en toute saison, y compris en période d'étiage. La fonction de ces fossés est plutôt de contrôler le niveau et le débit de l'eau en profondeur que de faciliter l'écoulement des eaux de surface.

Les ouvrages de drainage préhispaniques sont de deux genres:
(a) surfaces plus ou moins rectangulaires, délimitées par de profonds fossés, ayant probablement la même fonction que les actuels, et (b) *eras* ou *camellones,* groupes de longues arêtes étroites et parallèles séparées par des fossés. La terre provenant du creusage des fossés était entassée entre ceux-ci, afin d'élever la surface agraire au-dessus du niveau de la nappe phréatique en période humide, et afin d'augmenter l'épaisseur du sol. Une partie du fond de la vallée, adjacente aux plates-formes larges, a été cartographiée (voir pli central). Les deux système de drainages ont été l'objet d'investigations archéologiques, de même que les couches sous-jacentes naturelles, lesquelles ont permi de définir l'histoire sédimentologique de la vallée. Dans tous ces sites, la stratigraphie de base était similaire (fig. 31–37). La couche de fond consiste en des séquences quaternaires à couverture en majorité forestière, entrecoupées d'épisodes plus humides où des marais ou lacs se sont formés. A une date inconnue, l'accès étroit à la vallée était obstrué; un lac se forma dans le fond de la vallée, où se déposa une épaisse couche d'argile lacustre (stratum 4 dans les figures). Ce lac s'est peut-être asséché, faisant place à un marais, sur lequel s'est formé un sol (stratum 3). C'est à ce stade que le terrain devint cultivable, et que les premiers travaux de drainage eurent lieu.

Des fouilles ont montré que les *eras* et les fossés de cette partie de la vallée datent de la période de Yotoco. Era 3 (fig. 37) a été daté à environ 750 de notre ère (Beta-9755). Dans le site du fossé 4 (fig. 34), deux fossés de la période de Yotoco (avec une date de 100 ± 320 ap. J.-C. (Beta-9758) correspondant au remplissage primaire du fossé le plus ancien) ont été recouverts par un système à arêtes, également de la période de Yotoco. En l'absence d'autres résultats, nous ne pouvons pas affirmer que cette séquence s'applique partout à El Dorado. Des phytolithes de maïs ont été trouvés dans des sols agraires du fossé 2 et d'Era 3. Les objets de la période de Sonso sont rares ou absents dans ces systèmes agraires: il semble probable que ceux-ci ont été abandonnés quelques temps avant la transition Yotoco/Sonso. Cet événement a été daté vers 1200 ap. J.-C., et nos diagrammes palynologiques montrent que cette date coïncide avec un épisode climatique plus sec et plus froid (zone pollinique 5B, dans la table accompagnant la contribution de Monsalve, dans le volume présent). Ailleurs en Colombie, cette variation climatique causa une baisse du niveau de la nappe préatique. Si ceci a également eu lieu à El Dorado, il est possible que le travail du sol soit devenu impossible.

Le site à système de drainage de la période de Sonso est le fossé 1

(Ditch 1), une surface rectangulaire délimitée par des fossés visitée en 1981 et étudiée plus en détail en 1982 (fig. 38–40). La stratigraphie est donnée page 40. Les couches les plus anciennes (couches 6–10) montrent principalement des sols de forêts quaternaires, séparés par des cendres volcaniques et des sédiments de lessivage des pentes. La couche 5 est surtout composée de cendres volcaniques, datées par le radiocarbone dans une fourchette de 24 000 à 21 000 av. J.-C. Au-dessus, la couche 4/2 est argileuse et plastique; elle correspond probablement à l'argile lacustre du reste de la vallée. La couche 4/1 est un sol formé dans des conditions de drainage efficace, livrant les premiers indices d'activité humaine sous forme de tessons Yotoco et de phytolithes de maïs cultivé. La couche 3 est un sol Yotoco, à partir duquel un fossé a été creusé jusqu'à la couche de cendres poreuse. Le remplissage de ce fossé contenait du matériel Sonso et est daté à 1465 ± 65 (*Pro Calima* 3). Des prélèvements de phytolites provenant du sol cultivé correspondant au fossé montrent que pendant la période de Sonso, on y plantait du maïs. Par contre, le sol moderne (couche 1), correspondant au défrichement du fond de la vallée au 20[e] siècle visant à obtenir des surfaces pâturables, n'a livré aucun phytolithe de maïs.

Restes de nourriture d'une plate-forme de maison de la période Yotoco

Un échantillon de graines carbonisées a été prélevé sur une plate-forme située sur le flanc nord de la vallée de Calima, sur le domaine de l'Hacienda San Rafael (fig. 41). Celles-ci ont été identifiées par Earl C. Smith (Departamento de Antropología de la Universidad de Alabama); il s'agit de haricot (Phaseolus vulgaris) et de deux sortes de maïs, dont une semble apparentée à la variété Pollo-Nal-Tel.

La saison 1984 sur le terrain

Les résultats de la saison de 1984 seront rapportés dans le prochain numéro de *Pro Calima*. Des travaux complémentaires ont été effectués à la plate-forme et au fossé 1 d'El Dorado, et nous avons également repris le problème des «sillons» situés sur les flancs des collines (*Pro Calima* 3; 16–18). Un des buts principaux de ce programme était la fouille d'un site de la période Ilama à El Topacio, dans la vallée de Calima, dont la fin de l'occupation est datée au radiocarbone à 150 ± 100 av. J.-C. (Beta-9858).

Structure et genèse des sols de la vallée d'El Dorado

Par Pedro Botero

Les sols de la région de Calima se répartissent en trois groupes:

1. Sols de collines, au climat humide et semi-humide, situées en régions montagneuses d'altitude variable, aux propriétés ANDIC (Dystrandepts).
2. Sols de collines, au climat sec, à basse altitude, comportant des horizons durs et imperméables, sans propriétés ANDIC (Paleustalfs).
3. Fonds de vallées, mal drainés, argileux, de couleur grise (TROPAQUEPTS).

Les sols du premier groupe montrent une exploitation préhispanique intensive. Sur ces sols se trouvent les terrasses d'habitat, les grandes plates-formes et les «canaux en pente». Leurs propriétés physiques les rendent plus faciles à cultiver, et leur fertilité, quoique moyenne, est plus grande que celle des autres sols. Ces sols sont moins sujets à l'érosion superficielle due aux précipitations que les sols paleustalfs. Leur capacité de rétention de l'eau garantit un bon approvisionnement des racines des plantes. Leur principal désavantage réside dans le fait qu'ils sont sujets à des glissements, ce qu'on a tenté d'éviter en creusant des «canaux en pente».

Il y a peu à dire à propos de l'exploitation préhispanique des sols du deuxième groupe, car les traces en sont peu nombreuses. Cependant, ils paraissent avoir été aussi cultivés, puisqu'on y trouve aussi des «canaux en pente».

La présence de ces canaux dans des sols paleustalfs, dont la teneur en argile est haute sur tout le profil, rend l'explication donnée pour les sols dystrandepts inapplicable. Mais si on considère que ces canaux ont été creusés il y a quelque 1000 ans, il apparaît sûr que le terrain avait alors des propriétés différentes. Ils représentent donc un horizon superficiel humique (épipedon), formé de cendres volcaniques relativement récentes, non encore érodées ou transformées en argile, et présentant par conséquent des conditions semblables à celles des sols dystrandepts de zone humide.

Les fonds de vallée sont des TROPAQUEPTS mal drainés, présentant un certain degré de développement pédologique, ce qui permet de conclure à un certain âge, et d'exclure une ennoyage à long terme.

Trois étapes peuvent être décelées dans le fond de la vallée:

a) étape de forêts humides;
b) étape de lacs et de marécages;
c) étape actuelle, à sols mal drainés, mais non marécageux.

L'agriculture débute pendant la première étape.

Agriculture: La culture au fond de la vallée était pratiquée soit sur des surfaces surélevées, soit sur des petites terrasses. On ignore si ces deux systèmes étaient utilisés simultanément ou successivement. Sur les pentes des zones humides ou semi-humides ont été creusés des «canaux en pente», mais apparement sans que les déblais du creusage aient été accumulés sur les bandes de terrain à cultiver. Cependant, beaucoup de temps ayant passé depuis, cette observation ne peut être vérifiée; il est en effet possible que l'érosion ait emporté ces déblais.

Un autre mode de culture, plus ancien que les systèmes décrits, était pratiquée sur les pentes; il s'agissait de petites surfaces intensément exploitées (jardins). Le sol y était engraissé avec des matières organiques et minérales d'origine volcanique. Les rigoles ainsi formées sont visibles sur les côtés de la plate-forme 4, tranchée 4 (échantillons 3, 4, 5, 6).

Etude de phytolithes provenant de surfaces agraires préhistoriques de la région de Calima

Par Dolores R. Piperno

Ce rapport présente l'analyse de phytolithes de plusieurs champs drainés ou surélevés de la vallée de l'El Dorado. Les phytolithes sont des restes silicifiés de plantes, déposés directement au sol, et, une fois recouverts, ils contribuent de manière fiable à la connaissance de la végétation préhistorique et de son exploitation par l'Homme. Les phytolithes furent nombreux dans tous les contextes examinés. Des phytolithes du maïs ont été localisés dans de nombreuses couches de sols cultivés, laissant à penser que cette plante dominait dans ce système agraire. Aucun reste de courge, la seule autre plante cultivée importante supposée être représentée par des phytolithes, n'a été retrouvé. Des restes biologiques silicieux provenant de diatomées dulçaquicoles et de spicules d'éponges sont un indice du drainage insuffisant du fond de la vallée durant la période d'aménagement et d'exploitation des surfaces arables. Dans les couches sous-jacentes aux sols cultivés primaires, les phytolithes reflètent une exploitation du sol ainsi qu'un paysage changeants dans la vallée de l'El Dorado durant les 23000 dernières années. Dans les couches formées probablement par lessivage des pentes de la vallée, les phytolithes indiquent une culture de maïs sur brûlis. Il est ainsi possible que les flancs de la vallée aient été défrichés, brûlés et plantés de maïs, avant que le fond de la vallée ait été converti en champs, ces derniers ayant remplacé les sols bien drainés des pentes, devenus rares. Au-dessous de cet horizon, dans des sols datés au radiocarbone à 23 000 BP, les phytolithes indiquent une forêt tropicale humide.

Etude d'une colonne de sédiments de la Hacienda Lusitana (vallée d'El Dorado)

Par José Monsalve

Une colonne de sédiments de 5 m de hauteur a été prélevée dans une zone marécageuse de la Hacienda Lusitana, vallée d'El Dorado, région de Calima. Jusqu'à une profondeur de 410 cm, le sédiment se compose de tourbe, d'argile et de sable fin; entre 410 et 500 cm de profondeur, d'argile et de sable fin. Le diagramme des pollen montre une évolution très dynamique de la couverture végétale. Au cours de l'histoire, on peut y observer 7 grands changements. Les trois derniers sont dus aux populations préhispaniques, puis modernes. Au début de l'occupation du sol, le maïs était cultivé à grande échelle. Par la suite, la culture du maïs diminue de manière frappante. On peut cependant penser que cette plante continuait d'être cultivée, mais ailleurs.

Résumé

Par F. Roe

En 1982, il a été décidé d'entreprendre une étude pétrologique de la céramique de Calima à l'aide d'un microscope. 17 tessons de référence ont été choisis. Notre méthode d'analyse s'est révélée appliquable sur ce matériel. Un compteur de points a été utilisé pour obtenir les informations résumées dans le tableau I. Les principaux matériaux sont: 1. Argile, 54,11% pour tous les objets. 2. Fragments de roches autochtones, habituellement de tonalite, parfois de diabase. 3. Quartz et feldspath, abondants, puisque présents dans la tonalite. 4. Tous les objets contiennent des nodules ferreux. 5. Le concassage du dégraissant est variable, de même que la quantité de grains de diamètre supérieur.

Les comptages sont groupés de la manière suivante: (i) argile, quartz, feldspath et fer, qui couvrent entre 81,5 et 94,5% des totaux de comptages; (ii) éléments non minéraux, surtout des espaces creux, qui forment entre 1,8 et 11,19% des totaux; (iii) minéraux trouvés seulement en petites quantités, tels le clinopyroxène, la hornblende et la biotite.

Période Ilama: De la tonalite a été trouvée, mais surtout du quartz et du feldspath, en moyenne 29,82%. C1 contenait en plus de l'épidote et C2 de l'anthophyllithe, C3 et C4 proviennent du même récipient.

Période Yotoco: C5 et C6 sont les tessons les plus fins de cet échantillonnage, et proviennent du même récipient. C7 est dégraissé avec de gros graviers de diabase et C8 de même, mais avec de la tonalite altérée.

Période de Sonso: (1) La tonalite apparaît à nouveau. C10, C11, C15 et C16 contiennent en moyenne 30,0% de quartz et feldspath; C13 contient une tonalite altérée et une zone vitreuse qui pourrait être de la cendre volcanique. (2) C9, C12 et C17 contiennent 23% de matières ferreuses. C14 contient en plus des grains de sable, surtout de roches sédimentaires.

Conclusion. Un éventuel commerce est suggéré par la présence de poteries dont la composition varie dans un même site, et également par des poteries de composition identique apparues sur plusieurs sites.

Fouilles archéologiques dans un cimetière préhispanique à Guabas, vallée de Cauca, Colombie

Par Carlos Armando Rodriguez

Cet article traite d'un cimetière préhispanique de l'Hacienda Margarita (Corregimento de Guabas, municipio de Guacari) sur la rive est du Rio Cauca. 50 tombes ont été fouillées. Des informations générales ont pu être obtenues pour toutes ces tombes, trois d'entre elles font l'objet d'une documentation archéologique complète. Les tombes sont creusées en puits de 2,0 à 4,25 m de profondeur. Il s'agit soit de puits semi-rectangulaires comportant deux niches, soit de puits avec chambre funéraire. Les sépultures étaient individuelles ou collectives (fig. 44, 45), les squelettes déposés étendus en connection ou désarticulés et dispersés. Des adultes et des adolescents des deux sexes son représentés, et certains crânes témoignent de déformation artificielle ou de carbonisation partielle.

Les offrandes comportent des objets en os (aiguilles, poignards, éléments de flûtes), des os ornés, des dents d'animaux, des coquillages de mer, des objets en pierre (manos, metates et ciseaux), ainsi que des narigueras et des boucles d'oreilles de métal. Des épis de maïs et des os de gibier (cerf, pécari et pacas) livrent quelques informations sur l'alimentation et des fusaïoles suggèrent le travail du coton. Des contrastes dans la composition des offrandes (la plupart des objets de métal et la poterie fine provient d'une seule tombe, la tombe 2) montrent une stratification sociale. Les objets en céramique comprennent des figurines anthropomorphes ainsi que des récipients décorés par impression, incrustation, peinture et appliques représentant des grenouilles, oiseaux et visages humains à boucle nasale et yeux en grains de café (fig. 46–49). Ces caractères montrent la parenté du matériel de Guabas avec d'autres styles de la vallée de Cauca, allant de la région de Sachamate (au sud) à celle de Quimbaya (au nord).

Deux tombes ont pu être datées au radiocarbone: 140±70 ap. J.-C. (Beta-5925), tombe 2, et 1120±110 ap. J.-C. (Beta-5926), tombe 3. La première de ces dates paraît trop ancienne, mais la seconde est acceptable, et correspond à la transition Yotoco/Sonso à Calima.

Resumen

Informe del trabajo de campo en Calima durante el año 1982

Por Warwick Bray, Leonor Herrera y Marianne Cardale Schrimpff

Investigaciones sobre la fase Ilama

Nos pareció conveniente cambiar el nombre de esta fase, denominada inicialmente «Calima Temprano», al darnos cuenta que el estilo de orfebrería por el cual la región Calima es tan conocida, se encuentra asociado no a esta fase (como habíamos pensado inicialmente) sino a la fase posterior (Yotoco).

A partir del año 1982 ha sido posible intensificar nuestras investigaciones sobre la fase Ilama gracias a un contrato con la Fundación de Investigaciones Arqueológicas Nacionales del Banco de la República y se está preparando un informe extenso. Ya que hasta el año 1982 no habíamos podido localizar un solo sitio de habitación Ilama, resolvimos enfocar nuestro estudio hacia los cementerios descubiertos en años recientes por los habitantes de la zona. Gracias a la amable colaboración de sus descubridores, se logró recopilar mucha información acerca de ellos y el material allí encontrado, no solamente cerámica sino también artefactos y adornos en piedra, y algunos objetos en oro. Como los cementerios estan localizados, por lo general, en sitios excepcionalmente propicios para la vivienda, albergamos la esperanza de encontrar en su vecindad sitios de habitación. Sin embargo, en la mayoría de los casos la superficie sufrió muchas alteraciones en épocas posteriores, especialmente durante la fase Sonso, y sólo hasta el año 1984 se realizaron nuestras espectativas.

En la presente ocasión nos limitamos a una reseña de nuestra información sobre cementerios y una descripción más extensa de las vasijas antropomorfas allí encontradas, en un intento de arrojar más luz sobre algunos aspectos de vida en la época Ilama. El estudio se basa en más de 100 vasijas antropomorfas, las cuales dividimos en 9 categorías principales (Figs. 2 a 16). Estas representan diferentes categorías de personas (jóvenes, viejos, mujeres o hombres) o personas en distintas situaciones (como las figuras acostadas, Figs. 5, 6) que podrían representar personas dormidas o enfermas o, al menos en un caso, una mujer dando a luz. A cada categoría están asociadas ciertas formas de peinado, collares, etc. Las representaciones más naturalistas se encuentran sobre las vasijas con doble vertedera y asa puente («alcarrazas»). En cambio las figuras modeladas como parte de vasijas con cuello y formas relacionadas, presentan con frecuencia elementos zoomorfas, principalmente culebras.

Falta todavía información sobre los orígines y nexos culturales de la fase Ilama. Estratos sin cerámica excavados por Héctor Salgado en el sitio El Pital, fechados al sexto milenio A. de C. atestiguan una ocupación temprana de esta zona de la cordillera y, un milenio más tarde, existe evidencia de cultivo de maíz en el valle de El Dorado (Monsalve, este número). Sin embargo, no conocemos suficientes datos acerca de esta gente para permitir evaluar su relación, ancestral o no, con la cultura Ilama. Mientras la fase Yotoco formaba claramente parte de los desarrollos culturales del suroccidente colombiano que tuvieron lugar durante la primera parte del primer milenio después de Cristo, la situación con respeto a la fase Ilama es menos clara. Esto se debe en parte a que para el primer milenio antes de Cristo contamos con información acerca de tres áreas solamente (Tumaco, San Agustín y Catanguero en el bajo Río Calima).

Excavaciones en las grandes plataformas de la Hacienda El Dorado

En un imponente conjunto de grandes plataformas que se observa en la ladera occidental del valle de El Dorado se llevaron a cabo muestreos de fosfato aplicando el test de formación de anillo. Como los resultados no indican concentraciones notables de residuos de ocupación, se piensa que las actividades que allí se llevaron a cabo dejaron pocas huellas y éstas diseminadas por toda la superficie. En la figura 29 se muestra un perfil del sitio con la reconstrucción, basada en los datos de las excavaciones y cateos con mediacaña, del relieve original, la forma de construcción de las plataformas, así como las características generales de los estratos encontrados bajo los rellenos de construcción.

Plataforma 3: Las notables diferencias observadas en la clase y color de la vegetación, diagramadas en la Fig. 17, no muestran correlaciones con las lecturas de fosfato, no con los datos de las excavaciones. La trinchera 1, cuyo extremo corta la pared trasera de la plataforma, permitió observar el corte original efectuado para nivelar la plataforma y sobre la superficie de arcilla compacta, un piso de ocupación de color negro, textura suave y friable (Fig. 18). En este punto las características originales del suelo se conservaron bajo una gruesa capa de material erosionado del barranco, en una época posterior al abandono de la plataforma; pero donde quedó sometido a alteraciones por el clima y el pastoreo presenta características diferentes de color y textura. El material cerámico encontrado en este piso corresponde al período Sonso (Fig. 19).

Plataforma 1: Es la más extensa del conjunto y mide 110×37 m. Fué construida en forma similar a la Plataforma 3. El material cerámico sobre la mayor parte de su superficie es escaso y disperso, aunque hay una notable concentración de piedras grandes y tiestos en un punto cercano al borde (Fig. 23). En la trinchera 4, abierta en la parte rellenada de la plataforma, aparece un horizonte de suelo original con material cultural Yotoco y sobre éste cinco estratos de suelo antrópico de características diferentes, que indican actividad continua en el área, pero modificaciones en el uso de ésta (Fig. 20). Inicialmente se trata de un suelo de uso únicamente agrícola, probablemente fertilizado, con material cerámico Yotoco. Con el correr del tiempo las actividades se diversifican (se bota basura y material de relleno, en pocas cantidades). Hay un cambio también en el material cultural, pues empiezan a aparecer tiestos Sonso y finalmente cesa de aparecer material Yotoco. Del último nivel anterior a la construcción de la plataforma se obtuvo carbón que dió una fecha de 1.160±50 D.C. (Beta-6819).

Los sondeos con mediacaña ejecutados a intervalos regulares por toda la superficie de la plataforma permitieron conocer la extensión de esta área de paleosuelos, así como definir otras de características diferentes, tanto en la parte rellenada como en la cortada por la construcción de la plataforma (Fig. 22).

Plataforma 4: Fué construida amontonando relleno en la zona de transición entre la vertiente y el piso del valle, es decir en la zona pantanosa, playa del lago que alguna vez existió allí. Aunque se encuentra material cultural de los períodos Yotoco y Sonso (Figs. 25, 26, 28) no parece que esta hubiera sido una zona de mayor actividad humana. Sin embargo en la trinchera 2, abierta hacia la parte media de la plataforma, hay evidencias del débil desarrollo de un suelo antrópico (Fig. 24), pero de características muy distintas a los de la plataforma 1. En cuanto a la trinchera 1, en el borde de la plataforma, aquí ya se presentan condiciones más extremas de humedad y se trataba de un suelo lacustre (Fig. 27). Un fragmento cerámico encontrado en la transición entre los horizontes A y B de este suelo fué sometido a análisis por termoluminiscencia y dió una fecha de 1.422±20% D.C. (Alpha-1520) que sugiere una formación tardía para este suelo.

Excavación de sistemas de cultivo en el Valle de El Dorado

El suelo del valle sufre problemas de drenaje debido a lo alto del nivel freático y por la presencia de una espesa capa de arcilla impermeable bajo el terreno de cultivo. Las modernas zanjas de desagüe son estrechas y profundas, cortadas dentro de esta capa de arcilla para llegar al nivel freático todo el tiempo del año, incluyendo la época de sequía. La función de estas zanjas es controlar el nivel y la corriente de agua subterránea más que permitir que corra a la superficie.

Los sistemas de drenaje prehispánicos son de dos clases: a) un recinto más o menos rectangular delimitado por una zanja profunda que probablemente sirvió con el mismo propósito que las modernas, y b) *eras* o campos de cultivo, formados por largos *camellones* paralelos separados por zanjas. La tierra excavada de estas zanjas fue acumulada entre ellas para alzar la superficie cultivable sobre la temporada de lluvia y para proveer una mayor profundidad de terreno. Parte del suelo del valle, adyacente a las largas plataformas, fue trazado en una mapa (v. página central).

Las dos clases de sistemas de drenaje fueron estudiados por excavación, los estratos subyacentes estériles fueron examinados con el fin de estudiar la historia de la sedimentación en el valle. En todas estas localidades la estratigrafía básica fue la misma (Figs. 31–37). Los estratos más profundos constan de suelos orgánicos cuaternarios dominados por la vegetación forestal con episodios de condiciones más húmedas de pantano o formación de lago. En fecha desconocida, la entrada estrecha al valle fue bloqueada, creando un lago en el fondo del valle con el depósito de una capa espesa de arcilla lacustre (Estrato 4 en las figuras). Este lago eventualmente se secó convirtiéndose en un pantano sobre el cual se formó un suelo (Estrato 3). En esta etapa, el suelo del valle se convirtió en terreno aprovechable para el cultivo y los primeros sistemas de drenaje fueron construidos.

La excavación demostró que tanto *eras* como zanjas en esta parte del valle pertenecen al período Yotoco y hay una fecha de radiocarbono de 750±50 D.C. (Beta-9755) de la Era 3 (Fig. 37). En la localidad de la Zanja 4 (Fig. 34) las zanjas sucesivas de la época Yotoco (con fecha de C14 de 100±320 D.C. (Beta-9758) del relleno primario de la zanja más antigua) fueron tapadas por una era de cultivo también en el período Yotoco. Sin una investigación adicional no podemos estar seguros si esta secuencia es válida en todas las partes de El Dorado.

Material de la fase Sonso es raro o está ausente en estos sistemas de cultivo y parece probable que fueron abandonados en algún tiempo antes de la transición Yotoco-Sonso. Este ha sido fechado alrededor de 1200 D.C. y nuestros diagramas de polen muestran un episodio climático más frío y más seco precisamente en este tiempo (Polen Zona 5B en la gráfica anexada a la contribución Monsalve a este volumen). En algunas otras partes de Columbia, estas condiciones causaron una reducción del nivel freático. Si esto sucedió también en El Dorado, pudo haber hecho los campos poco laborables en el fondo del valle.

La única localidad con sistemas de drenaje en el período Sonso es la Zanja 1, un recinto cuadrangualar visitado en 1981 *(Pro Calima* 3) e investigado con más detalles en 1982 (Figs. 38–40). La estratigrafia está mostrada en la Fig. 40. Los estratos más antiguos (Estratos 6–10) están dominados por suelos forestales cuaternarios entremezclados con ceniza volcánica y material erosionado. Estrato 5 está principalmente compuesto de ceniza volcánica, con fechas de radiocarbono cerca de 24,000–21,500 A. C. Sobre esto, Estrato 4/2 es pegajoso y arcilloso que corresponde probablemente con la arcilla lacustre en otras partes del valle. Estrato 4/1 es un suelo formado bajo condiciones de mejoramiento de drenaje, con las primeras señales de actividad humana en la forma de los tiestos del Yotoco y fitolitos de maíz domesticado. Estrato 3 es una superficie de tierra del período Yotoco y de esta superficie de tierra fue excavada una zanja bajo la superficie de la ceniza porosa. El relleno de esta zanja contiene material Sonso y dió una fecha de C14 de 1465 ± 65 D. C. (*Pro Calima* 3). Muestras de fitolitos tomadas del correspondiente terreno sobre la superficie cultivable a lado de la zanja, mostró que el maíz creció aquí durante el período Sonso. En contraste, fitolitos de maíz estuvieron ausentes del terreno moderno (Estrato 1), el cual a principios de siglo era bosque y más tarde se convirtío en pastura para ganado.

Restos alimenticios de una plataforma de vivienda

De una plataforma localizada en la ladera norte del valle del Río Calima, en predios de la Hacienda San Rafael (Fig. 41), se obtuvo una muestra de semillas carbonizadas. Estas fueron identificados por Earle C. Smith (Departamento de Antropología de la Universidád de Alabama) como de frijol común *(Phaseolus vulgaris)* y de dos variedades de maíz, una al parecer relacionada con la clase Pollo-Nal Tel.

Trabajo de Campo 1984

Los resultados de la temporada 1984 serán dados a conocer en el siguiente *Pro Calima.* Un trabajo adicional fue llevado a cabo en la plataforma 1 y Zanja 1 de El Dorado, y también regresamos al problema sobre los canales en las laderas *(Pro Calima* 3 16–18). El mayor elemento del programa fue la excavación en El Topacio, en el valle Calima que dío una fecha de radiocarbono de 150 ± 100 A. C. (Beta-9858) de la superior del asentamiento Ilama.

Caracterización e historia general de formación de los suelos del Valle de El Dorado

Por Pedro Botero

Los suelos de la región de Calima se pueden dividir en tres grandes unidades:
1) Suelos de las colinas, en clima húmedo-sub-húmedo, montano y montano bajo, con características ANDICAS (Dystrandepts).
2) Suelos de las colinas en clima seco, montano bajo, con horizontes cementados, duros, impermeables y sin características ANDICAS (Paleustalfs).
3) Suelos de los fondos de los valles, mal drenados, arcillosos, de colores grises (TROPAQUEPTS).

Los suelos del primer grupo, presentan la mayor evidencia de utilización prehispánica. En estos suelos se encuentran los tambos, las plataformas grandes y los «canales en pendiente» en grandes cantidades. Sus características físicas los hacen fáciles de trabajar en agricultura y su fertilidad (moderada) es más alta que la de los otros dos suelos. Estas áreas, además, son menos propensas a la erosión hídrica por escurrimiento superficial que donde predominan Paleustalfs. Por sus características de alta capacidad de retención de humedad, mantienen un buen suministro de agua a las raíces de las plantas. Su principal desventaja radica en su tendencia a los movimientos en masa, los cuales fueron contrarrestados (aparentemente) por los «Canales en Pendiente».

Sobre los suelos del grupo 2 Paleustalfs, es poco lo que se puede decir en cuanto a su uso prehispánico, pues son pocas las huellas que se encuentran en ellos. Parece que sí fueron utilizados en agricultura en alguna época, porque también aquí se encuentran algunos «canales en pendiente».

La presencia de estos canales en suelos Paleustalfs, o con altos contenidos de arcilla en todo el perfil, hace que la explicación dada para los DYSTRANDEPTS, sea difícil acá. Sin embargo, si se piensa que los «canales en pendiente» fueron construídos en algunos casos hace 1.000 años, se puede decir que las condiciones de los horizontes superficiales de los suelos, eran diferentes. Esto es, que presentaban un epipedón, formado por ceniza volcánica relativamente reciente, que todavía no se había erosionado o transformado en arcillas y que por lo tanto, sí tenía unas condiciones similares a las de los Dystrandepts de la zona húmeda.

Los suelos de los fondos de los valles son mal drenados TROPAQUEPTS, con algún grado de desarrollo pedológico que indica una cierta edad y condiciones de anegamiento no permanentes.

En el fondo del Valle se han sucedido tres etapas bien diferenciadas:
a) Etapa de bosques muy húmedos.
b) Etapa de lagos y pantanos.
c) Etapa reciente de suelos mal drenados, pero no pantanos.

En esta etapa final, se presentaron los primeros agricultores en la zona. Agricultura: La Agricultura se efectuó en los fondos de los valles por medio de construcciones tales como «eras» o «camellones» y «microterrazas» (campos elevados), no se sabe si en forma simultánea o alternativa. En las laderas, especialmente de las zonas húmedas y subhúmedas, por medio de campos de cultivo separados por los «canales en pendiente», donde aparentemente no hubo aporte de materiales al área cultivada y por lo tanto no se pueden llamar en la actualidad «campos elevados». Sin embargo no se puede decir con seguridad, que no fueron, porque desde la época de abandono de estos campos de cultivo han pasado muchos años y durante este lapso los procesos de erosión superficial, han podido remover materiales que hubieran sido agregados a la superficie del suelo.

Otro sistema de agricultura en las laderas, más viejo que en el anterior, fue el cultivo en pequeños huertos de agricultura intensiva. En estos casos sí fertilizaron los suelos y se «preparó» la tierra en forma intensiva, utilizando materiales orgánicos y minerales (especialmente derivados de ceniza volcánica) y formando surcos o eras que todavía son visibles en paredes de la plataforma IV trinchera 4 (muestras 3–4–5–6).

Registros de fitolitos en campos de cultivo prehispánicos en la región de Calima

Por Dolores R. Piperno

En este informe se presenta el análisis de fitolitos provenientes de varias zanjas y eras en el valle de El Dorado. Los fitolitos son restos síliceos de plantas, que han sido depositados directamente en los suelos y que una vez recuperados de los horizontes del suelo constituyen un registro muy durable y diagnóstico de la vegetación y uso de plantas en épocas prehistóricas. Los fitolitos ocurren abundantemente en todos los contextos examinados. Se aislaron fitolitos de maíz procedentes de estratos de cultivo prehispánico, en número tal que sugieren que se trataba de un cultígeno principal en estos sistemas de cultivo. No se recobraron restos de calabaza, la única otra planta domesticada importante que hubiera podido dejar un registro de fitolitos.

La presencia de sílice biogénico de diatomeas de agua dulce y espículas de esponja, es un índice de las malas condiciones de drenaje existentes en la parte plana del valle, durante la época de construcción y mantenimiento de los campos de cultivo. En estratos inferiores al primer suelo de cultivo, la evidencia de fitolitos mostró un panorama de alteración en el paisaje y uso de entorno en el valle de El Dorado, a lo largo de los últimos 23.000 años. En los estratos formados por un posible lavado de vertiente de las laderas del valle, la evidencia indica cultivos de maíz en asociación con quemas de la vegetación. Es posible por lo tanto, que las laderas de las lomas hubieron sido sometidas a quemas y siembras de maíz antes que el fondo del valle fuera convertido en campos de cultivo. Esto último, tal vez tuvo lugar como respuesta a la decreciente accesibilidad a suelos mejor drenados en las laderas. Bajo este horizonte, el espectro de fitolitos indicó la presencia de un bosque húmedo tropical en suelos que fueron fechados por radiocarbono en 23.000 años antes del presente.

Estudio polínico de la Hacienda Lusitania

Por José G. Monsalve

El estudio polínico de sedimentos compuestos en su mayor parte por turba, arcilla y arena fina a lo largo de los primeros 410 cm de profundidad, y por arcilla y arena fina entre los 410 y 500 cm aproximadamente, de una perforación de cinco metros de longitud en un área de pantano de la zona de Lusitania (Valle de El Dorado), situada en la región arqueológica de Calima (Colombia), muestra el desarrollo de una sucesión vegetal muy dinámica. El diagrama de polen indica que la misma ha tenido aparentemente siete cambios importantes a lo largo de su historia; los tres últimos a causa de las alteraciones de la vegetación producidas principalmente por los primeros pobladores de la región, el indígena, y más modernamente por los posteriores habitantes. El maíz fue aparentemente más abundantemente cultivado durante el primer período de ocupación. Posteriormente su cultivo disminuyó drásticamente durante las siguientes épocas de ocupación. Posiblemente el mismo debió seguirse cultivando en lugares más alejados de esta zona.

Análisis petrológico de la cerámica Calima: Un informe preliminar

Por F. E. S. Roe

En 1982 se tomó la decisión de investigar el potencial de la cerámica de Calima por examinación bajo microscopio. Diecisiete tiestos diagnósticos fueron seleccionados. La cerámica demostró estar apropiada para este método de análisis y un pointcounter fué utilizado para obtener fecha, la cual fué resumida en la tabla I. Los factores más importantes son:
– 1) arcilla, 54,11% en todas partes. 2) fragmentos de roca local, usualmente tonalita, pero diabasa se encuentra ocasionalmente. 3) Cuarzo y feldespato, los cuales son abundantes desde que éstos se encuentran en la tonalita. 4) Todas las estructuras contienen algunos nódulos férricos. 5) El tamaño de los granos varía en la cerámica, así como la cantidád de granos más grandes.

La fecha del pointcounter puede ser agrupada bajo tres categorías: – (i) arcilla, cuarzo más feldespato y hierro, los cuales juntos constituyen entre el 81,5 y el 94,5% del cómputo total. (ii) Artículos no minerales, principalmente cavidades, constituyen el 1,8–11,19% de cada cómputo. (iii) Minerales encontrados solamente en pequeñas cantidades tales como clinopyroxeno, hornblenda y biotita.

Período Ilama. Tonalita fué encontrada, especialmente cuarzo y feldespato, dando un promedio de 29,82%. C1 contiene adicionalmente epidota y C2 antofillita, mientras que C3 y C4 parecen armonizar.

Período Yotoco. C5 y C6 son los tiestos más finos en este estudio y parecen armonizar. C7 está templado con grandes fragmentos de roca de diabasa y C8 igualmente con tonalita alterada.

Período Sonso. 1) Tonalita está de nuevo indicada. C10, C11, C15 y C16 contienen un promedio de 30,0% de cuarzo más feldespato; C13 contiene una tonalita alterada y un área vidriosa, la cual pudo haber sido ceniza volcánica. 2) C9, C12 y C17 tienen 23% de material férrico, C14 contiene adicionalmente granos

arenosos principalmente de roca sedimentaria.
Conclusiones. Está indicado un posible intercambio por la presencia de diferentes tipos en el mismo sitio, y también por tipos idénticos que se encuentran en más de un sitio.

Excavación arqueológica de un cementerio prehispánico en Guabas, Valle del Cauca, Colombia

Por Carlos Armando Rodríguez

Este papel describe un cementerio prehispánico en la Hacienda Margarita (corregimiento de Guabas, municipio de Guacarí) sobre la ribera oriental del Río Cauca. Quince tumbas fueron excavadas, sobre esas tumbas se obtuvo una información general y tres de ellas fueron completamente investigadas.

Las tumbas eran sepulcros en forma de pozo de 2,0 a 4,25 m de profundidad. La forma de los pozos eran simples rectangulares, pozos semirectangulares con 2 nichos, y un pozo rectangular con una cámara. Los entierros eran tanto colectivos como individuales (Figs. 44, 45), con la osamenta, unas en posición extendida y otras desarticuladas y dispersas. Adultos y adolescentes de ambos sexos están representados, y algunos de los cráneos muestran una deformación artificial y están parcialmente carbonizados.

El ajuar funerario de las tumbas incluye artículos de hueso (agujas, puñales, parte de una flauta), ornamentos de hueso, dientes de animal, conchas marinas, objetos de piedra (manos, metates y cinceles), así como narigueras y aretes de metal. Olotes y la osamenta de animales salvajes (venado, pecarí, paca) arrojan alguna información acerca de la dieta, y volantes de huso de cerámica sugieren que los tejidos de algodón fueron manufacturados. Contrastes en el mobiliario de las tumbas (la mayor parte de artículos de metal y cerámica fina provenientes de una única tumba, Tumba 22) son señal de una estratificación social. Entre los artículos de cerámica se encuentran figuras antropomorfas y también vasijas decoradas por medio de impresiones, pintura, motivos aplicados incluyendo ranas, pájaros y caras humanas con narigueras y ojos del tipo grano de café (Figs. 46–49). Estas características relacionan el material de Guabas con otros estilos del Valle del Cauca, desde el área de Sachamate en el sur hasta la zona Quimbaya en el norte.

Dos tumbas produjeron fechas de radiocarbono: 140 ± 70 D.C. (Beta-5925) de la Tumba 2, y 1120 ± 110 D.C. (Beta-5926) de la Tumba 3. La primera de estas fechas parece improbablemente temprana, pero la segunda es aceptable y correspondería con el período de transición Yotoco-Sonso en Calima.

Donatorenliste

Abbott AG, Zug
Alusuisse, Zürich
Amindus SA (Dr. M. Graf, Nyon)
K. Aus der Au, Rheinfelden
Autophon AG, Solothurn
Baumann Immobilien und Bau AG, Bern
Beecham AG (Dr. J. Macheret)
W. Belart, Gallenkirch
The British Academy
Fundación de Investigaciones Arqueológicas Nacionales del Banco de la República, Bogotá
Galenica, Bern
Buchdruckerei Gassmann AG, Solothurn
U. und H. Hediger, Pohlern
M. Hirter, Blumenstein
Dr. E. Hockenjos, Basel
Hoechst AG., Frankfurt/M.
Hoechst Pharma AG, Zürich
Janssen Pharmaceutica AG, Baar
St. T. Johnson Foundation, Bern
E. Just, Muttenz
F. Linder, Thun
London University Central Research Fund
Luitpold-Werk, Fällanden
Migros-Genossenschafts-Bund
H. und A. Müller, Lausanne
Physikalisches Institut der Universität Bern
Dr. Th. Ruedi, Oberwil
Rytir AG, Weinfelden
K. Schlup, Eysins
Dr. B. Schmid, Oberwil
Schweizerischer Bankverein, Jubiläumsstiftung
Schweizerische Treuhandgesellschaft
Schweizerische Volksbank, Jubiläumsstiftung
U. Sieber, Attisholz
Society of Antiquaries of London
Spirig, Olten
K. Spillmann, Solothurn
H. Stalder, Höfen
M. Strebi, Luzern
Dr. Ch. Studer, Solothurn
Dr. B. Wicke, Zürich
Gebr. Wyss, Reisebüro, Solothurn
Familie Zurbrügg, Rohrmoos