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Yarinacocha:

Stratigraphic Excavations

in the Peruvian Montana

A thesis presented

by

Donald Ward Lathrap

to

The Department of Anthropology

in partial fulfillment of the requirements

for the degree of

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in the subject of

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May, 1962
This paper is dedicated to the late

Harry Tschopik, Jr.

with highest admiration and in

profoundest gratitude.
Preface

The expedition to San Francisco de Yarinacocha was made possible by a grant from the American Museum of Natural History as part of their continuing program of anthropological research in the Peruvian Montana. I wish to thank Dr. Harry Shapiro, Chairman of the Department of Anthropology for the privilege of doing this research, and for his continuous, generous support during all phases of the expedition and during the subsequent period of study of the excavated materials.

Other people to whom I owe a profound debt of gratitude are numerous. Above all it was the late Dr. Harry Tschopik, Jr. who oiled the wheels of progress at all points. He recognized the archaeological potential of the Yarinacocha area and formulated the basic outline of the expedition. During his stay at the Shipibo village of San Francisco de Yarinacocha, he discussed the feasibility of archaeological field work with the Indians, and so accustomed them to the prospect of an archaeologist among them, that when I arrived and stated my intentions to the Indians their first reaction was to ask, "What has taken you so long in getting here?" Beyond this Harry opened numerous contacts for me in both Pucallpa and Lima which were of the greatest importance to the success of the expedition.

Dr. Junius Bird of the American Museum of Natural History
offered many helpful suggestions during the planning stages of the expedition, as did Dr. Clifford Evans, Jr. and Dr. Betty J. Meggers of the National Museum. Dr. David De Harport instructed me at length on the problems of photography under tropical conditions. Miss Bella Weitzner of the American Museum of Natural History was most helpful in arranging various of the small but time consuming details which arise during the early stages of expedition planning.

In Lima I was aided most notably by Dr. Jorge Muelle, Director of the Museo Nacional at Magdalena Vieja. He did everything in his power to assist and expedite my work, and it was through his intercession that I was able to bring sherd collections to the United States to complete their study. All of the other members of the staff of the Museo Nacional at Magdalena Vieja were most hospitable, friendly, and helpful.

Dr. Albert Giesecke of the American Embassy in Lima was a source of assistance at several points. Mr. Lionel Tweedy undertook the task of the shipment of my collections from Lima to New York. I am deeply grateful for the hospitality which I received from Dr. Jose M. Sarmiento and Sra. Elaina Gaffaron.

In Pucallpa I was assisted at every turn by Sr. Roger Mori. He took much time from his very busy schedule to make sure that all went well with my work. Roger and his very gracious wife entertained me on numerous occasions, and it was their most valued friendship which made my rest and recreation days in Pucallpa delightful.
Maximo Gomes, my cataloger and cook, was reliable and steady under adverse conditions. As well as keeping me fed, he did an admirably accurate job of keeping the collections numbered and in proper order.

The late Meyer Cohen was my source of supplies in Pucallpa, but his kindnesses and services went far beyond a pure business relationship.

The Reverend Joseph Hocking was the source of many favors and much help, and he gave me much excellent advice about living in the jungle.

The Shipibo Indians of San Francisco de Yarinacocha deserve much of the credit for any success which this expedition may have attained. In a wild confusion of statuses and roles they were my hosts, my teachers, my friends, and my workmen. As workmen they were devoted and patient and more will be said of this later. As friends and hosts they were a most delightful group of people. What has been said about the Shipibo in general is even more true of my compadre, Catalino Cumapa.

During the analysis of the ceramic materials I was aided by Miss Elizabeth Baldwin who undertook the extremely tedious and exacting microscopic examination of over 10,000 sherds from UCA-6, Cut 1. Miss Baldwin’s dedication to objectivity in ceramic analysis was complete.

I am deeply grateful to my wife Joan W. Lathrap who did a number of the more tedious chores of measuring and tabulating the ceramic materials, and who has been of greatest assistance
in the preparation of the manuscript. Miss Ruth Ballantyne typed the numerous tables with admirable accuracy. Dr. Betty Starr and Mrs. Anna Gissing also helped in the preparation of the final typescript.

Mr. John S. Phillips was most efficient and helpful in attacking my problems of lithic analysis and clay identification and his chapter on these matters forms a valuable addition to this paper.

Dr. William Root of Bowdoin and Dr. Clifford Frondel of Harvard examined the one scrap of metal from the excavations, and Dr. Frondel ran an X-Ray Diffraction analysis of the specimen, which indicated that it was of recent, commercial origin.

I am deeply indebted to my artists; Mrs. Setsuko Yim, of Lexington, Massachusetts, Mr. Philip D. Young of the University of Illinois, Mr. Nicholas Amorosi of the American Museum of Natural History, Mr. S. Chatterjee of the University of Illinois, Miss Ann Roninger of the University of Illinois, and Mr. Gerald Young of the University of Southern Illinois.

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May 19, 1962

Urbana, Illinois
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Introduction

The Peruvian Montaña:

A Brief Statement Concerning its Geography, Ethnography, and History

In standard anthropological usage the Peruvian Montaña has come to include most of Peru east of the high, arid, Andean grasslands. There are several types of plant cover within eastern Peru, but basically it is a zone of high rainfall and lush vegetation. There is no topographical uniformity within the Montaña. It includes the rugged eastern face of the Andes cut by fantastically narrow and deep canyons. It also contains rolling uplands between the headwaters of certain smaller rivers. Much of the Peruvian Montaña, however, consists of essentially level alluvial plains extending as far as the eye can see.

The Peruvian Montaña can be treated as a unit for reasons of its culture history. It lay beyond the limits of permanent Spanish domination, though Spanish missions were periodically established within it. Even today such economic penetrations as the rubber boom of the first decade of the century and the present exploration for oil have not brought this region fully within the sphere of modern Peruvian civilization. The Montaña was, and to a large degree still continues to be, Peru's Wild East.

Structurally, the Peruvian Montaña lies entirely within the upper Amazon drainage basin. It includes the upper Madre de
Dios, a major tributary of the Madeira, and the upper tips of the Purus and Juruá, southern tributaries of the main stream of the Amazon. Its large central section is made of the basin of the Ucayali and its tributaries. A narrow finger of the Montaña stretches up the gorge of the Huallaga, a smaller river immediately to the west of the Ucayali drainage. The remainder of the Montaña is in the lower gorge of the Marañón and in the upper reaches of such northern tributaries of the Amazon as the Tigre, Napo, and Putumayo.

The focus of this paper is entirely on the central Ucayali basin around the modern town of Pucallpa.

The Ucayali is one of the two sources of the Amazon. The Amazon comes into being as the Ucayali and Marañón merge near Iquitos, Peru. In its turn the Ucayali is the product of the Urubamba and the Tambo-Apurimac river systems which join at Atalaya. Thus the ultimate source of the Ucayali lies in two basins which played an important role in the development of high civilization in the Central Andes, the Cuzco basin and the Mantaro basin.

The middle and lower course of the Ucayali lies within a broad, flat valley, and even at Pucallpa on the middle Ucayali the elevation is less than 500 feet above sea level. It is already flood plain country, with river meandering between natural levies and constantly changing its course, leaving in its wake an
intricate network of swamps, sloughs, and ox-bow lakes. Yarinacocha is one such ox-bow lake, once part of the Ucayali river bed, lying a few miles to the northwest of Pucallpa. This is a region predictably lacking in natural stone larger than pebbles.

The geomorphology of the middle and lower Ucayali make it admirably suited to the application of the method of geological site dating which has been applied so successfully in the lower Mississippi Valley: that of correlating sites of different artifact contents with position on the various stages of the river channel. But such an application must wait on a more thorough knowledge of both the archaeology and geology of the area. However, knowledge in this latter field is progressing rapidly as a part of the quest for oil.

The climate of the area involves two seasons: winter, extending from April through September, is hot and relatively dry; summer, extending from October through to March is cool and wet. The dry season is marked by infrequent but violent rainstorms, perhaps once every three weeks; while the wet season is marked by heavy rains for days on end. The precipitation farther up the Ucayali at the boundary between the mountains and the plain is even heavier and of longer duration, and the river rises as much as twenty feet and maintains this level for months. This rise in level involves filling not only the river channel itself but also all of the adjoining sloughs and ox-bow lakes. The
river as it passes Pucallpa is approximately one-quarter of a mile
to one-half a mile wide. Large areas adjoining the rivers and
lakes are also subject to shallow flooding and during the wet
season humans withdraw to relatively restricted areas of high
ground.

Except where it has been cleared by man, this part of
the Ucayali valley is completely covered by the classic, full
blown, tropical rain forest. The top of the forest is 150 to
200 feet above the ground and very little sun penetrates to the
floor of the forest. The soils of the area are thin and poor.
Often there is no more than an inch of sandy soil above the
ubiquitous, lateritic, red clay, which is a bottomless mire when
wet and against which one can break a geologist's hammer after a
couple of rainless weeks have passed.

Land animals suitable for food are not abundant. The
most important are the two species of peccary, several species
of giant rodents, and monkeys. Tapirs are present though not
common. Birds which are edible and of decent size are more
common. In this respect a variety of ground dove, toucans, and
herons are important.

The rivers and lakes are a far more important source
of protein. The variety and quantity of life in these waters is
fantastic. One method of taking fish is by fishing arrows which
are shot not directly into the water but up in the air so that they
will land in the general area where fish can be seen disturbing
the water. About one shot in three succeeds in transfixing a fish. One small fish is so numerous and so active at night that a meal can be obtained merely by rowing out and placing one’s canoe in the middle of a school of them. There will soon be several flopping around in the bottom of the canoe. Two kinds of pirahna are very common, and the larger is an excellent food fish. A large number of species of fish in the catfish and armored catfish groups are perhaps most important as food. The paiche (Arapaima gigas) is one of the largest of all fresh water fish and is an important food fish. Dried paiche is now an important article of commerce. It and some of the larger catfish can be taken only by harpoon.

The great congregations of spawning river turtles which were a major food resource in many parts of the Amazon basin were extensively exploited by the Indians of the central Ucayali, and we have an excellent description by Marcoy of Conibo practices with regard to these turtles.⁴ A large, side necked turtle, the mata mata, is also much sought for food.

For reasons which I could not fully determine the meat of both species of dolphin, which abound in the waters of the central Ucayali drainage, is completely eschewed by both the Indian and mestizo populations. The usual answer to my question about this dietary taboo was that the meat was too tough, but I could find no one who had ever tasted the meat to
see if it was too tough. I got hints that the dolphin is regarded as a supernatural being with definite powers of witchcraft. The manatee is a favored meat animal for the Indians of the central Ucayali, and is represented in Chama ceramics. Persistent hunting has reduced this animal almost to the point of extinction, and it is seldom seen today.

A discussion of the fauna of the central Ucayali would be incomplete without a mention of the insects and arachnids. The great variety and incredible numbers of these pests give one the most lasting impression of jungle life. Mosquitoes, biting flies, stinging ants, burrowing fleas, ticks, and chiggers are by far the most unpleasant aspect of existence in this part of the world. These creatures are not insignificant part of the environmental niche to which Tropical Forest Culture has made its successful adjustment.

A full outline of the present state of knowledge concerning the Indians of the Peruvian Montaña would be out of place in this paper. Steward and Métraux have presented a useful summary of the state of our knowledge as of 1948, and few works of importance have appeared since then. Those interested in greater detail are referred to the Steward and Métraux article.5 I will not even attempt a sketch of the ethnography of the central Ucayali. Since it may be possible to connect the archaeology of this area in part to definite groups of Indians, it seems worth while to outline the distribution of ethnic groups.
Three of the major linguistic families of South America are represented in the area: Panoan; Tupí; Arawak. The group which holds the major part of the main stream of the Ucayali and the lower parts of several of its major tributaries is known as the Chama. The Chama speak languages of the Panoan family. This is a strange sort of an ethnic group in that it is not political, the Shipibo have often fought with their fellow Chama, the Conibo; neither is it exactly linguistic, for the Shipibo of the Río Pisqui speak a language which is closer to the neighboring Cashibo, than it is to the language of the Shipibo of Yarinaococha. The Cashibo are emphatically not Chama and are definitely of the marginal level of Tropical Forest Culture. The Chama consist of three major subgroups: the Setebo, Shipibo, and Conibo. The Setebo were on the lower Ucayali almost as far as Iquitos. They could be further subdivided but they have now largely broken down as a cultural entity. The Shipibo at present hold the lower Pisqui, the lower Aguatia, and the Ucayali between the mouths of these two rivers. The Conibo are in part mixed with the Shipibo on the middle Ucayali but are largely on the upper Ucayali and its eastern tributary, the Tamaya.

What these people share is a common art style and a feeling that they were civilized individuals living among a bunch of barbarians. Intermarriage was possible among these three groups but was extremely rare outside of them either with the surrounding Indians.
The Chama economy like that of many other "Tropical Forest" groups is oriented to a very high degree to the major rivers and lakes rather than to the forest. The Indians travel by canoe almost exclusively. Fishing and the hunting of aquatic mammals and reptiles provides the greater part of the protein consumed, and most of the hunting of land mammals is done from canoes at night as the animals come down to the water to drink. Sections of the forest are cleared in the course of practicing slash and burn agriculture, but such plots or chacras are as close to the waterways as possible. As is the case with most Montana groups yuca, sweet manioc, is the most important agricultural plant, and in post Columbian times the plantain has achieved great popularity. The Chama's image of himself is that of a river Indian and not a forest Indian.

On both sides of the Chama there are still groups of more primitive Panoan speaking Indians. The Cashibo are found to the west and the Amahuaca are one of the several primitive Panoan groups still extant in the hills to the east of the Ucayali valley. These groups emphasize hunting more and agriculture and fishing less than do the Chama. Their material culture is much less elaborate and sophisticated than that of their riverine neighbors. The settlement pattern is apparently much less stable. The Chama regard these forest Indians, especially the Cashibo, as
considerably less than human. There is a long standing pattern of warfare between the Chama and the Cashibo.

To the north of the Chama on the lower Ucayali are the Cocama. These are Tupí speakers who are at present considerably aculturated in some aspects but still form a vigorous group which at present appears to be expanding into the vacuum left by the breakdown of the Setebo. When compared to the Chama, the Cocama appear to be even more riverine in their economic orientation; more intensely agricultural; and in early times they were even more warlike and aggressive. Cocama material culture was at least the equal of Chama material culture in complexity and sophistication but has been more altered by White contact. The Cocama typically had larger and more permanent settlements and a more complex social organization.

To the south of the Chama, mainly in uplands away from the major streams, is a large block of Arawak speaking peoples. The most numerous subdivision of these peoples today is usually called the Campa, but the subdivisions in general are little understood, and to date we have no good ethnography on any of these Arawak peoples. Their material culture and especially their ceramics are poorly known. Their general level of cultural complexity when judged in terms of material culture, size and permanence of settlement, or devotion to agriculture appears to be somewhat below that of the Chama but higher than that of groups
such as the Cashibo. The Piro on the middle Urubamba are
divergent among these Arawak in being more riverine in their orienta-
tion and having a material culture which is largely acculturated
to Chama practices.

The history of Spanish attempts to dominate this area
is long and complex. Steward and Métraux give a fairly detailed
account of the repeated attempts to missionize the Indians of the
central Ucayali.8 In general, it can be said that the Chama were
perfectly willing to accept the Spanish priests as long as the
supply of iron cutting tools was low and perfectly willing to
exterminate the priests as soon as the demand for metal tools
was saturated. In later times the Chama especially underwent
considerable cultural disorientation as a result of their
association with White owned plantations and as a result of the
rubber boom. Recent economic influences, such as oil prospecting,
and recent major land developments as Turnavista, have put added
strains on the Indian way of life. Missionary activity, especially
by Protestant sects, has been especially strong in recent years.

In the face of all of the varied White contacts extending
over the last 400 years, it is surprising how much purely Indian
culture survived among the Chama groups as of 1956. There was a
complete dependence on trade for such metal tools as machetes,
harpoon heads, and fish hooks, but most aspects of material culture
survived. The basic economy was still oriented to self sufficiency
rather than to the market, and the systems of social and religious
behavior were still largely unchanged.

The Research Problems Which Motivated the Expedition

It cannot be claimed that the excavations made at Yarinaochocha were problem oriented in any refined or specific sense. As of 1966 the upper Amazon basin was essentially unknown archaeologically. The only systematic work had been confined to the lowlands of eastern Bolivia, where the early stratigraphic work of Nordenskiöld was admirable and far ahead of its time. More recently Bennett had made important contributions. These pioneer projects, excellent though they were, were still insufficient to illuminate the culture history of the upper Madeira watershed, let alone throw much light on the patterns of development of the upper Amazon basin as a whole.

Aside from the work in Bolivia there were only a handful of published collections from the whole upper Amazon. These were all without any real archaeological context. The best known archaeological materials were those from the Río Napo in Ecuador published by Uhle and Gillin. Howard suggested that the style of pottery known from the Napo was closely related to the well known polychrome style from Marajó at the mouth of the Amazon, an hypothesis later confirmed by the recent work of Meggers and Evans on the Napo. Other of the pottery collections from the upper Amazon basin were published in a summary way by
In no case outside of lowland Bolivia was it possible to define (adequately) a ceramic complex, let alone build a chronological sequence, on the basis of the data as published.

In 1956 the problems which could be framed concerning the culture history of the upper Amazon were of the simplest nature. What kind of archaeological materials were to be found in the upper Amazon? What was the time depth of sedentary, ceramic using peoples in the upper Amazon? Were the chronological sequences short and simple or long and complex in this area? Until such basic queries were answered, it would be impossible to frame more sophisticated questions in a meaningful way.

Work in any or all areas of the upper Amazon would have been of great importance for the filling in of what was essentially unknown territory. However, the Peruvian Montaña in general, and San Francisco de Yarinacocha in particular, seemed to offer certain advantages over an area of the upper Amazon picked at random. Both Tessmann and Tschopik had collected archaeological material from there, so it was certain that further work could not be completely unproductive. It was known that the ceramic tradition of the Chama Indians was still flourishing thus offering the possibility of the direct historical approach to culture history. Furthermore, the Chama ceramics had frequently been discussed in terms of their similarity to the
polychrome ceramic tradition of Marajo, \textsuperscript{19} what Meggers and Evans have termed Marajoara, \textsuperscript{20} and if the Chama pottery tradition proved to be old in the central Ucayali region some light might be shed on the origins of Marajoara ceramics.

The central Ucayali basin is in a strategic location with reference to the problem of connections between Tropical Forest Culture and the civilizations of the Central Andes. The Ucayali River may well have been a major avenue of trade and diffusion between the two areas and certainly the Arawak speaking tribes of the upper part of the Ucayali watershed were the Tropical Forest groups most closely in touch with the Inca Empire. This proximity to the Central Highlands might mean that any sequence established in the central Ucayali basin could be cross dated with Central Andean sequences by means of trade goods. (This was a possibility which failed to materialize.)

Finally, the central Ucayali might prove to be the area relevant to the solution of certain basic problems in South American culture history. Was Tropical Forest Culture largely the result of influences generated by the high civilizations of the Central Andes or, contrarywise, was Tropical Forest Culture sufficiently ancient to have exercised an important seminal influence on the rise of Central Andean civilization? Tello's hypothesis concerning the Tropical Forest origins of Chavín was one extreme form of the latter alternative, \textsuperscript{21} while another less specific and more easily
The History and Nature of the Expedition: Working Conditions

The itinerary of the expedition was relatively simple. I left New York City on March 15, 1956, and traveled by Grace Line steamer to the Port of Callao, Peru, arriving on March 27. The month of April was largely spent in Lima arranging for the documents necessary to continue the trip. On April 23 I was involved in an unsuccessful attempt to fly from Lima to Pucallpa; the plane was forced to return to Lima by bad weather after getting halfway across the Andes. On April 24 I finally arrived at Pucallpa. Between April 24 and April 28 my time was spent in accumulating the equipment necessary for my camp and in hiring a mestizo to take charge of the cooking and running the camp. On April 28 I obtained an outboard motor and a dugout canoe, and traveled up the ox-bow lake of Yarinacocha to the Shipibo village of San Francisco de Yarinacocha at its northern end. Here camp was established in a temporarily unoccupied house within the house cluster of the matrilocal extended family of Segundina Rinijo. Once the camp was in working order, fairly extensive excavations were started at two sites within a mile of my camp. This work continued uninterrupted until August 24, at which point the collections were shipped to Lima by truck and I returned to Lima.
by plane. I left Lima by Grace Line steamer on September 5, and arrived back in New York on September 17, 1956.

The archaeologist who is working alone, or at least without the help of anyone familiar with the aims and techniques of archaeology, is from the outset under severe handicaps. No matter how much such an archaeologist may admire the tactics and strategy proscribed by such an admirable scientist as Sir Mortimer Wheeler, he will not be able to carry out all of these suggestions. When the archaeologist must do all things himself or leave them undone, the quality of some of the performances is going to suffer. One cannot spend all day taking a picture or drawing the stratigraphy of a single sidewall if one must also supervise the course of excavation in several other cuts, label all level bags, and keep a close eye on the washing and numbering of sherds back in camp. Certain compromises with the "Platonic Ideals" of archaeology are necessary if any work is to get done.

If this lone archaeologist is working in the tropical forest regions of South America, he is faced with certain further problems which may necessitate other compromises. Meggers and Evans have discussed some of the problems they met at the mouth of the Amazon and their solutions to the problems. Some of the specific situations, which were noted by Meggers and Evans, were repeated in my own experience. A complete lack of archaeological material other than stone and pottery was as characteristic of the
central Ucayali as it was of Marajó. It was extremely difficult to follow the traces of architectural features in both areas. Roots were truly a nuisance. The density of vegetation made mapping a headache. The problem of transportation was difficult, and a dugout was the only practical solution, though I was able to attach an outboard motor to the dugout that I obtained. In certain respects, however, their experiences and procedures were markedly different than mine.

Meggers and Evans found that intensive stratigraphic work at any one site was either impossible or nonproductive of results to justify the expenditure of labor. I found that after working intensively at two sites for a period of four months I was just beginning to appreciate the stratigraphic subtleties involved. I was able to proceed as I did because of the relatively large and stable labor supply available in the village of San Francisco de Yarinaochoa, and because the two sites on which I worked contained several distinct occupations by peoples of divergent cultures. That it would have been desirable to couple the excavations with a really extensive site survey is freely admitted. It was always my intention to do a complete survey of the shores of Yarinaochoa as soon as I had outlined the stratigraphic sequences obtainable at the two sites. It turned out that the second of these sites continued to furnish surprises up to the point when time and money ran out.
It is perhaps worth while to give an account of the conditions under which the field work was done and of the modifications in technique which were made to meet these specific situations. Some of this matter will be repeated in the descriptions of the individual excavations, but a general statement of field conditions and methodology is assembled here for the casual reader who may not penetrate to the depths of the individual excavations.

When the statement was made that camp was set up inside a Shipibo house, it was meant both literally and figuratively. A Shipibo house consists of a gabled, thatched roof set on six, eight, or ten upright pillars of wood. There are no walls and the floor is carefully swept earth. In some houses there is a raised wooden platform which takes up a portion of the roofed area, and I was lucky enough to secure the use of such a house (Pl. 4a). In the part of the floor not covered by the platform I set up an eight foot by six foot by six foot mosquito bar. The mosquito bar permitted me to work at night by the light of a Coleman lantern, and also served as my sleeping quarters. The platform was sufficiently commodious so that one end could be used as the kitchen and pantry and the other as a sherd laboratory where the individual lots of sherds were washed, laid out to dry, and numbered. There was still sufficient space on the platform so that the lots of washed and numbered sherds, after having been returned to their bags, could be stored off of
the ground. Somewhere in the middle of all this my cook set up his own small mosquito bar and bed.

My only employee from outside of the village of San Francisco de Yarinacocha was my cook, Maximo Gomez. Actually his cooking took only about two hours a day, and the rest of the time he was in charge of the processing of the archaeological collections. His major task was numbering the individual sherds, which during the four month period added up to over 40,000. He also supervised the washing of the sherds and the storing of the processed sherd bags. In all of this work he was extremely conscientious and accurate, and during the course of rechecking the collections and studying them I have found almost no errors in his work. The job of sherd washing was entrusted to a Shipibo boy of about 14 named Gavino. He was a member of the matrilocal extended family in which I was living and was amenable to close supervision.

In order to prevent the mixing of sherds from different levels, he dumped out the water after each bag was finished. No small sherds could be missed in the sludge at the bottom of the dishpan and thus added to the content of the next sherd bag washed. Each lot of sherds was laid out to dry with its sherd bag which was numbered and with a slip of paper from inside the sherd bag which was also numbered.

Now that the camp organization has been described it is possible to discuss the actual digging. I began with a modest
crew of two, consisting of Catalino Cumapa, who was my host and closest contact and who was also one of the most influential and respected leaders of the village, and Catalino's unmarried brother-in-law, Manuelito Rinijo. At this period, when supervision was not taking up much time, I did considerable excavating myself. Once these two were well trained, I proceeded to expand my crew gradually so that my two original workers could help in the training of the new men. One problem I faced was that, while Catalino and Manuelito spoke a workable amount of Spanish and Manuelito read a bit of it, some of the later workmen spoke almost none. Communication with them was possible only in their native language, in which I failed to make much progress, or through signs. Gradually Catalino and Manuelito took on something of the quality of foremen and interpreters. During the last month, when I was working at site UCA-2 and trying to get as much work done as possible in the little time remaining, the crew reached the size of eleven men. With one exception all of the crew were Shipibo Indians, either inhabitants of San Francisco de Yarinacocha, or visiting friends and relatives in San Francisco de Yarinacocha. Many of these latter had come to take part in a girls' puberty celebration and the Venticocho de Julio festivities. The one non-Shipibo was the young son of a Peruvian family which lived near the village.

There was relatively little turnover in my labor force and
I never actually fired a member of the crew. All things considered, the Shipibo made excellent workmen, though there was considerable individual variation both in diligence and intelligence. Beyond the individual variation it soon became evident that the younger workmen were by and large more reliable excavators than the older Indians. Catalino excepted, my four best Shipibo workmen were all under 20. The younger men did more work and did it much better. They took great pride in keeping the side walls of their excavations as straight as possible and the floors of the excavation units as smooth and accurate as possible. The older men were much more given to gossiping and horseplay and showed much less interest in the niceties of their work. Even the poorest of these still did work which was sufficiently precise to be usable for my purposes.

The workmen were paid a flat monthly wage of 300 soles, about 15 dollars at that time, and the work week consisted of five days, Monday through Friday. I would have tried to maintain a longer work week, but the Shipibo needed at least two full days a week to take care of their fields and to look after various other subsistence activities. The work day was seven hours, extending without break from 7:30 A.M. to 2:30 P.M. The idea of a continuous working day with no time out for lunch came from the Shipibos, who wished to have the major part of the afternoon free for fishing and hunting. I was agreeable to the plan.
because it meant that most of the work was done in the relatively cool mornings. This schedule gave me the latter part of the afternoon to keep a close check on the processing of the sherds.

The technique of excavation was finally decided upon after about one week of experimentation, and after that it was not altered. I had originally planned to excavate by natural stratigraphy, but the first couple of experimental excavations showed that this would not be feasible in some excavation units where no natural stratigraphy was obvious. The first alternative to this was the use of six inch horizontal levels within five foot by five foot excavation units. Such levels proved to be too coarse to catch the complicated cultural stratigraphy which the sites had to offer. The midden layers were highly compacted and thin, and horizontal, arbitrary levels tended to cut across the cultural stratigraphy which seemed, more often than not, to parallel the present slope of the ground. The second alternative, and the one on which I finally settled, was to cut arbitrary levels three inches thick, which were parallel to the original ground surface, within five foot by five foot excavation units. This system was maintained by measuring the depth of each completed level at each corner of each unit. The floor of each level was a sloping plane passing through four points each at a vertical depth of three inches or a multiple of three inches below the original surface of the ground. The volume of earth in each
level, would vary only slightly from a value of 6.25 cubic feet, and in the better excavations levels yielded an average of about 100 sherds. All of the sherds, stone, and bone from a particular level was bagged separately and given a lot number indicating site, excavation unit, and level within the unit. The lumps of fired clay which were so common in the excavations were saved by levels from a few five foot by five foot units and for the rest were counted and discarded on the spot. The bagged lots of sherds were carried to camp where they were processed according to the procedures already described. The only departure from this procedure was in cases where intrusive pits were recognized in the course of excavation. Their contents were bagged separately.

The implementation of the method described above was relatively simple. One workman was assigned to each five foot by five foot unit. All the actual excavation, that is the loosening and examining of the soil, was done with the use of Marshalltown five inch trowels. Only after the soil had been thoroughly searched and all sherds removed, were shovels used to remove it from the excavation unit. This time consuming method of excavation was used to maintain the highest possible control over sherd recovery while using workmen of varying degrees of competence and diligence. It was used as a substitute for my original plan of passing all of the excavated dirt through a three mesh to the inch screen. Screening proved impractical under existing
conditions as the clay soils were gummy when moist and rock like when dry. The hardness of the dry clays, which proved to be the greatest single impediment to excavation, can be gauged roughly by the wear on the trowels. In the course of the four month excavation some of the trowels were abraded down to a third of their original length.
The Archaeological Sites

General Discussion

No systematic site survey was made at Yarinacocha. The major reason for this failure was that the two sites in which I excavated were complex and rewarding. In the time available I was unable to solve all of the problems they presented. Beyond this, I feel happier working with a sequence built up by extensive stratigraphic excavations rather than one built out of small samples from a large number of sites. Now that a skeleton sequence for the Yarinacocha area has been established, I believe that an extensive site survey would be the most productive kind of project to undertake for this region in the future.

All of the sites which I visited were brought to my attention by someone else. Because of this fact, any statement about the density of archaeological sites in this part of Peru would be a mere guess, but I suspect that sites are common and that most areas of ground, which are sufficiently high so that they are not periodically flooded, will on investigation show evidence of prehistoric occupation.

In all I recorded six sites. The sites were designated with the initials UGA- indicating that they were in the Province of Ucayali, and were numbered in the order of their discovery (Fig. 1).
UCA-1

This site is at the northern edge of the modern town of Pucallpa on the bluff above a slough connecting the large lake, Pacacocha, to the Ucayali. It is behind the hospital and just to the east of the cantina at the southeast end of Pacacocha. I visited the site on April 26, 1956, in the company of the Reverend Joseph Hocking, who had noted it previously. The visit was brief and I did not have the opportunity of examining it again.

There are several pole and thatch houses on the site of the type which is the common form of residence in Pucallpa. In the vicinity of the houses there are scatterings of broken glass and modern earthenware. There are also some sherds of modern Shipibo pottery. It is worth noting here that the Shipibo pottery does not necessarily indicate a Shipibo occupation, and in this instance it definitely does not. Shipibo pottery manufactured at the village of San Francisco de Yarinacocha is widely used in Pucallpa by all economic classes and sherds often find their way into modern rubbish heaps. Such pottery was in use in the houses on the site.

Beside the Shipibo pottery and the various kinds of non-aboriginal pottery there was a considerable amount of aboriginal pottery which was definitely not of Shipibo manufacture. This was coarse, thick ware, with a rough surface and a temper of large sherd fragments. A collection of about ten pounds of sherds was
made, but only a few of these showed any features of shape or decoration, and only these few sherds were transported back to the United States. The collection is treated in the discussion of the Pacacocha complex.

The only means of judging the extent of the premodern occupation at this location was to note the limits of distribution of the coarse, sherd tempered pottery on the surface. Such sherds were scattered along the edge of the bluff for several hundred feet. No digging was done, and there was no indication that the archaeological deposit had any depth. The location of the site can be noted on the map (Fig. 1).

UCA-2

This is one of the two major sites recorded. It was first marked as an archaeological site by Gunter Tessmann. He made a small collection of archaeological material here and illustrated a few examples in his "Menohen ohne Gott". This illustration included material of the Pacacocha and Hupa-iya complexes, but Tessmann did not distinguish between these two quite different kinds of pottery. Tschopik also made a small collection of archaeological material here in 1953. All of the sherds which he collected were either modern Shipibo or of the Pacacocha complex. It was on the basis of these collections that the American Museum decided to undertake archaeological work at the site.
The site is the center of the modern Shipibo village of San Francisco de Yarinacocha. It occupies the crest of a bluff about 600 feet back from the western shore of Yarinacocha and just to the north of the stream channel which drains Cashibococha into Yarinacocha. The bluff rises abruptly to a height of 40 or 50 feet above the flat land at its base. During the wet season, Yarinacocha rises until the water reaches the foot of the bluff.

The exact limits of the site were never determined. Archaeological deposits extend along the edge of the bluff with greater or lesser thickness for a distance of at least 1500 feet. They spill over the sharp eastern bank and since erosion is extreme there must be considerable secondary deposition at the base of the bluff. No attempt was made to test there. As one progresses to the west back from the edge of the bluff, the land drops away gradually and the archaeological deposit becomes progressively thinner. At a distance of 200 feet from the edge of the bluff the depth of the deposit is negligible in most places. The archaeological deposit is shallow in most parts of the site but in at least two areas reaches a depth of five and one-half feet. It is a complex archaeological midden resulting from at least six and more probably seven or eight distinct occupations.

The extent and intensity of the several occupations could be determined only by testing over the full extent of the site. The available time did not permit such an elaborate attack.
Excavations were attempted at eight locations in the site. Of these excavations only three provided completely satisfactory cultural stratigraphy. The excavations and the information which they yielded will be discussed in later sections of this report.

The location of UCA-2 can be seen in the general map (Fig. 1), on the aerial photograph (Pls. 2, 3), and in the sketch map (Fig. 2) derived from the photograph. The location of the several excavations on the site are indicated in Fig. 3. Because of the extent of the site, and because the topography of the site was mainly the result of natural rather than cultural activity, no topographic map was prepared.

The surface of the site is put to a number of uses. The main street of the village runs most of its length. The street is swept clean daily and kept free of vegetation. Under these conditions the surface is being lowered through erosion, so that non-Shipibo pottery is frequently exposed in the street. Some of the deepest and most productive areas of the site lie directly under the street.

Shipibo houses occupy a considerable area on both sides of the main street. In and around the Shipibo houses the land surface is constantly being lowered through sweeping, and non-Shipibo sherds are frequently to be noted sticking up through the dirt floors of the houses. As a general rule, there is no accumulation of Shipibo midden within 25 feet of a Shipibo house.
All broken pottery and other refuse is removed to at least that distance in the course of the daily sweeping. If the houses were completely isolated, and if it were not for the street which connects them, each house would be surrounded by a ring of midden at a distance of 25 or 30 feet from its corners. Actually, because of the layout and topography of the site, there are two lines of Shipibo refuse, one on either side of the street. It appears that about two-thirds of the Shipibo rubbish is dumped on the edge of the bluff and spills down the side of the bluff. In most places this refuse is eroding away faster than it is being deposited. The other third of the Shipibo refuse is swept to the inside of the main street and here a stratum with great quantities of Shipibo sherds is building up. This stratum is evident in the most important of the excavations made at UCA-2, Stratigraphic Cut 2, and will receive more attention as the excavations are discussed below.

The pattern of midden deposition in this Shipibo village has been described here because it may be of importance to future archaeological work in the Amazon basin. In extensive excavations, the arrangement of houses within a site could be reconstructed from the pattern of trash accumulation. Also the Shipibo mode of garbage disposal seems to be widespread in the upper Amazon basin in the Japura, Vaupes, and Putumayo drainages, and is thus probably of fair antiquity.25
What seems to be the geographical center of the site is now occupied by the soccer field of the Shipibos. This playing field was in almost daily use so no tests were made within its limits, but a test made at the western edge showed that the midden there was of negligible depth. Presumably the midden would become thicker as one went eastward toward the edge of the bluff.

Immediately to the north of the soccer field is a roughly square chacra planted in yuca (sweet manioc). Two of the most important excavations were made within the limits of this chacra. North of this chacra and west of the main street there is a considerable area of dense, second growth jungle which was not examined in detail. The limits of the site in this direction were not determined.

At the southern end of the main street stands the Peruvian government schoolhouse with a parade or drillfield immediately in front of it. There is also a small jail.

Between the drillfield and the soccer field there is an open area covered with grass and heavily infested with chiggers. Cultural deposits seemed to be of negligible depth in this area, but no tests were made.

The area to the south and west of the schoolhouse was all under intensive cultivation for commercial purposes. It is owned and operated by a family of Italian extraction, and I am indebted to the dueña of the property for permission to excavate.
within her lands. This part of the site is being heavily eroded and there are several large, and apparently recent, gullies cutting in through the bluff. Where it has not been eroded away, the cultural deposit often exceeds a depth of two and a half feet. The major part of the cultural deposit is the result of an occupation by people of the Hupa-iya culture, but there is a thinner layer of Shakimu material underlying it in most places. The excavations carried out in this part of the site will be discussed below.

Still farther to the south and beyond a very deep and much branched arroyo, is an area of the bluff which is now cleared for pasture. No excavations were made here, but an examination of the surface revealed only occasional traces of aboriginal occupation. This region seems to be beyond the limits of extensive occupation.

UCA-3

This designation was given to the section of the Shipibo village which lies along the lake shore and to the northeast of UCA-2. See the sketch map (Fig. 2) for the exact location. It was my intention to excavate in this area in order to get a pure, excavated sample of Shipibo pottery. There seemed to be no previous occupation in the area. When excavation was attempted, it was noted that the Shipibo midden had no appreciable depth, so no
further work was done here.

**UCA-4**

This designation was given to a third major segment of the village of San Francisco de Yarinacocha. This unit of the settlement lies about two and one half miles northwest of UCA-2. By foot the journey between the two parts of the village takes a little over an hour. The trip may also be made, somewhat circuitously, by canoe, for UCA-4 stands immediately above a slough which connects with the lower end of Yarinacocha (see the map, Fig. 1). The small Shipibo settlement lies just off the crest of a very high ridge which parallels the slough. I suspect that this ridge is a natural levy but am not really competent to judge the geomorphology of the situation. The slope from the ridge down to the caño is precipitous. The Shipibo houses are on the more gradual slope on the side away from the caño. Evidence of pre-Shipibo occupation is found along the very top of the ridge and in the bare plaza between two of the Shipibo houses. This area is completely free of Shipibo sherds, since all of the Shipibo rubbish is swept farther down the inland slope into the jungle. The area of pre-Shipibo occupation is not great, extending only about 200 feet along the top of the ridge.

No excavations were made, but a search of the plaza
area and the ridge yielded a fairly large and very useful surface collection. The collection suggests that prior to the Shipibo occupation there had been only one other occupation here. That was by people making the kind of pottery which I have called Pacacocha. The site should be excavated, as it would provide a good, pure sample of Pacacocha pottery. The collection made here is analyzed and compared to other Pacacocha collections in the section treating that ceramic complex descriptively.

UCA-5

This site was not visited by me, and I know it only through a very large collection of sherds which some of the Shipibo women brought to me. These sherds were picked up in the course of gardening and the women told me that they were representative of the site. I examined at least 100 pounds of these sherds and selected out those showing rim or bottom form. The sherds were notably uniform, being coarse, thick, poorly fired, sherd tempered, and with an uneven surface. As a whole these sherds most closely resemble those from UCA-1. They are also like the coarser Pacacocha material from UCA-2 and UCA-4, but none of the thinner sherds of this complex occurred in the sherd collection brought to me. This collection and the problems it raises will be discussed in the descriptive section on Pacacocha ceramics.
According to the women who brought me the ceramics, this site is immediately across the caño from UCA-4. It is evidently a very productive one.

**UCA-6**

This site is on the top of a knoll rising from the floor of the jungle at a distance of some 650 yards back from the shore of Yarinacocha. The trail to this knoll leaves the lake shore near the house in which I set up camp (UCA-3), and cuts straight back through the jungle, crossing a small caño just before it starts up the knoll. The exact location of the knoll can best be seen with reference to the aerial photograph and the sketch map made from it (Pls. 2 and 3).

I would estimate that the knoll rises some 30 feet above the dry season level of water in the caño, but I ran my surveying lines only about half way down the side of the knoll toward the caño. As can be seen in Pl. 4a, the top of the knoll is more than 100 feet lower than the top of the surrounding jungle, so that in the aerial photograph the knoll shows up chiefly as an area of low vegetation. The high jungle does not extend up on the slopes of the knoll.

The Shipibo have never lived on this knoll, but they cultivate it at the present time. The southeastern slope of the
site is very sandy and was extensively planted in yuca, pineapple, and banana in 1956. There were patches of sugar cane near the top of the knoll. That part of the knoll not under cultivation was covered by a very dense scrub jungle between 25 and 40 feet high. Most of the excavation on this site was carried on in the cultivated areas, but one line of pits was placed on a connecting passage hacked through a strip of the scrub jungle (Pl. 6b). The full extent of the site was not determined. On the eastern and north-eastern side the knoll drops abruptly toward the caño and occupation does not extend down this steep bank. A fair number of sherds, mostly of the Late Tutishcainyo complex, are spread over the whole sandy, southeastern side of the knoll. This area was open and could be investigated with ease. Aside from this area, investigation of the site was confined to within a 60 foot radius of the top of the knoll. Large areas of the gentle, western and north-western slopes of the knoll were in very dense scrub jungle and were not examined. On the basis of the excavations, it seems safe to predict that when this side of the knoll is carefully searched extensive cultural deposits will be found. These deposits will be mainly of Late Tutishcainyo culture.

The topographic map (Fig. 4) will give an idea of the shape of the small area around the top of the knoll where the excavations were concentrated. This in conjunction with the photographs of the site area should be a sufficient addition to
the description already given. Where they are of importance, further details will be given as the individual excavations at the site are discussed.
Descriptions of the Excavations:

The Chronological Information Derived from the Excavations

General Discussion

In a number of recent archaeological monographs the data from stratigraphic excavations have been presented in a highly summary form. Frequently the results of several stratigraphic cuts from the same site or even from a number of sites are merged in a single table. Such complex tables are then offered as accurate pictures of cultural change. The analysis of chronological problems presented in this paper stands apart from this trend. I have considered that the chronological implications of each stratigraphic cut could be understood only through an analysis which took into account the unique conditions under which midden was deposited at that particular point. The stratigraphic complexity of the Yarinacocha sites may be unusual, but I have found that I could not understand the collective implications of the several stratigraphic cuts until I understood the unique depositional history of each cut individually. This statement will perhaps be more meaningful after specific applications have been discussed.

In the description of their archaeological work at the mouth of the Amazon, Meggers and Evans employ an effective method for the presentation of the information derived from the
They have continued with the same kind of organization in their latest major publication on tropical forest archaeology. They excavate fairly consistently in arbitrary levels of eight or 15 centimeters thickness.

The ceramic content of each of these levels is reduced to a bar graph showing the relative frequency of each ceramic type. Once this is done the individual bar graphs are treated as if each were an accurate measure of the relative popularity of the various ceramic types at a particular point in time. On the basis of this assumption the bar graphs of the levels from several excavation[s] are intercalated so as to present the most consistent and smoothest picture of ceramic change within a particular cultural tradition. In the course of this seriation, that is, in the course of the intercalation of the bar graphs representing the excavated levels, the basic principle of stratigraphy is not violated. No bar graph of a particular level is seriated as later than the bar graph of a level which lay above it in a particular excavation unit. Using this method, the results of a large number of excavations are summarized in a compact master chart. In theory such a chart gives one the best of both of those powerful tools of archaeology, stratigraphy and seriation.

There would be no point in digressing here to review the history of the method which Meggers and Evans utilize. It is enough to point out that the specific model of seriation which they
use is largely the work of Ford. Ford has been an admirable historian of the development of these ideas in his own work and has most ably propounded the rationale and virtues of his style of seriation. The widespread use of this particular model of seriation by archaeologists seems to be largely the result of its diffusion from Ford to others participating in the Virú Valley project (note Collier's paper). The feature of methodology which interests us most here is the presentation of the stratigraphic information from several distinct excavations lumped together in a single seriation chart in lieu of a detailed analysis of each individual excavation. This device certainly has the virtues of compactness and ease of comprehension.

The work of Meggers and Evans at the mouth of the Amazon has a definite priority in the field of tropical forest archaeology, since it was the first project in the area to exercise close control over excavation procedures, and to present the results of these excavations in a quantitative manner. This fact and the ease of comparability, which would result if I followed their method of presentation, are strong arguments in favor of honoring the precedent which they have established. This precedent should not be disregarded without serious consideration. A detailed account of the reasons which lead me to abandon their method of presentation is in order.
The sites which I excavated seem to present much more complex stratigraphic problems than the sites at the mouth of the Amazon. In general, the sites excavated by Meggers and Evans appear to be single component sites. That is, they seem to have been occupied by a single social group of people for an appreciable period of time and then to have been abandoned not to be occupied subsequently. This does not rule out the possibility of seasonal occupation or of a series of occupations by the same group separated by fallow periods of a decade or two. Granted the extreme alteration in tropical forest soils, which tends to obliterate all but the most massive and striking features of soil profiles, and given the method of excavation used by Meggers and Evans, the stratigraphic evidence recovered under these three situations would be indistinguishable. As long as one is dealing with the refuse of a single social group, one could not under these conditions decide if one is dealing with continuous, seasonal, or intermittent occupation over a period of time. For purposes of seriation these distinctions would not be important. All that is necessary for the seriation to be successful is for the ceramics in any particular level to be similar to and a direct outgrowth of the ceramics in the preceding level. In this circumstance the failure of the arbitrary levels of the excavation to coincide with the natural levels of deposition would cause no great distortion of the actual ceramic history. The worst that could happen would be a
smoothing effect on the ceramic differences between any two strata. In every case the ceramic content of a particular arbitrary level will be a fairly accurate sample of the ceramics in use at the site during a particular point in time.

In contrast to the situation described above let us imagine sites which show several discrete periods of occupation by what appear to be completely distinct social groups. Such multicomponent sites may yield batches of sherds which are mixtures of the refuse from two or more temporally distinct occupations. Even when one digs most carefully and by natural stratigraphy it is seldom possible to obtain absolutely pure samples of the later occupations. In the course of the mechanical mixture of soils inevitable in any form of occupation, sherds from the lower midden will find their way into the upper deposits. When the site is excavated by arbitrary levels, the problem becomes even more vexing as there will certainly be a number of the arbitrary levels of excavation which will straddle the natural layers of deposition. The ceramic content of such levels will not be representative of the ceramics made by a particular group or of the ceramics made at any particular point in time.

The above statement may seem obvious enough, but it has certain implications which are worth emphasizing. If such a mixed sample is used in relative dating or in seriation it will definitely
give wrong answers. Such a mixed sample, when seriated, will be given a relative date intermediate between the two constituent complexes. If it is about a fifty fifty mixture it will be seriated about half way between them. This "date" may then be extended to any rare or unique artifacts in the sample and to the "context" from which the sample came.

An imaginary example may elucidate this possibility. Suppose that an archaeologist wants to date the introduction of a certain style of female figurine, one with large breasts and coffee bean eyes, into the lower Mugamuga valley. In the Mugamuga valley we find a single, unbroken cultural tradition for which three phases have been described. Phase A is the earliest, and for purposes of seriation is characterized by having 10 per cent of its pottery tempered with shell and 90 per cent of its pottery tempered with hair. Phase B is characterized by having 50 per cent of its pottery tempered with hair and 50 per cent with shell, while Phase C, which is immediately prehistoric, has 90 per cent shell and 10 per cent hair tempering. The lower Mugamuga valley is periodically flooded, and there are only a few places that stay dry during the wet season, so that various high places were often reoccupied.

There are a number of occurrences of the large breasted, female figurines in sites which have deep midden, all of which seem to date from Phase C. On the other hand, none of these figurines
has been discovered in sites which show only midden of Phase A. Four sites with deep midden are quite similar in that they run 40 per cent shell temper in the lower levels and 65 per cent shell temper in the upper levels. These are taken as typical of the intermediate phase, Phase B. None of these has produced a single example of the large breasted, female figurines. There are, however, two very shallow sites, both too shallow to make stratigraphic control possible, which have produced a number of fragments of the large breasted, female figurines. Both of these sites produced sherd collections which run about 50 per cent hair and 50 per cent shell temper. Therefore, it appears definitely established that the figurines in question first appeared in the lower Mugamuga valley during Phase B. The results are announced in print and are accepted as true by almost all of the archaeologists specializing in the lower Mugamuga valley. Then more work is done on these two shallow sites. In one case the sherd collection which dated the site is re-examined on the basis of a more refined classification of rim shapes, and it appears that the rims from this particular site resemble those found on sites definitely dated as Phase A or definitely dated as Phase C but never on those from the other sites dated as Phase B, in fact, there are about 50 per cent of the rims of the kind found on Phase A sites and 50 per cent of the kind found on Phase C sites. The second site turns out to have two cemeteries, one of which produces 90 per cent shell tempered
vessels as grave offerings and the other 90 per cent hair tempered vessels as grave offerings. Since the two collections of sherds which were used to give a Phase B "date" to the figurines turned out to be mechanical mixtures of Phase A and Phase C sherds, it now appears far more likely that this style of figurine made its appearance in the lower Mugamuga valley in Phase C times.

The example which we have just examined is imaginary. This does not mean that it is improbable or far fetched. Actual situations closely paralleling this model could be produced.

The geography of the middle Ucayali Valley is not dissimilar to that of the lower Mississippi. Both are areas of meandering, aggrading rivers which often change their course and annually overflow their banks. Williams has said of the situation in the Mississippi Valley:

This relative scarcity of land which remained dry under foot the year round and which could be used as a place of more or less permanent habitation caused the favorable sections of the area to be used over and over again as village sites. Because of this pattern of site reoccupation or long intermittent habitation, most sites, no matter whether their refuse deposits are 5 feet deep or only 1 foot thick, contain more than one cultural component. Surface collections from such sites, which are the vast majority found so far, are difficult to handle, and the seriation of sherd samples must be treated with the greatest
care if justice is to be done to the resulting picture of cultural development. 30

I can not make a general statement about the sites on the middle Ucayali as to whether there are more multiple component sites than single component sites. My sample of sites is much too small. All I can say is that the two sites at which I did carry on excavations were emphatically multicomponent sites, and I suspect that they were multicomponent sites for just the reasons that Williams presented.

Tolstoy, in his lucid defense of Ford's method of seriation, has emphasized that a seriation is no better than the samples that are fed into it. Thus he says, "the effectiveness of seriation rests on the condition that the samples gathered in the field represent by and large cultural 'points' or brief intervals in time, not accidental mixtures of disparate materials spanning large time intervals." 31 Tolstoy has also discussed the ways in which mixture can arise both in surface and in excavated samples. He has not stressed the process which, under the conditions of tropical forest archaeology, seems most operative. Here such mixtures may arise frequently through the application of arbitrary excavation units to a natural stratigraphy which is not easily distinguished in a profile. In every case where such an arbitrary excavation level is cut by the demarcation between two
natural levels of a multicomponent site, a sample which is worthless and misleading for purposes of seriation will be produced.

These circumstances present difficulties. The samples I must work with have been dug by arbitrary levels and in many cases even if I had wished to dig them by natural levels, I could not come appreciably nearer to reaching this ideal. The only possible way out is to try to reconstruct the natural stratigraphy and the history of deposition for each major stratigraphic cut. It may be questioned as to whether this is possible on the basis of the imperfect data which is at hand. The substantive part of this chapter is an attempt at such a reconstruction for each of the major stratigraphic cuts. In one sense, the purpose of this work will be to reduce the ceramic contents of each stratigraphic cut to a series of samples each of which fulfill the condition set down in Tolstoy's statement. Each sample will, we hope, represent a single point in time. The vertical order of the samples within the stratigraphic cuts will give their order in time, and beyond this the conditions of the excavation may give some indication of the relative amounts of elapsed time between the various occupations which gave rise to these samples.

When one is dealing with multiple component sites, one is faced with two kinds of chronological problems. One, which might be called macrochronology, involves the separation and ordering of the various components which went into building up the cultural
deposit. The other, which might be called microchronology, involves the search for the direction and nature of cultural change within the relatively short spans of time represented by the individual components. The first problem is relatively simple and involves only establishing that several distinct components are involved and establishing the stratigraphic relationship between these two components. I feel that I have been successful in dealing with this first problem. The second problem is more complicated and involves isolating the cultural content of each of the components and analyzing each component as if it were a single occupation site uninfluenced by earlier or later occupations. In practice this means taking those excavation units in which the remains of the component in question are most concentrated and subtracting from these units all non-contemporaneous cultural material which has been mechanically intruded into these units from earlier or later occupations. Only then are such units fit to be subjected to any kind of microchronological analysis. These stipulations are merely correlaries of the condition laid down by Tolstoy. If a sample is to be taken as representative of a particular point in time, all of its contents must, in fact, come from that point in time. This is especially true if seriation is to be used. For a relatively small number of intrusive sherds will alter the percentages sufficiently so that the sample may be moved a great distance along the seriation chart.
The following methodology is an attempt to meet some of the practical difficulties raised in the preceding discussion. I have also attempted to formulate this methodology in an operational manner. I am interested in isolating and describing the individual components in a multicomponent site. Henceforth I shall call such a component a ceramic complex. For the Yarinaococha region the terms cultural component and ceramic complex are synonymous for most practical purposes, since in all of the excavations, the cultural components must be defined and studied solely in terms of their ceramic content.

My abstract definition of a ceramic complex is a body of pottery which was made by a face to face social group over a relatively short period of time. My operational definition of a ceramic complex is any series of ceramic features (i.e., any distinction or cluster of distinctions which can be used consistently and objectively as a sorting criterion) which share the same pattern of horizontal and vertical distribution through a series of stratigraphic cuts. There is a rationale behind this definition. While several successive occupations in the same spot may result in a considerable mixture of sherds from different complexes, in most cases this churning will not progress sufficiently so that sherds of all of the components in the deposit are homogeneously distributed. In most cases the distribution patterns of the sherds from each complex will remain observably distinct. Even
in cases of extreme disturbance, such differences in distribution should be distinguishable if one makes use of large stratigraphic cuts and of horizontal as well as vertical controls. Furthermore, the individual ceramic features which are diagnostic of a ceramic complex should share the same general pattern of distribution over the whole site. Therefore, a total complex can be treated as a cluster of ceramic features, all of which show the same general pattern of horizontal and vertical distribution throughout a large stratigraphic cut or a site. Once the reality of such a clustering is demonstrated, sherds without context or with doubtful context can be assigned to the complex on the basis of showing a number of the features which define the complex, but this should be contemplated only during the last stages of an analysis. After all sherds, or at least all decorated sherds, have been assigned to their proper ceramic complex, and thus to their proper cultural component, it becomes possible to identify and remove intrusive sherds from particular samples. In this way pure samples which are accurate representatives of particular ceramic complexes may be restored.

A precise explanation of the way in which I am using the phrase ceramic feature is in order. I have taken the definition from a recent paper by Rowe, but am using it in a considerably more restricted sense than did Rowe. By ceramic feature I mean any distinction or cluster of distinction which can be used
consistently and objectively as a sorting criterion. That is, any characteristic of paste, firing, shape, surface finish, design, or combinations thereof, which one can distinguish consistently in a quantity of ceramic material from a series of related excavations.

A ceramic feature is to be regarded merely as a tool for pulling complexes out of multicomponent sites, or for extracting what we have called microchronology out of a single complex of some duration. I shall use the word mode somewhat in the way it has been used by Rouse34 and by Smith, Wiley, and Gifford35 to cover the rest of what Rowe has called ceramic features. My usage of the word, mode, has application only in discourse dealing with the structural analysis of ceramic complexes viewed synchronically.

By mode I refer to a distinction which was consistently made in the minds of the potters of a particular face to face social group. I feel that it is absolutely necessary to make the distinction between ceramic feature and ceramic mode in order to circumvent the argument between those archaeologists who maintain that useful classificatory units must have cultural reality and those archaeological pragmatists who maintain that at best classificatory units are only useful tools and that questions of the cultural reality are irrelevant. A mode, by definition, has cultural reality but, as such, does not necessarily have a precisely definable chronological significance. A ceramic feature to be useful must show a precisely definable chronological significance, otherwise it will be of no
value to the archaeologist. It does not necessarily have cultural reality. Since for the remainder of the chapter I will be discussing ceramic features and not ceramic modes, there is no value in belaboring this point further. However, this distinction will be the focus of further discussion in later sections of this paper.

Now that the theory of my chronological analysis has been presented it will be necessary to say a few words about the practice. For each of the group of five foot by five foot units which I choose to consider as meaningful blocks for chronological analysis, I made up a blank form with a space for tallying the contents of each three inch level within each unit. Such blocks of five foot by five foot units have been designated stratigraphic cuts. A large number of copies of the form were then dittoed for each of the stratigraphic cuts. For each ceramic feature which I distinguished in a particular cut I set aside an individual copy of the form appropriately labeled, and each occurrence of the feature within the cut was tallied on the appropriate sheet. The total of these sheets showing the distribution of features was then inspected to see how many distinct patterns of distribution were present. This examination indicated the number of ceramic complexes present in the unit and also in almost every instance gave a clear indication of the stratigraphic relationship between the several complexes present. All of the features showing the same general pattern of distribution were grouped together and from
that point on each grouping was treated as a demonstrable ceramic complex.

Should an inspection of the assembled distribution tables reveal a large number of overlapping distribution patterns for the various features rather than a smaller number of distinct distribution patterns, this fact could be considered as indicative of a single component occupation of some duration rather than of a multicomponent site. One could directly attack the problems of microchronology in this situation. It may be noted that this kind of analysis of ceramic material involves considerable work, and in the course of the analysis every sherd in the collection is handled several times. On the other hand, much of the work necessary for the structural analysis of the ceramic complexes is already done through this kind of ceramic ordering.

It is hoped that the above discussion has convinced the reader of the necessity for a detailed treatment of each of the significant excavations, but the interest of the following detailed treatment to the general reader may be questioned. It is suggested that the reader who is interested only in the general picture of what I found and not in the details of how I arrived at this picture confine himself to the summary statement at the end of the discussion of each stratigraphic cut.

It is worth stressing again that the chronological arguments in this present chapter are based entirely on ceramic
data. The acid character of jungle soils makes for poor preservation of archaeological remains. Shell and bone are preserved in recent Shipibo refuse but in all pre-Shipibo deposits almost every trace of organic material has been leached away. There are occasional flecks of charcoal and charcoal stains, but even these are rare. With one major exception, to be noted below, every trace of bone has completely disappeared. Since Yarinacocha is in an alluvial plain, natural stone above pebble size is extremely rare. Unworked stone is uncommon in the middens, and artifacts of stone are rare. Stone axes are the one kind of lithic artifact sufficiently common to show cultural patterning. These show a remarkable stability in form through time, so that they are of little service for refined chronological work. For the rest of this section on chronology, attention will be focused entirely on the ceramic complexes. Stone and stone artifacts will be given individual attention in a separate section. The amorphous lumps of fired clay which make up such a large part of the volume of most cuts will also be given separate treatment.

Excavations at UCA-6

Stratigraphic Cut 1

DESCRIPTION OF EXCAVATION: Stratigraphic Cut 1 at UCA-6 consisted of 16 five foot by five foot units. These units
are numbered 1 through 10, 43 through 45, 31 through 33. The arrangement of these units with regard to each other and to the topography of the site can best be understood with reference to the site map, Fig. 4. The somewhat chaotic system of numbering of the units in this cut is a result of my failure to establish a grid system for the whole site, but considering the amount of time and labor which would have been expended in clearing and mapping the whole site, I do not feel obliged to be particularly apologetic about these inconsistencies.

Stratigraphic Cut 1 was partially in a Shipibo field of sugar cane and partially in the scrub jungle. The site was selected for excavation because of the large collection of sherds which was made on the surface of what later became Units 1 and 2. It can be noted from the site map that a small gully has eroded into the knoll at this point and a dense layer of Late Tutishcainyo midden was thus exposed. The cut was originally conceived as a 10 unit block, that is a rectangle with the dimensions of 10 feet by 25 feet. The major axis of the cut was laid out at 32 degrees east of magnetic north. This position was selected in order to spare as much as possible of the sugar cane field. In spite of this precaution, by the time the cut had been expanded and the back-dirt piles had built up on both sides of the excavation, little was left of the sugar cane field. Nevertheless, this particular axis proved to be a fortunate one for obtaining a good cross
section of the cultural deposits on this part of the site.

Excavation was started here on May 17, 1966, after two weeks of fairly unsuccessful digging at UCA-2. At this time I was still using a two man crew. The ten original units were excavated in checkerboard fashion; that is the odd numbered units were excavated to sterile base before the even numbered units were started. The profiles of all four side walls of each of the odd numbered units was recorded before excavation was started on the even numbered units. In this excavation and in all excavation carried out subsequent to it, each unit was taken down in arbitrary levels three inches thick and parallel to the original ground surface. All of the surface irregularities were absorbed in the first level. For each level depth measurements were made from the ground surface at each of the four corners of the unit. Every effort was made to keep the side walls of the excavations absolutely vertical and to maintain the floor of every level as a plane passing through the four points three inches and the various multiples of three inches below the four corners. Excavation was continued in each unit level by level until at least 80 per cent of the floor of the last level had penetrated into the culturally sterile red clay which forms the base of the midden. All pockets of midden extending still further into the red clay base were then cleaned out completely and their cultural content added to that of the deepest full level in the pit.
All stone, whether worked or not, was placed in the level bags and saved. All fragments of pottery were bagged by levels and numbered by levels. The irregular baked clay objects which formed a very significant part of the bulk of this midden were counted by levels and then discarded. An exception to this last procedure was made for Units 1, 3, and 5. All of the baked clay objects from these three units were saved in the level bags and shipped back to the United States for further study. With the exception of a small fragment of a carnivore's mandible from the top level on one of the units, all traces of bone had completely disappeared from the midden. With one other exception this statement may be extended to all of the other excavations made in this site. The preceding statement refers to free bone only since a considerable number of fish vertebrae and fish scales were found included within the paste of Early Tutishcoinyo pottery. All traces of shell had likewise completely leached out of the midden. Shell was in common use as a tempering material in Early Tutishcoinyo pottery, and much ground shell was preserved sealed within the paste of potsherds.

In general, I feel that my experiment in using non-horizontal, arbitrary levels was successful in that such levels more closely approximated the cultural stratigraphy than horizontal ones would have. I found that the chief flaw in this manner of excavation was that it gave poor results in cases where the
surface of the cultural deposit has been altered by recent gully erosion. This failure shows up in the results of Unit 1 of the stratigraphic cut now under discussion and to a much lesser degree in Units 16, 18, and 20 of stratigraphic Cut 4 at UCA-2.

The workmen were very scrupulous about maintaining levels, and in the present stratigraphic cut only one level was lost. Level 6 of unit 44 was dug too deep, and so its contents were added to and presented as a part of level 7 of that unit. As it turned out, this was the only level lost in the total course of excavations at both sites. As has been stated already, all excavation and searching of the soil was done with Marshalltown five inch mason's trowels, or similar trowels of Italian manufacture which were purchased in Pucallpa after some of the Marshalltown trowels had worn down to the nub. Shovels were used only to remove the backdirt from the pits. This method was used to insure maximum control over sherd recovery while employing workmen unused to archaeological work. In this respect I feel that the technique was highly successful, and that the sherd samples recovered from the various levels, done by different workmen, are comparable samples in a statistical sense.

The material recovered from the ten original units proved of sufficient interest so that the stratigraphic cut was expanded by running a trench to the northeast toward the top of the knoll. By this time several more Shipibo had been added to the
work force. As the dry season progressed excavation became more difficult, for the lower levels of the units took on a cement-like hardness. The lowest levels of Units 32 and 31 were completed only with the greatest difficulty and were the last digging accomplished at the site before all of our energies were again focused on UCA-2. Excavation and backfilling at UCA-6 were completed by July 20.

PHYSICAL STRATIGRAPHY: The physical stratigraphy revealed in the sidewalls of this excavation is of a less complex nature than the cultural stratigraphy which it contained. Fig. 5 presents a full set of profiles for this stratigraphic cut. The top layer present in this profile is a fairly loose sand or sandy clay. It is light gray-brown in color and has a relatively low content of cultural remains. Most of the sherds recovered from levels within this layer have a battered and eroded look and are of smaller size than sherds from lower levels in the site. This layer has been designated Stratum 1. The layer underlying stratum 1 is still sandy, but has a much higher clay content. Cultural material is abundant. The second layer is relatively easy to dig when moist but becomes hard when dry. The color of this layer is a dark brown. This second layer has been designated Stratum 2. In the northeastern extension of the stratigraphic cut a thin layer of very dense refuse, mainly sherds and amorphous baked clay fragments, is noted lying directly on the surface of the sterile red clay base.
This layer shows up very clearly in the profiles as a series of clay fragments and sherds sticking out of the sidewalls.

The break between the overlying midden and the red, lateritic clay base on which it lies is sharp and clear in the profiles. The surface of the clay is by no means smooth, but it does not intergrade with the midden. The division between stratum 1 and stratum 2 is not as sharp. It does not show up in any of the photographs which I took of the sidewalls, however, when the sidewalls are smooth and moist, the color change is sufficiently marked so that an accurate drawing of the profiles can be made.

In Units 5 and 43 through 45, at a depth of about 24 inches, there was a layer of loose sand, relatively barren of cultural material. This was noticeable during the course of excavation, since it was so much softer and easier to dig than the surrounding midden. However, it was not evident in the sidewalls of these units once the excavation had been completed. This layer is reflected in the relatively lean level bags of levels 8 or 9 in this series of units.

Two pockets of obvious recent disturbance were noted in the sidewalls and are indicated in the profiles. They are almost certainly the result of recent Shipibo agricultural activity. Probably they indicate spots where the root systems of moderate sized trees were grubbed out. These are of interest only in that they suggest how a modern Shipibo sherd could have reached a depth
of nine inches in Unit 3.

The irregularity of the surface of the red clay base has already been mentioned and can be observed in the profiles. Several small pits, six to nine inches deep, penetrating into the hard red clay can be noted in the profiles. Others in the center of various of the units were dutifully measured and recorded. Their arrangement does not suggest a pattern which could be interpreted as the ground plan of a house or houses, but this is quite possibly due to the fact that not enough of this original occupation surface of the site was cleared. Most of these pits were irregular with wide mouths and shallow bottoms, but the profile of the pit exposed in the northeast sidewall of the excavation unit number 10 is sufficiently narrow and deep to suggest that it was a post mold. The two broad, shallow, basin shaped depressions presented in profile in the northwest side wall of Units 9 and 10 are sufficiently regular in outline to make one suspect that they were excavated by human agency. The more westerly of these was densely packed with baked clay objects and sherds. Among these were several irregular chunks of clay which bore pole impressions. The pattern of these impressions (Fig. 127a) indicates that these represent fragments of a wattle and daub wall which had burned. All of these observations lead me to believe that considerable valuable information concerning Early Tutishoainyo architecture could be obtained if large areas of the original clay surface of the hill were carefully cleared and
mapped. To do this properly would necessitate a different set of digging techniques and a crew more carefully trained than the one I had at my disposal. The lack of any large, relatively flat areas, which might have served as house floors, is puzzling. The use of pile dwellings might be indicated, and this possibility has already been suggested by Meggers and Evans for the earliest inhabitants of Marajo.

A particularly large sherd from the complex which I have designated Yarinacocha was exposed in the northwest sidewall of Unit 10 at a depth of about 15 inches. This is indicated in the profile. Stacked together with this sherd were several other pieces of the same large urn comprising about one-half of a vessel similar to Fig. 102a. Unfortunately, this batch of sherds was misplaced in the course of shipment to the United States, so the urn could not be restored. This was the only batch of material lost in shipment. The position of this group of sherds is interesting, since it is exactly at the boundary between Stratum 1 and Stratum 2. This provenience is highly relevant to the understanding of the distribution of Yarinacocha pottery within this stratigraphic cut.

A huge urn of coarse, corrugated ware was found within the limits of Unit 33 associated with the neck of a somewhat smaller pot of the same ware. The urn had been buried in the ground whole, at a time when the ground surface had approximately reached its present level, otherwise, given the height of the urn, the rim...
would have projected far above the ground surface. The pointed bottom of the urn was only fifteen inches below the surface. The rim and top part of the walls of the urn had been badly broken and scattered by root action, but the lower part was still in place, though badly cracked. The condition of the urn as excavated can be seen in Pl. 6a, and the restored urn and the pot neck associated with it are illustrated in Figs. 117 and 118. Catalino and I did the excavation of the interior of the urn very carefully, being constantly on the look out for any traces of what the urn might have contained. As far as the naked eye could tell, the sandy soil inside was identical to that outside the urn. Nonetheless, I feel fairly certain that I was dealing here with an instance of urn burial. Except for the lack of any trace of human bones this feature is very like the Arúa urn burials on Marajó and the urn burials on the Guaporé recently described by Becker-Donner.\(^\text{37}\)

**ANALYSIS OF CHRONOLOGY:** As can be seen from the profiles, the cultural deposits in this excavation are between 30 and 36 inches deep in most areas. This means that the excavations are 10, 11, or 12 levels deep. It is now time to consider the distribution of each identifiable ceramic feature within the levels of this stratigraphic cut. If all ceramic features within this cut show the same pattern of spatial distribution, then I am treating with a single component deposit. If, on the other hand, there are several distinct patterns of spatial distribution
displayed by various ceramic features, this must be taken as evidence for a multi-component site or at least an occupation of long duration. Should the cut give evidence of multicomponent deposition, then each ceramic feature must be assigned to a particular component, and the time relationship between the components must be established. Finally, an attempt must be made to relate the cultural stratigraphy to the natural stratigraphy.

The total sherd count for each level of this stratigraphic cut is given in Table 1. From this data one may form a clear idea of the intensity of occupation in the various areas and levels of the stratigraphic cut. Especially notable is the scarcity of sherds in most of those levels which fall within Stratum 1 of the natural stratigraphy. This poverty of cultural material is most noticeable in the northeastern part of the cut in Unit 31, and was even more marked in Unit 30 where excavation was not completed after the first two levels proved to be completely sterile.

In the chronological analysis of this cut several minor, late components are immediately recognizable in the upper levels. It is necessary to disregard the effect of these components if the major chronological problem presented by the cut is to be clearly analyzed. There are a number of problems to be unraveled, and these must be treated individually if the total picture is to be made clear. To this purpose certain groups of pottery, the remains of the later components, were disregarded at this particular stage in
the analysis as irrelevant to the most significant aspect of cultural stratigraphy in this particular cut. For the time, I set aside the few modern Shipibo sherds whose distribution is given in Table 2. These obviously formed a minor and current component of this midden. There are several features which immediately set these sherds apart from all others in this stratigraphic cut.

Likewise, I put aside the coarse, sherd-tempered, corrugated ware as well as a distinctive, crude, plain ware which is associated with it. The position of the whole corrugated urn in Unit 33 and the distribution of the remainder of the corrugated sherds in the stratigraphic cut (Table 4) indicated that these sherds represent a separate component, relatively late in relationship to the depositional history of this midden.

There is a fairly large quantity of thick pottery with a coarse sherd temper, which is usually plain, but which sometimes has painted decoration. A feature of surface finish, a highly floated surface, is distinctive to this pottery. A number of features of rim shape are also diagnostic. The distribution of this pottery, which has been designated the Yarinacocha Complex, is presented in Table 5. This distribution presents certain difficulties which will be considered presently, but for the present analysis this pottery was considered indicative of a relatively late component and set aside.

The ceramics which remained after the above mentioned
components had been subtracted were subjected to a complete analysis by ceramic features, other than paste and firing. This meant that all absolutely plain sherds were temporarily disregarded, while all sherds showing surface decoration, rim form, basal angle form, or any other distinctive feature of form such as a spout or handle were retained. The distribution of each distinguishable feature of shape or decoration was then individually plotted. Once this was done it becomes evident that there were two distinct patterns of spatial distribution involved. From the point of view of methodological rigor it would have been desirable to publish a tabular distribution for each of the features in order to demonstrate that there are, in fact, two and only two patterns of distribution. Such tables have been prepared and are on file, with the rest of my notes, at the American Museum of Natural History. Distributions of some of the more common features are given below.

The most characteristic ceramic feature, whose pattern of distribution clusters in the lowest levels of the excavation, is represented by a group of rims whose range is illustrated in Figs. 20; 21. The decisive single trait here is a flanged rim with two incised lines on the flat, upper surface of the flange and one incised line just below the rim in the interior of the vessel. A number of variations within this general shape feature were checked to see if their distribution varied notably from that of the pattern of the generalized trait. The results of this study
were generally negative. All other features or combinations of features exhibited on these flanged rims, showed the same strong tendency to be distributed in the lowest levels of the cut. There was a fair range of design motifs on the decorated upper surface of these rims, and a variety of texturing technique to fill in the zones of these designs, but the distribution of any one of these features did not differ significantly from that of any other. Later when I am examining the possibility of slight chronologically significant shifts within the earliest complex, certain possible exceptions will be discussed, but these variations in distribution were all minor compared to the difference of any one of them from the pattern of distribution of any of the features of the later major component. The distribution of all flanged rims with interior incision in stratigraphic Cut 1 is given in Table 6.

Basal flanges are a feature particularly common in this stratigraphic cut. The basic shape feature of basal flange does not in itself show a strongly distinctive pattern of distribution, but when it is combined with the various features of surface decoration which occur on it, several groups of basal flanges can be distinguished which do show one or the other of the two major patterns of distribution. Those basal flanges which show the same quality of incised line as the group of rims just discussed, show the same range of surface texturing, and an expanded but related series of design motifs also show the same pattern of
distribution as the flanged rims (see Table 7). Those basal flanges which do not meet these specifications show the other pattern of distribution (see below, Table 20).

There are a series of rims, of the kind illustrated in Fig. 30, which come from fairly deep, slightly constricted bowls. On these rims the decorated surface is turned outward rather than upward. In most cases the designs on these rims are the same as those on the more numerous flanged rims discussed earlier, but rims of this general shape show a wider range of motifs. When this series of rims is broken up into several groups on the basis of small variations of shape and the presence or absence of the internal incised line just below the top of the rim, most of these groups show a pattern of distribution which coincides with that of the more numerous flanged rims discussed above. The summation of the distribution of these groups is presented in Table 8. Two groups, however, show a pattern of distribution which overlaps the two major patterns suggesting that there are certain traits which the two complexes share in forms which are not readily sortable.

Broadmouthed, shallow bowls with slightly concave sides and an unmodified rim occur in both complexes. When sherds from these bowls are studied, it is noted that one group of them carries a series of incised decorations identical in motif and treatment to those on the basal flanges already assigned to the earlier complex. The distribution of this group of sherds is given in
Table 9, and bowls of this kind are illustrated in Figs. 31; 32. It can be noted that this is the same pattern of distribution that we have already seen several times before.

A small, sharp ridge of clay, added to the basal angle, with an acute angle profile and a smooth, neat finish, is a feature which shows the pattern of distribution which places it in the earlier complex. Basal angles of this type are illustrated in Fig. 20 a; Fig 22 e, f, l, and the distribution of this feature is presented in Table 10.

Vessels with a compound profile, specifically with the top part of their sidewalls concave and with the bottom part of their sidewalls markedly convex, form another shape feature which is found in both complexes, but again this shape feature can be broken into several groups on the basis of surface decoration. Those showing the kind of designs and surface treatment noted on the rims and basal flanges already assigned to the earlier complex also show a pattern of distribution (Table 11) which places them securely in the early component. The variation within this group of decorated shoulders is shown in Figs. 23; 24. Certain design motifs on these convex shoulders are outside the range already noted on flanged rims and basal flanges, but still show distribution patterns which place them in the earlier component. Among these are decorations consisting of closely spaced vertical incisions (Fig. 22 n) and large round pits (Fig. 23 c). Certain other
design motifs on these shoulders show a pattern of distribution which indicates that they belong in the later complex and these are tabulated below (Table 21). One design group, that consisting of shoulders decorated by contiguous rows of pits, shows a pattern of distribution spanning the two complexes and evidently occurs in a very similar form in both complexes.

One final group of basal angles will be mentioned as occurring exclusively in the earlier complex. These are nearly right angle basal angles, without added flanges or ridges, which occur on very large pots with slightly concave, flaring walls. Such an angle is always associated with a broad band of decoration immediately above it. In surface treatment this band shows a range of texturing and incision identical to that on other major features assigned to the earlier complex. The range of designs is larger and can not at present be studied because of the fragmentary nature of the material. Sherds showing basal angles of this kind are illustrated in Fig. 29, and their distribution is given in Table 12.

There are a large number of other features which when plotted show distributions identical to those we have just examined. To show the distribution of each of these features would take up too much space and would certainly exhaust the interest of the reader. As was mentioned before all these tabulations are on file at the American Museum of Natural History. The sum of all of these
various distributions is given in Table 13.

Table 14 is nothing but the sum of all of the distribution tables preceding it. It shows all sherds from Stratigraphic Cut 1 which show features of shape or decoration diagnostic of the earliest occupation represented in this cut. This pattern of distribution defines the extent and intensity of the earliest occupation at the site. To the ceramic remains of this occupation the name Early Tutishcainyo has been given. Tutishcainyo was the name suggested to me for the slough which lies at the foot of the nameless knoll on which we were excavation. At least, that is the way I heard the name as pronounced by my Shipibo workmen. More mature reflection indicates that it should have been recorded as Tutishcaño. Inquiry revealed that Tutish is a kind of tree which is prevalent along this slough. Since I had already spread the spelling, Tutishcainyo, widely by correspondence, I decided to retain the original rendering as an arbitrary label for a long extinct archaeological complex.

The decorated rim with its horizontal upward facing flange is the most diagnostic feature of the Early Tutishcainyo ceramic complex. Equally diagnostic of the later major occupation at this site is a rim with an outward facing, vertical, decorated surface. There are several distinctions which can be made within this general group of rims, but all show the same pattern of distribution within the cut. Some of the variation included
within this group of rims is illustrated in Fig. 40; Fig. 41 a-f. A small number of these rims occur on small shallow bowls with simple hemispherical profiles. A somewhat larger group occur on very large globular pots. (see Fig. 41 a for illustrations and Table 15 for distribution). Over 80 per cent of such rims are from large pots with concave sides and marked basal angles. Pots of this kind are illustrated in Fig. 40 and the distribution of rim sherds of this kind is given in Table 16. It can be noted from the illustrations that the basal angle of pots in this group is as distinctive as the rim. Several broad, horizontal, incised lines are present just above the basal angle, which more often than not is decorated for its total length with closely spaced notches or punctations. In addition a distinctive form of lug, usually decorated, is often attached to these basal angles (Fig. 41 c, h-j; Fig. 42 b, h, i). Sherds showing the horizontal, incised lines but not the notched basal angle were tabulated separately from basal angle sherds which showed notching. Sherds showing the attached lugs were also tabulated separately from the above two groups. Each of these tabulations showed the same pattern of distribution and so they were lumped (Table 17). This group of rim and basal angle features are most diagnostic of the later complex, and the distribution of all of these features shows most accurately the concentration of the later of the two major components at this site (Table 18).
As has been mentioned above, there are certain shallow bowls with concave sides and unmodified rims, showing decorative treatments not typical of Early Tutishcainyo. The range of such decorative treatments is indicated in Fig. 45, and the distribution of sherds from such bowls is given in Table 19. Likewise there are groups of basal flanges whose decorative treatment (Fig. 42 c-g; j-n; Fig. 43 a, l, m) is outside of the range of Early Tutishcainyo design and whose distribution is that of the later complex (see Table 20). The same may be said for a group of decorated, convex, basal shoulders (Fig. 43 b-k, n-q; Fig. 44 a-d, and Table 21).

Several groups of undecorated rims (Fig. 47 l-o) have no antecedents in the earlier complex. Their combined distribution is shown in Table 22. Finally, small, crude, circular plates with a marked thickening of the rim are a feature peculiar to the later complex (Fig. 46 a-d, g-k, and Table 23). There are a number of other distinctive groups of sherds whose spatial distribution will not be presented individually. Their combined distribution is given in Table 24.

The total of sherds, which show features of shape or decoration the distribution of which places them in the later of the two principal components represented at the site, is given in Table 25. These sherds define the complex which I have called Late Tutishcainyo. This name has been used because I feel that the evidence is strong that this complex is in the same tradition as the
complex which I have called Early Tutishcainyo. In other words, it is a direct, but not necessarily an immediate outgrowth, of Early Tutishcainyo.

There are some groups of sherds which show features, principally of form, which can not be assigned exclusively either to Early or to Late Tutishcainyo. Their patterns of distribution overlap the two principal patterns of distribution already discussed. Some of these have been mentioned above. The total distribution of all sherds showing such features is given in Table 26. Since these tend to blur rather than to clarify the cultural stratigraphy, they are not given further attention in this present discussion. They will, however, be treated in the descriptive analyses of the two complexes involved.

Among the sherds we have been considering there remains a residue of small or highly eroded bits of pottery which can be recognized as coming from rims, basal flanges, or basal angles but which do not give sufficient information to permit their further sorting. The distribution of such sherds is given in Table 27. They will not be discussed further.

I think, on the basis of the evidence already presented, that most readers will be willing to grant that there is a valid case of cultural stratigraphy here. The material I have called Late Tutishcainyo is concentrated in the middle and upper levels of Stratigraphic Cut 1, while that which I have called Early
Tutishcainyo is concentrated in the lower levels. This much is obvious from the two tabulations already presented. There is a sufficiently large sample of sherds so that sampling error can be ruled out as a cause for these differences in distribution. If it is granted that the material I have called Late Tutishcainyo dates later in time than the material that I have called Early Tutishcainyo, there still remains the question as to whether this cultural deposit is the result of a long, continuous occupation or two occupations separated by a considerable space of time during which this locality was not occupied. This question must be given a conclusive answer, for if the cultural deposit is the result of a long, continuous occupation then we may consider the ceramic sample from each level as more or less representative of a particular point in time. If this condition prevails then each of the levels in the site may be used as a sample in the type of ceramic seriation advocated by Ford, Tolstoy, and Meggers and Evans. If, on the other hand, the midden is the result of two distinct occupations separated by an appreciable length of time, then any levels which contain the ceramics of both complexes can not be used in seriation. The sherd content of such levels would not represent the ceramics of a particular point in time, but would be the result either of mechanical mixture of the two middens in the course of occupation activities or of the failure of arbitrary excavation levels to coincide with depositional strata.
If the midden is the result of a long, continuous occupation then the diagnostic features of Early Tutishcainyo should be replaced gradually as one goes from bottom to top of each of the units within the stratigraphic cuts. If, on the other hand, two distinct occupations are represented, then there should be a sharp and marked displacement of Early Tutishcainyo features by Late Tutishcainyo features as one passes from the lower component into the upper component. The bar graphs of Fig. 6 a were arranged to test which of these two conditions actually occurs in the deposit. For purposes of calculation the number of sherds which present diagnostic features which can definitely be attributed to one complex or to the other are taken as the total sample for each level. The number of diagnostic sherds per level is presented in Table 28. The size of sample should be kept in mind while evaluating the significance of each of the levels of the bar graph. In some of the very top levels the sample consists of only two or three diagnostic sherds and the bar graphs for these particular levels obviously have a very low level of significance. This is not the case for most levels. The bar graph shows what percentage of this total is made up of the sherds definitely of the Early Tutishcainyo complex and what percent is made up of sherds definitely of the Late Tutishcainyo complex. In every unit except Unit 1 the same story seems to be repeated. The replacement of Early Tutishcainyo features by Late Tutishcainyo features is sudden, dramatic, and
fairly complete; rather than progressive and gradual. This bar graph indicates that there were two distinct occupations rather than one continuous occupation.

In evaluating my estimate of the significance of this bar graph the reader should remember that the total midden here is only 30 to 36 inches deep, that it is now under cultivation, and that it has been under cultivation many times in the past. Aboriginal occupation of an intense nature will stir up the ground surface considerably, and the Late Tutishcainyo occupation here obviously was an intense one. Finally, the reader should remember that the arbitrary levels of excavation were unusually thin, only three inches in thickness. Granted these considerations, I find it remarkable that the break in the cultural stratigraphy is as sharp as the bar graph indicates.

The cultural deposit is, then, the result of the distinct middens from two occupations. The break between these two middens occurs at a depth of about 18 inches in the four Units, 1, 2, 6, and 7, and the southwestern end of the cut and elsewhere at a depth of about 15 inches.

For those who may object to this conclusion or the method which was used in reaching it I can only beg patience. The same conclusion will be derived on the basis of an independent set of data and by use of another method. At present I will merely attempt to answer some of the objections which might be raised to
my methodology. The first objection which comes to my mind is, "Should not the sherds showing features common to both complexes have been used in making up the bar graph?" My reason for a negative answer is that we are at the moment not interested in the similarity between the two complexes. It has already been admitted that such a similarity exists to a high degree, and both complexes have been assigned to the same tradition and given the same basic name. What we are interested in is whether the features which are distinctive to the earlier complex are replaced gradually or suddenly by those distinctive to the later complex. The data presented and the mode of presentation chosen seem to me to be the ones relevant to that particular question. A second answer is that these sherds showing features common to both complexes have a distribution which is fairly uniform throughout the total midden of both complexes and are not particularly concentrated around the break between the two complexes (again see Table 26). This being the case, the inclusion of this data would somewhat reduce the percentage values for the distinctive sherds but would not smooth out the distinct jog in percentage values as one goes from bottom to top in each pit.

The second objection is, "Would not the bar graphs have presented a smoother curve if the data from all of the units had been lumped into a single average stratigraphic column 12 levels deep?" The answer is, of course, an emphatic yes. Such a smoothing effect would be entirely an artifact of faulty
methodology. Because Bird suggested to me that this is a point of considerable importance, I intend to belabor this particular point of methodology at some length in my treatment of stratigraphic Cut 3 at UGA-2. At present it is sufficient to say that it is a dangerous assumption to expect cultural stratigraphy to behave like the arbitrary levels of excavation for a distance of five feet. It is unfortunately an assumption which I must get along with. To expect cultural stratigraphy to exactly parallel the arbitrary levels of excavation for a distance of fifty five feet is an supposition that can charitably be described as naive.

A final objection which deserves an answer is the question, "What is wrong with the distribution of percentages in Unit 1? Is it not possible that Unit 1 represents the true picture and that the picture in all of the other units is out of step?" It was mentioned earlier that a small gulley had cut into the surface of the site in the area of Unit 1. This can be noted if one glances at the topographic map (Fig. 4). Not only did it lower the ground surface, but it left the surface with a steep slope to the south. Due to the excavation methods outlined above, the levels in the unit also dipped steeply to the south. Thus, while in most units my arbitrary levels tended to parallel the cultural stratigraphy in this particular unit they tended to cut across it.

The seriation of excavation levels done by Meggers and Evans for their work at the mouth of the Amazon and in British
and those done by Ford in the Virú Valley are largely based on plain ware "types". These types are defined largely in terms of features of paste, temper, and color. Those who advocate the use of Ford's type of seriation might suggest that had I emphasized the features of paste and temper, rather than the features of shape and decoration, in my chronological analysis, I would have obtained results more compatible with the hypothesis of cultural continuity. I will now turn to the plain sherds from this excavation, which have been set aside but not forgotten, and check the validity of this contention. Since the plain ware associated with the corrugated ware and the plain ware of the Yarinacocha complex were rather grossly different from the plain ware of the Tutishcainyo complexes, these were sorted on the basis of simple examination with the naked eyes. I feel that this sorting was about 98 per cent accurate and that even with more detailed examination the few sherds which were ambiguously between Late Tutishcainyo and Yarinacocha in appearance could not have been more accurately sorted. All sherds, whether plain or decorated, which were even suspected of harboring the sanidine temper were viewed under a microscope and sorted accordingly. All plain Tutishcainyo sherds, that is sherds showing no features of shape or decoration, were sorted under a microscope. A fresh break was made in each and this was studied in order to determine the kind of non-plastic particles present. Sorting was done on the basis of several...
categories of these non-plastic inclusions.

It is perhaps worthwhile to present a brief statement on the controls used in trying to keep this sorting as objective as possible. Since, by the time I turned my attention to the plain pottery from this excavation unit, I already had a fair idea of the distribution of features of decoration and shape, I decided to disqualify myself from the task of sorting by temper on the grounds of the possibility of unintentional bias. Miss Elizabeth Baldwin, a Radcliffe Graduate Student in the Department of Anthropology at Harvard, did all of the actual sorting. A binocular dissecting microscope was used with a combination of lenses giving 35 magnifications. The categories of temper which were used in this sorting were established by Miss Baldwin and myself after considerable discussion and a number of dry run sortings. They consisted of all distinctions of non-plastic inclusions which she felt that she could make consistently. Standard sherds were used for the more difficult categories so that she could check any tendency to drift away from the original definition of the category as the sorting progressed.

While she was doing the sorting, Miss Baldwin was unaware of the cultural stratigraphy of the stratigraphic cut. She was also purposely kept in ignorance of the significance of the numbering system of the sherds and of its proper interpretation. To counteract any possible tendency toward a halo effect on Miss
Baldwin's part, all sherds from the whole stratigraphic out were mixed together and given to her in batches unrelated to the excavation levels. This was possible because, as has been mentioned before, the sherds were individually numbered according to location.

A fairly large number of categories of temper were necessary to encompass the observable differences. A very heavy temper of shell was the most distinctive and useful of the temper varieties. The sherds contained large amounts of finely ground, freshwater mussel shell (Distribution, Table 31). Such molluscs are evidently still fairly common in Yarinacocha for their shells are not uncommon in modern Shipibo midden. I did not have the species identified.

Almost equally distinctive and useful were a group of sherd tempered sherds, in which the sherd tempering came from shell tempered sherds. This category was given the rather clumsy name of shell tempered sherd temper, but its meaning should be clear after this bit of explanation (Distribution, Table 32).

Four categories of sand tempering were recognized: 1. a very fine grained uniform sand, almost a rock dust (Distribution, Table 33); 2. a fine grained quartz sand (Distribution, Table 34); 3. a fine grained quartz sand with a large number of milk white particles (Distribution, Table 35); 4. a coarse, poorly sorted sand (Distribution, Table 36).

Aside from the shell tempered sherd temper, which is a
finely ground sherd temper, one other distinction was made in the sherd temper categories; that between large sherd temper (Distribution, Table 37) and finely ground sherd temper (Distribution, Table 38). The sherd temper I am referring to as large could only be called large in reference to the finely ground sherd temper; compared to the temper in pottery of the Yarinaochoa or Shakimu Complexes it could only be classified as medium. No precise measurements of particle size were made, but I would estimate that the finely ground sherd particles ran around one millimeter in diameter, while the large sherd temper ran about three millimeters in diameter. Other considerations than sheer size entered into this distinction. The degree of angularity and the amount of pot surface present on the temper particles were also considered. Both of these characteristics decrease markedly as the grind of the temper becomes finer. This still remains a somewhat subjective distinction and I was surprised at the clear cut results which it gave.

The highly distinctive sanidine temper has already been mentioned. It presented no ambiguities in sorting (Distribution, Table 30).

Finally, there were five sherds which contain a large number of iron concretions which may be natural inclusions in the clay but which give the paste a distinctive appearance, and another very small group which was clearly tempered by the addition of fresh
vegetable material (Distribution, Table 39). Neither of these last two temper groups were sufficiently common to show a distinctive pattern of distribution.

There was one interesting by-product of the microscopic examination of the sherds. Not a few of the sherds of the Early Tutishcainyo complex contained fish scales, fish ribs, and vertebrae. A separate category of fish tempered pottery was not established, for it seems highly unlikely that these inclusions were intentional on the part of the potters. These inclusions do throw light on the conditions of the area in which the pottery was made. If the spot where the potter chose to work was covered with fish remains that these not infrequently became mixed into the paste of the pottery, then it is highly likely that fish was an important part of the diet of these people. A rather unflattering light is shed on the neatness and cleanliness of the vicinity of the houses.

The distribution of each of these temper categories, along with the distribution of Yarinacocha (Table 5), and the plain pottery associated with the sherd tempered Corrugated Ware (Table 40) are all presented. A somewhat condensed version of this information is presented in Fig. 6 b. For ease in comparison this chart has been placed along side of the graphic presentation of the cultural stratigraphy based on
features of shape and decoration. Unfortunately, certain important information had to be suppressed in order to fit the chart. The four categories of sand tempering had to be combined in order to make texture coding possible for a graph of this size. The pattern of distribution for the four groups of sand tempered sherds is similar but not identical. All four are significantly present in both Early and Late Tutishcainyo, but poorly sorted sand temper is more common in Late Tutishcainyo than the other three, while fine sand with white inclusions is noticeably more rare in Late Tutishcainyo than the other three. These facts may be noted in the tabular presentation by those who are interested. The inclusion of this information in the graph would not blur the picture it presents but would, if anything, sharpen it.

I entered into this study of temper without much hope that it would show anything very definite or striking. I thought that the best that could be hoped for would be a fuzzy version of the picture of cultural stratigraphy already presented. I was highly gratified and surprised to see how clearly this same pattern of cultural stratigraphy was reflected in the chart based on temper.

In comparing the two charts one should disregard the disturbing influence of the Yarinacocha sherds and of the coarse, plain sherds associated with the corrugated ware, since these are absent in the first chart and present in the second. It will be noted that if one discounts the effect of these two later groups
of sherds, there are two basic patterns of temper frequency presented
by the bar graphs. One of these is to be noted in unit 2, levels
7-10; unit 4, levels 6-10; unit 5, levels 7-10; unit 43, levels
6-10; unit 44, levels 8-12; unit 45, levels 8-12; unit 33, levels
8-11; unit 32, levels 6-11; unit 31, levels 6-11; unit 6, levels 8;
unit 7, levels 8 and 9; unit 8, levels 7-10; unit 9, levels 7-11;
and unit 10, levels 6-11. The second pattern appears in its clearest
form less frequently, chiefly because of the interference of
Yarinacocha pottery but can best be seen in the following levels:
unit 2, levels 3-5; unit 3, level 3; unit 5, levels 2-4; unit
43, levels 2-4; unit 6, levels 3-6; unit 7, levels 1-6; unit 8,
levels 2-5; unit 9, levels 2-4; and unit 10, levels 1-5.

It takes no leap of the imagination to see that the
distribution of these two quite different patterns of temper
use corresponds exactly to the distribution of the two already
established complexes. The first pattern of temper use is that of
Early Tutishcoainyo, the second pattern of temper use is that of
Late Tutishcoainyo. Again we may ask the same question, "Is the
transition from one pattern to the other gradual, so as to suggest
a single long term occupation with a gradual cultural development,
or is the transition abrupt so as to suggest two distinct occupations?"
Again the chart gives the same answer. The transition is abrupt,
taking place in one or two of the three inch levels. On either side
of these one or two boundary levels the percentages of the several
tempers remain constant. The small fluctuations noted as one goes down through the pure Early Tutishcainyo midden or up through the two or three levels of fairly pure Late Tutishcainyo midden seem to be random, minor, and due to sampling error, rather than consistent, progressive, and culturally significant. It must be noted that the two charts correspond in this respect not in a vague and general way but in a highly specific way. The charts show similar trends when compared unit by unit and, within each unit, level by level. Thus Unit 1 is hopeless in both charts. The cultural break in Unit 3 is less sharply defined than in the units on either side of it, and in both charts Early Tutishcainyo material appears in slightly higher levels in Unit 3 than in the adjoining units. The apparent intrusion of Late Tutishcainyo sherds in Unit 5, level 10, is to be seen in both charts. The same odd mixture of Early and Late material can be noted in the levels largely in Stratum 1, i.e., Unit 8, level 1. The same rarity of Late Tutishcainyo ceramics in the northeast end of the excavation is easily seen in both charts.

The information presented here should give considerable comfort to those who argue for the efficacy of seriation on the basis of the percentages of plain wares present in a sample. It is clear that one can obtain an accurate relative date on the basis of a relatively small sample of absolutely plain sherds when one is working within the range of the Tutishcainyo tradition. All
of the samples from levels which are pure Early Tutishcainyo show a high degree of stability and similarity in the percentages of various kinds of temper present. Layers which are relatively pure samples of Late Tutishcainyo also are markedly similar among themselves. It is now absolutely clear that the few individual levels intermediate between these two groups of levels do not date a period of time intermediate between that of Early Tutishcainyo and Late Tutishcainyo, but are, in fact, the result of mechanical mixtures of the two contiguous middens or the result of arbitrary levels which straddle the less regular cultural stratigraphy.

I can not answer the question as to how many level samples from this cut would be suitable for treatment in a massed seriation of the type used by Meggers and Evans. There are a fairly large number of the deeper levels, especially in Units 8, 9, 10, 44, 45, and 33, which show little or no evidence of intrusion of later materials. These, with little injustice to the facts of cultural deposition, could be taken as ceramic samples representing a specific point in time. The intermediate levels must be rejected out of hand, as mechanical mixtures of two distinct middens. All of the levels showing heavy concentrations of Late Tutishcainyo material show also a certain amount of upward intrusion of Early Tutishcainyo material. As they stand they are not representative of a particular point in time. It would, however, be theoretically possible to correct these levels so that they do represent pure samples of Late Tutishcainyo ceramics. The number of intrusive, distinctive
Early Tutishcainyo sherds can be determined accurately for each level. This number could be reduced to a percentage of the total diagnostic sherds in the level. This percentage could then be projected on the amounts of plain ware, and the number of intrusive plain ware sherds could be calculated. Since it is largely in terms of shell temper, shell tempered sherd temper, and small sherd temper that the two complexes differ, one could probably get results that were just about as accurate by taking all of the fine sherd tempered sherds, shell tempered sherds, and shell tempered sherd tempered sherds out of the levels which mainly represent the Late Tutishcainyo Complex. This procedure should give sherd samples which are fairly representative of a particular point in time.

It is perhaps advisable to insert a word of caution about the uncritical use of the chart based on the percentages of various kinds of temper. All levels which produced one or more plain sherds were plotted on the chart, but it is obvious that samples in the one to five sherd range are not particularly reliable. Therefore, any detailed and critical use of this chart should be done in conjunction with Table 41 which gives the number of plain sherds used in the calculations for each level. One would not expect very small samples to be reliable, but what is somewhat surprising is the high degree of reliability shown by samples of the 20 or 30 sherd ranges. These data suggest that Rowe's and even Ford's estimates for the size of sample necessary for seriation are rather
too high. In situations where there are marked differences in temper in a historical continuum, and where one is dealing with samples which can be demonstrated to be unmixed (There is the catch.) a sample of 30 sherds or so seems to be sufficient to give a fairly accurate relative date.

There is another tendency illustrated by this chart and the one prepared on the basis of decoration and shape. Both charts show that there are a fair number of levels in the lowest parts of this stratigraphic cut which seem to represent pure Early Tutishcainyo without the admixture of later, intrusive material. On the other hand, the levels which produce the highest concentrations of Late Tutishcainyo materials, always contain some Early Tutishcainyo sherds which have been churned upward into the later midden. Stated as a general rule, the upward movement of early sherds into the overlying midden statistically is a more important phenomenon than the downward intrusions of later sherds into the underlying midden. This observation holds for all of my excavations in the Yarinaococha area. It is possible that elsewhere this rule might not hold. I feel that this observation is worth recording in light of Tolstoy's recent categorical statement that the surface of a site is as good a place as any to pick up unmixed sherd samples, that is, a sample representing a particular point in time. In fact, Tolstoy tends to favor surface samples over excavated samples. My own experience is that a surface sample from a multicomponent
site is likely to contain at least a few sherds of each of the components of the site, though the later components will predominate. The pure samples, if they are obtainable, are likely to come from the deep levels and the earlier components.

The value of sorting sherds on the basis of surface color was also checked with reference to the Early Tutishcainyo, Late Tutishcainyo distinction. For this I used all of the small sherd tempered sherds and large sherd tempered sherds from the stratigraphic cut. In this group I made three distinctions: a predomately gray-black surface; a white to cream surface; a surface in the orange to red-brown range. To distinguish between the white to cream range and the orange to brown range, I used a control sherd against which all sherds to be sorted were compared. Any sherd showing a higher concentration of color in the orange-red range was placed in the orange sherd category, any sherd which matched or was lighter than the control sherd went in the cream-white category. I did this particular sorting job myself.

The results of this sorting on the basis of surface color are presented in Fig. 7. It is readily seen that the results are far less satisfactory than those obtained by the other two methods used. I feel that the larger number of orange surfaces in Late Tutishcainyo represents a cultural reality. Nonetheless, in situations where pottery firing is largely uncontrolled and a sherd of any size shows a wide range of colors on one side
and a somewhat different but equally wide range of colors on the other, color is not likely to be a very useful criterion. In the particular case of the pottery under consideration, I feel fairly certain that there was still another factor working against this kind of sorting. A major distinction between Early and Late Tutishoinyo pottery seems to be the much higher occurrence of whitish pottery in the earlier complex. This whitish surface is very thin and seems to be more the result of chemical alteration of the sherd surface in the ground than of firing practices. Spaulding made similar observations concerning some sherds from the Arzberger site. I do not mean to imply that the greater surface alteration on the Early Tutishoinyo sherds is the result of a much greater age. The difference, I suspect, is that sherds on or near the red clay base, which is almost completely impermeable to water, remained wet for a much longer period than sherds which were higher up in the midden and thus better drained.

Now that the most important single point of cultural stratigraphy has been established, we should return to the natural stratigraphy and see how closely it parallels the cultural stratigraphy. It can be seen immediately, if one refers back to the profiles (Fig. 5), that the two do not coincide. All of the levels which show the remains of intensive occupation of either of these two major components of the site lie either partly or wholly in Stratum 2. Stratum 1 has very few diagnostic sherds from either complex, and
these are mixed together in no particular pattern. It appears, then, that Stratum 2 of this profile consists of the combined middens of the Early Tutishcainyo occupation and the Late Tutishcainyo occupation. Stratum 1 was laid down some time after these occupations and this sandy deposit, which is lean in cultural material, appears to be largely the result of natural action. Possibly this deposit is water laid sand. As has been mentioned, the scanty diagnostic sherds from both of the Tutishcainyo components are small, eroded, and possibly rolled. Carneiro suggested another possibility in the remarkable earthmoving power of some of the larger South American ants. These creatures are capable of raising the ground level a considerable distance in a relatively short span of time. Their activities might account for the relatively sterile surface layer on many parts of UCA-6 and on cut 4 at UCA-2. Evans and Meggers noted similar sterile layers on certain sites in British Guiana which might have a similar explanation.

Even though the two most extensive occupations of this knoll are within Stratum 2, human utilization of this knoll did not cease during the period during which Stratum 1 was being laid down. The use of this area as a Shipibo chacra has been mentioned, and there are a few superficial sherds of Shipibo fine ware which give archaeological proof of such utilization. It may be asked why Shipibo sherds are found here when there is no actual Shipibo occupation of the locality. My own observations can give a probable
answer. When the men were working all day away from the village, either in the course of farming or in the course of working for me, their wives would often bring them a lunch time snack of masato (yuca gruel), or baked bananas. Such food was carried in fine ware bowls. I did not see any such bowl get broken on the site, but over a long span of time such an occurrence would be almost inevitable.

Sherd tempered, corrugated ware and a coarse, poorly fired, and poorly smoothed ware which is associated with it are not made by the modern Shipibo, but the evidence from this stratigraphic cut, and from a number of other excavations both at this site and at UCA-2, indicates that such pottery is from a relatively recent occupation in this region. The large corrugated urn excavated in Unit 33 could not have been buried before the deposition of Stratum 1 was complete. If it had been buried before the ground level reached its present height, the urn would not be as well preserved as it is. Once one gets away from the considerable intrusion and disturbance created by the burial of this urn, the corrugated sherds are entirely superficial in their distribution within this stratigraphic cut.

There are four sherds from this cut which are, beyond doubt, of the Hupa-iya complex which is represented by over 10,000 sherds at UCA-2. Not much reliance should be placed on the pattern of distribution of four sherds (Table 4). Luckily, establishing the chronological position of Hupa-iya is not dependent on these four sherds. The pattern of distribution which they do present, suggesting
they were deposited at the site during the period that Stratum 1 was being laid down and well after both of the Tutishoainyo occupations here, agrees with the more reliable evidence on the dating of Hupa-iya yielded by the excavations at UCA-2. A more interesting question is how the sherds got here when there is no evidence of an actual Hupa-iya occupation at this locality. One could evolve an interesting theory that their presence is the result of trade between two groups of people living on the two sites within a 30 minutes walk of each other and making entirely different pottery. I strongly doubt such a theory is tenable and would prefer to attribute the presence of the few Hupa-iya sherds to the same agency which brought the scattering of Shipibo sherds to the surface of the site. It is nice to think that the women of the society which made Hupa-iya pottery took as good care of their husbands as the modern Shipibo women take of theirs.

The next batch of ceramics to receive consideration is the Yarinacocha complex. These sherds have been reserved since they present problems, the resolution of which is not entirely satisfactory on the basis of the evidence from this cut alone. The reader is at this point referred to Table 5 which gives the total distribution of Yarinacocha sherds and Table 29 which gives the distribution of Yarinacocha rim sherds. This second table is the more accurate, because Yarinacocha rim sherds are far easier to sort from Late Tutishoainyo rim sherds than Yarinacocha body sherds are from Late
At first glance the total pattern of distribution for sherds of the Yarinacocha Complex does not appear to be strikingly different from that of Late Tutishoaínyo, especially if one stresses vertical distribution rather than horizontal distribution. One might argue that the Yarinacocha material represents the utility ware of the Late Tutishoaínyo Complex. There are several reasons to doubt this assumption. The vocabulary of shapes and sizes found in Late Tutishoaínyo ceramics has already received some notice and will receive systematic treatment when the ceramic complex is given a thorough descriptive analysis. The range of shapes runs from large pots which were almost certainly cooking vessels to small bowls and plates which would have served as individual food dishes. Pottery of the Yarinacocha Complex also shows a wide vocabulary of shapes and sizes. There is no overlap between the shapes shown by Yarinacocha pottery and those shown by Late Tutishoaínyo pottery with the single exception of one form of plate. Aside from this the only features which the two complexes share are the simple facts of sherd tempering and not very well controlled firing. Late Tutishoaínyo pottery is almost always decorated by some form of incision and modeled applique is a moderately common adjunct to the decoration. The shapes are complex. Yarinacocha pottery is usually starkly plain, and decoration where it occurs is in the form of polychrome painting. The Yarinacocha shapes are particularly simple and severe. Late Tutishoaínyo
pottery was carefully smoothed after the clay was fairly dry so that the finished surface, though quite regular, is still slightly gritty to the touch. Yarinacocha pottery was smoothed while wet so that the surface, though often fairly irregular, is smooth or soapy to the touch. This condition often approaches a true slip and cases of white slip do occur. On purely morphological grounds it is rather hard to imagine that these two groups of pottery are the work of the same potters.

There is considerable evidence from other excavation units which confirms the suspicion that we are dealing here with two distinct ceramic complexes. Stratigraphic Cut 3 at UCA-2 contains a quantity of Late Tutishoainyo pottery in its lowest levels, but the only two sherds from the stratigraphic cut which are definitely Yarinacocha are from the very surface. In other cuts at UCA-6 the distribution patterns of the two groups of pottery are not as similar as they are here. These facts suggest that the distribution patterns of the two groups of ceramics in this cut should be examined more carefully to see if there are significant differences.

A closer look at the two distribution patterns reveals that there are definite differences. These differences are not so much in the absolute depth at which the two groups of pottery tend to be massed but in the horizontal arrangement of the concentrations of the two groups. It is quickly noted that the major concentration of Late Tutishoainyo material is in the southwestern part of the cut.
The refuse from this component becomes progressively thinner as one moves toward the northwest end of the cut and beyond Unit 45 such refuse is negligible. Yarinacocha material does not show this tendency. Indeed, it is quite rare in the southwesternmost pair of units, and there are large accumulations of it in Units 31-33.

A second difference is evident. Late Tutishcainyo refuse tends to be spread in a fairly uniform blanket of midden with a high density of potsherds throughout. This blanket is thick at one end and thin at the other but is definitely continuous. By way of contrast, the Yarinacocha sherds show a remarkably strong gregarious tendency. The great majority of such pottery is found in three clusters in which the density of Yarinacocha sherds is very high. One of these clusters is in the three contiguous Units 3, 4, and 8. A second clump is in Unit 44, spilling over slightly into Unit 45. The third clump is in Unit 32 with slight overlap into the adjoining units. It seems likely that Unit 10 nicked the corner of another such concentration. There are some interesting characteristics about these concentrations of Yarinacocha sherds. The sherds are typically quite large and appear not to have been kicked around much on the surface of the ground. Large numbers of sherds from the same vessel are found in proximity, so that the reconstruction of half vessels and in some cases almost whole vessels is possible. This is not the case with Late Tutishcainyo pottery.

These peculiarities in the distribution of Yarinacocha
pottery suggest that the sherd concentrations are the contents of intrusive pits. The sherds in Unit 32 were so numerous and so closely packed that they were bagged together and designated as an excavation feature. In the other two instances these concentrations were noted only when the level bags were studied, but considering the fact that I was trying to do too many things at once, it is not surprising that I missed evidence of intrusion. My workmen did not know exactly what to look for in such cases. My method of digging has certain virtues which I have already enumerated, but it is not the best methodology for the quick recognition of features such as intrusive pits, unless they happen to be cross sectioned by the excavation unit walls. Any further excavation at UCA-6 should concentrate on the problem of locating and carefully excavating several of these concentrations of Yarinacocha sherds so that their nature can be better understood.

We have already mentioned that the sidewall of Unit 10 did cross cut a mass of Yarinacocha sherds and revealed their relationship to the natural stratigraphy. This pottery lay on the surface of, but not in, Stratum 2. Luckily, in another excavation unit in UCA-6 the sidewall of a unit did cut through an even larger mass of Yarinacocha pottery and disclosed that it was, if fact, in an intrusive pit. On the basis of these lines of evidence I will proceed on the assumption that the Yarinacocha pottery on the site was the result of an occupation considerably later than the Late
Tutishcainyo complex is the only one possible. Since the Yarinacocho component occurs in concentrated pockets within the matrix of Late Tutishcainyo midden, it could only have been deposited after the Late Tutishcainyo midden was in place. These pockets could not have been held together unless they were contained by Late Tutishcainyo midden.

There still remains one group of sherds whose distribution has not been treated. These are a series of sherds with a highly distinctive tempering material, sanidine. The clay of this pottery also shows a different range of color under various firing conditions than that of the rest of the ceramics of the site. All things considered, this pottery appears to be a trade ware manufactured at some other locality. Its distribution, given in Table 30, shows clearly that if it was a trade ware, it was mainly traded to the society responsible for the Late Tutishcainyo remains on the site. There does, however, seem to be a small amount of this pottery which is associated with the Early Tutishcainyo Complex. The number of sherds from deep in the midden is too great to be explained away as purely the result of intrusion from the midden of the later complex. Features of shape among these few early examples of the sanidine tempered pottery are rare, but those which do occur set these early sherds apart from the sanidine tempered ware definitely associated with Late Tutishcainyo. The discussion of the characteristics of this sanidine tempered ware will be
reserved for later, now its temporal position has been established. It is a fairly common occurrence in the Late Tutishcainyo component and a very rare one in Early Tutishcainyo.

Now that all of the macrochronology has been rung out of this excavation, it is time to turn to the possibility of microchronology. I am now sure how many components there were and what their order in time was. Is it now possible to detect any trend of temporal significance within the duration of any of the occupations?

It is apparent that the Early Tutishcainyo occupation offers the best possibility for such distinctions, if only because there is much more Early Tutishcainyo midden. I have already noted that within levels which seem to be pure Early Tutishcainyo there seems to be a very definite stability in the kinds of temper used, and any shifts toward the pattern of percentages of Late Tutishcainyo appear to be the result of intrusion rather than evolution. Therefore, temper does not seem to be a very useful feature for determining trends within the Early Tutishcainyo component. Certain features of shape and decoration do show some anomalies of distribution within the Early Tutishcainyo midden, and these may prove to be significant on the basis of future work. At present, the best that can be said about these variations is that they are suggestive.

For the discussion of these possible examples of microchronology it is necessary to divide the Early Tutishcainyo midden
into three blocks: the low levels in Units 1, 2, 6, and 7; the low levels in Units 8, 9, and 10; and the low levels of Units 44, 45, and 33. In the ceramic features to be examined the first and last blocks stand farthest apart while the lower levels of Units 8, 9, and 10 seem to be intermediate with regard to these ceramic features, as they are spatially. The common rim in all three blocks of levels is the rim marked by a more or less horizontal decorated flange with a zoned design bounded by two parallel lines. However, in the lower levels of Units 44, 45, and 33 a narrow, very carefully decorated version of this rim is more common, while in Units 1, 2, 6, and 7 a broader rim, showing a wider range of design is more numerous. (For examples of the narrower rim see Fig. 20 d, e, and for the broader rim see Fig. 21). Compared to the number of rims present, basal flanges appear to be relatively rare in Units 44, 45, and 33. Their place seems to be taken by decorated, convex, basal shoulders, and sharp, plain basal ridges which occur in greater frequency in this block. To quantify these statements see Tables 7, 10, 11, and 12. These differences are minor compared to the overall uniformity of Early Tutishcainyo material, and it could be that we have nothing more than the difference between the pottery of the occupants of two completely contemporaneous households. It will be noted that we are dealing with horizontal rather than vertical differences in distribution. On the other hand, there are two bits of data which suggest that
these may be temporal differences. In a few cases where sherds from a single pot have been assembled it has been noted that such sherds will occur in levels 6 and 7 or Units 44 and 45 and in levels 9 and 10 or Units 9 and 10, suggesting that the Early Tutishcainyo deposits were almost completed in the northeastern end of the cut before they really began in the southwestern part. Also in design and execution some of the wider and more elaborate rims suggest the beginnings of trends, which if continued might lead to Late Tutishcainyo practices. Specifically, I am referring to the tendency to emphasize acute angles in designs, compare Fig. 21 j with Fig. 44 j, k; Fig. 50 a-c, e.

The shallowness of Late Tutishcainyo deposits in most areas of the cut made it seem unlikely that internal cultural trends could be noted, and no likely clues presented themselves as the sherds were being studied.

The various clumps of Yarinacocha pottery were compared to see if they varied in the relatively few features which this austere ceramic complex presents. Such batches turned out to be remarkably uniform in the features present and in the proportion which each feature made up of the total.

The Corrugated Ware and modern Shipibo pottery obviously did not present material which was sufficiently numerous to encourage a search for microchronology.

SUMMARY: The 30 to 36 inches of cultural deposit
explored by Stratigraphic Cut 1 contained ceramic remains from six distinct ceramic complexes. Analysis of the unit was a complex chore but not an unrewarding one. The temporal relationship among five of these six complexes is established in this excavation beyond any reasonable doubt.

At some time in the past, this knoll presented a surface of bare, lateritic clay. On this surface people manufacturing the ceramic complex called Early Tutishcainyo set up a permanent and fairly extensive village. The debris from this occupation ultimately extended the full 55 feet of the stratigraphic cut and beyond and reached a depth of from 12 to 21 inches. The sherd count in this debris is high and there are large numbers of highly distinctive decorated sherd s present. Even the plain sherds of this complex are easily identified from relatively small samples since the complex shows a highly distinctive pattern of temper preferences. Early Tutishcainyo ceramics run, by sherd count about: 10-15 per cent each of shell tempered and shell tempered sherd temper, 10-20 per cent split among the four varieties of sand tempering, 40-50 per cent finely ground sherd temper, and 5-10 per cent angular sherd temper. This pattern of tempering seems to have remained stable for the duration of the Early Tutishcainyo occupation, though there are some features of decoration which offer faint suggestions of temporal trends within the span of the occupation.

The knoll was then unoccupied for a period of time which
was short when judged by the yardstick of soil profiles and soil deposition but long when judged in terms of the stylistic development which the ceramics of the Tutishcainyo tradition underwent. The second occupation of the knoll was, if anything, more intense than the first but was probably of shorter duration. Within the stratigraphic cut the Late Tutishcainyo occupation had its center of intensity at the southwestern end, and it appears that the real center of the Late Tutishcainyo occupation lay still further to the south and west. There is up to 15 inches of Late Tutishcainyo debris in the southwest end of the stratigraphic cut, but the layer becomes progressively thinner as one goes toward the northwest end of the excavation, having a negligible thickness beyond unit 45. The ceramics in Late Tutishcainyo are definitely related to those of Early Tutishcainyo but have undergone significant changes during the period the site was unoccupied. Some vessel shapes have been preserved almost intact, but their decoration has changed, other vessel shapes have undergone considerable modification but are still recognizable, and there are a few features which have no prototype in Early Tutishcainyo. The paste of Late Tutishcainyo pottery shows profound difference from that of Early Tutishcainyo. Shell temper and shell tempered sherd temper have disappeared, and finely ground sherd temper makes up a small, and probably accidental, part of the temper; sand temper holds on at about 10 per cent; and there is a paste with sanidine temper, certainly a trade ware, which
while rare in Early Tutishcainyo makes up about 5 per cent of the sherds in Late Tutishcainyo deposits. The remainder of the pottery is tempered with a coarsely ground, angular fragments of sherd. This makes up 60 to 70 per cent of the pottery from levels which are largely Late Tutishcainyo, and one suspects that if one found samples of Late Tutishcainyo with no Early Tutishcainyo admixture this kind of temper would run between 80 and 85 per cent. Late Tutishcainyo pottery is also somewhat harder, somewhat more uniform in firing, and considerably thicker than Early Tutishcainyo pottery. The details of these differences will be presented later.

After the Late Tutishcainyo occupation the knoll was again unoccupied for a considerable length of time. The occupation of the knoll by people making pottery of the Yarinacocha Complex was of a different kind and a different degree of intensity. Instead of a dense blanket of cultural material, there is a fairly sparse scattering of sherds interspersed with occasional dense accumulations of sherds which appear to have been dumped into shallow pits intrusive into the Late Tutishcainyo midden. Compared to the Tutishcainyo occupations, the Yarinacocha component seems to have been of much shorter duration or to have involved a much smaller number of people. Most likely both these factors were involved in producing a culture deposit of this nature.

During the Yarinacocha occupation and for a considerable length of time thereafter some agency, probably natural, spread a
layer of relatively sterile, sandy material over much of the surface of the stratigraphic cut. This layer, which is designated Stratum 1 in the profiles of the excavation, is rather hard to explain considering the topography of this knoll, but may have been water laid. An alternative possibility is that it is the work of ants.

Evans and Meggers note similar superficial sterile layers in British Guiana. It reaches its greatest depth at the north end of the stratigraphic cut where it is almost completely devoid of cultural material. There are some sherds of Tutishcainyo pottery, both Early and Late, which appear to be redeposited.

After this period of natural deposition had come to an end the top of the knoll was again used by man. A huge corrugated urn and part of another pot were buried in Unit 33 after the ground had reached its present level. Sherds from eight or 10 other pots of Corrugated Ware and the related plain ware were scattered over the northeastern two-thirds of the cut. This amount of cultural activity might suggest a two or three month camp by a single extended family, with one death and burial taking place during this time.

At the present time the knoll is under Shipibo cultivation, and in the course of these activities three or four Shipibo fine ware bowls have been broken here.

Four decorated sherds represent the total contribution of the Hupa-uya complex to this cultural deposit. Their distribution
suggests little except that they were left here subsequent to the Late Tutishcainyo occupation. This temporal position will be demonstrated elsewhere on the basis of much more voluminous evidence.

Stratigraphic Cut 3

DESCRIPTION OF EXCAVATION: Stratigraphic Cut 3 is an extension of Stratigraphic Cut 1 toward the southeast and can be most usefully considered at this point. This cut consists of Units 46, 47, 49, 51, and 53. This row of units was planned in order to determine the relationship between the layers of cultural deposit on the northwest side of the knoll and the unconsolidated sand on the southeast side of the knoll. In this respect it was a failure for it revealed that between these two areas of the site the red clay base rises almost to the present ground level effectively separating the two areas of deep, culture bearing deposit.

The excavations were carried out in exactly the same manner as that already described for stratigraphic Cut 1.

PHYSICAL STRATIGRAPHY: The natural stratigraphy of this cut is presented in Fig. 8. It is merely an extension of the stratigraphy of Cut 1, and the same texture code is used. The layers are the same: a stratum of relatively sterile sand, a stratum of midden containing Early and Late Tutishcainyo remains.
and a very dense layer of Early Tutishcainyo midden on the original red clay surface. Toward the southeast along this row of units the layers of midden are gradually pinched out between the rising red clay base and the relatively sterile Stratum 1.

A burial was noted in Unit 47. This consisted of traces of a very badly decomposed human skeleton. A large part of the burial had been removed from the excavation unit before the worker noted anything unusual and brought it to my attention. This reflected carelessness on neither his part nor mine since the bones only consisted of loose masses of white, fibrous material. Once the bones were noted, it was possible to expose the pattern of the inhumation, but nothing of the bones themselves could be salvaged. The femora, ribs, and pelvis were the most obvious elements present.

The burial was of an adult, or at least a person who had attained full size. The inhumation was primary and tightly flexed. These facts could be demonstrated because the articulation of one femur with the pelvis was preserved and the distal ends of the femora were very near the thoracic cavity. The individual was on his right side with the head oriented to the northwest. There was absolutely no evidence of grave offerings. No indication of the level of origination of the grave pit could be seen. The burial was at a depth of 21 inches which placed it within the level of Tutishcainyo midden, but I would estimate that if it were buried deeply enough to escape the jaguars that it must have
originated from considerably higher. A tentative assignment of this burial to the Yarinacocha Complex is the best guess that can be made at present. There is considerable Yarinacocha material at the level from which the burial must have been made.

A small, intact pot of the Yarinacocha Complex was recovered from Unit 51, level 5, and as the only whole pot from the total excavations in the vicinity, was of interest (See Fig. 105 i). Aside from these two finds the excavations were featureless, though sherds were fairly common.

ANALYSIS OF CHRONOLOGY: The distribution of baked clay objects is given in Table 167, and the total distribution of sherds is given in Table 42. Since the ceramic analysis of Cut 3 offered nothing really new beyond what was learned in stratigraphic Cut 1, the presentation will be synoptic. Using the same methodology as described for stratigraphic Cut 1, distribution tables were prepared for all features of shape and decoration. Such tables were combined following the procedure already outlined. Table 43 presents the distribution of the sherds showing features which have been designated as Early Tutishoaingyo. This grouping is somewhat expanded over that used for Cut 1. All shell tempered and shell tempered sherd tempered sherds are included with the Early Tutishoaingyo material. Table 44 shows the distribution of Late Tutishoaingyo sherds. Again, this grouping is somewhat expanded
over that used for Cut 1. All sanidine tempered sherds are included with Late Tutishcainyo as well as a few rim types which are more common to, but not unique to, Late Tutishcainyo. This falling off from methodological rigor should, if anything, blur the distinction between Early and Late Tutishcainyo, but a comparison of the two tables shows that the cultural stratigraphy is still clear.

Table 45 presents the fairly numerous contributions of the Yarinaacocha complex to this cultural deposit. If one compares this table to the distribution of Late Tutishcainyo material one will note that the stratigraphic separation between the sherds of the two complexes is here considerably sharper than that in Cut 1. This confirms the position of the Yarinaacocha material as subsequent to Late Tutishcainyo.

The distribution of sherd tempered Corrugated Ware is presented in Table 46 and the coarse, plain ware associated with it in Table 47. It can be noted that such pottery is again confined to the uppermost layers of the Cut. Almost certainly associated with the corrugated pottery are three sherds with a unique kind of applique decoration (Fig. 120 a-c). This kind of decoration turns up again in the surface collection from UCA-2 but not elsewhere from the excavations. The distribution of the three sherds is as follows: 2 sherds in Unit 49, level 1 and one sherd in Unit 51, level 3. All are from the same pot. Both the distribution and the nature of the sherds themselves tend to confirm the association of these with the Corrugated Ware.
Three sherds of Shipibo fine ware were recovered from level 1 of Unit 46.

It will be noted that the plain sherd tempered, and sand tempered sherds of the Tutishoaïnnyo Complexes were not included in the various subtotals, though they were, of course, presented in the grand total, Table 42. To have treated them adequately would have involved further microscope work, and they would have added nothing new to the picture; therefore, they were ignored. Fig. 9 shows the percentages for each of the various definitely identified sherd groups in the levels of Stratigraphic Cut 3.

SUMMARY: This excavation added little new information to that obtained from Stratigraphic Cut 1. The shape of the underlying knoll was revealed, and the effective southeastern limits of intense Early Tutishoaïnnyo and Late Tutishoaïnnyo occupations were established at about Unit 55. The chronological relationship between Early and Late Tutishoaïnnyo was again demonstrated. The case for the chronological separation of Late Tutishoaïnnyo and Yarinacocha was greatly strengthened. The late temporal position of the sherd tempered Corrugated Ware was demonstrated. In this cut it was again in stratigraphic superposition above the Yarinacocha Complex.

Stratigraphic Cut 2

DESCRIPTION OF EXCAVATIONS: The gradual, southeastern
slope of the knoll provided a generous surface collection of sherds, most of them of the Late Tutishoainyo Complex. Stratigraphic Cut 2 was planned in order to test the depth and nature of the archaeological deposit in this area. It consisted of eight contiguous five foot by five foot units, 11-18 respectively, arranged in a rectangle with the dimensions of 10 feet by 20 feet. The shorter axis of this rectangle was oriented to magnetic north. The technique of excavation used on this cut followed the standards already described. The ground surface in this area was almost level, so that the levels in the cut were almost horizontal. The digging in this cut and its northward extension, Units 20-28, was by far the easiest encountered, since the deposit was relatively loose sand. It was sufficiently consolidated to stand as a straight sidewall but not so as to offer any impediment to excavation. In only one unit was the red clay base of the knoll encountered, elsewhere excavations were discontinued after two levels in a particular unit had been completed without finding a sherd.

PHYSICAL STRATIGRAPHY: The appearance of the completed and smoothed sidewalls of this cut was arresting. The numerous and intricate bands of red-brown silt, which ran through the light colored sand, made the sidewalls attractive subjects for photography. The drawing of the wall profiles was an involved and time consuming job. As in stratigraphic Cut 1, the pits were taken down checkerboard fashion, and a full set of the intricate profiles was taken.
Plate 7a shows the appearance of one of the sidewalls while Fig. 10 gives the profile of the complete north sidewall of the cut.

In the early stages of the excavation of this cut, I maintained a stubborn and wishful conviction that I was dealing here with something useful and interesting in the way of natural stratigraphy. As the excavation progressed and longer sections of these profiles were exposed, it finally became obvious to me that these red silt layers could not represent successive land surfaces. They were much too intricate and irregular, though their general trend was more or less horizontal. I finally came to the tentative conclusion that they represented some kind of segregation of the finer silts from the coarser sands after the total deposit was in place. The most likely explanation was that percolating rainwater washed the finer silt out of the upper part of the deposit and concentrated it in layers further down.

Later I was lucky enough to find confirmation for this hypothesis. Webb, in his work in the Wheeler Basin, Alabama, found identical conditions in the Copena burial mound on Tick Island La° 14. Webb's Pl. 48b should be compared with Pl. 7a of this report. Webb calls these layers of silt "seepage lines" and gives a detailed explanation of their formation. He also presents positive proof that his explanation is the correct one. The sidewalls of his excavation crosscut earlier excavations
made in the site by Moore. In the churned backfill of Moore's pits these seepage lines had already started to reform. Since Webb knew the exact length of time between Moore's excavations and his own, and was able to measure the thickness of the seepage lines in the undisturbed part of the mound as well as in the disturbed area, he was able to make a minimum estimate of the age of the mound. 48

The apparent stratigraphy of this deposit proved useless for separating different batches of cultural material, since the only distinctions to be noted in the sidewall were the seepage lines, which had formed well after the deposit had been laid down. The care I spent on recording this feature was largely wasted effort. They do, however, indicate that this particular section of the deposit has been undisturbed for a considerable span of time.

ANALYSIS OF CHRONOLOGY: This stratigraphic cut proved to be almost equally disappointing with regard to cultural stratigraphy. In part this was due to the relative scarcity of cultural material in the deposit. Stratigraphic Cut 2 had almost three quarters as much volume as stratigraphic Cut 1, but produced less than one tenth as many sherds. Also, unlike Stratum 2 of stratigraphic Cut 1, the soil of stratigraphic Cut 2 seems to be less a cultural deposit than a natural deposit with incidental cultural material included.

The distribution of baked clay fragments is given in
Table 170. Table 48 gives the total number of sherds found and their distribution within the levels of the cut. It is immediately obvious that sherds are not uniformly distributed throughout the cut and that the top levels are in general remarkably barren of cultural material. Much less effort was expended on the analysis of the sherds from this cut, because it became apparent in the early stages of analysis that a refined study of this material would be largely wasted effort. A thorough microscopic analysis of all plain ware was done as a warming up exercise for the study of the sherds from Cut 1. This showed very little, and except for comment on a few sherds of unusual temper this information will not be presented. A presentation of the distribution of sherds showing features of decoration and shape will be sufficient to show the general uselessness of this stratigraphic cut for purposes of detailed stratigraphic analysis.

The relatively few sherds showing features, which have already been definitely associated with the Early Tutishcainyo complex on the basis of the study of the material from stratigraphic Cut 1, are shown in Table 49. These are largely small and somewhat rounded along the edges, as if they had been rolled. The somewhat more numerous sherds which show features definitely attributable to the Late Tutishcainyo complex are presented in Table 50, while Table 51 gives the total of all sherds which are definitely Tutishcainyo, either Early or Late. (This is a combination
of the other two tables plus a few sherds which were definitely Tutishcainyo but not sufficiently distinctive so that one could say whether they were Early or Late Tutishcainyo.) It will be noted that the distribution of the Early Tutishcainyo material is not different from that of the Late Tutishcainyo material. The Late Tutishcainyo material also seems to be eroded.

Yarinacocha sherds were fairly numerous in stratigraphic Cut 2. The stratigraphic separation between the Yarinacocha material and the Tutishcainyo material is not sharp, but there is a definite tendency for the Tutishcainyo material, viewed as a whole, to be concentrated somewhat deeper in the excavation. The Yarinacocha sherds are large and well preserved, and the well drained sands of this excavation unit seem to have been kinder to the painted surfaces of Yarinacocha pottery than the heavier soils of stratigraphic Cut 1. At least, a fair number of painted Yarinacocha sherds were recovered. Table 52 gives the distribution of sherds showing Yarinacocha features of shape and all painted sherds of the Yarinacocha Complex.

There are a fair number of coarse, plain, rim sherds which on the basis of profile must be excluded from the Yarinacocha Complex. They do, however, agree with the rims of the Pacacocha Complex which will be defined in terms of the excavations at UCA-2. The relationship between the Pacacocha complex and the sherd tempered Corrugated Ware noted in stratigraphic Cut 1, is a problem
not completely resolved. It will be treated more fully on the basis of the more extensive evidence from UCA-2. It would be difficult to separate these two groups of pottery on the basis of the distribution patterns they show in this stratigraphic cut. Table 53 gives the distribution of plain Pacacocha rim sherds, and Table 54 gives the distribution of all corrugated sherds. It will be noted that both groups of ceramics are common down to a depth of 30 inches.

Three fragments of fire dogs, a trait which can definitely be assigned to the Pacacocha Complex, were also found in this stratigraphic cut in Unit 12, level 14 and Unit 14, level 8.

There remain a few difficult sherds which merit further discussion. Five sherds with designs done in thin line incision show a distribution well up in the cut: Unit 11, level 4; Unit 12, level 4; Unit 14, level 1; Unit 14, level 4. These are similar among themselves and to certain other sherds which seem assignable to the Corrugated Ware Complex. Their position in this deposit suggests that they are recent. These are illustrated in Fig. 120 f, h, i, k. There are some absolutely plain sherds, which do not quite resemble Shipibo pottery, but which do stand apart from almost all other pre-Shipibo pottery noted in that they are cariape tempered. The distribution of these is shown in Table 55. There is nothing unusual about their external appearance, so they are not illustrated. Three other decorated sherds are
illustrated. One of them might possibly be an aberrant Hupa-iya sherd (Fig. 121 d), but the other two are unique (Fig. 121 a, f).

SUMMARY: This excavation was carried out in a deep bank of sand which had been deposited against the southeast slope of the knoll. The excavation has given a certain amount of information about the structure of the knoll. The red clay core of the hill does not slope out gradually on the southeast side. It appears to drop off almost as abruptly on the southeast as it does on the east side. However, the southeast slope has been padded out with an enormous mass of poorly consolidated, silty sand, which disguises the shape of the red clay core. The most important question raised by this excavation concerns the depositional history of this sand bank. There seems to be but one possibility worth considering, that it is a water laid sand bar. If the climate and geography were different one might entertain the possibility that this was a sand dune, but that seems unlikely under tropical forest conditions. Until there is some evidence of extensive earthworks in this part of Peru, I will refrain from entertaining the theory that this is a man made mound. There was certainly nothing in the structure of the hill indicative of human agency.

It is obvious that the present conditions are not such that a sand bank could build up against the knoll of red clay. I suspect that there have been major changes in the various stream courses since the sand bank was deposited. If the history of the
changes in river channel had been as well worked out for the Ucayali as it has been for the Mississippi valley, it might be possible to specify a certain stage in the history of the river channels when conditions would have been conducive to the formation of this deposit. Such geological information has been of the greatest assistance to archaeological working in the Mississippi valley. Any such assistance in the Ucayali valley must wait on more geological work.

If this natural deposit has not been of help in developing a sequence, it can at least be dated in terms of the sequence which was developed in the course of the other excavations. This body of sand was definitely laid down sometime subsequent to both of the Tutishcainyo occupations at this spot since material representative of both these components is found redeposited in almost all levels. Much of this sand bank was laid down subsequent to the Yarinacocha Complex, though there is a definite possibility that there was a Yarinacocha occupation on the growing surface of the sand bank. At least the last 30 inches of the sand bank were laid down after the occupation of the site by people using the sherd tempered Corrugated Ware. In terms of the archaeological sequence this sand bank is recent. The possibility can be ruled out that the Corrugated Ware is at a depth of 30 inches because of some kind of intrusive pits. The complex profiles of the seepage lines, on which I spent so much effort, may not be of great use.
archaeologically, but they do act as clear check against the possibility of intrusive pits. Webb's examination of Moore's older excavation in a similar deposit shows that any disturbance of such seepage lines is easily noticed. Nowhere in the profiles of the stratigraphic cut did the seepage lines show signs of having been broken.

Webb has made the suggestion that seepage lines such as these might be used in dating. He had the advantages of being able to compare the thickness of the undisturbed seepage lines with those which had developed in Moore's excavation in a relatively short, but known, period of time. There is no such control with reference to the seepage lines which I encountered. The most that can be said is that they are somewhat more developed and have moved deeper into the deposit than those in the Copena burial mound which Webb excavated. To extrapolate from this and suggest that the Corrugated Ware in the Yarinacocha area is older than Copena in Alabama would be unsound, unless it could be demonstrated that the rainfall and soil conditions were exactly the same in these two widely separated areas. These conditions do suggest that the Corrugated Ware, though it is the latest pre-Shipibo pottery encountered, does have an antiquity of at least a few hundred years.
Stratigraphic Cut 4

DESCRIPTION OF EXCAVATION: The row of units extending north in line with Units 17 and 18 were planned as part of an exploratory trench to relate the two major stratigraphic cuts. These Units: 20; 22; 24; 26; and 28 are designated as stratigraphic Cut 4. These units revealed a north-south profile of the internal structure of the knoll, especially of the juncture between the sand bank and the red clay base of the knoll. Otherwise, from an archaeological point of view they were not particularly informative. The excavation was carried out in the manner already described.

PHYSICAL STRATIGRAPHY: The profiles of the west walls of Cut 4 are presented in Fig. 11. The deep, loose sand of Cut 2 becomes shallower toward the north along this cut, and the red silt becomes more concentrated in the lower levels of the shallower units. In the northern end of this cut the bed of sand becomes indistinguishable from and merges with Stratum 1 of Cut 1.

ANALYSIS OF CHRONOLOGY: The archaeological picture is essentially that presented by stratigraphic Cut 2. The total distribution of baked clay fragments and of sherds are in Tables 171 and 56 respectively. Table 57 presents the rare and eroded Early Tutishoainyo material. The Late Tutishoainyo material is
somewhat more numerous but in no better condition (Table 58).
Sherds of the Yarinacocha Complex are the most common group of
ceramics in this cut. The plain sherds are presented in Table 59,
the rim sherds in Table 60, and the painted sherds in Table 61.
Again there are indications that there might have been a fairly
extensive Yarinacocha occupation when the surface of the sand bank
was about 30 inches lower than it is now.

Sherds which can be attributed to the Pacacocha complex
are rare. Table 62 shows the distribution of rim sherds which are
diagnostic of that complex. However, one of the highly diagnostic
rim adornos of the Pacacocha Complex was recovered from level 1
of Unit 26 and two fragments of fire dogs were recovered from
level 8 of Unit 22.

Corrugated Ware is fairly well concentrated in the upper
levels of the excavation (Tables 33 and 64), and the same may
be said for the few sherds of Shipibo fine ware (Table 65). There
are two sherds showing incised decoration which can not be fitted
easily into any of the defined complexes. One is illustrated in
Fig. 121 f. The remainder of the sherds from the unit are small,
plain, and badly eroded. Little could be done with them.

Stratigraphic Cut 5

DESCRIPTION OF EXCAVATION: The final group of excavations
to receive consideration is the row of units extending west from,
and in line with, Unit 22. These include Units 58-68. This will be designated Cut 5. Again only alternate pits were excavated as these revealed sufficient information about the structure of the knoll.

**PHYSICAL STRATIGRAPHY:** Fig. 12 gives the north wall of the row of units starting with Unit 22. Again one can note the progressive diminution of the layer of sand, which gradually merges with and becomes the Stratum 1 already described for stratigraphic Cut 1. Most of the units were shallow and most of the excavated deposit seems to have been equivalent to Stratum 1 of Stratigraphic Cut 1. On the basis of this information one would not expect that the excavations would be particularly rewarding archaeologically, and in general this expectation was fulfilled. There were no changes made in excavation technique for this series of units, and with one exception, which I will discuss presently, the cut showed no unusual features.

**ANALYSIS OF CHRONOLOGY:** Table 172 gives the distribution of baked clay fragments and Table 66 gives the total of sherds recovered from the excavation. The breakdown of this total into the various groups of sherds gives no very striking results. Definite Early Tutishcainyo sherds are tabulated in Table 67 and show a pattern of distribution which is not strikingly different from that displayed by sherds which are definitely Late Tutishcainyo
Sherds showing features of shape or decoration which could indicate either Early or Late Tutishcainyo are given in Table 69, and plain sherds in the Tutishcainyo tradition are given in Table 70. Yarinacocha sherds are particularly common in this cut and there is a tendency for them to be concentrated at higher levels than the Tutishcainyo ones. Table 71 gives the distribution of Yarinacocha body sherds, and Yarinacocha rim sherds are presented in Table 72. Two decorated sherds of the Hupa-iya complex, one from level 1 of unit 64 and one from level 2 of unit 68 and two corrugated sherds, from the top levels of units 60 and 64 are the only other fragments showing distinctive features. These distributions do not contradict any statements made so far, but they do not add much new information either. The one striking aspect of the distribution is the heavy concentration of Yarinacocha sherds in levels 4 and 5 of Unit 64. In this instance the south sidewall of the unit bisected one of the intrusive pits jammed with Yarinacocha material which were hypothesized, but not demonstrated, for Cut 1. There was no difference in soil color to give a clear outline of the pit's limits, but the sherds were packed so close together that they alone gave a clear indication of its boundary. In this case I robbed the sidewall and cleared the pit. The pit had sloping sides and a diameter of 18 inches. The bottom of the pit extended into the red clay base and so could be given clear definition. Most of the sherds, with which the pit was packed,
came from four or five large pots which were broken before being dumped into the pit. One of these pots was largely restorable (Fig. 100 c). The concentration of sherds extended to within 10 inches of the surface so that the level of origination of the pit could not have been lower than that, and was probably somewhat higher. In the tabular presentation above the contents of this intrusive pit have been combined with level 4 of Unit 64 which contained most of that part of the feature within the bound of the original excavation unit. The information that this one intrusive pit gives concerning the nature of the Yarinaochocha occupation at the site is important in that it shows conclusively that the pattern of distribution and concentration of Yarinaochocha sherds is completely independent of that of the Tutishoainyo complexes.

Summary of the Results of the Excavations at UCA-6

Excavation demonstrated that UCA-6 was a multicomponent site with a vengeance. Only one of the archaeological complexes so far discovered in the Yarinaochocha area is unrepresented at this site. The earliest occupation on this knoll covered a considerable area and was intensive, leaving up to 21 inches of cultural deposit over the area immediately to the northwest of the crest of the knoll. Though this occupation seems to have been of considerable duration, only a few hints of cultural change during the occupation
were noted. The ceramics made by the people of this earliest component have been called the Early Tutishcainyo Complex. After the Early Tutishcainyo occupation the site was abandoned for a considerable length of time.

The second occupation of the knoll was also an intensive one. It seems to have had its center off the top of the knoll to the north and west. In the area excavated the debris of this component reached a maximum depth of 16 inches. The ceramics of this occupation have been called the Late Tutishcainyo Complex. They are clearly related to Early Tutishcainyo and give every indication of being an outgrowth of Early Tutishcainyo. However, sufficient stylistic development differentiates the later component from the earlier so that it seems likely that they are separated by a considerable lapse of time. Several reasons have been advanced to show that the change from Early Tutishcainyo to Late Tutishcainyo did not take place at this site but elsewhere, while UCA-6 was deserted. The most cogent reason is the fact that forms intermediate between Early and Late Tutishcainyo do not occur at this locality.

Immediately after the Late Tutishcainyo occupation there again seems to have been a period when the site was not much used by humans. Considerably subsequent to the Late Tutishcainyo occupation the site was occupied by people making the kind of pottery which has been called the Yarinacocha Complex. This
occupation was by no means as intensive as the earlier ones. A thin scattering of sherds was left over most of the area of the site and heavy concentrations of sherds were dumped into shallow pits often intrusive into the Late Tutishcainyo midden.

Starting sometime before the occupation of the knoll by people making Yarinacocha pottery and extending for a considerable period of time after this occupation, natural processes greatly altered the shape of the knoll. A blanket of relatively sterile sand, three to nine inches thick, was laid over most of the cultural deposit on the knoll, and a bank of sand 10 to 15 feet deep was laid against the southeast slope of the knoll. These deposits contain a certain amount of redeposited Tutishcainyo material.

After the deposition of sand on top of the knoll had ceased, but before the sand bank on the southeast slope of the knoll had reached its final height, people making a kind of plain pottery which will be described under the name of the Pacacocha Complex and people making a corrugated, sherd tempered pottery sporadically occupied the knoll. That there were two separate occupations is suggested by the distribution of these two kinds of pottery at UCA-6, and evidence from UCA-2 and UCA-4 indicates that these are separate components. A few sherds of modern Shipibo pottery have found their way to the surface of the knoll in the course of Shipibo farming activities. Earlier an even smaller number of sherds of the Hupa-iya Complex were deposited on the
the site. These can not be dated more closely than to say that they are more recent than the Late Tutishcoainyo occupation.

The two earliest occupations of the site were by far the most intense and rewarding to the archaeologist and after the Yarinacocha occupation human utilization of this locality seems to have been highly sporadic. In part this may be due to a progressive decrease in the size and stability of social groups in this area. Another factor which may be important is a possible change in river courses or other topographical features which could have rendered this knoll less attractive to human occupation.

Excavations at UCA-2

Stratigraphic Cut 3

DESCRIPTION OF EXCAVATION: By far the most successful excavation carried out at site UCA-2, and in many respects the most successful excavation carried out by the expedition, was the block of Units, 27-32 and 41, which have been designated Cut 3. This cut can be located on the maps, Figs. 2,3, and on the aerial photograph, Pls. 2,3. It is at the western edge of a plaza-like area serving the house of Antonio Cumapa, nicknamed Shakimu, and several smaller houses satellite to it. The cut lies lower than the surface of the plaza and slopes very slightly to the northwest. A field of yuca bounds its western edge. The cut was originally laid out as six five foot by five foot units in the form of a
rectangle 10 feet by 15 feet with the shorter axis pointing toward magnetic north. Unit 41 was added to check the depth of the deposit as one got closer to the center of the plaza and a couple of further units were planned along this line. They were not started because time ran out. The same excavation procedures were used here as have been described previously: five by five units, and three inch levels parallel with the original ground surface. In this particular cut the method worked well.

PHYSICAL STRATIGRAPHY: The natural stratigraphy of Cut 3 is presented in Fig. 13 and as a transparent overlay to Fig. 14. The physical stratigraphy of this cut was particularly well marked in the side walls. The uppermost stratum of the deposit consists of a thin layer of dark gray to black sandy clay with much charcoal and ash included. Shell and bone are still preserved in this stratum. The second stratum from the top consists of a light gray, sandy clay with no visible charcoal. The third stratum from the top is a thick band of bright orange, sandy clay with very heavy concentrations of baked clay fragments. The fourth stratum from the top is a red-brown layer of sandy clay containing much less cultural material. The fifth stratum from the top is a thick bed of sand almost completely barren of cultural material. This grades from red-brown at the top to white at the bottom. The sixth layer from the top is the hard, red, lateritic clay which has already been encountered in the excavations.
at UCA-6.

In general the excavations were carried one level into Stratum 5. An occasional eroded sherd of the Tutishcainyo tradition could be found in stratum 5, about one every three or four levels, but I did not think the results sufficiently rewarding to excavate Stratum 5 completely. A post hole was put down in Unit 31 to determine the depth of Stratum 5, and to verify the existence of a base of red clay under the sand. This is illustrated in the west profile of Unit 31 (Fig. 13).

A number of concentrations of fire burned clay were encountered in the sidewalls of the excavation. These represent hearths and temporarily established living surfaces. None of these was cleared over its total area in order to determine its plan. All such concentrations cut by the sidewalls are indicated schematically in the profiles. Aside from these and a few ash lenses in the uppermost stratum of the deposit, the only striking feature uncovered is the deep, steep sided pit which intrudes out of Stratum 3 all the way through Stratum 4 and slightly into Stratum 5. This pit, illustrated in the profile of the north wall of Unit 28 and in Pl. 8 b, is obviously the work of man. It does not show up too clearly in the black and white photograph (Pl. 8 b) but is obvious in several Kodachrome slides on file at the American Museum of Natural History. The purpose of this pit is problematical. There is no direct evidence that it represents a
burial, but such negative evidence is by no means conclusive, since I have already mentioned the tendency for bones to disappear completely under these soil conditions. The upper part of the pit contained a fair number of Shakimu sherds and unfortunately the existence of the pit was not noted until the excavation was almost finished so that these sherds were included in the regular level bags. The bottom of the pit was a rounded oval depression and was crammed with large sherds of Shakimu pottery, fragments of baked clay, and numerous minute charcoal flecks.

Unit 28 was the last unit finished during the end of the last week of my stay at San Francisco de Yarinacocha. Since only a portion of the intrusive pit was included within the limits of the excavation, I was torn between robbing the sidewall to get the rest of the contents of the pit or leaving the rest of the pit for future work, when my sidewall could be cleared again and the whole adjoining block of deposit including the intrusive pit could be excavated by natural stratigraphic levels. I finally settled on the latter alternative and carefully preserved the face by back filling but have since had reason to regret my scruples. The charcoal sample, which I obtained from the bottom of this pit, undoubtedly would date the Shakimu occupation on this site in a precise way. Unfortunately it is of only about half the size necessary for a Carbon 14 assay. If the rest of the pit were excavated, it is
probable that sufficient charcoal could be obtained for a Carbon 14 analysis. The complete excavation of this feature would also yield a quantity of elaborately decorated Shakimu pottery.

The deposit can best be understood in terms of the location of this cut with reference to the topography of the site. The surface of this cut is somewhat lower than the crest of the bluff immediately to the east. The crest of the bluff is occupied by the house of Antonio Cunapa and the adjoining plaza area. During a heavy rain all of the water which falls on the plaza area drains into the area of Cut 3, and a certain amount of soil is washed in along with it. I discovered this fact, much to my chagrin, when after a heavy rain three feet of water had to be bailed out of the partially completed excavations. One would need more information and an enlarged excavation to be certain, but it seems likely that the deposit in this stratigraphic cut represents the gradual filling of an old gully, which had earlier been cut into the west side of the bluff. In part this fill consists of dirt and occasional sherds washed off the top of the hill. In the course of this gradual aggradation of ground level there were three periods when this area was occupied intensively. A dense layer of midden was laid down during each of these occupations. The distinct strata of this deposit indicate that the filling of the area was not a constant process. There seem to have been stabilized land surfaces for long periods of time interspersed with periods
of soil deposition. Luckily the relation between the archaeological deposit and the natural stratigraphy is a direct and simple one.

Perhaps it will be easier for the reader to follow the discussion if a brief statement concerning the relationship between cultural and natural stratigraphy is prefaced to the detailed analysis of chronological data. I shall review working from the bottom up. Stratum 5 is entirely a natural deposit of sand. Stratum 4 is predominately a natural deposit with only occasional evidence of occupation within the area of the excavation. The sherds found within this stratum are of the Tutishcainyo complexes. Both Early and Late Tutishcainyo are represented without stratigraphic separation. Stratum 3 contains evidence of an intensive occupation by people making pottery of the Shakimu complex. In the eastern end of the excavation this stratum also contains a layer of relatively sterile soil overlying the Shakimu occupation and containing only a few redeposited Tutishcainyo sherds. The lower part of Stratum 2 is a very dense layer of midden of the Hupa-iya complex. The upper part of Stratum 2 gives evidence of a time when natural deposition again predominated over cultural deposition, though the area was not completely unoccupied during this period. Stratum 1 is the layer of Shipibo midden which is still accumulating at the outer edge of the plaza.

ANALYSIS OF CHRONOLOGY: There is no necessity for as detailed and tedious a discussion concerning the separation of the
complexes as was inflicted on the reader with regard to the separation of Early Tutishcainyo from Late Tutishcainyo. The Tutishcainyo complexes have already been defined. The contents of the intrusive pit in the sidewall of Unit 28 give almost the full range of features occurring in the Shaikmu Complex. The Shaikmu Complex can be defined in terms of a number of features of rim shape which it shares with no other known complex in the Yarinaucocha area, a lustrous, highly polished surface which is unique to it, a series of completely distinctive designs, and the extensive utilization of the technique of excision.

The Shaikmu Complex does share a few traits with other of the complexes, but only in a highly generalized form. Basal flanges are not uncommon on Shaikmu pottery but are not very similar to those of the Tutishcainyo complexes. Even on the basis of a very slight acquaintance with Shaikmu and Tutishcainyo pottery it would be impossible for one to confuse a Shaikmu basal flange with a Tutishcainyo basal flange, either Early or Late. Adornos are an extremely rare mode in the Shaikmu ceramic complex and a somewhat more common one in the Hupa-iya ceramic complex, while plain rectangular lugs are fairly common in both complexes. Again there are sufficient marked differences in detail so that it would be impossible to confuse a Shaikmu adorno or lug with the corresponding mode from the Hupa-iya Complex.

The Hupa-iya Complex is distinct from all other pottery
found in the area to date. The character of the incised lines in Hupa-iya decoration makes any decorated sherd of the Hupa-iya complex easily recognizable. There are a number of cliches in Hupa-iya design, which can be identified on minute fragments of decorated pottery. Since 30 to 40 per cent of the sherds of the Hupa-iya Complex show incised decoration, the sorting out of much of the pottery of the Hupa-iya Complex is an easy matter.

A level by level distribution of each feature of each of these complexes has been prepared and is on file at the American Museum of Natural History. It seems unnecessary to burden the reader with each of these. Some of them will be presented when the possibilities of microchronology are being discussed, but to demonstrate the major pattern of the macrochronology of the out they are superfluous.

Since the decorated sherds of the Hupa-iya and Shakimu Complexes can be sorted with the greatest ease and 100 per cent accuracy, as can all sherds which show any features of shape such as rim form, lugs, or basal flanges, one might suppose that the segregation of the absolutely plain sherds would be relatively easy. Unfortunately, this is not the case. The kinds of consistent differences in paste which separate the plain sherds of the Early Tutishcainyo Complex from the plain sherds of the Late Tutishcainyo Complex are not found when one compares the plain sherds of the Shakimu Complex with the plain sherds of the Hupa-iya Complex.
They are in both cases sherd tempered sherds, of about the same thickness and showing the effects of firing in an uncontrolled atmosphere. As will be pointed out in the descriptive analysis of the ceramic material, there is a significant difference in hardness between the two groups of sherds, but there is also considerable overlap in the two ranges. The sherd temper in Shakimu pottery averages somewhat larger than the sherd temper in Hupa-iya pottery, but again there is a great amount of overlap. The well polished Shakimu sherds show a surface luster which is outside the range of any polish to be noted on Hupa-iya pottery, though Hupa-iya pottery is generally well smoothed. Unfortunately Shakimu pottery is variable with regard to surface polish and even more unfortunately much of the Shakimu pottery is sufficiently eroded so that it has lost its surface. Though it is possible to sort well preserved and well polished Shakimu sherds from the plain sherds of Hupa-iya with a high degree of accuracy and consistency, there is no single feature which will facilitate this segregation when the Shakimu sherds are poorly polished or somewhat eroded.

I spent considerable time on this problem without resolving it in a satisfactory way. Many hours were expended in looking alternately at the paste of groups of Shakimu and groups of Hupa-iya sherds through a microscope. This yielded no single consistent distinction which could be used as a sound operational basis for sorting. I also practiced extensively at a gross sorting by
general appearance and feel. With practice I think that I developed a fair degree of accuracy at this kind of intuitive sorting. I would guess that the accuracy was in the 80 to 90 per cent range. This involved taking a large number of factors into account for each sherd, and semiconsciously, in an unsystematic way, balancing these factors. Since this kind of sorting can not be prescribed in a precise way, I feel that it has no scientific validity, though it certainly has a good deal of utility during the earlier stages of ceramic analysis.

As a solution to this dilemma I have made two tabular presentations of these data. One, which pleases me, merely rejects from consideration that group of nondescript sherd tempered sherds which could be either Hupa-iya or Shakimu. The other, which should please those who feel that all sherds from every excavation must be "typed" and tabulated, presents these plain sherds as sorted by me using the overall gross approach. It will be noted that the two graphs are not very different in the general picture which they present.

None of the other sorting problems involved in this stratigraphic cut are worthy of extended discussion. There is no difficulty in separating Shipibo pottery, either fine ware or culinary ware, from any of the other ceramics in the excavation. The sherd tempered Corrugated Ware is distinctive and the two Yarinaooccha rim sherds from this pit could not be confused with
the pottery of any other complex.

Table 173 gives the total distribution of baked clay fragments in stratigraphic cut 3, and Table 73 gives the total distribution of sherds.

Fig. 14 presents the cultural stratigraphy of the cut and its relationship to the natural stratigraphy. The underlying bar graph has been prepared so that each level is drawn to scale. The superimposed stratigraphy on transparent paper permits one to relate each level to the natural stratigraphy. The sherd counts used in the calculations for this chart are presented in Tables 74 through 78. These include all sherds from the excavation which can definitely be assigned to a particular complex on the basis of a single definable feature. Specifically it includes all Shipibo pottery, both fine ware and culinary ware (Table 74) (This can be sorted on the basis of paste alone.); the sherd tempered Corrugated Ware (Table 75); all sherds showing distinctive features of Hupa-iya decoration or distinctively Hupa-iya rim or lug forms (Table 76); all sherds showing distinctive features of Shakimu decoration and sherds showing distinctive rim shapes which can be assigned to the Shakimu Complex plus all sherds showing the highly lustrous polished surface which is unique to the Shakimu Complex (Table 77); and all sherds of either Early or Late Tutishcainyo which show distinctive features of shape or decoration plus all plain sherds which exhibit varieties of temper which are found only in the Tutishcainyo
complexes (Table 78). Aside from the sherds from closed bottle spouts, which will be treated separately, and a few unique sherds, there are only four groups of sherds which are not included in these tabulations: all sherds from the coarse ware complexes, the Yarinacocha Complex and the Pacacocha Complex (Table 79) are omitted; all plain and featureless sherds which have been sorted on the basis of overall impression as belonging to the Hupa-iya Complex (Table 80); all plain featureless sherds which have been sorted on the basis of overall impression as belonging to the Shakimu Complex (Table 81); and the plain Tutishcainyo sherds with large sherd temper (Table 82). The difficulties of sorting Tutishcainyo plain ware from Hupa-iya or Shakimu plain ware are not as great as those involved in separating the plain sherds of the last two complexes named, and I feel that there is a high degree of reliability in the sorting of the large sherd tempered Tutishcainyo pottery. Nonetheless, this sorting must be done by combining a number of criteria and so for the sake of consistency these sherds have not been included in the calculations for Fig. 14.

Fig. 15 presents the same picture but for this tabulation the four major groups of sherds omitted previously have been included. This tabulation includes all sherds found in the cut except spout fragments and a handful of unique sherds. I feel that it is not as reliable as Fig. 14 because the sorting of the plain, featureless, sherd tempered sherds is not on the same level
of reliability as the sorting of the sherds showing distinctive features of temper, shape, or decoration. I would estimate that it is between 85 and 90 per cent reliable while Fig. 14 is at least 99 per cent reliable in its sorting.

The conjunction of the bar graphs and profiles in Fig. 14 should be self explanatory. Shipibo pottery is essentially confined to Stratum 1 and is largely confined to the uppermost excavation level of each unit. The most important exceptions are levels 2 of Units 28 and 32, the two units where Stratum 1 reaches its maximum depth. The sherd tempered Corrugated Ware is concentrated slightly lower than the Shipibo material and can be assigned to the top of Stratum 2. The upper part of Stratum 2 shows low sherd counts. Hupa-iya sherds are concentrated in the lower part of Stratum 2 and penetrate into stratum 3 only as occasional intrusives.

The Shakimu Complex is typical of Stratum 3 and there are heavy concentrations of Shakimu sherds only in levels which are wholly or partly within Stratum 3. There is a small amount of downward intrusion of sherds of both the Shipibo and Hupa-iya Complex. Since this plot of ground is now under cultivation and probably has been under cultivation several times in the past, these relatively few examples of intrusive sherds are not remarkable. There is no reason to suppose that they are evidence for the gradual evolution of one complex into another.

Sherds of the Tutishcainyo complexes are not as restricted
in their distribution as sherds of the other complexes. With the exception of a few intrusive Shakimu sherds, Tutishcainyo sherds are the only kind found in Stratum 4. They are characteristic of this depositional layer, but they are by no means confined to it, since they occur in fair numbers in Stratum 3 and even in Stratum 2.

The general chronological implications of this excavation are sufficiently clear and will be summarized before attention is directed to certain minor points for which the explication is more complex. There are Late Tutishcainyo sherds in the lowest levels of Stratum 4, therefore the beginning of the deposition of Stratum 4 was contemporary with or later than the Late Tutishcainyo Complex as defined at UCA-6. The occupation of the site by the people making pottery of the Shakimu Complex was in its totality subsequent to the deposition of Stratum 4 since it occurs on top of the upper boundary of Stratum 4 and in a pit intrusive into Stratum 4. It is obvious that an intrusive pit could not be excavated until the deposit into which it intrudes had been laid down. Part of the most intensive Shakimu occupation lies at the bottom of stratum 3, especially in Unit 41 and part of the most intensive occupation lies well up in Stratum 3, especially in Units 31 and 32. (Check Table 77 for the validation of these statements.) This fact suggests either that the deposition of Stratum 3 was relatively rapid or that the utilization of this locality by people making pottery of the Shakimu Complex lasted a considerable time, perhaps involving two or more distinct occupations. I will return to
this point when I examine the possibility of microchronology within the Shakimu Complex.

All of the occupation by people making Hupa-iya pottery was subsequent to the deposition of Stratum 3. The intense occupation of this component is near the bottom of Stratum 2 and there are shallow, basin shaped depressions intrusive into the surface of Stratum 3 which seem to be hearths of the Hupa-iya component. Since in other excavations at UCA-2 there is a certain amount of mixture of Shakimu and Hupa-iya sherds, the question of the distinctness of these two components must be examined carefully. On the basis of the evidence from this stratigraphic cut, they are demonstrably distinct. The only levels which show appreciable quantities of sherds from both complexes are those levels which straddle the boundary between Stratum 2 and Stratum 3 and thus contain material from both strata. The sharp break in the stratigraphic profile between Stratum 2 and Stratum 3 also suggests that considerable time elapsed between the two occupations during which a stabilized land surface was developed. Unit 41 gives even stronger evidence for a fairly long period of elapsed time between the two occupations. Here the two layers of intense occupation are sealed from each other by a band of relatively sterile soil, naturally deposited and containing only occasional redeposited Tutishcainyo sherds.

The top part of Stratum 2 is relatively sterile, again representing a period of time when cultural deposition was less
significant than natural deposition at this particular spot.

The cultural content which is peculiar to the upper part of Stratum 2 is largely masked in the graphic presentation by the upward movement of Hupa-lya sherds and the downward intrusion of a few Shipibo sherds. The sherd tempered Corrugated Ware and the coarse plain ware associated with it are the most numerous cultural materials contemporaneous with the deposition of the top part of Stratum 2. There are also a few rim sherds of the Pacacocha complex; two from unit 30, level 4, and two from unit 28, level 2; and a typical Pacacocha adorno, unit 31, level 2. Fire dogs are a trait which can be definitely assigned to the Pacacocha complex and the only three fragments of fire dogs from this cut come from the top part of Stratum 2; two from Unit 30, level 3, and one from Unit 29, level 1. There are two sherds of the Yarinacooha complex from the whole excavation and these are both from the very top level of Unit 28. The most important point to note about the Yarinacooha Complex is that in this cut it does not occur in the levels containing Late Tutishcamayo material.

Only the sherd tempered Corrugated Ware is presented in Fig. 14, since this is the most distinctive and numerous pottery in this somewhat disparate grouping of sherds. In Fig. 15 all of this coarse late pottery is lumped together even though three distinct components are represented.

The assumption must be made that even though the relatively
sterile upper part of Stratum 2 is thin, its deposition took a considerable period of time.

The accumulation of Shipibo midden, which is Stratum 1, has all taken place after the deposition of Stratum 2 was completed. As far as I could tell, the Shipibo occupation here is subsequent to the establishment of a Franciscan mission here around the turn of the century. In other words, three to six inches of midden has accumulated in about 50 years. The average depth of the Shipibo midden is closer to three inches than to six. If we could assume a steady rate of deposition for the whole of stratigraphic cut 2 we would arrive at a minimum age for Late Tutishosinyo of 1000 years. I consider such an estimate next to valueless since there is good evidence that the rate of accumulation has not been constant through time. The strongly developed profile suggests that there were stabilized land surfaces over considerable periods of time. The concentration of cultural material in the layers of intense Hupa-iya and Shakimu occupation is such that sherds form a considerable part of the volume of the deposit. The growth of the deposit must have been more rapid during these periods of intensive occupation than during periods when natural deposition was the major operative factor. Finally, the three inches of Shipibo midden are by no means equivalent to three inches of Hupa-iya or Shakimu midden, since the Shipibo midden is loose and still contains large quantities of organic material such as
shell and bone, while the earlier middens are compact and have lost all of their organic material. It is certain that, if the Shipibo midden were to undergo the same processes which have compacted the Hupa-iya and Shakimu middens, it would lose much volume. There is no way in which to calculate the factor of volume loss involved.

Fig. 14 and Table 74 exemplify the effect of the pattern of Shipibo rubbish disposal which has already been touched on briefly. Each house floor and a cleared area for some distance around each house is swept daily. This means that there is no accumulation of rubbish close to the house. Midden does build up in a band just beyond the edge of the area which is habitually swept. Stratigraphic Cut 3 cuts perpendicularly across such a band of midden, which is building up around the house of Antonio Cumapa. Units 28, 29, and 30 lie precisely under the peak of this accumulation and thus show the maximum concentration of Shipibo material. Units 31 and 32 are too far away from the source of sherds, and sherds reach them only as the result of particularly vigorous broom strokes. On the other hand Unit 41 lies at the edge of the swept area and only a particularly inept sweeping job would allow Shipibo sherds to rest there.

The evidence presented in Fig. 14 proves beyond any reasonable doubt that we are here dealing with a series of discreet occupations. Thus any levels which contain sherds of more than
one complex are not suitable material for seriation until they have been purified of mechanically intruded sherds. There are very few levels which could be used for seriation without such treatment.

Since the evidence for a series of distinct components is so completely unequivocal in this particular stratigraphic cut, it presents a good opportunity to check a point of methodology which has already come up once in the description of the stratigraphic cuts. Throughout this paper I have presented my data unit by unit and level by level rather than by combining all levels of the same depth within a stratigraphic cut. This procedure has given rise to tables which are admittedly large and clumsy, and it might be asked if a presentation which did combine all levels of the same depth for each cut would not present this material as meaningfully or at least almost as meaningfully. To ask this question is to make the assumption that natural stratigraphy remains equivalent to the arbitrary levels of excavation over long distances. A glance at the natural stratigraphy of Cut 3 (Fig. 13) refutes this assumption, but it will be instructive to show what kind of a picture results when the excavation data is pooled in this fashion. Fig. 16 presents the data used in Fig. 15 with all levels of the same depth combined. It is immediately apparent that such a presentation destroys the sharp breaks between the several occupations. In fact, presented this way the several
components show the kind of battleship-shape curves which Ford, and those who have followed his method, regard as the typical distribution patterns of "types" when their popularity through time is plotted. Thus we see that a spurious picture of cultural continuity is substituted for the valid picture of a series of distinct components.

I have belabored this obvious point because it is of some significance and because Bird has suggested to me that it is source of considerable confusion in archaeological reporting. I do not want my meaning misunderstood, for I am not maintaining that all examples of smooth transition from one type to another or from one complex to another are the result of the arbitrary lumping of distinct strata. Ford's method of seriation is based on the assumption that every ceramic type (I would prefer to use the word ceramic feature here), when its popularity is plotted against elapsed time, shows a pattern of distribution which approaches a normal distribution curve. I feel sure that the basic assumption is a generally valid one, though I have never seen a rigorous demonstration of it. Nonetheless, in the course of the deposition of a midden and in the course of excavating and describing a midden there are a number of processes, which, because they are more or less random in operation, tend to smooth out the distribution curves of various classes of artifacts when these are plotted against depth. In other words these processes tend to make the
distribution curve of any group of artifacts look more "normal" than it should. Among these random processes are the mechanical mixture of adjoining strata through root action, burrowing animals, cultivations and various other kinds of disturbance; the occasional falling of a sherd out of a sidewall and into a lower level in the course of an excavation; the occasional mislabeling of a sherd, or misplacing of a sherd in the course of processing archaeological material; and the process which we have just examined which is the failure of excavation units to coincide exactly with natural stratigraphy. In short there are a number of processes at work on archaeological materials which can produce a picture of gradual transition which is spurious. The archaeologist must be constantly on guard against spurious periods of transition and spurious associations of pottery. Phillips gives an admirably lucid discussion of this point when he deals with the transition, or lack thereof, between Baytown and Mississippi components in the Lower Mississippi Valley. Also this is approximately what Rowe is saying when he points out that while Ford's methodology is adequate to determine the midpoints of temporal distribution curves it can not determine the length of the tails of these curves.

All of the real difficulties in interpreting the material from stratigraphic Cut 3 involve the distribution of sherds of the Tutishominyo complexes. These difficulties do not concern
the relationship of the Tutishcainyo complexes to the other complexes in the cut. Since Tutishcainyo material is typical of Stratum 4 and since the Shakimu occupation could not have taken place until Stratum 4 had been completely deposited, the Tutishcainyo material must be earlier than the Shakimu material and thus the earliest ceramic component represented in this cut. The problems concern the relationship of the Tutishcainyo materials from this excavation to the good sequence established at UCA-6, in which Early Tutishcainyo is separated from Late Tutishcainyo by a considerable lapse of time. The Tutishcainyo material from this cut has so far been presented in pooled form in order to clarify the macrochronology of the cut. It is easy to make a division of the material into Early and Late Tutishcainyo by using the same set of criteria which were used in the analysis of Stratigraphic Cut 1 at UCA-6. By so doing one arrives at the tabulations presented in Tables 83 and 84. It will be noted that the stratigraphic separation between Early and Late Tutishcainyo which is so clear at UCA-6 is not evident in the tabulations of the present material. There are sherds which are undeniably Late Tutishcainyo in the deepest levels of Stratum 4 and sherds which are emphatically Early Tutishcainyo well up in Stratum 3. If anything, Late Tutishcainyo features seem to be slightly more common in the lower levels. It is obvious that if the stratigraphy of UCA-6 is taken at face value (and the evidence there is copious and unequivocal) then
there must be something peculiar about the distribution of the 
Tutishcainyo material from the cut now under consideration. There 
is no intensive occupation layer in Stratum 4 which is comparable 
either to the Early and Late Tutishcainyo midden layers at UCA-6 or 
to the Shakimu, Hupa-iya, or Shipibo midden layers in this cut. 
Stratum 4 seems more like the deposit in Cut 2 at UCA-6. There 
appears to have been some slight occupation within the limits of 
the cut during the time when Stratum 4 was being laid down, if one 
can judge by the concentrations of baked clay fragments which 
were noted in the profiles. The scarcity of sherds within Stratum 
4 indicates that the occupation was a minor one, or that this 
particular spot was near the limits of the occupied area. The 
mixture of sherds showing Early Tutishcainyo features with those 
showing Late Tutishcainyo features, which occurs in all of the 
lower levels of the site, could be explained in several ways. 
One might postulate that the mixture is the debris of an occupation 
which is intermediate in time between the Early and Late Tutish-
cainyo occupations at UCA-6. This seems unlikely since most sherds 
when viewed individually are either typical Early Tutishcainyo 
or typical Late Tutishcainyo. Few of the sherds show features 
which might be regarded as intermediate between the two. 
Another possible explanation is that the sherds in Stratum 4 
represent a mechanical mixture of the remains of two components. 
This, I feel, is the true situation and I will give what appears
to be the most likely explanation of how such a mixture came about. The Tutishcainyo material of Stratum 4 contains more sherds showing Late Tutishcainyo features than Early Tutishcainyo features. It is basically an assemblage of Late Tutishcainyo sherds with a number of Early Tutishcainyo sherds mixed in. This conclusion is supported by an examination of the temper of the plain sherds from the lower levels of this cut. Miss Baldwin did a microscopic sorting of the plain Tutishcainyo material from this cut using the same methodology and the same temper categories as she had used in sorting the UCA-6 material. The percentages of various kinds of temper used agree with those found in the Late Tutishcainyo levels at UCA-6 rather than those of the Early Tutishcainyo levels. It seems likely that what actual occupation there was within the Stratum 4 deposit was a Late Tutishcainyo occupation. It is then necessary to account for the Early Tutishcainyo material in Stratum 4. A possible explanation is that these sherds washed in along with the sand and clay which make up the bulk of the deposit. To accept this explanation one must assume that there is a midden, containing considerable Early Tutishcainyo material and closer to the top of the bluff, out of which such sherds could have been eroded. No excavations were made on the very crest of the bluff but stratigraphic Cut 2, which was just on the other side of the crest of the bluff, did show a concentration of sherds with Early Tutishcainyo features. The details of Cut 2 will be
presented below.

That a large part of the Tutishcainyo material in Strata 3 and 4 is redeposited, is suggested by two lines of evidence. The distribution of Early Tutishcainyo material in Strata 3 and 4 is fairly uniform. There are no layers of intense occupation, and the distribution of Tutishcainyo material is independent of rather than correlated with the distribution of Shakimu material. This uniformity of deposition suggests that it is involved with the continuous natural deposition of the sands and clays. Overlying the Shakimu occupation in Unit 41 is a layer which is almost lacking in sherds. This is surely the result of natural deposition and the few sherds which are contained in this deposit are Tutishcainyo. One has only to assume that the processes responsible for the deposition of this nearly sterile layer containing a few Tutishcainyo sherds were operative during the time when the site was occupied as well as during the time when it was not. This seems a more economical explanation than to invoke a second very minor Tutishcainyo occupation subsequent to the Shakimu occupation.

The second line of evidence concerns the high degree of uniformity shown by all of the Tutishcainyo material whether from Stratum 3 or Stratum 4. If the Tutishcainyo material were not largely redeposited I would expect to see some change in its nature during the time that 30 inches of midden was laid down. I have already shown that no significant change takes place in the
proportions of Early and Late decorated sherds. The proportions of the several groups of temper are equally constant. Table 85 presents the temper data with the levels pooled into three groups: those levels which are entirely in Stratum 4; those which are partly in 3 and partly in 4; and those which are entirely in 3 or above. There are no significant differences in the proportion of the various types of temper used in these three groups of plain Tutishcainyo sherds. To recapitulate, I think that there were at least two distinct Tutishcainyo occupations on the site. The Early Tutishcainyo occupation adjoined the area of the cut and was on slightly higher ground. The Late Tutishcainyo occupation, though not centered on the area of the excavation, did extend into it to a minor degree. This minor Late Tutishcainyo occupation was contemporaneous with the beginning of the deposition of Stratum 4. Along with the sand and clay which washed off the top of the bluff to be deposited as Strata 4 and 3, some sherds of the Tutishcainyo occupations were carried along and dropped so as to be included within the later cultural debris.

The problems surrounding the interpretation of the Tutishcainyo materials from this cut do not in any way affect the major stratigraphic picture. The Shakimu Complex must be dated as considerably later than the Late Tutishcainyo Complex since Late Tutishcainyo material is an integral part of Stratum 4 even to its very base, while Shakimu material occurs only in
stratum 3 and in pits intrusive into stratum 4. These uncertainties
do make it unprofitable to use the rather scant Tutishcainyo
material as the basis for an attempt to refine the internal
chronology of the Tutishcainyo tradition. For reasons I will
explain in the sections of the paper describing the Tutishcainyo
Complexes, I suspect that the Early Tutishcainyo occupation at
this site was somewhat later than the one at UCA-6, and the Late
Tutishcainyo occupation here was somewhat earlier than that at
UCA-6. The material is not sufficiently voluminous to substantiate
my hunches on these questions.

Since the only extensive body of Shakimu sherds comes
from this cut, any attempt to discern chronological trends within
Shakimu must be done on the basis of the sherds from this cut.
The distribution of every identifiable Shakimu feature was
plotted independently. The patterns of distribution showed a
high degree of similarity in almost every case. There are three
groups of plain rim sherds which may be possible exceptions to
this statement. Table 86 gives the distribution of sherds
showing a rim profile of the form illustrated in Fig. 56 a,b.
A second group of rim sherds is tabulated in Table 87 and illustrated
in Fig. 56 d. The third group is presented in Table 88 and
Fig. 56 f,g. The distribution patterns of the first two groups
suggest that they may be somewhat earlier than the last group. The
difference between the first two groups and the last group lies
in the angularity of the rim profile. The first two groups have sharply angled and very carefully formed rims, while the last group is characterized by a rounded and less carefully shaped rim. This trend, if it is a real one, might be associated with a slight deterioration in workmanship. These data are by no means conclusive and the suggested trend should be regarded only as a hypothesis to be checked by further work.

The possibilities of microchronology within the Hupa-iya complex will be examined in conjunction with the description of stratigraphic Cut 4 in which the Hupa-iya component was both richer and deeper. The Hupa-iya material from stratigraphic Cut 3 will then be used as a check for any trend which may be noted.

The possibilities of discerning microchronology within any of the coarse ware complexes on the basis of this cut are not worth considering. The Shipibo midden is too thin to make any kind of stratigraphic subdivision profitable.

The major features of the stratigraphy of Cut 5 have now been covered. Certain features and unattributed sherds remain to be discussed.

Closed pouring spouts have not been treated along with the rest of the sherds. Most of these are assignable to the Tutishoaainyo complexes but some are part of the Shakimu Complex. The distribution of each of the various forms of spout will perhaps permit a sharp distinction between Tutishoaainyo and
Shakimu spouts. The total distribution of sherds from spouts is given in Table 89. Of these two are so small as to offer no diagnostic features. One adorno spout with applique modeling (Fig. 71 b) came from Unit 41, level 14. This location places it within a dense layer of Shakimu midden and the nature of the applique also suggests a Shakimu association for this piece. Two short tapered spouts with well marked lips show a distribution which suggests Tutishcainyo associations. One is from level 16 of Unit 32 and the other is from level 18 of Unit 32. A similar spout came from the Late Tutishcainyo levels of Stratigraphic Cut 1 at UCA-6 (Fig. 49 i), so the attribution of this particular form to Late Tutishcainyo seems reasonable. Tall, well made, tapering spouts are represented by four examples (Fig. 53 a,b). These are from Unit 32, level 20; Unit 31, level 16; Unit 30, level 14; and Unit 28 from the bottom of the intrusive Shakimu pit, Feature 1. The last mentioned of these (Fig. 71 a) is certainly attributable to the Shakimu Complex; its surface finish suggests this and the content of the bottom of this pit is almost 100 per cent Shakimu. (Out of the 289 sherds all but four small fragments are Shakimu.) The other three are probably Late Tutishcainyo as this form is the common Late Tutishcainyo form of spout at UCA-6. Three examples of short, crude, tapering spouts (Fig. 53 c,d) show a distribution which suggests Shakimu associations. One is from Unit 27, level 8; one from Unit 29, level 10; and one from Unit
41, level 11. There are somewhat similar spouts in the Late Tutishcainyo midden at UCA-6 (Fig. 53 i), and a similar spout came from a Shakimu context in Unit 40 at UCA-2. It seems likely that spouts of this general shape occur in both the Late Tutishcainyo and the Shakimu Complexes. Large, fat bodied spouts with a high arched connecting bridge are represented in this cut by five specimens (Fig. 53 e, f). The distribution of sherds from spouts of this form is as follows: Unit 51, levels 14 and 18; Unit 29, levels 9, 12, and 14. In general, this suggests a Tutishcainyo association. There are no spouts from UCA-6 which exactly parallel these specimens, but this group of spouts is more similar to the typical Early Tutishcainyo spout form (Fig. 35 h) than it is to the Late Tutishcainyo forms. It is also strikingly similar to Barrancoid spouts from Venezuela. Finally, there are two small and very crude sherds which represent spouts (Fig. 53 g, h). The distribution of these, Unit 28, level 5 and Unit 52, level 4, would suggest Hupa-iya associations. Since these are the only data which would attribute spouts to this complex, the question of the occurrence of spouts in the Hupa-iya complex had best be left open.

A few unique sherds and infrequent traits have been excluded from the tabulations till now. There were three fragments of clay fire dogs, a trait which is definitely associated with the Pacacocha Complex. One is from level 1 of Unit 29, and the other
two are from level 3 of Unit 30. Three spindle whorls came from the cut. One is the crude form of spindle whorl associated with the Paaaccocha Complex and came from level 2 of Unit 28 (Fig. 112 i). The second specimen is of typical Hupa-iya form and came from level 3 of Unit 32 so that a Hupa-iya association is reasonable. A third plain, round spindle whorl came from level 12 of Unit 28 (Fig. 53 k). The location of this specimen suggests a Shakimu rather than a Hupa-iya association, but the specimen is indistinguishable from plain Hupa-iya spindle whorls. Since this is the only evidence which would place spindle whorls in the Shakimu Complex, the question had best be left open.

A smoothed fragment of baked clay which seems to have come from a reel shaped object was recovered from level 15 of Unit 30 (Fig. 53 m). No similar object was recovered in the whole course of the excavations. Its position in the cut would be compatible with either a Tutishcainyo or a Shakimu association. Two fragments of fired clay which appear to have come from the walls of wattle and daub houses were recovered from this excavation. They are similar to the fragments recovered from Stratigraphic Cut 1 of UCA-6. The present specimens are illustrated in Fig. 122 c,d. The position of these fragments, one from Feature 1 of Unit 26 and the other from level 10 of Unit 29, indicates that they are part of the Shakimu component of the cut.

There remain only a handful of anomalous sherds to be
discussed. One of these is a deeply serrated basal flange of a type not encountered at UCA-6. It is from level 5 of unit 41. On the basis of its form one might be tempted to assign it to Late Tutishcainyo, but its position in the excavation does not particularly support this attribution. The most curious aspect of this sherd is that it parallels in a rather precise way the shape of the final form of basal flange in Early Teneu pottery in the Peten (Fig. 52 j). Level 3 of Unit 31 produced a plain sherd with a very heavy shell temper. This had a rather waxy surface finish and did not appear to be within the range of Early Tutishcainyo shell tempered pottery.

A fragment of what appears to be a vessel leg came from Unit 29, level 7. It is of sanidine tempered ware (Fig. 53 l).

The most unusual sherd of the collection from this cut was a well polished, well fired sherd with a black painted design on the interior surface. The temper of this sherd is vegetable material of some kind, and it may be similar or identical to the tempering material used in modern Shipibo pottery. The interior surface of the pottery shows a hardness of about 4 on Moh's scale while the exterior is somewhat softer. Both surfaces are well smoothed but unslipped. The decorated area of the sherd is too small to show much of the design, but what is present is not particularly similar to the designs of Shipibo pottery.
The position of the sherd in the midden, level 5 of Unit 31, suggests that it is a relatively late trade piece, but it cannot be said with any certainty into which of the later components this piece might have been traded.

Level 3 of Unit 29 produced part of a perforated disc of sherd. The general form of this specimen is somewhat similar to the sherd discs which were a not uncommon feature in the Tutishoainyo midden at UCA-6. The workmanship involved in flaking the edges is crude, however, and the sherd out of which it was made is somewhat too thick and crude to be typical of Tutishoainyo (Fig. 53 j). The sherd from which it was manufactured is far more suggestive of the Pacacocha or Yarinacoocha Complexes. The position of this artifact in combination with the crudity of the sherd suggest that the trait of perforated sherd discs, which was typical of the Tutishoainyo Complexes, was revived at a much later period.

TRADE GOODS: A small number of fragments of metal and glass were recovered from this stratigraphic cut and from cut 2 at this site. Table 90 gives the distribution of fragments of iron tools and Table 91 gives the distribution of sherds of glass. It can be noted that all of this material is unequivocally associated with the refuse of the present Shipibo occupation. Though there has been extensive and continuous contact between this group of Shipibo and the bearers of Western culture for the last 50 years
and sporadic contact for a long time before that, archaeologically preserved evidence of this contact is rare when compared to the quantity of indigenous pottery still being made and broken at this site. This is remarkable when one considers that San Francisco de Yarinacocha is but 12 miles from a Peruvian city of 15,000 inhabitants.

There was no evidence recovered here or elsewhere in my excavations of the preColumbian use of metal in this area, though bronze axes are reported to be fairly common in the lower Pachitea River valley. A small piece of metal foil which was "recovered" fairly deep in this cut proved on close inspection to be a piece of modern commercial foil such as is used in cigarette wrappers. Either it was inadvertently dropped into the cut and trampled into the dirt, or it was planted as a joke by one of my Shipibo workmen.

SUMMARY: The five and one-half feet of deposit exposed by the excavation of Stratigraphic Cut 3 showed a well developed natural stratigraphy which was paralleled by an equally clear segregation of several ceramic complexes. Stratum 4, the lowest stratum containing appreciable cultural material, appeared to be largely the result of natural deposition, and the sherd count per three inch level was low. The only kinds of ceramics which occurred in the undisturbed sections of this stratum were those characteristic of the Early Tutishcainyo and Late Tutishcainyo Complexes. The
stratigraphic segregation of these two groups of pottery, which was so well marked in Stratigraphic Cut 1 of UCA-6 could not be demonstrated in this cut. The most important point to be noted was that the deposition of Stratum 4 in this cut was contemporaneous with or later than the Late Tutishoainyo Complex since that was the latest culture material included in the deposit.

Stratum 3 which overlay Stratum 4 showed evidence of more intensive occupation. It contained quantities of sherds which were typical of the Shakimu Complex.

Stratum 2 showed a dense midden at its base. The kind of ceramics which have been designated Hupa-iya occurred in this midden in quantity. The stratigraphic break between the Hupa-iya and Shakimu middens was sharp and in part of the cut there was a relatively sterile layer of soil separating the two occupations. This point is worth emphasizing since there were other cuts at UCA-2 in which the ceramics of the two complexes were mixed. In the upper part of Stratum 2 natural deposition again seemed to have predominated over cultural deposition, and the sherd counts by levels were relatively low. Some diagnostic sherds of the Pacacocha, Yarinacocha, and the Corrugated Ware Complexes occurred in the upper part of Stratum 2, and these three complexes were thus given a relative date with regard to the sequence in this stratigraphic cut.

Stratum 1 was the dark refuse still being produced by
the present Shipibo occupation on this site. It contained quantities of shell, bone (mainly turtle carapace), and other organic material which had completely disappeared from the earlier strata. The cultural content included numerous sherds of Shipibo ceramics as well as some sherds of glass and implements of iron, which had been obtained by the Shipibo in trade.

The long cultural sequence revealed in this stratigraphic cut was perhaps the most important single unit for building a cultural chronology for the Yarinacocha area. Its stratigraphy covered much the same span of time as stratigraphic Cut 1 at UCA-6, but there the earlier part of the sequence was best represented while the later complexes were poorly represented and segregated. In the Cut 3 at UCA-2 the early part of the sequence was telescoped, but the middle range of the sequence was richly represented and the chronological relationships of the complexes were admirably clear.

**Stratigraphic Cut 5**

**DESCRIPTION OF EXCAVATION:** This excavation unit consisted of a 10 foot square, that is four contiguous five foot by five foot units, 33-36, lying about 50 feet west northwest of Cut 3 and within the same yuca field. A considerable amount of interesting Hupa-Iya material was found on the surface in this general area, and it was hoped that the cultural deposit in this area
would be as deep as that encountered by Cut 3. These expectations were not fulfilled, as the cultural deposit here had an average depth of only 18 inches. Nevertheless, the major features of the cultural stratigraphy obtained from cut 3 were telescoped into this shallow midden. Stratigraphic cut 5 supplied more than just a repetition of the previous cut in that it yielded sufficient information for the clear delineation of the Pacacocha Complex.

**PHYSICAL STRATIGRAPHY:** The 18 inches of midden showed no obvious differentiation and lay directly on the sterile, red, lateritic clay which formed the core of the hill underlying each of the sites excavated. On several occasions I scraped and examined the sidewalls of this cut, but was unable to discern the least indication of any physical stratigraphy to match the complex cultural stratigraphy of the Cut. The culture bearing layer was fairly loose, sandy clay such as had been met with in other of the excavations.

The excavation of this unit followed the usual procedure with three inch arbitrary levels parallel to the original ground surface. With one exception the excavation revealed no features of note. A large, oval depression around 18 inches in diameter was found intruding into the sterile, red clay base to a depth of 10 inches below the juncture of the midden and base. This pit, which was apparently man made, was largely in the northeast quarter of Unit 33 and extended very slightly into unit 35.
(This was only in the wider upper part of the pit and not at the very bottom.) The bottom of the pit contained quantities of potsherds and some fragments of fire dogs. The upper part of the pit, that is the part above where it started to cut into the red clay base, was not noted or recorded, so that the only way that the pit could be dated was on the basis of its cultural content. There was no visible evidence of its level of origination. The fact that no evidence of this pit was noted above the red clay base should not be taken as an indication that the pit was dug before the midden was laid down. I have already mentioned the extremely uniform nature of the midden in this cut. Actually the dating of this pit presented no problems once the ceramic stratigraphy of this cut was examined and analyzed. This pit was designated Feature 1, Unit 33, UCA-2

ANALYSIS OF CHRONOLOGY: The same procedure of ceramic analysis already described above for various of the other cuts was used here. The basic problems at this level of analysis were to determine if one or more identifiable occupations occurred at this spot; and if more than one component was present, to determine the temporal order of the components. The archaeological evidence for a discrete occupation in this region is the ceramic complex. I have offered the theoretical definition of a ceramic complex as the total pottery made by a face to face social group at a particular point in time. My operational definition of a
ceramic complex is any group of ceramic features which share the same pattern of spatial distribution within a series of excavations. This cut is particularly instructive as an example of the working out of the operational definition of ceramic complex used in this study. The Pacacocha Complex was isolated in this cut as a series of ceramic features which did not fit into any of the already defined complexes and which when studied all showed the same pattern of spatial distribution.

It is not necessary to run through the feature by feature definition of all of the complexes represented in this stratigraphic cut. Both Early and Late Tutishcainyo have received adequate definition in the discussion of Stratigraphic Cut 1 at UCA-6 and Shakimu has been defined on the basis of its clear separation in Stratigraphic Cut 3 at UCA-2 immediately to the east of the present excavation. The definition of the Hupa-iya Complex has also been discussed in some detail. It has been pointed out that there is greatest difficulty in confusing either the slipped or unslipped Shipibo pottery with any other ceramics recovered from the excavations. I will treat in detail only the features which have been united to form the as yet undiscussed Pacacocha Complex.

Perhaps the simplest way to present the material is to run through the distribution of the already defined complexes in this cut starting with the earliest.
The distribution of baked clay fragments is given in Table 174, and the total sherd distribution is given in Table 92.

The combined representation of sherds from both Early and Late Tutishcainyo is only 37 or about one per cent of the sherds recovered from this cut. This total includes both decorated and plain sherds. This paucity of material suggests that there was never a Tutishcainyo occupation directly on this spot, and that even to a higher degree than the area of stratigraphic cut 3, this locale was marginal to the centers of Tutishcainyo occupation at UCA-2. The distribution of these sherds is given in Table 95. It can be seen that their distribution pattern is not very clear or striking. The most that can be said is that they are over twice as numerous in the lower half of the cut as in the upper half.

Sherds of the Shakimu Complex are considerably more numerous in this cut than those of the Tutishcainyo complexes, but are still not sufficiently common to indicate an intensive Shakimu occupation on this spot. Again Shakimu sherds are approximately twice as common in the lower half of the midden as in the upper half. Table 94 gives the distribution of all sherds showing features of shape or decoration which can be ascribed indubitably to the Shakimu Complex, while Table 95 gives the distribution of plain sherds which are probably assignable to the Shakimu Complex. In some instances the sherds are very highly
polished so the ascription is certain. In other instances the assignment is less certain.

I have already discussed at some length the difficulties met with in separating small, plain sherds of the Shakimu Complex from small, plain sherds of the Hupa-iya Complex and need not restate the problem here. It is worth reiterating that these sortings of plain sherd tempered sherds while fairly accurate are by no means as reliable as the sorting of decorated sherds and sherds showing features of vessel form.

Though Shakimu sherds are not particularly common, their distribution indicates that while the lower half of the 18 inches of cultural deposit was being laid down at this point, the area was occupied by people making pottery of the Shakimu Complex. The scarcity of sherds suggests that this point was toward the edge of a Shakimu village area.

There is evidence of a very intensive Hupa-iya occupation at this spot. Table 96 gives the distribution of sherds showing features of shape or decoration which are definitely of the Hupa-iya Complex. Table 97 gives the distribution of plain sherds which are probably of the Hupa-iya Complex. The difficulties in sorting Hupa-iya plain sherds from Shakimu plain sherds were just mentioned. The problems involved in sorting Hupa-iya plain sherds from Pacacocha plain sherds were even more formidable, for a reason which will be discussed below. The pattern of distribution
indicated by these two tables is remarkably clear considering how shallow the cultural deposit was. Hupa-iya material is concentrated in levels 2 and 3 of all units, in level 4 of Unit 33, and in level 1 of Units 34 and 36. The implications of this pattern are obvious: at some time subsequent to the rather meager Shakimu occupation at this spot there was an occupation by people making pottery of the Hupa-iya Complex. This occupation was of sufficient intensity and duration to lay down six to nine inches of very dense midden.

The distribution of Shipibo pottery is given in Table 98. The sorting problems when dealing with Shipibo pottery are nil, since the distinctive cariape temper sets this pottery apart from all other ceramics found in the excavations. With regard to both the slipped fine ware and the unslipped cooking ware this sorting can be regarded as completely accurate. The pattern of distribution is well marked, though there is some downward intrusion of Shipibo pottery in Unit 35. Shipibo pottery is largely confined to the top three inches of the deposit, and even here does not form a uniform layer. This spot is near the edge of the deposition of Shipibo refuse so that while the southern half of the cut, Units 33 and 35, are under a considerable mantle of Shipibo midden, Units 34 and 36 have a much thinner layer on them and produced far fewer Shipibo sherds. Thus dense Hupa-iya refuse was reached within the top three inches of Units 34 and 36, while in Units 33 and 35 it was buried under more than three inches of later deposition. Though Shipibo occupation comprises
only a thin layer at the top of the midden and does not even include
the full depth of the first arbitrary level of excavation.
individual Shipibo sherds are intrusive downward to a depth of as
much as 12 inches. Considering the fact that the field is and has
been under cultivation by the Shipibo, the only surprising aspect
of this downward intrusion is that the intrusive Shipibo sherds
are so rare. The pattern of downward intrusion displayed by the
Shipibo sherds is comparable to that displayed by the Hypa-iya
material below a depth of nine inches. In other words, there are
no more sherds of the Hypa-iya Complex within the levels of
Shakimu midden than one would expect as a result of disturbance
created by human habitations and horticulture. The mixture of
Hupa-iya and Shakimu sherds can not be taken as evidence for a
transition between the two complexes.

After all sherds of the four ceramic complexes already
discussed were subtracted from the total sherds recovered from this
cut, there still remained a great mass of ceramic material to be
accounted for. Much of this material consisted of plain, coarse,
poorly fired sherds, with a coarse sherd tempering. The surfaces
of these sherds tended to be pitted and irregular. In terms of
hardness and smoothness the bulk of this pottery fell outside of
the range of plain Hupa-iya sherds. There were a fair number of
rim sherds which had the qualities just described and which
indicated vessel forms well outside the range of any of the
complexes so far described. These rim forms included: simple, rounded, incurved rims from closed globular vessels (Fig. 108 b, c and Table 99); simple rims, also from closed globular vessels, showing a shallow S curve in profile (Fig. 108 d-f and Table 100); shallow plates with simple rounded rims (Fig. 108 a and Table 101); simple, straight, insloping rims from shallow, sharply carinated bowls (Fig. 108 g and Table 102); rims from large constricted mouth vessels with slightly thickened, everted lips (Fig. 109 c; Fig. 110 h-j and Table 103); and the rims of huge, straight sided urns, with the top of the rim squared off in the horizontal plane (Fig. 109 d and Table 104). It will be noted that each of these features taken separately shows the same pattern of distribution, a concentration in the bottom of the large man made pit cut into the red clay base of Unit 33, and in the uppermost levels of all four of the Units, but with a tendency to be concentrated in Units 33 and 35.

Fragments of fire dogs (topia) show the same pattern of distribution, and this feature can be safely attributed to the same complex (Table 105). Large, curdely made spindle whorls with a biconical shape occur in this excavation (Fig. 112 g, k and Table 106). Such spindle whorls are completely different from the well made, spherical, incised Hupa-iy a spindle whorls and from the well made, slipped, biconical spindle whorls of the modern Shipibo. Their distribution within this cut suggests that they may be
safely attributed to the same complex. Two fragments of very coarse,
sherd tempered comals were recovered from level 1 of the cut (Fig.
109 a,b and Table 107), and an attribution to this complex seems
reasonable. The same may be said for the large, crude, strap
handle from the intrusive pit (Fig. 109 c). The attribution of
the cruder style of adornos found at San Francisco de Yarinaococha
to the complex now being defined is even more certain since in
several instances adornos of this kind are found attached to the
S profile rims which are typical of the complex. The distribution
of this group of adornos within the cut also supports this attribution
(Fig. 110 d; Fig. 112 e and Table 108). A fair quantity of the
pottery of this complex was covered with a thick but somewhat
fugitive red slip. The slip had almost completely disappeared
from many of the sherds, and it is certain that if the sherds
were in a less eroded condition this trait would appear to be
more common than my tabulation indicates. Table 109 gives the
distribution of coarse, red slipped sherds which could be identified
as such with certainty.

The summation of the occurrences of all those traits
which can now be regarded as diagnostic of the Pacacocha Complex
is given in Table 110. This distribution is compatible with only
one interpretation, that the Pacacocha remains were the result of
an occupation on this location following the Hupa-lya occupation
but preceding the Shipibo occupation. The overwhelming majority
of the ceramics in the large intrusive pit, Unit 33, Feature 1, are of the Pacacocha Complex, so that the pit must have been dug and refilled during the time of the Pacacocha occupation. That there are a few sherds from each of the earlier occupations at this location is understandable since the pit cut through two earlier occupation levels. The complete absence of Shipibo sherds from this feature indicates that the pit could not have been dug after there was Shipibo material in the area.

Since Pacacocha pottery is predominately plain, its ceramic refuse consists of a very high percentage of crude, plain, sherd tempered pottery. It has already been noted that when this pottery is compared to the plain sherds of the Hupa-iya Complex, it is generally much softer and much rougher, tending to have a pitted rather than a smooth surface. In spite of these differences, no single sorting criterion will serve to separate all Pacacocha sherds from all Hupa-iya plain sherds. There would be some overlap no matter which criterion is stressed. Nonetheless, if sorting conditions had been good it would have been possible to segregate the plain sherds of the two complexes with a fair degree of accuracy. In this particular instance the conditions were far from ideal. The Gut was in a low and relatively flat area in which water tended to stand. As a result of these soil conditions, most sherds in the top two levels of the cut were coated with a hard layer of iron oxide up to one sixteenth of an inch thick.
This coating was absent from Shipibo sherds but was well
developed on the sherds of all the previous occupations. To a
large degree it obscured the surface finish of the sherds and made
the separation of plain sherds a difficult matter. The distribution
of the plain sherds probably of the Pacacocha Complex is given in
Table III. The distribution supports and agrees with that of the
sherds showing features of shape and decoration.

Since the Pacacocha and Shipibo materials are both more or
less confined to the top three inches of the deposit, the three
inch levels of the excavation are insufficiently thin to accommodate
this fine drawn cultural stratigraphy. It is easy to demonstrate,
however, that the Pacacocha material and the sherd tempered
corrugated sherds are of considerably greater antiquity than the
modern Shipibo pottery. The heavy layer of iron oxide, mentioned
above, was well developed on the Hupa-ya, Pacacocha, and
Corrugated Ware sherds, but the Shipibo sherds from the same levels
did not show any of this coating, though there has been Shipibo
occupation in this area for the last 50 years or so. This fact
gives strong indication that the Pacacocha sherds and the Corrugated
Ware have been subjected to those soil conditions for at least
several times as long as the Shipibo sherds. In short, the
Pacacocha material is not only pre-Shipibo but is separated from the
Shipibo occupation by a considerable lapse of time.

Corrugated, sherd tempered pottery similar to that
recovered from the uppermost levels of UCA-6 is fairly common in Gut 5 at UCA-2. The distribution of such sherds is given in Table 112. At first glance this pattern of distribution appears to agree fairly well with that of the sherds of the Pacacocha Complex. There is, however, one major discrepancy, for corrugated sherds are absent from the sherd concentrations at the bottom of the pits intrusive into the sterile red clay in Unit 33. It seems improbable that Corrugated Ware would be completely absent from the fill of this pit if it had been at all common on this locality when the pit was dug out and refilled. This kind of sherd is particularly numerous in the top level of Unit 33, and it would have been difficult to refill the pit without accidental inclusions had sherds of this kind been numerous on the surface at that time. Such an event is perhaps not outside the range of possibility, but the situation indicates the probability that the use of the sherd tempered Corrugated Ware was subsequent to the excavation and refilling of Feature 1, Unit 33. It seems likely that the Corrugated Ware at this location represents a minor occupation later than and distinct from the Pacacocha occupation at this point.

There is evidence from elsewhere which also suggests the conclusion that the Corrugated Ware found at UCA-2 and UCA-6 represents the remains of an occupation distinct from and subsequent to the Pacacocha occupations. As will be noted below, stratigraphic Gut 2 at UCA-2 contained a relatively large number of the sherd
tempered corrugated sherds but almost none of the rims and vessel forms typical of the Pacacooha complex, exactly reversing the situation in Gut 5. In the various Guts at UCA-6 the Pacacooha material showed a different horizontal distribution than the sherd tempered Corrugated Ware and was considerably rarer. At site UCA-4 the total surface collection was comparable to the Pacacooha material from Gut 5 at UCA-2, and yet not one sherd of the Corrugated Ware was recovered from this site. The question as to whether the Corrugated Ware should be considered as belonging to a component distinct from the Pacacooha Complex can not be regarded as settled, but the sum total of available evidence does suggest that such is the case.

Three sherds showing a scratchy, fine line, incision were recovered from the first two levels of Unit 35. This pottery is not dissimilar to the fine line incised sherds from the top levels of stratigraphic Gut 2 at UCA-6. Such sherds may represent a very rare mode of decoration within the Corrugated Ware Complex or a ware being traded in at this time (Fig. 120 g, j).

There remain only five sherds which have not been covered in the previous discussion. These are plain rim sherds which show profiles typical of the Yarinacooha Complex. Their distribution in this Gut is given in Table 113. This distribution suggests that the Yarinacooha material is earlier than the Pacacooha occupation.

No evidence of an intensive Yarinacooha occupation was
encountered at UCA-2. Due to this fact the precise chronological position of the Yarinacocha Complex has not been unequivocally established. From the excavations at UCA-6 it is clear that such pottery is older than the sherd tempered Corrugated Ware and younger than the Late Tutishcainyo occupation at the site. That much is certain, but the temporal relationship of Yarinacocha to the Shakimu, Hupa-iya, and Pacacocha Complexes remains undemonstrated. The slim evidence from Gut 3 of UCA-2 suggests that Yarinacocha is later than Hupa-iya, and the somewhat more numerous data from Gut 5 of UCA-2 suggest that it is earlier than Pacacocha. A judicious use of all available data suggests a chronological placement between Hupa-iya and Pacacocha, and such a relative dating will be tentatively accepted. It should be remembered, however, that this particular decision is based on slight evidence.

A synopsis of the ceramics of stratigraphic Gut 5 in bar graph form is given in Figs. 17 and 18. The Yarinacocha material is omitted since it is negligible in terms of percentage. Fig. 17 includes all plain sherds as well as decorated sherds and should be evaluated in terms of the difficulties which were encountered in sorting plain sherds. Fig. 18 shows only those sherds which present features of shape, decoration, or temper which made their assignment to one or another of the complexes absolutely unequivocal. In both of the bar graphs the chronological history of the Gut is clearly demonstrated.
SUMMARY: Evidence of five successive occupations was recovered from the relatively shallow midden of Cut 5. The earliest occupation on this spot was by people making the kind of ceramics which has been designated as the Shakimu Complex. Compared to the later occupations here, the Shakimu occupation was not intensive. Superimposed on this was a six inch layer yielding much evidence of intensive occupation by people making pottery of the Hupa-iya complex. A thin but dense layer of Pacacocha debris overlay the Hupa-iya material, and the people responsible for the Pacacocha deposit excavated a large pit which cut all the way through the previous middens into the sterile base of the site. Corrugated Ware with coarse sherd temper showed a pattern of distribution similar to that of pottery of the Pacacocha Complex except that it was absent from the large intrusive pit excavated by the Pacacocha people. Such pottery could conceivably be a part of the Pacacocha Complex, but the evidence from this excavation and from other excavations suggests that it was the result of a later minor occupation. A large number of sherds from the present Shipibo occupation of the site were recovered from the top levels of the Cut.

The depth of the midden at this point, which did not exceed 18 inches, was insufficient to permit as clear a definition of cultural stratigraphy as was possible in certain other excavations; but even with the considerable mechanical mixture which had occurred between the remains of the several components, the
stratigraphic picture was sufficiently clear so that one does not hesitate to interpret the midden as the result of several distinct occupations rather than as the result of a gradual evolution within a single tradition. The material from the excavation was not suitable to seriation. The thickness of the individual occupation layer was too slight to permit an attack on the problem of temporal change within any of the components represented in this cut.

The excavation was important in that it permitted the definition of the Pacacocha Complex, and its place in the relative chronology was demonstrated. The analysis of these data again indicated in clear terms the stratigraphic relationship between the Shakimu and Hupa-lya Complexes.

Stratigraphic Cut 2

DESCRIPTION OF EXCAVATIONS: This was the second Cut attempted during the course of my work in the Yarinacocha area, and as a consequence my excavation methods were still experimental. The Cut consisted of five Units numbered 4, 5, 6, 7, and 9 respectively. The arrangement of the units and their location with relation to the other Cuts may be noted in the map, Fig. 3. Units 4 through 7 were arranged in a straight line running east and west while Unit 9 adjoined the south side of Unit 7. The Cut lay on the very edge of the escarpment at the east side of the village, so the
ground surface sloped markedly both to the north and to the east. It was immediately adjoining the edge of the swept area around the large house of Antonio Cumapa, and was centered in an actively growing Shipibo midden.

Units 4 and 6 were the first excavated and these were done in six inch horizontal levels. The results were not satisfactory and as the side walls of the Units revealed the sharp slope of the layers of deposition in a northern and eastern direction, I decided that it would be more profitable to use three inch levels parallel to the original ground surface, in hopes that these would more closely approximate the layers of deposition. From that time on this was the method of excavation used. As has been mentioned earlier this method was successful in most of the excavations carried out, but in the case of the cut now under consideration it was not adequate to the problems involved. Nothing short of the most careful excavation by natural levels could have obtained a clear cultural stratigraphy from this particular midden.

**PHYSICAL STRATIGRAPHY:** The natural stratigraphy of the cut involved three strata. The uppermost was a stratum of fairly loose gray-black midden containing considerable charcoal, bone, fish scales, shell, and other organic matter. The sherd content of this layer was largely modern Shipibo pottery, and the midden was quite obviously the result of the present Shipibo occupation.
The second layer consisted of a more compact gray-brown midden which contained no visible bone or shell. The third layer was the hard, red lateritic clay which has been so frequently met with in the course of these excavations and which always indicated that sterile base had been reached.

The breaks between these three layers were sharp but were by no means straight. The division between the earlier midden and the modern Shipibo midden was particularly irregular and dropped sharply and jaggedly along the north south sidewalls of the Units. For instance, in Unit 7 the Shipibo midden was only six to eight inches deep at the south side but on the north side pockets of Shipibo midden extended almost to the full depth of the excavation, that is to a depth of 36 inches. The complete failure of the levels of excavation to parallel the natural stratigraphy of this Cut goes a long way toward explaining the generally unsatisfactory results of the work done at this spot.

ANALYSIS OF CHRONOLOGY: In order to avoid possible confusion, I should again stress the point that the levels of Units 4 and 6 are six inches deep while those of all of the other Units in this Cut are only three inches deep.

The occurrence of lumps of baked clay is given in Table 175. The total sherds are given in Table 114. The distribution of sherds will be dealt with in a more summary manner than usual. The total of all sherds showing features which are definitely of the
Early or Late Tutishcainyo Complexes is presented in Table 115.

There is no stratigraphic separation between sherds showing features which have been classified as Early Tutishcainyo and features which have been classified as Late Tutishcainyo in the excavation at UCA-6. A number of the features which are diagnostic of the Late Tutishcainyo pottery of UCA-6 are missing from Gut 2 at UCA-2, while a number of features which here have been classified as Early Tutishcainyo are not quite identical with the corresponding features in the Early Tutishcainyo material of UCA-6. It is possible that I have recovered the remains of a single occupation which was intermediate in time between Early and Late Tutishcainyo as defined at UCA-6, rather than a mechanical mixture of two separate occupations. Unfortunately, neither the size of the sample nor the conditions of the excavation were such that it was possible to test between these two alternatives. I will re-examine this question in the section on the description of the ceramic complexes.

At this time it is enough to note that Early Tutishcainyo features predominate in this group of sherds, and if these sherds do represent a Tutishcainyo occupation intermediate in time between Early and Late Tutishcainyo, it is an occupation closer to Early Tutishcainyo as defined at UCA-6 than to Late Tutishcainyo.

All sherds which could be indubitably attributed to the Shakimu Complex are given in Table 116. It will be noted that their distribution is not strikingly different from that of the Tutishcainyo sherds, but that the distribution of both complexes
suggests that both are early in this particular depositional history. It will be noted that the large majority of the sherds of both complexes are concentrated in levels 9, 10, 11, and 12 of Unit 7 and levels 8, 9, and 10 of Unit 9. These are the lowest levels of both Units. The horizontal distribution of both complexes is also distinctive for heavy concentrations of the refuse of neither of these complexes extend as far east as does the modern Shipibo refuse.

The total of sherds which are definitely of the Hupa-iya Complex is presented in Table 117. It can be noted that there is a tendency for the sherds of this complex to be concentrated in the middle levels of the excavation, especially in Unit 7. This distribution weakly confirms the stratigraphic placement of Hupa-iya as subsequent to the Shakimu complex. It is fortunate, however, that this point is more clearly demonstrated in three other cuts at this site.

Sherd tempered Corrugated Ware, such as was recovered from Cut 6 at this site and from superficial levels of the excavations at UCA-6, was common in the present excavation. Table 118 shows the distribution of sherds of this kind. The most striking feature of this distribution is the concentration of such sherds in Unit 5. Most of these sherds could have come from a few large vessels. This kind of pottery is concentrated at a deeper level than the modern Shipibo sherds, but its relationship
to the other complexes represented in this cut is by no means clear from the evidence of this Gut alone. It is fortunate that the chronological placement of this group of ceramics is not entirely dependent on the sherd distributions noted within this stratigraphic Gut.

Sherds which can unequivocally be assigned to the Shipibo ceramic complex make up a very large part of the ceramic content of this Gut. The distribution of such sherds is given in Table 119. It is obvious that there is a definite tendency for the sherds of the Shipibo ceramic complex to be concentrated in the upper levels of the Gut, but it is equally striking that a couple of Shipibo sherds have been intruded into the deepest level of the deepest Unit. The occurrence of a large number of Shipibo sherds in the middle and lower levels of Units 5, 6, and 7 is clearly related to the sharp dip of the stratigraphic break between the Shipibo midden and the earlier midden in the northern halves of these Units. The paucity of Shipibo sherds in Unit 4 indicates that the trench extended beyond the ring of Shipibo trash deposition around the house of Antonio Gumapa. The peculiarities of Shipibo midden deposition, which were commented on in two earlier sections of this monograph, are again demonstrated.

The plain sherds showing no features of shape or decoration are tabulated in Tables 120 through 123 according to their probable cultural affiliations. There is no Table for plain Shipibo sherds.
since the carape tempering and high firing temperature makes all Shipibo sherds easily identifiable. The Tutishcainyo sorting is the most accurate of these groupings (Table 120). The problems of sorting plain Hupa-iya pottery (Table 122) from plain Shakimu pottery (Table 121) have already been explained, and there is no point in repeating that discussion. Table 123 presents the distribution of thick sherd tempered sherds. Some of these sherds are certainly in the thicker range of Hupa-iya plain sherds. Others may well be plain sherds associated with the sherd tempered Corrugated Ware, for it is clear from excavations at UCA-6 that a certain amount of plain, sherd tempered ware is associated with the Corrugated Ware, and that the same pot may show large areas of plain surface as well as large areas of corrugation. A number of these sherds could not be formally distinguished from the plain sherds of the Pacacocha Complex, but, since sherds showing features of shape or decoration possibly attributable to the Pacacocha Complex number only two in this particular cut, it seems unlikely that there was an extensive Pacacocha occupation at this point.

It must be admitted that because of the intractable nature of this particular Cut and due to the unpromising character of the residual group of sherds presented in this particular table, I did not spend the usual amount of time and energy in sorting them.

There remain just two fragments which have not been discussed. One of these is an animal head adorno possibly represent-
ing a dog (Fig. 112 h). It is not identical to any other adornos recovered, but in general style it is far closer to the adornos of the Pacacocha complex than to those of the Hupa-iya complex. The other object is what appears to be the foot of a figurine (Fig. 114 i). What evidence there is from other excavations and sites suggests that such figurines are peculiar to the Pacacocha complex. The animal head adorno was recovered from level 3 of Unit 9, while the figurine foot came from level 3 of Unit 7.

SUMMARY: This was one of the less successful excavations carried on at the site, but it still produced some information of value. The stratigraphic segregation of Shakimu and Hupa-iya sherds in this Cut was not particularly sharp, but the difference between the distribution of the two groups of sherds definitely suggests what has been more clearly affirmed elsewhere, that Shakimu is the earlier of the two. The occurrence of a quantity of sherd tempered corrugated sherds in a cut almost completely lacking in diagnostic sherds of the Pacacocha Complex indicates that the Corrugated Ware is not an integral part of the Pacacocha Complex but represents the debris of a separate occupation. The general distribution of Tutishcainyo material in the cut confirms the position of Tutishcainyo as early in the sequence even though Tutishcainyo sherds are not clearly separated from Shakimu material in this Cut.

On purely formal grounds the sample of Tutishcainyo
material from this Gut has great interest. Though the majority of these sherds must be classified as Early Tutishcainyo, if the same criteria are used in sorting them as were found to be efficacious in dealing with the material from UCA-6, this collection of sherds is by no means identical to the Early Tutishcainyo pottery from UCA-6 and may well represent a point in the Tutishcainyo tradition intermediate between Early and Late Tutishcainyo.

The Shipibo material in this Gut was more clearly marked off in its distribution, but even so several sherds of Shipibo pottery occurred in the very lowest levels of the excavation.

The cultural sequence implied by this excavation runs as follows: first there was a fairly heavy occupation by a group making Tutishcainyo pottery of a kind which may prove to be intermediate between the Early and Late Tutishcainyo Complexes as defined at UCA-6; this was followed by a Shakimu occupation, though on the basis of the evidence from this Gut alone it would be difficult to demonstrate the priority of the Tutishcainyo material; the Shakimu occupation was followed by a Hupa-iya occupation; subsequent to the Hupa-iya occupation a considerable quantity of sherd tempered Corrugated Ware was deposited in a spotty horizontal distribution; all of the preceding is now being buried under a heavy and rapidly accumulating layer of Shipibo garbage containing quantities of Shipibo sherds.
Stratigraphic Cut 4

DESCRIPTION OF EXCAVATION: Cut 4 was located at a considerable distance from the other cuts so far discussed at UCA-2. It lay beyond the southern end of the Shipibo village and within the plantation of an Italian family which lived at San Francisco de Yarinacocha. The economic activities of this family involved both farming and cattle raising and a large part of their holdings had been cleared of jungle and left as pasture. The area in which I was excavating had been planted in coffee bushes and millet. I am indebted to the owners of the land for permission to excavate. The selection of localities for excavation was in part influenced by the necessity of avoiding the small coffee bushes.

This area of the site was separated from the part previously discussed by a deep gully, but since the archaeological material from this Cut was comparable with that from other areas of UCA-2, I have designated this area as a locality within a large site rather than a distinct site.

This area was selected for excavation because large quantities of Hupa-iya material could be collected from its surface, and the cut bank of the gully exposed a considerable depth of midden. I hoped to find an archaeological deposit which was the result of a single component, so that I could use the contents of the Cut to define the Hupa-iya Complex. With regard to my original intention the excavation was not completely successful.
I failed to find an absolutely pure Hupa-iya deposit, but since the Hupa-iya refuse was deep and extremely rich in potsherds and since there was a significant admixture of earlier material only in the very deep levels of the cut, the ceramics recovered from the cut were usable as a type sample of Hupa-iya ceramics.

Stratigraphic Cut 4 was originally laid out as a 10 foot by 10 foot square comprising the four five foot by five foot Units 15, 16, 17, and 18. A five by five extension, designated unit 20, was later added adjacent to the east side of Unit 16. The cut was located near the edge of the gully and the surface of the outer tier of Units 16, 18, and 20 had been slightly lowered by recent erosion into the gully. Had I noted this point at the beginning I would have excavated the levels of the cut horizontal rather than parallel to the ground surface, for in the light of the excavation it appears certain that the layers of rubbish were laid down more or less horizontally on level ground before the gully was cut rather than parallel to the existing slope, which is the result of recent gully formation. This obvious point of geology should have been evident to me on the basis of surface appearances, but I did not think about it until after the excavations were done. Luckily the slope was not great within the cut, and the mistake could be rectified by a realignment of the levels of the two tiers of units. This manipulation will be explained below.
PHYSICAL STRATIGRAPHY: The cultural stratigraphy within the Cut was clear, but there was no trace of physical stratigraphy to reinforce it. The midden appeared homogeneous and consisted of the usual gray-brown sandy clay mixed with quantities of potsherds and clay fragments. The midden ranged between 33 and 36 inches in depth and was clearly demarcated from the underlying red clay base.

ANALYSIS OF CHRONOLOGY: As always the initial problem was to determine if the rubbish in this particular cut was the result of one or more than one component. As in every other cut made, I found that the sherds of several complexes did occur here, but the predominance of Hupa-iya sherds over those of all other complexes made this area of the site closer to a one component midden than any other which I examined. Aside from the numerous remains of a Hupa-iya occupation, there was within this cut evidence of a fairly intensive Shakimu occupation, a few Tutishcainyo sherds, and a scattering of post Hupa-iya material in the uppermost levels of the cut.

The total of baked clay fragments is given in Table 176 and the total distribution of sherds from the cut is given in Table 124.

The combined total of sherds showing features of shape or decoration which can be attributed to Early or Late Tutishcainyo is eight. These plus the plain sherds from the Tutishcainyo
complexes make a total of 32 sherds. None of these sherds is particularly noteworthy except for a fragment of a large spout of Late Tutishoainyo form. The distribution of these 32 sherds is given in Table 125. These do not show a tight pattern of distribution but are concentrated in the lower half of the midden. Thirty two sherds can not be taken as evidence for an extended occupation, and the most that one would be justified in saying is that there was some Tutishoainyo utilization of this general area and that the Tutishoainyo material was left during the earlier part of the formation of the deposit.

The major non-Hupa-iya component in the midden is a Shakimu occupation. The difficulties in sorting the sherds of these two complexes when the sherds show neither features of decoration nor features of shape have already been discussed at length. In this particular cut the difficulties were somewhat increased, since the surfaces of the pottery were badly eroded, and it was difficult to recognize what was left of the highly polished surfaces peculiar to the better grade of Shakimu pottery. Because of this condition, and because I had grown very tired of trying to sort plain, sherd tempered pottery on the basis of multiple, non-rigid criteria, I did not complete the sorting of the plain, featureless sherds from this cut. This mass of featureless, sherd tempered sherds was finally set aside as unclassified. The distribution of these 2768 sherds is given in Table 126. Well over
90 per cent of these should be Hupa-iya plain sherds, but it is clear that some from the lower levels must be Shakimu plain sherds.

The sherds which show modes of decoration which are certainly Shakimu are presented in Table 127; the plain rim sherds which show features of shape which are Shakimu are presented in Table 128; and the sherds which retain enough of their glossy surface so that they can definitely be placed in the Shakimu complex are given in Table 129. The total of these three groups, the 132 sherds which assuredly belong in the Shakimu complex are given in Table 130. Such sherds are concentrated below level 7 in the several units. A discussion of the implications of this distribution will be deferred until the distribution of sherds of the Hupa-iya complex has been examined.

The total of sherds and ceramic artifacts which on the basis of shape or decoration can be definitely classified as belonging to the Hupa-iya Complex is presented in Table 131. The distribution of these 2507 sherds shows that the heaviest concentrations occur between levels 4 and 7, but that the sherds are still common in the uppermost layers of the cut. By comparing the pattern of distribution in Units 15 and 17, the tier of units further from the gully which had suffered little surface erosion, with the pattern of distribution in Units 16, 18, and 20, the tier of units which was closer to the gully and which had consequently suffered more recent surface erosion, it can be seen
that the Hupa-iya material tends to be concentrated one level higher in the unit closer to the arroyo. This is true of the tabulation of the total, and it is also true of the tabulations of the individual ceramic features. This observation can be interpreted to mean that erosion had removed about three inches more midden from Units 16, 18, and 20 than from Units 15 and 17. In other words, in any alignment of the five units of this cut, level 1 of the even numbered units should be aligned with level 2 of the odd numbered units, level 2 of the even numbered units with level 3 of the odd numbered units, and so on. Such an alignment is confirmed by the distribution of sherd lots from individual vessels. Such an arrangement largely compensates for my mistake in digging this particular cut in levels parallel to the original ground surface.

The major item of stratigraphic information to be derived from this excavation unit concerns the relationship of the major Hupa-iya occupation to the less intensive Shakimu occupation. This relationship is illustrated by the bar graph in Fig. 19. The basis of calculation for this set of graphs are the total sherds definitely classified as belonging to the Hupa-iya Complex and the total sherds definitely classified as belonging to the Shakimu Complex. This includes all rim sherds and all sherds giving the slightest clues as to vessel form or decoration. It is clear that we have here another demonstration that Shakimu material tends to be earlier than Hupa-iya. The only question raised is whether the lower levels
of the excavation represent a mechanical mixture of two distinct occupations or represent a point in time when Hupa-iya pottery was replacing Shakimu pottery in popularity. In this particular case the evidence is not as clear cut as in the deeper excavation, Cut 3. Nonetheless, I feel that the bulk of evidence favors two distinct occupations. There are no sherd [sic] of ceramics intermediate between Hupa-iya and Shakimu which might indicate the evolution of Shakimu into Hupa-iya, and there are no vessels of one complex which give evidence of influence from the other complex, a condition which would be expected if two distinct social groups were living side by side. Considering the fact that three inch excavation levels were used and that there was no natural stratigraphy, the replacement of Shakimu pottery by Hupa-iya pottery should be more gradual if the graph actually represented a transitional period between the two complexes. Finally, the Hupa-iya material from this cut is essentially indistinguishable from the Hupa-iya material from Cut 3 and this is likewise true of the Shakimu material from the two cuts. At Cut 3 there is clear evidence for temporal separation of the two complexes.

My interpretation of the graph and of the cut would be as follows: the lower 12 to 14 inches of the deposit represent a not very intensive Shakimu occupation of this locality; the next 12 to 15 inches of the deposit represent a particularly intensive occupation of the locality by people making pottery of the Hupa-iya
Complex; and the top three to six inches represent a decrease in
the intensity of Hupa-iya occupation, plus considerable natural deposition
after the Hupa-iya occupation had ended. Given this interpretation
the Hupa-iya sherds in the lower four levels of the cut represent
mechanical intrusions in the course of a particularly intensive
utilization of this area. There are two reasons why the Hupa-iya
sherds are proportionally so significant in these lower levels. The
first is that the later occupation was more intensive than the
earlier and left a much larger number of sherds in this particular
locality. The second reason is that the sherds which can be
definitely identified as Shakimu on the basis of shape or decoration
form a much smaller part of the total Shakimu Complex than is the
case with Hupa-iya. About 30 to 40 per cent of all Hupa-iya
sherds are decorated as opposed to about 10 per cent of Shakimu
sherds, and when distinctive modes of shape are added it is
found that close to 60 per cent of all Hupa-iya sherds can be so
identified on the basis of shape or decoration while only about
20 per cent of the Shakimu sherds can be identified definitely
in this way.

There are seven sherds from the cut which seem to belong
to ceramic complexes other than Tutishcainyo, Shakimu, or Hupa-iya.
Three are sherd tempered, corrugated sherds, and all three are
from the top level of the cut, two from Unit 17, and one from
Unit 18. One rim sherd exhibits what appears to be a rudimentary
form of a Pacacocha adorno. The remaining three include: a rim sherd with bosses (Fig. 120 e, unit 16, level 3); a rim sherd with fine sharp line incision (Fig. 120 m, unit 18, level 1); and a body sherd with sharp, fine line incision (Fig. 120 l, unit 15, level 1). This fine line incision is similar to the decoration on the four sherds from the upper levels of cut 2 at UCA-6 (compare with Fig. 120 f, h, i, k). These scattered sherds in the upper levels of Cut 4 corroborate what is much more fully demonstrated in other cuts at the site, that the Pacacocha materials and the sherd tempered Corrugated Ware are later than the Hupa-iya Complex. The scarcity of sherds from later complexes suggests that there was no major occupation on this spot subsequent to the Hupa-iya occupation and that the three to five inches of relatively sterile deposit overlying the denser Hupa-iya midden was the result of natural processes.

The questions concerning the macrochronology of the cut, that is the relationships among the distinct occupations at this spot, have been answered by the preceding analysis, but there still remain possibilities of microchronology which must be tested. This particular cut was laid out to provide the maximum possible information about the Hupa-iya Complex and was in great measure successful from this point of view. The depth and intensity of occupation shown by the Hupa-iya midden at this spot made it reasonable to hope that some chronological change might be observed
within the Hupa-iya occupation.

In the attempt to determine chronological trends within the Hupa-iya occupation attention was concentrated on decorated sherds and on features of shape which were unequivocally of the Hupa-iya Complex, so that mechanical mixture of sherds from the other components could not influence the results and produce a pseudo-chronology. The basis of the methodology used was to check whether any of the numerous features of shape or decoration found in the Hupa-iya Complex showed a pattern of vertical distribution within the cut which differed from the distribution of the total complex. In order to obtain statistically significant samples of the various features it was found necessary to group the contents of all five units. In this massing of the sample, the pattern of alignment discussed above was used, that is level 1 of the even numbered units was aligned with level 2 of the odd numbered units. Within this grouping of levels, levels 2 through 8 of the massed units were taken as more or less limiting the actual Hupa-iya occupation. The massed vertical distribution of Hupa-iya incised sherds in levels 2 through 8 is given as part of Table 132. This is taken as the standard or expected distribution for Hupa-iya material within this cut since there seems to be no consistent trend in the relative frequency of incised as compared to plain sherds within the Hupa-iya midden. A similar massed distribution was prepared for all of the ceramic features of the Hupa-iya Complex.
which were sufficiently numerous so that their patterns of distribution might be considered as statistically significant. For most of these features, which included features of shape and features of decoration, the massed pattern of distribution did not differ in any obvious way from the pattern of distribution for the Hupa-iya complex as a whole. There were four features of shape, however, which were very common in the complex, whose massed pattern of distribution differed from the pattern of distribution of the complex as a whole. Two of these features involve the rim profiles of open, hemispherical bowls, while the other two involve the rim profiles of the common form of pot with everted rim. The distinctions are subtle. The one form of bowl rim is completely unmodified and direct, maintains uniform thickness out to the rim, and shows an even curvature from the rim into the body of the bowl (Figs. 77, Fig. 78). The contrasting feature of bowl rim profile shows a diffuse thickening on the interior and a definite break in the curvature a short distance below the rim (Figs. 73-76).

One of the forms of everted rim makes a sharp angle with the body of the pot (Fig. 84 c, d, h), while the contrasting form shows a more obtuse angle between everted rim and convex body wall (Figs. 84 a, b; Fig. 85 a).

In Table 132 the patterns of distribution for these four features are plotted beside the distribution of Hupa-iya
incised sherds in general. It can be noted that the slightly thickened bowl rims and the sharply everted pot rims tend to be concentrated in the lower levels of the Hupa-lya midden while the evenly curved bowl rims and the weakly everted pot rims tended to be concentrated in the upper part of the midden. A series of tests were run to see if these trends were statistically significant. The test and the results are given in Table 132. The method of running the $X^2$ was simple. The total distribution pattern of Hupa-lya incised was used as a basis for calculating the expected frequencies. Levels 2 through 5 were lumped as representative of the later Hupa-lya occupation, and levels 6 through 8 were lumped as representative of the earlier Hupa-lya occupation. Sampling error appears to be unlikely as a cause of these apparent trends, and I believe that non-random human error in sorting can also be ruled out, since I was unaware of these chronological possibilities when I did the sorting. I thought it worthwhile to check these possible chronological trends by re-examining the Hupa-lya material from Cut 3 of UGA-2. The Hupa-lya midden here is not quite as thick or as dense, but if the chronological trends suggested by this analysis are valid, they might also be reflected here. It was necessary to pool the data from Cut 3 in order to obtain samples of meaningful size. It was also necessary to do some realignment of the levels of the seven pits, since it will be remembered that the cultural and natural stratigraphy of the
out fluctuated in depth over its 20 foot length. The alignment
was achieved by an inspection of the distribution of Hupa-iya incised
sherds. I attempted to align those levels which showed the largest
number of Hupa-iya sherds and were closest to the center within
the limits of the Hupa-iya midden. Levels 5 of Units 32 and 41
were aligned with levels 6 of Units 28, 29, and 31, and with levels
7 of Units 27 and 30. The distribution of these features in cut 3
is given as a further section of Table 132. I was surprised that
even after these manipulations had been performed the results in a
general way tended to support the chronological trends deduced
from the data of Cut 4. There is a tendency for gently angled,
everted pot rims and evenly curved bowl rims to become progressively
more common and to replace slightly thickened bowl rims and
sharply angled pot rims.

The evidence is strong for accepting these two changes in
vessel shape as valid chronological trends which can be projected
on other batches of Hupa-iya material as they are found.

Unfortunately, these were the only such trends found. I
have already mentioned the uniformity of distribution pattern
presented by all the other ceramic features which I could isolate
from the complex. Other attempts were made to derive chronology
from this huge mass of Hupa-iya material. Several times all of
the sherds were laid out in proper stratigraphic order. Intensive
and repeated visual inspection of such layouts failed to reveal any
consistent difference in the sherds from the various levels.
Surface color was highly variable but showed no consistent trends. The same could be said for the degree of surface smoothing. The nature of the incised lines was highly standardized in all of the decorated sherds, and where there were deviations from the norm these appeared to be rare, individual accidents and failures rather than the product of trends. In a word, all of the Hupa-iya material was depressingly uniform both within the several cuts and when the contents of the several cuts were compared. Two possible and not mutually exclusive explanations of this situation are that ceramic change occurred at a slow rate in this complex and that all of the Hupa-iya material from the various cuts in the site dates within a relatively short time span.

A lump of clay with an impression on one surface, which seemed to be from a mat, came from level 5 of Unit 15 and thus lay within the Hupa-iya part of the midden, as did a baked clay object which had been wrapped in strips of leaves when wet (Unit 20, level 6). A fired fragment from a wattle and daub wall similar to those from UCA-6 and Gut 3, UCA-2 came from level 11 of Unit 15 and so was most likely associated with the Shakimu occupation at this spot.

The stone artifacts of this cut will be discussed in a later section, but I will anticipate that section by noting that fragments of ground stone axes were relatively common within the
SUMMARY: The two major components within this cut were of the Hupa-iya complex and the Shakimu complex. Of these the remains of the Hupa-iya complex were many times more numerous. This cut demonstrated again that the Shakimu complex was earlier than the Hupa-iya complex. The few Tutishcainyo sherds in the cut offered no further information as to the relationship between Tutishcainyo and Shakimu but again indicated that Tutishcainyo was earlier than Hupa-iya. The handful of Pacacocha and sherd tempered Corrugated Ware sherds were all from near the surface and reinforced the conclusion that these complexes were subsequent in time to Hupa-iya. In this cut the Hupa-iya occupation was sufficiently deep to give evidence of certain subtle changes in vessel shape within the time span of the occupation.

The Minor Excavations at UCA-2

All of the cuts so far discussed made some positive contribution to our knowledge of the cultural chronology of site UCA-2. Four other cuts were started, which for one reason or another failed to produce positive results. A 10 foot by 10 foot square was laid out a short distance to the west of Cut 4. Two of the units numbered 19 and 22 were excavated to a depth of two levels, six inches, before excavation was stopped and the cut refilled. The cut turned out to be in the middle of the
main trail leading to the charcoa of a Peruvian family back in the jungle, and the people who were using the trail objected violently. It was thought better to refill this promising cut than to risk antagonizing a part of the community. Fifty four sherds of the Hupa-iya Complex were recovered, and as the excavation was just getting through the rather sterile surface layer noted in cut 4, this cut should have been rewarding if it had been finished.

Another 10 foot by 10 foot cut was laid out a short distance to the east of Cut 4. Two of the five by five units, numbered 37 and 40, had been taken down to sterile base, which here was loose sand rather than red clay, by the time it was necessary to stop all digging. These will be designated Cut 6. It is unfortunate that the cut could not have been finished and expanded because the stratigraphic situation in this area was cryptic on the basis of the two finished units. The first six levels of both units were almost completely sterile. Below this there was a heavy concentration of sherds extending to a depth of 48 inches in Unit 40 and to 63 inches in Unit 37. The sherds were mainly Hupa-iya but included a fairly large number of Shakimu sherds and a few Tutishcainyo sherds. There was no clear cut segregation of these three complexes. The physical stratigraphy was complicated and could not be interpreted on the basis of only two five foot by five foot sections. The discrepancy in depth between the two adjoining units suggests that the deposit was laid down on a
steep slope, perhaps as a gully was being filled. In Tables 133 to 138 the sherd counts of the cut are given in the following order: total baked clay objects (Table 177); total sherds (Table 133); Tutishcainyo sherds (Table 134); Shakimu sherds, so classified on the basis of shape or decoration (Table 135); Shakimu polished plain sherds (Table 136); residual, plain, sherd tempered sherds showing no features of shape or decoration (Table 137); total sherds which are classified as Hupa-iya on the basis of shape or decoration (Table 138).

Again it might be argued that this deep cut represents a transition period between the Shakimu Complex and the Hupa-iya Complex, but there are several facts which do not favor such an interpretation. First, there are no transitional sherds in the cut. All of the decorated sherds are either Shakimu or Hupa-iya and look like normal Hupa-iya or Shakimu sherds from other areas of the site. Secondly, the situation at nearby Cut 4 does not favor the existence of a transition between the two complexes. Finally, the frequencies of the sherds of the two complexes do not show any consistent trends as one goes from top to bottom. The most economical explanation is that I am dealing with a mechanical mixture of two components. If more extensive excavations had been carried out in this immediate area, it is probable that the situation could be clarified in terms of its causes, but because the excavation was of an inadequate scope these particular units must remain an enigma.
A 10 foot by 10 foot cut was laid out at the edge of the bluff to the south and east of Cuts 2 and 3 and about halfway between these and the gully which separates Gut 4 and the other excavations just mentioned from the main part of the site. The locality can best be determined in reference to the site map Fig. 3 or the aerial photograph (Pls. 2 and 3). The cut was in the vicinity of three modern Shipibo houses and was remarkably unproductive. Only two of the units numbered 23 and 26 were excavated. Sterile red clay was met in the first three inches and only seven Shipibo sherds were recovered in the course of the excavation. The excavation clearly demonstrates the cultural sterility of this part of the site.

Stratigraphic Cut 1 deserves mention as my first try at digging in the region but was significant for no other reason. It was laid out as a 15 foot trench and the three five foot by five foot units were numbered 1 through 3. It was located on the western edge of the soccer field where there were a number of the kind of sherds which I ultimately came to call Pacacocha on the surface. The excavation, which was done in six inch horizontal levels, exhausted the cultural deposit in two levels. The cut produced a few Shipibo sherds, quite a few Pacacocha sherds, and some Hupa-iya material, but was not deep enough to provide stratigraphic separation.
Summary of the Chronological Information

Derived from the Excavations at UCA-2

The great extent of the site and the varying conditions of excavation at UCA-2 make it difficult to present as coherent a discussion of its cultural deposits as was possible for UCA-6. Each stratigraphic cut made at UCA-2 offered its own distinct picture and often cuts close together showed very different ranges of materials. Cut 3 was by far the most significant made at the site in that it showed multiple occupations separated by sufficient depth of deposit so that a clear relationship between cultural and natural stratigraphy was visible. Cut 5 was important in that it gave the evidence for defining the Pacacocha Complex, and repeated part of the cultural sequence of Cut 3. Cut 4 gave a rich sample of Hupa-iya ceramics and again confirmed the relative chronological position of the Hupa-iya and Shakimu Complexes.

The chronology from the excavations at this site can be summarized in semi-tabular form as follows:
<table>
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<tr>
<th>Cut 3</th>
<th>Cut 5</th>
<th>Cut 2</th>
<th>Cut 4</th>
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<tr>
<td>Shipibo</td>
<td>Shipibo</td>
<td>Shipibo</td>
<td>Shipibo</td>
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<tr>
<td>Corrugated Ware</td>
<td>Corrugated Ware</td>
<td>Corrugated Ware</td>
<td>Corrugated Ware, rare</td>
</tr>
<tr>
<td>Pacacocha</td>
<td>Pacacocha</td>
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</tr>
<tr>
<td>Yarinacocha</td>
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<tr>
<td>all rare and not stratigraphically segregated</td>
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<tr>
<td>Hupa-iyá</td>
<td>Hupa-iyá</td>
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<tr>
<td>Shakimu</td>
<td>Shakimu</td>
<td>Shakimu</td>
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<tr>
<td>Early and Late Tutishcoainyo</td>
<td>Tutishcoainyo</td>
<td>Early Tutishcoainyo</td>
<td>Tutishcoainyo</td>
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<tr>
<td>rare</td>
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________________________ disconnections in cultural deposition
The stratigraphic separation of Early and Late Tutishcainyo, which was so clear at UCA-6, can not be demonstrated at the present site. There seem to have been two and possibly more distinct occupations within the Tutishcainyo tradition. One of these, which is best represented in Cut 2, is closer to the Early Tutishcainyo complex as found at UCA-6 but differs from it in several important respects. I suspect that the Tutishcainyo material from Cut 2 at UCA-6 is somewhat later in time than Early Tutishcainyo as defined at UCA-6. The other Tutishcainyo occupation, which is best represented in Cut 3, is much closer to Late Tutishcainyo as defined at UCA-6 but again is not identical to it. Sherds from both occupations and perhaps from an earlier Early Tutishcainyo occupation are mixed in the lowest levels of Cut 3. The Tutishcainyo material from UCA-2 is of little help in further chronological refinement within the Tutishcainyo tradition. In none of the cuts are the Tutishcainyo deposits as deep or as rich as those at UCA-6. The most important fact concerning the Tutishcainyo materials, which was derived from excavations at UCA-2, is their chronological position with relation to other complexes. The results of Cut 3 prove conclusively that Late Tutishcainyo was earlier than the Shakimu occupation at this location. A pit containing rich Shakimu refuse was intrusive into deposits containing Late Tutishcainyo material, and a blanket of Shakimu midden overlay deposits containing Tutishcainyo
material only. This Tutishcainyo deposit produced ceramics which show a number of features found only in Late Tutishcainyo as defined at UCA-6. Therefore, Late Tutishcainyo must be earlier than Shakimu.

The relationship between Shakimu and later material is clearly demonstrated by several cuts; in fact, the relationship between the Shakimu occupation at this site and the Hupa-iya occupation is the most thoroughly demonstrated chronological fact to emerge from the excavations at Yarinacocha. In four separate cuts at UCA-2 Shakimu materials underlie the later Hupa-iya materials.

The chronological relationship of Hupa-iya to later occupations is also clearly demonstrated. Cut 5 proves that the Pacacocha occupation at this point overlies and is subsequent to the Hupa-iya occupation. The existence of the Pacacocha Complex as a discrete ceramic grouping is demonstrated by Cut 5 at UCA-2 and is confirmed by the surface collections at the pure Pacacocha site, UCA-4.

The available evidence, which has been reviewed previously, indicates that the relatively sparse deposits of sherd tempered Corrugated Ware from both UCA-6 and UCA-2 are not part of the Pacacocha complex but represent still another occupation later than the Pacacocha occupation.

In all cuts where they occur sherds of the modern
Shipibo ceramic complex overlie all of the previously discussed ceramic materials.

The foregoing discussion disposes of all of the ceramic complexes known from both UCA-6 and UCA-2 with the exception of the Yarinacocha Complex. From the excavations at UCA-6 we know that Yarinacocha is earlier than the sherd tempered Corrugated Ware and later than Late Tutishcainyo. Unfortunately, Yarinacocha material is not common in any of the excavations made at UCA-2, though the occurrence of sherds in surface collections suggests that somewhere on the site there must be a Yarinacocha component. The best evidence as to the placement of Yarinacocha in reference to Hupa-iya comes from Cut 3 at UCA-2 where the two Yarinacocha sherds occurred in a level higher than that containing the Hupa-iya occupation. The somewhat more numerous sherds from Cut 5 at UCA-2 suggest that Yarinacocha preceded Pacacocha. The pattern of sparse occupation and the use of refuse pits would seem to place Yarinacocha in the same general time range as Pacacocha.
On the basis of all available evidence from both sites the following cultural sequence can be suggested:

Shipibo
Corrugated Ware
Pacacocha
Yarinacocha
Hupa-iya
Shakimu
Late Tutishcainyo
Early Tutishcainyo

All of the points in this sequence are fully demonstrated except for the precise placement of Yarinacocha.

In working toward a comprehensive picture of the cultural history of the central Ucayali one must keep in mind that the data available consist of information about eight disconnected points in time rather than a continuous cultural sequence. The order of these points in time is, with one exception, certain, but there are many questions which remain unanswered. There is no proof that Early Tutishcainyo represents the earliest ceramic using society in the area, even though it is the earliest one that I found.

No really sound internal evidence is available which would either date the full duration of the eight point temporal series, or give reliable indications of the amount of time separating any two points in the sequence. When any two consecutive complexes are examined they are found to be mutually dissimilar to a high
degree. Only in the case of Early and Late Tutishoainyo is it possible to demonstrate fully that both are part of the same cultural tradition. In other cases the dissimilarities between consecutive complexes in the sequence are so great as to suggest the arrival of completely new cultural traditions in the central Ucayali. I believe that only an influx of new social groups could explain the appearance of the Hupa-iya Complex. It also seems likely that the Shakimu Complex and many elements of the modern Shipibo ceramic tradition were brought to the central Ucayali by migrations.

I can describe ceramic patterning during the eight points in time when either UCA-6 or UCA-2 was inhabited, but what was going on between these points in time largely remains a mystery. Only between Early and Late Tutishoainyo is it possible to project a pattern of cultural change.

The pattern of occupation indicated by the stratigraphic analysis just concluded is by no means surprising. At both of the sites I found occupations of varying length separated by long periods during which the particular locality was not occupied. Such a pattern of discontinuous utilization is what one would expect to be associated with an economy based on slash-and-burn agriculture. This is especially true in an area where habitation spots which do not flood are at a premium. No single location may be inhabited continuously over a long period of time, because of
the constant necessity to clear new agricultural land. However, deserted chacras will revert to jungle, and as it becomes possible to reclear and use a particular area, people will return again and again to the best habitation sites regardless of whether they have been occupied before.

The eight ceramic complexes which emerged from the preceding analysis are essentially without time depth, since they represent occupations of relatively short duration. Only in the Early Tutishoainyo and Hupa-iya occupations are there indications of temporal change during the life span of a particular settlement. In both cases such temporal shifts are minor. It was argued during the introductory section of this chapter that the samples out of which a sequence is created by seriation must be large, representative groups of ceramics with essentially no time depth. Though I wish that I had more such samples, the eight which have been analyzed out of these stratigraphic cuts do fulfill the requirements for such samples.

It will be argued in the following chapter that the cultural patterning of a particular group of artifacts can best be understood by studying samples with no time depth and no geographical spread. The eight complexes also are suitable for treatment in the context of cultural analysis.
Analysis of the Ceramic Complexes Recovered

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General Discussion

It will have been noted that the chronological analysis in the preceding section was done without recourse to an elaborate formal categorization of the ceramic material. The only concepts used were the ceramic feature (any characteristic noted in a group of sherds which permits accurate operationally defined sorting within that group of sherds) and the ceramic complex (the ceramic debris of a particular face to face community). This parsimony of classificatory devices was deliberate.

There has been considerable disagreement among archaeologists as to what kind of classificatory devices (scaling devices in the terminology of Spaulding's recent analysis of these problems) are most useful in dealing with the formal variation found in groups of artifacts. One group of archaeologists have advocated applying uniformly scaled classificatory systems to all artifacts within particular broad categories of artifacts such as projectile points, shell ornaments, or bone tools.

The system of point classification used by Strong in his early work in the archaeology of far western United States is an early and very influential example. This
particular system became popular and was widely utilized and imitated. Similar systems for other classes of artifacts were proposed by Black and Weer in 1936 and by Finkelstein one year later. Perhaps the most elaborate and thoroughgoing development which the idea of universal types received was at the hands of Gifford in his typologies of bone artifacts and shell artifacts, the latter appearing as late as 1947.

The purposes of such a system are obvious and to a high degree still desirable. Such a system would standardize the sorting of various workers and would facilitate the comparison of objectively similar artifacts. A universal system of classification, with its categories logically developed from the various shapes of plane geometry, can be applied in an unequivocal way, and will have much the same utility as the filing system used in a library. If widely accepted and used such a system will facilitate the grouping together of all shell ornaments which objectively have a square shape, or all projectile points which are isosceles triangles in outline, and give to them their appropriate labels. The next worker who wants to study the distribution of square shell beads or points which have the shape of an isosceles triangle knows under which heading to look, and his research is much accelerated.

Though the potential utility of the universal systems of typology is not small, the difficulties in applying such
systems are considerable, and such systems have never been formalized for ceramics.

The trend toward universal typologies has been countered in American archaeology by a number of workers who have insisted that the classificatory units relevant to the formal variation of artifacts should be developed with reference to particular groups of artifacts of known and limited spatial and temporal distribution, rather than with reference to all projectile points or all shell artifacts from all over the world. Most of these archaeologists would also maintain that such classificatory units can grow out of a study of temporally and spatially limited groups of artifacts and are not merely imposed on the data by the worker.

Krieger's famous article on typology has been one of the most influential and frequently cited declarations of this second point of view, but Rouse's early work on an operational methodology for the determination of such units has been of at least equal theoretical importance.67

My intellectual sympathies are entirely with the second group of archaeologists. I believe that the more usable kinds of scaling devices grow out of the study of specific artifact assemblages. It is because of my position on this question, that I refrained from a systematic formal classification of the ceramics from my excavations at Yarinacocha until these
ceramics were divided into several ceramic assemblages, or, as I have called them, ceramic complexes.

My procedure in making a formal analysis of the eight ceramic complexes from the Yarinacocha region has paralleled to a marked degree the system outlined by Spaulding in his recently published article, "The Dimensions of Archaeology". I did not read Spaulding's paper until the formal analysis of the Yarinacocha material had been completed for a considerable period, though I was aware of, and had been much influenced by, Spaulding's earlier writings of typological problems.

There is just one major point in which my usage and the conceptualization underlying it seems to differ from that of Spaulding. Spaulding uses the term "qualitative attribute" to refer to minimum units of meaningful behavior with respect to material culture. Spaulding uses the same term, "qualitative attribute", to refer to any unit of discontinuous variation which can be observed in a "collection" of artifacts. If Spaulding had substituted the word assemblage for collection, I could find no reason to disagree with him, but he is quite explicit about not wanting to make such a substitution.

It appears to me that there is a useful distinction to be maintained between any discontinuity of variation to be noted within a collection of artifacts and a unit of discontinuous variation which we have reason to believe has meaning in terms
of cultural patterning at a particular time and within a particular cultural tradition. I have, therefore, appropriated the term mode, which was given currency by Rouse, to designate a minimal unit of meaningful behavior with regard to material culture.\textsuperscript{72} The distinction between "qualitative attribute" and "mode" is precisely analogous to the distinction between the "phonetic element" and the "phoneme" which has proved so crucial to elegant and systematic analysis in linguistics.\textsuperscript{73} In fact, Spaulding does compare his "qualitative attributes" to phonemes.\textsuperscript{74} The comparison is in a strict sense not precise, since phonemes are typically clusters of units of discontinuous variation along two or more dimensions, rather than simple units of discontinuous variation. In spite of this quibble, the comparison is particularly apt and illuminating. It will be remembered that phonemes can not be defined for language in general but only for particular languages at particular points in their history. In fact, the more closely one restricts one's sample of analysis to a localized speech community, the easier it is to define phonemes. One can not define the vowel phonemes for American English in general, but only for particular regional variants of American English.\textsuperscript{75} One could generalize from the specific case of the phoneme or the ceramic mode and say that the cultural significance or non-significance of a particular unit of physical variation can be
judged only in a particular cultural context strictly limited as to space and time.

One might be willing to admit the truth of the above generalization and still maintain in practice that it is possible to examine collections of artifacts for units of discontinuous variation. This is, of course, true if one does not care whether these units are "minimal units of meaningful behavior", or accidents of sampling inherent in particular collections. If one works with collections, groupings of artifacts which are not tightly localized as to space and time, rather than with assemblages, groupings of artifacts which represent a particular point along both the temporal and spatial dimensions, one is likely to miss units of variation which are culturally significant and find discontinuous variation that lacks cultural meaning. I will discuss two hypothetical cases.

A particular tradition of projectile point manufacture lasted for 3000 years. At any moment during this time span the society which was the bearer of this cultural tradition distinguished between two groups of points, big ones and little ones. During this 3000 year period there was a gradual, progressive diminution in projectile point size. At the beginning of this time span "big points" had a modal length (Here I am using the word mode both in its statistical sense and in the archaeological sense just presented,) of five centimeters and "little points" had a
modal length of three centimeters, while at the end of the 3000 year period "big points" had a modal length of three centimeters and "little points" had a modal length of one and a half centimeters. It is easy to see that a collection of points which spans the total length of the tradition will show a continuous range of variation from above five centimeters to below one and a half centimeters, while any assemblage of points drawn from this tradition will show that there are two modes along the formal dimension, point length.

A ceramic tradition had a duration of 500 years. At the beginning of the tradition 90 per cent of the plain pottery showed black surfaces (non-oxidized firing) and 10 percent showed red surfaces (oxidized firing), while at the end, 90 per cent of the pottery showed red surfaces and only 10 percent showed black surfaces. In the kind of ceramic typology advocated by Ford 76 or by Evans and Meggers 77 this situation presents no difficulties. Ford would, and in actual similar situations has, established two types of plain pottery, a black-fired plain ware and a red-fired plain ware. 78 Within the frame of reference established by Ford this is an adequate solution, but a solution which begs the question in which we are interested. Are these differences in physical characteristics culturally meaningful? The question might be phrased in another way. At any point in
time during the course of this ceramic tradition was there one or more than one concept as to the proper firing of plain pottery? Are the 10 per cent red sherds noted from the earliest time period the result of a poorly controlled firing process which aimed at incomplete oxidation but did not always achieve its aim, or were 10 per cent of the pots deliberately fired in an oxidizing atmosphere while the remainder were deliberately fired in a non-oxidizing atmosphere. If the differences in surface color are intentional then the distinction has a cultural meaning, and two minimal units of behavior can be postulated along the dimension of firing. If the differences are the unintentional result of imprecision in technology then these differences, though they have a temporal significance, do not have a cultural significance in a strict sense.

If one examines a large assemblage of sherds from any point in time along this ceramic tradition, one should be able to answer this question. A detailed study of the range in color of a large group of sherds, which used the finest available color distinctions rather than a simple red-black distinction, would give some idea as to the actual range of color present and the distribution of sherds along this range. Examination to determine whether all sherds tended to be one color or whether each sherd showed a considerable range of color would also be indicative. Judicious experimentation with the firing of comparable clays
might also be of help in deciding if there was one or more than one concept of how pots should be fired. As long as one dealt with an assemblage of sherds from a single time, a definite answer should be possible, but if one worked with a collection of sherds which spanned the full time range of the tradition no such decision would be forthcoming.

To put the matter tritely, questions of cultural significance can not be asked in general. Differences in physical characteristics which have a cultural significance at one point in time in a particular ceramic tradition may lack such significance in another tradition or at another point in time in the same tradition. The culturally meaningful discontinuities of artifact variation must be sought in assemblages and not in artifact collections.

Spaulding has admitted that the assemblage is the conventional unit for studies in artifact classification. There is a sufficient area of agreement with my own conviction that the assemblage is the only unit which may be studied for the purpose of discerning modes, so that we may proceed to further problems. It was this position which forced me to use the operationally specific but culturally non-specific unit, feature, rather than the more refined concept, mode, in my initial analysis of the ceramics from Yarinacocha. The purpose of that analysis was to determine how many components were present in the excavations, and to place these components in the proper temporal order. In
other words a ceramic collection was reduced to a series of ceramic assemblages.

Spaulding holds a firm belief that any archaeologist working within a particular set of artifacts should arrive at one and only one solution to the question of how many "qualitative attributes" are present. Rouse has made a similar statement that the determination of modes in a collection is not a matter of the personality or whims of the investigator, but is accomplished by a set of operations which are repeatable in the scientific sense. I would agree as long as the unit of study is an assemblage and not a random collection of artifacts.

It will be well to examine some of the characteristics of the mode before going on to the analysis of ceramic complexes. Each ceramic complex is defined by a finite number of modes. These modes are distributed along a finite and probably smaller number of dimensions. (The term dimension is used here in the same way as in Spaulding's recent article on ceramic classification, or in the sense used by the recent writers on componential analysis of kinship systems. By a ceramic dimension I mean any axis or range within which ceramic material may show formal variability.) It is clear that the elaboration and complexity possible within a ceramic complex will be related not only to the number of modes involved in the complex, but also to the number of dimensions along which these modes are arranged. A large number of modes
along only a single dimension will not necessarily yield a high degree of ceramic differentiation since in most cases two such modes can not be combined on the same pot. Likewise, a complex with a large number of dimensions each having only one mode will not offer the potter any freedom of choice, and only one kind of pot can be produced.

Shepard's great book on ceramic technology offers the archaeologist a most lucid discussion of the various ways in which ceramics made under pre-industrial conditions can vary. In a real sense she presents to the archaeologist a series of data comparable to what the rigorous student of phonetics presents to the linguist. In each case the student of cultural phenomena, whether he be archaeologist or linguist, is made aware of a number of dimensions along which variability is possible and which he must check for variation which is of cultural significance. In neither case are the data presented of direct cultural significance, for no language or ceramic complex makes use of all of the range of variability available to it. This selective factor in culture is one of the major features which has been emphasized in the many attempted definitions of culture. Not all of the phonetic variability observable within the speech of any one linguistic community is of cultural significance, and attempts to make completely exact and detailed phonetic transcriptions of language have long
been out of fashion among practicing linguists. It is likewise doubtful if all of the variability exhibited by pottery made under pre-industrial conditions is either culturally significant or culturally controlled. A modal analysis, that is to say a cultural analysis, must deal only with that part of the physical variability found within a ceramic complex which is culturally controlled. In a sense it is more difficult for the archaeologist to discover the significant units within an archaeological complex than it is for the linguist to discover the distinctive features of a language. The linguist can consult directly with the people responsible for the particular bit of cultural behavior in which he is interested, and he has a series of standard methods for verifying his conclusions about the significant units of variation within a language. Potsherds are somewhat more reticent about yielding information, but Rouse's contention that modal analysis is on an objective and operationally sound basis would indicate that it is possible to derive this kind of information from the potsherds. My procedure, which I suspect is similar if not identical to that which would be advocated by Rouse, is to study the variability within any particular dimension of the ceramic material in order to discover whether the range of variability is continuous or non-continuous. A continuous range encompassing only part of the available variation suggests that only one mode was recognized in this particular dimension by the potters responsible
for the ceramic complex. A continuous range taking in all of
the available variability suggests that the dimension was not
culturally significant. For many dimensions this matter can
be examined rigorously by the plotting of distribution curves
for the sherds on the basis of the variability they exhibit within
a particular dimension. If such a curve is unimodal and normal
we are justified in believing that the ceramic complex had just
one mode in that particular dimension. Should the curve prove
to be bimodal or trimodal we are justified in believing that
there was more than one cultural norm controlling the variability
in that dimension. The use of mode is apt since its technical
meaning in ceramic analysis does not violate, and in fact is an
extension of, its technical meaning in statistical analysis.
This method of mode identification is applicable to dimensions
such as size, thickness, hardness, firing temperature, and
temper size. At the moment I do not see how it could be extended
to the various dimensions located within the general category
of shape. Here the continuity or discontinuity of variability
must be determined by inspection alone, a much less rigorous
and elegant procedure. From the point of view of the archaeologist,
modes are clusterings of the data along a particular dimension
involved in a ceramic analysis.

Sometime after I had written the preceding paragraph,
I read Spaulding's discussion of the determination of "qualitative
The very nature of quantitative attributes ensures that no two artifacts will yield exactly the same measurement, but it is necessary to discriminate between the unimportant and presumably random variation expected of products made by hand from materials which are not uniform and the culturally meaningful variation resulting from significantly differing models held by the makers of the artifacts. The problem can be attacked by listing in order the individual values of some measurement (say projectile point length) in a collection. If the list seems to show a pronounced clustering of values around a central point with progressively fewer values toward the extremes of the observed range, the conclusion ordinarily reached will be that the variation is of the random type. If, on the other hand, there are two or more values around which the measurements cluster, then two or more categories will be distinguished, and each can be thought of as a separate qualitative attribute such as 'large' and 'small'. The problem is purely statistical, although in many instances it can be solved by inspection rather than by formal statistical curve fitting.

From the point of view of the potter operating within a particular culture the modes represent degrees of freedom or culturally approved alternatives. Does all of the clay selected by the potter for use in the paste of pots more or less conform to a single cultural ideal or does the culture offer the alternative of two distinct kinds of clay for use in pots? Does the temper added to the clay
conform to a single cultural norm or are there alternatives within the dimension of temper? Is the ceramic technology of the culture sufficiently advanced so that there are several distinct possibilities for firing a pot under different conditions, or are the variations in color and hardness exhibited by the potter's finished work merely the result of the vagaries of poorly controlled firing? In each case the answer to the question will be the statement of whether there is one or more than one mode in the particular dimension.

A large part of the selectivity exhibited by a culture will be in terms of which dimensions are utilized, and which of the several utilized dimensions are emphasized by being bi- or tri- or multimodal. A utilized dimension which is unimodal will not contribute to the complexity of structure of a ceramic complex, though the single mode within the dimension will affect the nature of the pottery. Thus if only one mode occurs in such a basic dimension as temper, that dimension will contribute nothing to the structural elaboration within the complex, and the dimension might be spoken of as being a non productive one. If we proceed to a less basic dimension such as the use of appendages (lugs, handles, or adornos) to the shape of the pot, the situation becomes more complex. If there are no such additions within the ceramic complex, the dimension is not utilized and thus of no significance to the ceramic complex under study. If one particular kind of handle is added to all vessels made in this ceramic complex, then the dimension is a utilized but non productive one. If one kind of handle is used but is added only to some vessels manufactured
within the ceramic complex, the dimension becomes a productive one since the zero mode, no handles, is presented as an alternative to the potter; the possibility for elaboration of the complex thereby being increased.

One may make a modal analysis of a ceramic complex on the basis of a somewhat different set of assumptions by concentrating on the modes of behavior which go into the manufacturing of a pot. Thompson, in his recent analysis of Yucatecan pottery making in which he compared the inferences possible on the basis of pottery alone with the information derived from an ethnographic study, emphasized such behavioral modes, especially in his section on inferences derivable from the actual pottery. Such modes of behavior are clearly cultural modes to the same degree as the formal modes discussed above, but the two are not interchangeable. In any particular ceramic complex the two kinds of modes will be closely related. Thus the behavior patterns surrounding pottery firing will be closely related to the fact that a potter working within a particular complex has the choice of smudge pottery or fully oxidized pottery, but a description of the two behavior patterns is not exactly equivalent to saying that there are two modes of surface color for unslipped pottery. Likewise, it is not the same to say that the lip of a vessel is finished off by using a bracket fungus soaked in water and bent double around the rim and to say that there is only one mode of lip shape within a particular ceramic complex. The two kinds of statements
belong in different realms of analysis. Rouse, in his review of Thompson's monograph, emphasizes this point and suggests that Thompson's failure to make this distinction overt somewhat diminished the comparability of the two independent ceramic analyses which Thompson made. On this point I would agree with Rouse. Rouse elaborates on this point and equates the distinction between formal modes and what might be called behavioral modes to the distinction which Osgood made between Mental Culture and Material Culture. I am somewhat uneasy about this last distinction and would prefer to follow Bagby in maintaining that all culture consists of \textit{mental} patterns and not either actual objects or actual behavior as such. In this sense all culture is mental, but some mental culture may refer to formal ideals for objects and other mental culture to patterns of behavior.

My emphasis on formal modes as opposed to behavioral modes stems from a desire to work through one set of abstractions in as methodical and thorough a way as possible. In spite of Thompson's admirable tour de force, it is obvious that formal modes are more readily obtainable from potsherds than are behavioral modes, and that there are some behavioral modes which will leave no permanent and absolutely identifiable traces on the finished pot or on the sherds of such a pot. This is especially true after the sherds have been subjected to the rigors of tropical soils over a long period of time. Thus
an analysis of behavioral modes would be somewhat less complete than an analysis of formal modes.

It is possible to proceed operationally in the analysis of an assemblage of potsherds to the point at which all of the modes of the complex are identified and arranged along a series of significant dimensions. Such a list of culturally meaningful modes and dimensions is the first step in the clear definition of a ceramic complex, but is an inadequate definition of a ceramic complex. Spaulding has outlined further procedures. One may list all of the combinations of modes which do occur, at the same time noting which theoretically possible combinations of modes do not occur. As Spaulding points out, this is in a real sense a full and adequate definition of a particular ceramic complex.\(^1\) Spaulding indicates a further step by which to test the relative popularity of the various modal combinations which do occur. He suggests a particular form of mathematical analysis for accomplishing such cluster analysis. The combinations of modes which are far rarer than would be expected if combinations were on a purely random basis can be regarded as accidents, idiosyncratic experimentation, or the products of individuals not thoroughly enculturated. Modal combinations which occur far more frequently than would be expectable on the basis of random distribution can be regarded as representative of cultural norms, and Spaulding has suggested that such culturally determined clusters
of modes be dignified with the designation "ceramic type".\footnote{92}

Whether or not ceramic types are formally designated, it is important that such types not be used in lieu of a full presentation of the pattern of cluster shown by the modes. If one merely names the tighter clusters of modes and presents no data as to how tight such clusters are or whether there are specimens intermediate between the clusters, one is throwing away a vast amount of valuable cultural information. Deetz has recently demonstrated one way in which this kind of data on the tightness of mode clustering can be of the greatest value in cultural reconstructions, and, as such information becomes more readily available, other uses should become obvious.\footnote{93}

Every ceramic complex can be thought of as a system in which there is a greater or lesser degree of organization. One can conceive of such a system in which every mode on a particular dimension occurs in association with every mode on every other dimension. (We have already seen that since modes are defined as contrasting units, two modes on the same dimension may be mutually exclusive in their distribution by necessity. This is certainly true of such basic dimensions as temper, body shape, firing conditions, or clay. For other dimensions, especially those of decoration, it is possible to have two modes from the same dimension occurring together on the same pot.
Thus one can find two kinds of incision or two or more different pigments in association.) In such a system there would be minimum structuring. The predictability in such a system would be zero. At the very least the number of "ceramic types" in such a system would be the product of the number of modes occurring on each dimension all multiplied together. (Of course, if two modes on the same dimensions could occur together the number would be still higher.) One may also visualize a ceramic complex in which no mode on a particular dimension occurs with more than one mode on any other particular dimension. Such a system would show maximum order and structuring. One could say that such a system was completely redundant, in that the knowledge of one mode on one dimension of a particular pot will permit prediction of all the other modes on the other dimensions utilized in the manufacture of the pot. In such a system of maximum structuring the number of types will be given by the largest number of modes occurring on any one dimension. Such types will be completely objective and not matters of convenience.

It is doubtful if many ceramic complexes reach either of the extremes of this spectrum of structuring though some extremely simple ones, such as Vinette I or Owens Valley Brown Ware, may. (It is evident that in the simplest imaginable ceramic complex, one in which few dimensions are utilized and in which there is but one mode on each utilized dimension, the
two ends of the spectrum are identical, and the question of structuring becomes irrelevant.) Most ceramic complexes will fall somewhere between these two extremes. The differences in the degree of structuring may be either qualitative, in the occurrence or non-occurrence of particular combinations of modes, or quantitative, in the frequency of occurrence of particular combinations of modes. It is my belief, and the data from the excavations at Yarinacocha confirm this belief, that ceramic complexes vary widely in the degree to which they are structured. It is my further belief that any ceramic complex can be more adequately defined by a statement which indicates the degree of qualitative structuring and which indicates the dimensions which give the clearest reflection of such structuring, than by a statement which divides the complex into five or 10 types without indicating the tightness of clustering underlying any of these types. As a consequence of this belief, my procedure has been to list all modes and dimensions observable in a particular complex and all combinations between modes which can be demonstrated from the sherd materials. This step is precisely that described by Spaulding as the second logical step in ceramic analysis.96

My failure to follow through with Spaulding's third step, that of mathematical cluster analysis, is not the result of any lack of faith in the efficacy of such an analysis. It is the result of several factors of personal history. I did
not start out with such an analysis in mind and to do it for all eight complexes would necessitate considerable restudy of the collections and the reorganization of the data on I.B.M. cards. This analysis would still further delay a presentation of the basic data, which I feel has been delayed too long already.

As Spaulding has pointed out, for certain purposes a full listing of the modes which occur in a complex and the combinations of modes which occur in a complex is an adequate qualitative description of the complex. It is also true, and Spaulding emphasizes this point, that two complexes can share the same modes, the same dimensions, the same mode combinations, and the same tightness of mode clusterings and still be very different in terms of the frequencies with which the various mode clusters occur. A full definition of a ceramic complex must contain quantitative as well as qualitative information.

The archaeologist feels nervous if he can not quantify his data. One may suspect that for some archaeologists the ceramic type is any device which will permit them to divide a large group of potsherds into several smaller piles, so that the number of sherds in each pile may be counted. There has been, and continues to be, much discussion among archaeologists as to the most useful way of quantifying ceramic data. The argument rages between those who would count sherds and those who would weigh sherds, and between those who would count all sherds and those
who would concentrate on rim sherds or reduce the sherds to lots which are representative of individual vessels. My own treatment of the question is largely an outgrowth of Krieger's and Spaulding's discussions of these problems.

In the course of the analysis of each ceramic complex a series of mode clusters came to light involving modes of vessel body form, of rim modification, of lip treatment, and sometimes of modes of various dimensions of decoration. These clusters revealed categories of total vessel form. I would be justified in calling these "form categories" types on the basis of Spaulding's definition of ceramic type, but such a usage would be at variance with the many other shades of meaning which the term type has had to carry. There is considerable ethnographic evidence that such categories of vessel form have a considerable cultural reality. Where studies are available, it is usually these form categories which are found to be individually named. Basically such form categories seem to represent groups of vessels specialized for particular functions. These form categories were taken as representative of the total ceramic complex and as units for quantification. Rim sherds were taken as fully representative of the form categories, since all ceramic vessels must have rims. In the structural analysis only rims were counted. All of the rim sherds in the sample, which was taken as representative of
a particular complex, were divided into such form categories. The sorting was such that there were no residual rim sherds. All rim sherds in a particular category were counted. Each rim sherd was also measured along the arc of its curvature, and the mouth diameter of the vessel from which each rim sherd came was estimated, provided that the sherd was sufficiently large to make such an estimate feasible. This estimate of vessel size had two functions. It gave an indication of whether a particular form category had one or more modes of size and it also made possible a correction for the fact that large vessels produce more sherds than do small vessels. For each form category the summation of the arcs of the rims was divided by the modal mouth diameter for that form category, giving what I have called a frequency index. (In cases where more than one mode of size was present, the sherds were divided proportionately among the several modes and a separate calculation made for each size.) The summation of frequency indices divided into the frequency index of a particular form category should give as accurate an estimate as is possible of the percentage which each form category made up of the total vessels which were broken and discarded by the people of a particular social group. Since different functional classes of vessels have different life expectancies (Among the Shipibo, for instance, beer mugs get broken much more frequently
than do brewing urns or water jars.), this is only an oblique estimate of the relative frequency of a particular form category in the equipment of a household at any one time. There are minor inaccuracies inherent in this method. The estimated modal mouth diameter for each form of vessel will be somewhat higher than the modal mouth diameter which would be obtained by measuring a series of whole pots. This is again due to the fact that the larger vessels will produce more rim sherds than the small vessels in a particular category, so that the distribution curve of mouth diameters will be skewed somewhat to the high side. It is possible that a systematic correction formula might be introduced here, but there is another factor which in part compensates for the above effect. It is more difficult to obtain an accurate estimate of mouth diameter from a rim sherd of large mouth diameter than from a rim sherd of equal length from a vessel of smaller mouth diameter. The tabulation of estimated mouth diameters includes only those sherds for which an accurate estimate was possible. For each complex these manipulations of the data are presented in tabular form. There is a table showing the clustering of the modes of vessel body form, modes of rim modification, modes of lip treatment, and modes of decoration to produce the form categories to be quantified. There is a second table in which the rims from each form category are counted, and the distribution of the mouth diameters of this
category is indicated. The second table also contains the summation of the arcs of all sherds of a particular form category, the frequency index of each category, and the percentage which it makes up of the summation of frequency indices of the complex. In those complexes having highly inflected basal angles it was possible to calculate an auxiliary set of frequency indices relative to basal flanges and basal angles, and this information is also included. For certain complexes there are further tables which show the pattern and frequency of association of particular modes or mode clusters of decoration with particular decorative fields.

The reasons for my procedures should be evident to most readers who are familiar with the various arguments concerning the proper quantification of pot sherds. Sherd counts are presented for those archaeologists who prefer to deal with this kind of quantification. A summation of arc measurements is used rather than a count since this counteracts any tendency for one form of vessel to break into smaller pieces than another. (The arc measurements were obtained by pressing a flexible plastic ruler against the curvature of the rim.) The summation of the arcs of each form category of vessel is in each case divided by the modal mouth diameter or diameters of the form category. It might be argued that since it is the circumference of the vessel
mouth that controls the amount of rim sherds produced by the breakage of a particular vessel, the circumference should have been used in calculating the frequency index. Since diameter and circumference are related by the constant $\pi$, the relationship between the various frequency indices of each complex would not change, though a smaller value would be obtained for each frequency index. I concentrated on rim sherds in this quantitative presentation, since I feel that there is something elegant about a tabulation which ultimately adds plain body sherds to diagnostic rim sherds. My reasons are those already eloquently discussed by Krieger and Spaulding.\textsuperscript{102} I concur with the opinion expressed by Spaulding that it takes a hardened typologist to put the body sherds from one vessel in one type and the rim sherds from the same vessel in another type.\textsuperscript{103}

In many recent ceramic analyses plain pottery types are constructed by adding all sherds from plain vessels to the sherds from plain areas of decorated vessels. This procedure seems to me somewhat analogous to adding horses and apples. Even if this procedure is logically permissible, there are practical considerations which lead me to doubt that the ratio of plain sherds to decorated sherds is a particularly reliable index of the nature of a ceramic complex. In ceramic complexes in which only part of the vessel surface is decorated this ratio will vary widely depending on the degree of fragmentation of the sherds.
If the sherds are relatively large, a high percentage of the sherds will show some decoration. If the sherds are smashed into small bits, many more sherds, showing no decoration will result, and the percentage of plain "types" as opposed to decorated "types" will go up. For all of the complexes discovered in the Yarinacocha area a study of the rim sherds gives a more accurate picture of ratio of decorated vessels to undecorated vessels.

The kind of synchronic, structural analysis of ceramic complexes which has been advocated, and to a degree followed, in this monograph, has certain definable advantages. It is as close as we can come to a statement of the ceramic culture of the social group responsible for a particular assemblage of pottery.

Such a structural analysis grows out of the data and is not a mere whim of the archaeologist analyzing the data. A comparison of the structure of two particular ceramic complexes should offer the best basis for an estimate of the existence of a historical relationship between the two, and whether both are part of the same cultural tradition.

This kind of analysis in archaeology is quite consciously patterned on structural analysis in linguistics and on the componential analysis of kinship systems. A recent statement by Romney and Epling on the advantages of such structural analyses is as applicable to ceramic studies as to the treatment of kinship systems.
Finally, advantages accrue from the existence of standardized forms of presenting materials. The advantages include ease of presentation and ease of comparison of structures. The advantages for comparative studies warrant further comment.

Two common criticisms of comparative work are: (a) that comparisons are made between societies that are inadequately known, and (b) that elements are taken out of context in making comparisons. The use of models may be of aid in both situations. The existence of sufficient information to provide a basis for analysis in terms of a model could be taken as one criterion of adequate coverage of a society. With respect to the second criticism, it is important to note that models represent whole systems and thus allow comparisons of one system with another. Elements are retained in their context. 104

Ford has pointed out this kind of ceramic analysis also has its limitations. As he says, "This order does not provide the historically significant grouping of traits which the archaeologist must have to measure culture history." 105 Ford has also stated that classificatory units which are designed to give a maximum of chronological control must be developed within the limits of a structural analysis of a particular ceramic tradition. "It is this inherent order in culture of which archaeologists must be aware when they begin the search for types for this is the framework within which
the typology must be constructed. This is certainly the order that will be revealed by applying statistical devices to the ceramics of prehistoric dwelling sites as recently advocated by Spaulding (1953)."  

The ceramic types advocated by Ford can be conceptualized as segments of formal variation extracted from the range of formal variation which is presented when the ceramics of a cultural tradition are ordered along the temporal dimension. This rather long winded definition seems necessary if we are to avoid the methodological difficulty, pointed out by Spaulding, of maintaining that a "type" contains a certain amount of form and a certain amount of time.  

Ford has long maintained that setting the limits of such segments of formal variation is an arbitrary procedure which will reflect the nature of the problem to be solved and the judgement of the archaeologist who is analyzing the materials. It is this opinion of Ford's which has led to the long and heated controversy between Ford and Spaulding as to whether types are or should be arbitrary or reflections of distinctions inherent in the data, Ford's kind of ceramic type will be arbitrary if ceramic change in a particular tradition is gradual and continuous. Such types may be objective if the ceramic tradition shows a number of points of sharply discontinuous change, or marked changes in several dimensions of the tradition at the same point.
in time. Ford has presented a well conceptualized model of cultural change which emphasizes the continuity and gradual nature of such change.\textsuperscript{110} Spaulding has presented a contrasting model in which certain points in a ceramic tradition are marked by discontinuous variation in several aspects of the complex involved.\textsuperscript{111} Such points in Spaulding's model are separated by long stretches during which change is very slow or absent. While it is obvious that both models can not accurately represent the same span of culture history, some reflection should yield several actual examples of culture change exemplifying each model. Ford's model seems to hold for the long central span of most ceramic traditions, while Spaulding's model is most adequate for periods of marked cultural contact or periods when an old ceramic tradition is breaking down and being replaced by another.

If we return to the abstract definition of a ceramic complex already presented, it can be seen that as a ceramic complex changes through time it is likely to show both continuous and discontinuous variation. Change can occur through the addition of new modes or the dropping of old modes, thus changing the number of modes in the system. Such change is of necessity discontinuous. The ceramic complex may add or drop whole dimensions. This will also give discontinuous change. The complex may, without changing the number of modes or dimensions, add new mode combinations or drop old mode combinations. Again
the change will be discontinuous. The number of mode combinations may remain constant, while the popularity of particular mode combinations may vary. This will, of course, yield continuous variation. Finally, the number of modes on each dimension may remain constant, while the actual central value of each mode may shift gradually through time. Such a shift in modal values is exemplified by the changes in firing in the Viru Valley sequence. In many cases such a shift will be gradual and continuous, quite analogous to that part of linguistic drift which relates to the phonetic value of phonemes. The chronological utility of such shifts in the value of modes, unaccompanied by change in the number of modes, is great. Good examples of the chronological utility of mode shifts are the change in the nature of the incised line in going from Coles Creek Incised to Hardy Incised (Mouth of the Red River Sequence) and the shift in stirrup spout shape in the Moche ceramic tradition as studied by Larco Hoyle and Rowe. (In some instances this latter change appears continuous, i.e. from Moche I to II, in other cases discontinuous, i.e. from Moche IV to V).

There are certainly discontinuities when ceramic change is viewed through time. However, a chronologically oriented analysis of ceramics which concentrates only on the points of discontinuity, ignoring the continuous alteration exhibited by many ceramic traditions when they are viewed through time,
will be a less sensitive chronological tool than one which makes use of continuous change. If such change is to be utilized it is obvious that some kind of arbitrary units must be imposed. The fact that such units are arbitrary, does not mean that they can not be precisely and operationally defined.

It is clear from the preceding discussion that the analysis of ceramic change through time, since it involves the treatment of both discontinuous variation and continuous variation, needs a different conceptual basis than the analysis of the structure ("types") in a ceramic assemblage, which involves only the study of discontinuous variation. As Kluckhohn pointed out in a recent article, the kind of model which is most efficient for treating discontinuous variation is emphatically not the most efficient model for treating continuous variation and visa versa.115 Typically, archaeologists have tried to treat both kinds of problem using a single conceptual unit, the ceramic type. The above discussion suggests that the two kinds of analysis should be rigorously separated, with, as Ford has suggested, the structural analysis preceding the chronological analysis.

One kind of chronological analysis which has proven successful in recent archaeological work is the quantitative seriation of a relatively small number of named types (segments of the range of formal variability which appears when ceramics
are ordered along the temporal dimension). As has been pointed out earlier in this paper, the developed form of this seriation, as it is used today, is largely the work of Ford. I have already dealt with some methodological problems which may arise out of the incautious use of this method, and Rowe and Bennyhoff have dealt with other difficulties.\textsuperscript{116} The method has, nonetheless, proven itself to be a powerful chronological tool, especially in the Lower Mississippi Valley.

Another kind of seriation is a qualitative form using the coexistence of discrete definable features as its basis. This method has been most extensively used in American archaeology by Rowe and his students.\textsuperscript{117} It has the advantage of being able to incorporate all of the variation in form discussed. A range of continuous variation can be divided into a number of arbitrary but operational units, and each of these units can be treated as a feature. Each instance of discontinuity can also be used to delimit a feature. In this way no chronologically significant information is lost, and a highly refined chronology can be developed.

Recent writings by the proponents of each of these methods of seriation have tended to be partisan in tone. There is a strong implication that the individual archaeologist must take a stand and decide which side he is on. One of the interesting implications of the comparative marshaling of data in Figs. 6a and 6b of this monograph is that given good controls over the material
and fairly unmixed middens, a quantitative analysis of such features as temper will give the same chronological picture as a qualitative analysis of fairly minute features of form. If one pays sufficient attention to the problem of mixed samples discussed in Chapter 3, a quantitative seriation should provide an excellent independent check on the results of a qualitative seriation. It is here suggested that, as more data become available for the Central Jéjéjé, so that the discrete ceramic complexes here described can be joined into a continuous sequence, both methods of seriation be used as cross checks. Where both methods agree, the certainly of the conclusions is greatly strengthened, and, where they disagree, the discrepancies should provide valuable clues for further research and analysis.

The procedure underlying the following analyses of ceramic complexes is basically simple, though requiring a considerable amount of tabulation for its execution. The largest pure sample representative of each of the occupations was selected as the unit for analysis. The total sample was analyzed in terms of the variation it showed along a number of basic dimensions. I have endeavored to make these dimensions encompass all of the meaningful variation separating the various sherds in a particular sample, and separating the sherds of the various samples. A list of the dimensions used in this analysis follows. This list and a brief discussion of each of the dimensions will illustrate
my use of this term far more clearly than any further abstract definition.

CLAY: This dimension deals with the kind of basic material used for the manufacture of the pot. Variation in the kind of clay used may indicate a preference for certain kinds of clay to be used in making certain specific vessel forms. On the other hand, a continuous variation in the nature of the clay combined with a rather narrow range of such variation will suggest a single cultural norm for the proper sort of clay to be used for pottery making.

TEMPER: This dimension includes the variation in the kind or kinds of aplastic materials added to the clay to give it the proper working characteristics.

FIRING: This dimension embraces the range of variation resulting from the firing practices of the people making the pottery.

THICKNESS: This dimension embraces the range in variation of thickness of vessel wall.

VESSEL BODY FORM: This embraces variation in the vertical cross section of the various vessel forms made as a part of a particular complex. The vessel form silhouette is considered independent of rim modification, basal angle modification, or bottom form in cases where the bottom is separated from the walls of the vessel by some kind of inflection. This silhouette is also considered independent of various modes of appendages such as lugs,
handles, and feet.

HORIZONTAL CROSS SECTION: This dimension embraces variation in the horizontal cross section through the side walls of the various forms of vessels.

SIZE: Size is considered an independent dimension when a particular vessel body form shows discontinuous variation in dimensions. Otherwise, in cases where each vessel body form shows a single modal size, it is considered as dependent on and a part of vessel body form.

BOTTOM FORM: Bottom form embraces variations in the profile of vessel bottoms within a particular ceramic complex. Bottom form is considered as separate from vessel body form only in those instances showing a definite point of inflection between the side and bottom of the vessel.

NECK FORM: This embraces variations in the vertical cross sections of vessel necks.

LIP TREATMENT: This embraces variations in the shaping of the uppermost or outermost extension of the vessel, i.e., whether the lip is consistently rounded, squared off, or thinned to a sharp edge. (Evans, Meggers, and Estrada in a recent publication have found it useful to distinguish lip treatment from the basic cross section of the rim, and I have followed them in this distinction.\textsuperscript{118})

RIM MODIFICATION: This refers to variation in the
vertical cross section through the uppermost or outermost part of the vessel. It includes additions of strips of clay, and/or a marked turning of the vessel wall.

**BASAL ANGLE MODIFICATION:** This encompasses any modifications of, or additions to, the point of inflection between the side and bottom of the vessel.

**NECK JUNCTURE MODIFICATION:** This refers to variation, in, additions to, or modification of the point of inflection between the neck and body of the vessel.

**SURFACE FINISH:** This refers to the range of variation in smoothing and/or polishing of the surfaces of the vessels manufactured.

**SLIP:** This refers to the variation in the all over coating of refined clay or pigment added to the surface of the vessels before firing.

**PAINTED DESIGN BEFORE FIRING:** This refers to variations in the kinds of painted lines and massed areas of pigment applied to the vessel surface before firing.

**PAINTED DESIGN AFTER FIRING:** This embraces variation in pigments applied to the vessel surface after firing.

**RESIN COATING:** This applies to variations in the application of a coat of vegetable resin to the surface of the pot after firing.

**INCISING:** This dimension concerns variations in the
nature of lines cut into the surface of the vessel before firing.

NOTCHING: This dimension embraces variations in shallow nicks cut into the salient edges of vessels before firing.

PUNCTATION: This dimension embraces variation in the pits punched into the surface of the vessel before firing.

STAMPING: This dimension covers variations in depressions punched in the surface of the unfired vessel by distinctively shaped implements which leave uniform impressions.

EXCISING: This dimension embraces variations in the use of a decorative technique in which part of the surface is cut away leaving the rest of the area standing in relief.

MODELING: This dimension covers variation in a technique whereby areas of the surface of the vessel are modified by being pressed outward or inward.

APPLIQUE: This dimension covers variation in the addition of strips, or blobs of clay, to the surface as design elements.

CORRUGATION: This involves variation in the production of a corrugated surface by thumb print or fingernail impressing, sometimes in conjunction with incompletely obliterated coils.

PERFORATION: This involves variations in the nature of holes pushed all the way through vessel walls or appendages.

A broad dimension, appendages, covers variations in a number of kinds of additions to vessels which do not basically
alter the vessel form. These can best be handled as a series of subdimensions.

**TABS:** This includes horizontal or vertical noncontinuous extensions of rims or flanges.

**LUGS:** This category subsumes solid horizontal shelves of clay.

**HANDLES:** This involves vertical or horizontal strips of clay attached at both ends and free in the middle, or attached at one end only.

**FEET:** This embraces discrete multiple additions to the vessel bottom or sides which support the weight of the vessel.

**ANNULAR BASES:** This is a continuous ring of clay added to the vessel bottom and acting to support the vessel.

**SPOUTS:** These are tubular or trough-like additions to the upper surface of the vessel for the purpose of draining liquid from the vessel.

**BRIDGES:** These are strips of clay connecting paired spouts or spout and vessel body.

**ADORNOS:** This covers eccentric or life form additions to vessel rims or walls not covered in preceding categories of appendages.

**DECORATIVE FIELD:** This dimension covers variations in the areas of vessel surface selected for decoration within a particular complex.
DESIGN ELEMENT: This dimension covers variations in the basic units of design available for combination.

DESIGN LAYOUT: This dimension covers variations in the rules for the combination of design elements into completed designs. In this discussion the categories of symmetry discussed by Shepard are used as a basis for description.119

Certain data concerning these ceramic complexes seem best presented by means of comparative tables: Table 139 gives the hardness of a random sample of 30 sherds drawn from each of the ceramic complexes, and Table 140 gives the thickness of samples of 30 sherds drawn from the several ceramic complexes. These measurements of thickness are comparable. Each measure is minimal for each sherd. All sherds measured were vessel sidewall fragments away from the thickening typical of rims or of points of inflection.

Also, there are certain data concerning vessel manufacture and the general appearance of sherds in their present much eroded condition which can not be incorporated readily in the formal analysis of mode. These data, which are of considerable importance to anyone attempting to sort the archaeological ceramics from this area, are presented in a paragraph subsequent to the formal analysis of modes and their combination.

The Early Tutisheainyo Ceramic Complex
The largest group of Early Tutishcainyo sherds was that concentrated in the lower levels of Stratigraphic Cut 1, UA-6. The stratigraphic separation of this material from the Late Tutishcainyo materials in the same cut has already been discussed at great length and this problem need not be re-examined. The total of all sherds from this unit showing features of shape or decoration, which have been demonstrated to be a part of the Early Tutishcainyo complex, has been selected as a representative sample for Early Tutishcainyo, and will be subject to a modal analysis.

Certain difficulties were noted in the precise separation of the Early Tutishcainyo materials from the Late Tutishcainyo materials in this cut. There were certain features, especially those of shape, which clearly occurred in both complexes and which offered no obvious basis for segregation. Sherds showing such features had patterns of distribution which completely overlapped the distribution pattern of uniquely Early Tutishcainyo features and of uniquely Late Tutishcainyo features. The total of sherds showing each of these indeterminate features has been divided proportionally and arbitrarily into two segments, one to be counted as part of each of the two complexes. The proportional division was based on the number of such sherds occurring above and below the line giving the best stratigraphic separation between Early and Late Tutishcainyo. This line occurred between
levels 5 and 6 of most of the units in the cut, but between levels 6 and 7 in units 1, 2, 6, and 7.

CLAY: No detailed tests were run on clays and sherds to determine whether more than one source of clay was used, but on the basis of visual examination there was nothing to indicate more than one concept of the proper kind of clay to be used. This statement might be extended to include all the locally made ceramics. Usable clay was readily available on the banks of the river of the numerous oxbow lakes. No differences in preferences for clays were observed either within any of the complexes or between any two of the complexes, if we exclude the Sanidine Tempered Wares. It is possible that detailed analysis by refiring of sherds will necessitate a re-evaluation of this point, but until such an analysis is made clays can tentatively be excluded from the list of dimensions giving rise to culturally meaningful variations. One made observable.

TEMPER: A. Ground shell temper: Finely ground shell of a fresh water mussel, species unknown, was added in large quantities. The particles averaged about one to three mm in size. The amount of temper added was generous, leaving a vessel wall with a highly laminated structure. The paste was well mixed and of uniform consistency. In some sherds the shell had leached out leaving only thin, flat cells.
B. Shell tempered sherd temper: A quantity of Early Tutishcainyo pottery fragments had a temper of finely ground, shell tempered sherd added to the paste. Microscopically such pottery is readily distinguishable from the pottery tempered with freshly crushed shell. The sherd particles center in the one mm. range. There seems to have been a conscious preference for shell tempered sherd as opposed to other kinds of sherd for tempering material, as shell tempered sherd temper is more common than would be expected if the sherd material available for temper had been collected at random. The fairly fine sherd temper gives a relatively smooth surface to the broken edges of this pottery.

C. Sherd temper: Here is included all sherd temper derived from sherds tempered with material other than shell. Most of such material appears to have been sherd tempered, though the demonstration of sherd temper in temper sized particles of sherd is difficult. Most of the temper particles are of small size, averaging one mm. in diameter or less. The pottery with this kind of temper fractures with a relatively smooth break.

For purposes of chronological analysis a small sherd temper was distinguished from a large sherd temper. This distinction proved to have definite chronological significance. As can be seen from the graph, Fig. 6b, small sherd temper is more typical of Early Tutishcainyo than large sherd temper,
however a certain amount of typical Early Tutishcainyo pottery has what was classified as large sherd temper. The evidence does not suggest that we are dealing here with two modes of sherd temper, but that the larger sherd temper represents part of the variation around a single norm. Apparently the difference in temper between Early and Late Tutishcainyo is not a difference in the proportional representation of two norms, but the result of the gradual shifting of the value of a single mode through time.

D. Sandy pastes: In the foregoing categories we were clearly dealing with materials which were intentionally added to the paste to modify its characteristics. This situation is less clearly defined in the case of pottery whose paste shows a greater or lesser admixture of sand. As is clear from the graph, Fig. 6b, such pottery is numerically important in the Early Tutishcainyo ceramics and continues to be an important element in Late Tutishcainyo ceramics. Using a 35 power microscope it was possible to sort consistently four groups of sandy paste: one with sparse and/or poorly sorted sand; one with fine transparent sand; one with fine milk-white sand; one with extremely fine sand. The finer sands made up a much larger proportion of the paste than did the coarser. The extremely fine sand tempers were freely used, giving a sandpaper-like consistency to the sherds.

There are several questions about these sandy pastes which can not be answered on the basis of studies so far carried
out. Clays with greater or lesser admixtures of sand are available in the Yarinacocha area, and it is possible that such clays were selected for pottery making. Beds of pure or almost pure sand were also available to be used as temper, so there is no way to decide if sandy clays were used or if normal clays were tempered by the addition of sand. As was stated above, the sand particles varied widely in size and somewhat in color. Without an extremely fine and painstaking analysis it would be impossible to demonstrate whether this range is continuous or discontinuous, and thus whether more than one mode of tempering is represented in these sandy pastes. My impression is that there is only one mode present, but further study may modify this impression. As previously mentioned, there was some shift in the frequency of use of these categories through time.

FIRING: The sherds give no indication that there was more than one central tendency in the firing practices of Early Tutishcainyo pottery making. The pottery shows a wide range of surface color, but the range is continuous and even a small shard will show considerable variation in the color of one surface. There seems to have been no attempt made to keep all of the surfaces of any pot the same color. The most that can be said is that atmospheric conditions during firing were poorly controlled. The chronological implications of differences in
in firing have been discussed above (Fig. 7). The distribution of hardness in Tutishcainyo sherds also suggests a single concept of the proper methods of firing pottery. The distribution curve is narrow and unimodal with nearly two thirds of the sherds tested falling between two and two and one half on the Mohs Scale (Table 139). In summary of the above it can be surmised that there was but one mode of firing, and that an uncontrolled atmosphere and relatively low firing temperatures were normal. The prevalence of thick, black cores supports this statement.

THICKNESS: There appear to be two modes of thickness in Early Tutishcainyo pottery:

A. Relatively heavy pottery about one centimeter in thickness is rare. This thick ware occurs only with Vessel Body Form Mode G, large, cylindrical urns, and with the smaller cylindrical vessels or objects, Vessel Body Form Mode H.

B. The second mode is typical of all other Early Tutishcainyo vessels. This is a thin ware averaging about four and one half mm.

VESSEL BODY FORM: There are 12 distinct modes along this dimension. These are illustrated in idealized form in Table 141. They are as follows:

A. An open mouthed vessel with flaring, concave sides.

B. A vessel with slightly insloping or vertical sides which are relatively tall in comparison to vessel diameter.
The sidewalls are slightly convex and curve inward just above the inflection point separating vessel side from vessel bottom, so that the transition from vessel side to vessel bottom is a gentle S curve.

C. A shallow bowl with very short, slightly flaring, concave sides.

D. A constricted orifice bowl with convex, insloping sides.

E. A shallower, more open bowl with convex, incurving sides.

F. A closed, globular body with orifices connected to two pouring spouts.

G. A very large urn with straight sides sloping outward slightly.

H. A cylinder, tall in relationship to its base diameter with vertical, straight, or slightly concave sides.

I. A shallow bowl with straight, vertical sides.

J. A shallow, hemispherical bowl with no break between side and bottom.

K. A deeper, hemispherical bowl with sides more nearly vertical. No break between side and bottom.

L. A plate with very little concavity.

HORIZONTAL CROSS SECTION: Early Tutishcainyo pottery shows two distinct modes of horizontal cross section.
A. By far the more common is circular.

B. An elongate, elliptical cross section is extremely rare and is associated only with Vessel Body Form Mode K.

SIZE: In Early Tutishcainyo ceramics modes of size appear not to function independently. Each mode of Vessel Body Form shows a unimodal distribution curve with reference to mouth diameter.

BOTTOM FORM: There are two modes of bottom form represented in the Early Tutishcainyo sample.

A. An evenly curving, convex, spherical section. In a few instances a small area of these hemispherical bottoms is flattened. This relatively rare variant is designated as Bottom Form Mode Al.

B. A flat, horizontal bottom. This rare mode is associated only with Vessel Body Form Modes H and I.

NECK FORM: Only one form of vessel neck was noted in the Early Tutishcainyo collection.

A. A relatively short, straight sided, outwardly flaring neck with a modal aperture of around 12 centimeters. No sherds showing this mode are sufficiently complete so that the body form of these flasks can be determined.

LIP TREATMENT: There are apparently only two forms of lip treatment:
A. An evenly rounded, blunt edge.

B. A squared edge with flat upper surface and angular corners. Mode B is rare, occurring only with the large urns, Vessel Body Form Mode G, and the cylindrical vessels, Vessel Body Form Mode H.

RIM MODIFICATION: A. Zero modification. This form is typical of the shallow bowls, Vessel Body Form Mode C, as well as the rarer Body Form Modes D, E, J, K, and L.

B. The addition of a horizontal labial flange. This flange takes three forms:

B1. By far the most common is horizontal and at roughly a right angle to the vessel wall.

B2. Tilted upward at an obtuse angle to the vessel wall.

B3. Slightly concave on its upper surface and projecting inward toward the interior of the vessel as well as outward. The upper surface is tipped inward.

Variants of B1 and B2 are almost always associated with large, concave sided vessels, Vessel Body Form Mode A, while variant B3 is associated with shallow, hemispherical bowls, Vessel Body Form Mode J.

C. Labial flanges pressed downward and in against the vessel wall, so that the upper surface of the flange lies at an angle of roughly 45 degrees to the line of the vessel
Variations in profile make it useful to distinguish four variants of Mode C. (Table 141.) Mode C Rim Modification is invariably associated with Vessel Body Form Mode B.

D. Everted rim with no addition of clay strips. This rare mode of rim modification occurs most frequently with closed, globular vessels, Vessel Body Form Mode D.

E. A roll of clay with circular cross section added to the upper surface of nearly flat plates, Vessel Body Form Mode L.

F. An S-curve modification of the rim of a closed vessel. This unique form is represented by one sherd only (Fig. 34f).

BASAL ANGLE MODIFICATION: A. Zero modification. In some vessels of Vessel Body Form Mode A and in almost all vessels of Vessel Body Form Modes B and C there is no further modification of the sharp carination produced by the intersection of the curvature of the vessel wall and the convex curvature of the vessel bottom.

B. Broad, horizontal basal flange. Such flanges are invariably decorated and are associated with Vessel Body Form Mode A and Vessel Body Form Mode D.

C. Short, thick basal flange usually tilted slightly downward. These are plain and associated with Vessel Body Form Mode A.
D. A sharp ridge of clay with an acute angle cross section and with the upper surface roughly horizontal. Associated with Vessel Body Form Mode A.

E. Ridge of clay having an obtuse angle cross section and with the upper surface sloping downward and outward. Associated with Vessel Body Form Mode A.

F. A squaring off of the basal angle of Vessel Body Form Mode A so that the side and bottom form roughly a 90 degree angle. This mode of basal angle modification appears only in association with those vessels of Vessel Body Form Mode A having broad band decoration on the vessel wall.

G. Convex basal shoulder with a sharp point of inflection between the vessel wall and the vessel shoulder and another between the vessel shoulder and vessel bottom. These convex shoulders are hollow. It is associated with Vessel Body Form Mode A.

H. Long, horizontal lugs. These could be treated as appendages but appear to be more closely related to the basal flanges than to the short, rectangular lugs of Early Tutishcainyo. It is associated with Vessel Body Form Mode A.

I. A broad, horizontal flange with a secondary vertical flange at right angles to it at its outer edge. The outward surface of the vertical flange is decorated. Associated with Vessel Body Form Mode I.
NECK JUNCTURE MODIFICATION: Not relevant.

SURFACE FINISH: There is apparently only one normative standard of surface finish for Early Tutishcainyo ceramics, though the eroded surfaces of Early Tutishcainyo sherds make any statement on this matter highly tentative. The surfaces of Early Tutishcainyo pottery were carefully and evenly smoothed, but do not show the high gloss which is typical of the most carefully polished Shakimu ceramics.

SLIP: Not present.

PAINTED DESIGN BEFORE FIRING: Not present

PAINTED DESIGN AFTER FIRING: A. A dry, red pigment was rubbed into the depressed areas of incised designs after firing. By its nature this pigment is extremely fugitive and the frequency can not be precisely determined. In most sherds which had deep incisions and which still contained a little dirt in their incised lines after washing, traces of such red pigment could be discerned by carefully cleaning out the incision.

RESIN COATING: No evidence of use.

INCISING: Incision is by far the most frequently used decorative technique in Early Tutishcainyo ceramics, and almost all Early Tutishcainyo vessels had some form of incised decoration, completely plain vessels being extremely rare. Incised lines took three basic forms and the use of each of these modes was rigidly controlled.
A. A relatively broad, continuous, U-shaped groove. This was very carefully removed after the clay was relatively dry, probably with a gouge shaped implement, since there is no ridge of clay on either side of the incised line. Such lines are basic to the Tutishcainyo design layout, being used for any long line which runs parallel to the direction of the band design. (See the section on design below.)

B. These lines are approximately as broad and deep as those of Mode A, but could as easily be treated under the dimension of Punctuation as Incising, since these lines are made up of a series of contiguous circular punctations, rather than being continuous grooves. Mode B lines are used in Tutishcainyo design for curved lines, for any relatively short, straight lines, and in most cases for all lines running perpendicular to the direction of the band design.

C. Mode C lines are very shallow, very thin, and have a V rather than a U cross section. Such lines are invariably packed closely together and used only for texturing zones demarcated by Mode A or B lines. These texturing lines can be subdivided into six submodes on the basis of their length, direction, and the way in which they are combined.

C1. Long, thin parallel lines perpendicular to the direction of the band design.

C2. Long, thin parallel lines diagonal to
the direction of the band design, and slanted down to the left.

C3. Like C2, but slanted down to the right.

C4. Multiple tiers of short lines perpendicular to the axis of the band design.

C5. A single tier of short, incised lines, perpendicular to the axis of the band design.

C6. Crosshatched incision in which both sets of parallel lines are diagonal to the axis of the band design.

NOTCHING: A. Broad, U-shaped notches were carefully cut into the outermost edge of certain modes of rim modification and basal angle modification.

PUNCTATION: A. Individual punctations used to punctuate the termination of broad incised lines, Incising Mode A; used in rows; or used individually as part of more complex design elements.

B. Fine, zoned punctation. This is very rare. It is used in the same way as the fine line texturing. Two examples are illustrated (Fig. 29 d, Fig. 33 m).

C. Unzoned all-over punctation. Only one example recovered. On hemispherical bowl of elliptical horizontal cross section (Fig. 33 l).

STAMPING: No form of roulette stamping occurs in Early Tutishcainyo. The statement to the contrary which appeared
in the preliminary report was in error. All of the examples which appeared to be dentate roulette stamping turned out, on careful examination, to be rows of individually made punctations. The only form of stamping which occurs is the use of a large circular stamp, evidently some kind of cut reed or bone tube.

A. Widely spaced, large circular stamp marks. These occur only twice, once as the only decoration on the sidewalls of a shallow bowl, Vessel Body Form Mode D (Fig. 32 a), and once on the outer surface of the secondary flange of Basal Angle Modification Mode I (Fig. 33 b).

EXCISING: A. Circular, excised pits less than a centimeter in diameter are the only form of excision found in Early Tutishcainyo pottery, and are used in a row as band designs. These are rare, two examples only occurring; one on the sidewall of the shallow bowl, Vessel Body Form Mode D (Fig. 32 c); and the other on the convex shoulder, Basal Angle Modification Mode C (Fig. 23 c).

MODELING: Modeling is very rarely used in Early Tutishcainyo vessels.

A. The only example involved the pushing in of grooves in the sidewall of a vessel to give a fluted effect (Fig. 34 3).

APPLIQUE: Not present in sample.

CORRUGATION: Not present in sample.

PERFORATION: Not present in sample.
TABS: Small projections extending out from the rims or basal flanges of Early Tutishcainyo vessels are not uncommon. It is difficult to determine if these are pinched out from the clay of the rim of the vessel or are added pieces of clay. No careful cross sections were ground to determine which mode of manufacture was used.

A. A rounded, globular, horizontal projection always associated with Rim Modification Mode A. It is frequently associated with notching and usually marks quadrants or eighths of the vessel circumference. It is also frequently associated with an axis of symmetry in the band design on the rim of the vessel (Fig. 22 i, k).

B. Like above, except that the tab is sharply angular (Fig. 20 b).

C. A thin, rectangular tab rising nearly vertically from the rim. Examples are rare and are only small fragments so that this form of tab can not be definitely associated with any rim or vessel form, except that it is definitely not associated with Rim Modification Mode A or any of the three most common modes of Vessel Body Form (Fig. 33 g).

LUGS: Small, solid lugs occur relatively rarely as appendages to Early Tutishcainyo pottery. These occur in two forms:

A. A small, upcurving lug of oval cross section attached
to a vessel shoulder. This frequently has punctuation on its flat outer end (Fig. 34m).

B. A flat, sharply rectangular lug which is also rectangular in cross section. Such lugs may be plain or with typical Early Tutishcainyo forms of decoration.

HANDLES: A. Vertical, strap handles were very rare additions to Early Tutishcainyo pottery. Only four examples occurred in the whole sample. These were affixed to the outside of the vessel wall, and in no case were they riveted through the vessel wall. There is no evidence as to what form of vessels they were affixed. They were sometimes decorated (Fig. 34c).

FEET: Vessel feet were relatively rare, only 15 examples occurring in the total sample. They show considerable variation in form.

A. A solid leg curving outward and downward from the vessel bottom (Fig. 36 a).

B. A short, solid, conical foot (Fig. 36b,e).

C. A hollow, cylindrical leg with perforations in the base (Fig. 36f-h).

D. A hollow, mammiform foot (Fig. 36c,d).

ANNULAR BASES: Does not occur in sample.

SPOUTS: The total sample contained 29 fragments which were probably from spouts for closed bodied water bottles.

A. The typical form of these spouts is squat and
globular, usually with a slightly everted lip. One third of these spouts are decorated with typical Early Tutishmainyo design. In only one instance can the arrangement of the spouts with reference to the vessel be determined. In this case the arrangement is a double spout attached to a low, globular vessel body and connected by a broad, arched bridge (Fig. 35 h).

B. Nearly of a football shaped forms may also be a variant of a squat bottle spout. The most complete specimen of this form strongly suggests such a function. This form of "spout" is invariably decorated (Fig. 35 g, i).

BRIDGES: A. Broad, arched bridges connecting paired vessel spouts. Seven examples of such bridges occurred (Fig. 35 h).

ADORNOS: Do not occur in sample.

DECORATIVE FIELDS: Only certain zones of Tutishmainyo pottery were considered proper zones for decoration. These decorative fields can be defined quite precisely in terms of the vessel forms described above.

A. Immediately below the rim on the interior of Vessel Body Form Mode A and Mode B.

B. The upper surface of the labial flanges, Rim Modification Mode B.

C. The outer surface of labial flanges, Rim Modification Mode C.

D. The total vessel side on bowls of Vessel Body Form
Mode A. This decorative field only occurs in association with Basal Angle Modification Mode D.

E. The side of Vessel Body Form Mode B from a short distance below the labial flange to a short distance above the basal angle.

F. The convex basal shoulder in Vessel Body Form Mode A with Basal Angle Modification Mode G.

G. The upper surface of broad basal flanges, Basal Angle Modification Mode B.

H. The total side of shallow bowls, Vessel Body Form Mode C.

I. Upper surface of rims of hemispherical bowls, Vessel Body Form Mode J, Rim Modification Mode B.

J. Zone between rim and shoulder of closed spherical bowls, Vessel Body Form Mode D.

K. Band below rim on outside of large, cylindrical urns, Vessel Body Form Mode G.

L. Band extending from the rim down part way on the sides of elliptical, hemispherical bowls, Vessel Body Form Mode K.

M. Outer surface of secondary flange, Basal Angle Modification Mode I.

N. Outer edge of sharp ridge, Basal Angle Modification Modes D and E.
O. Total side wall of narrow base, cylindrical vessels, Vessel Body Form Mode H.

F. Outer surface of spouts.

Q. Upper surface of lugs.

R. Outer surface of strap handle.

It will be noted that with two exceptions, Fields Q and R, all of these fields are continuous, horizontal bands running completely around the vessel. All Early Tutishcainyo design planning is much influenced by the nature of these, band form, decorative fields.

DESIGN ELEMENT: A. Continuous horizontal line executed in Incising Mode A.

B. Short, vertical line executed in Incising Mode B.

C. Short, vertical line executed by Incising Mode A.

D. Point executed by notching.

E. Oval or circle executed by stamping or excision.

F. Continuous band of diagonal hatching, Incising Mode 62, between two parallel, continuous lines, Incising Mode A.

Design Element Modes G through O are complex design elements which, through symmetrical repetition, generate infinite band designs (Table 143). A series of fragments of design which are not thoroughly analyzable are also included in Table 143.
DESIGN LAYOUT: A. Repetition at halves, quarters, or eighths of the vessel circumference along either the rim or basal angle. This layout is combined with notching, Design Element D, and with Tabs, Modes A and B.

B. Continuous, closely spaced repetition. This is associated with dots, Design Element Mode D; short vertical lines, Design Element Modes B and C; and circles or ovals, Design Element Mode E.

C. Continuous uniform line or band.

D. Band design generated by transverse reflection. Following Shepard, this is Class 3 of Infinite Band Designs. This pattern of symmetry is associated with Design Element Modes G, H, and I.

E. Infinite band designs generated by a combination of longitudinal and transverse reflection. This is Class 5 of Infinite Band Design according to Shepard's classification. This pattern of symmetry occurs only with Design Element J in Early Tutishcainyo.

F. Infinite band designs generated by a combination of transverse reflection and bifold rotation. This is Class 7 in Shepard's Classification of Infinite Band Designs. This scheme of symmetry is used with Design Element Modes K through O.

Most Early Tutishcainyo band designs appear to be planned symmetrically, but there are a number of instances of obvious
asymmetry (Fig. 28 h, x; Fig. 30 f). In some instances such asymmetry appears to be the result of insufficient planning in fitting the design to the available space, but other instances appear to be intentional. Most of the available evidence, from partially reconstructed vessels, suggests that in cases of Class 7 Infinite Band Design the cultural norm is to repeat the basic design element eight or 16 times.

Analysis of the narrower Early Tutishcainyo band designs occurring on rims, convex basal shoulders, and basal flanges is fairly complete even though it is based on rather scrappy sherd material. The designs of the broader Decorative Fields, Mode D and Mode E, are more complex and can not be fully analyzed on the basis of the available materials. One tentative reconstruction of a band design in Decorative Field Mode D is presented (Fig. 29 a), and one much less tentative reconstruction of the full band design of Decorative Field Mode E is also presented (Fig. 30 b), but these do not allow any general statements concerning these types of designs. The unanalyzed data on complex band designs is also tabulated in Table 143.

By following the typological procedures of Evans and Meggers, it would have been possible to establish a large number of types for Early Tutishcainyo pottery. By emphasizing the differences in temper found in Early Tutishcainyo ceramics
I could have named at least eight "types" of plain ware. Using the various modes involved in decoration, such as the contrast between simple hatching and crosshatching, or between groove-incised lines and punctate incised lines, I might have established at least 10 or 15 types of decorated pottery. I fail to see what further light such a taxonomy would have shed on the nature of Tutishcainyo ceramics. The mode combinations or clusterings which actually occur and their frequency are all given in the preceding series of tables. There are certain obvious conclusions to be drawn from the pattern of clusterings present.

If one examines the percentages of the various rim categories which are given in Table 142, one sees that plain rim sherds are almost absent. If one follows Spaulding in being disinclined to put sherds from the same vessel in several different "types", one must insist that there are essentially no plain pottery "types" in Early Tutishcainyo, but only plain sherds from restricted areas of decorated vessels.

Particular modes of decoration occur on a wide range of vessel forms and on the various decorative fields of the same vessel form. There is a quite specific grammar as to the proper combination of these modes, and these rules of combination are evident from the preceding tabulation. It can be noted, for instance, that there was a far wider range of
decoration occurring on the labial flanges of Vessel Body Form Mode B than on the labial flanges of Vessel Body Form Mode A. A number of the rarer design elements are largely confined to the former decorative field.

Certain peculiarities of Early Tutishcainyo ceramics, which were not emphasized in the modal analysis, should be mentioned. The paste is well kneaded and uniform. There is no tendency for the vessel walls or vessel bottoms to show parallel horizontal fractures which would give evidence of coiled construction. If coiling was used in building up the vessel sidewalls, all evidence has been obliterated by a careful joining of the coils. On the other hand, all Early Tutishcainyo vessels which have a marked point of inflection between the sidewall and bottom show a definite tendency to fracture along the line of juncture between the sidewall and bottom. An examination of such fractures indicates that there is a rather poor weld between the two sections of the vessel. A good union between the two segments occurs only near the surface and does not extend to the core. On the basis of this evidence it appears likely that the two parts of the vessel were made separately and were allowed to become firm before they were joined. Labial and basal flanges were built from additional strips of clay and were not drawn out from the vessel wall. Again the juncture between the flange and the
vessel wall is weak, suggesting that these elements were added to the vessel after its clay had become partially dried.

Summary of the Early Tutishcainyo Ceramic Complex

The Early Tutishcainyo ceramic complex shows elaborate cultural patterning. A large number of dimensions are utilized, and most of these dimensions show a large number of modes. The cultural structuring is rigid both with reference to the execution of the individual modes (Tutishcainyo modes typically show a small amount of variation around the central norm.), and in terms of acceptable mode combinations. Certain modes of Rim Modification or Basal Angle Modification are invariably associated with particular modes of Design Element or of Design Layout.

The Tutishcainyo ceramic complexes are unusual among those of the Yarinacocha area in that several modes of temper were used concurrently. With one exception, however, the use of a particular kind of temper is not associated with particular vessel shapes, or modes of decoration. The one exception, shell tempering, is definitely less common in labial flanged vessels than could be accounted for by chance. Otherwise the usage concerning the various modes of temper is the most permissive aspect of the ceramic complex.

With minor exceptions there is no plain ware in the
Tutishcainyo complex. A ceramic assemblage drawn from a Tutishcainyo midden will contain a high percentage of plain sherds from vessel bottoms and vessel sides, but with the exception of the straight sided cylinders, occasional plates, and bowls of elliptical horizontal cross section, all of the form classes of Tutishcainyo ceramics have zones on which a particular kind of decoration appears to be obligatory. The frequency with which particular designs and decorative techniques were used in Early Tutishcainyo was determined by the popularity of particular vessel shapes. The simplest categories of design were used in the narrowest decorative fields, especially on the labial flanges; designs of moderate complexity were most common in decorative fields of medium width; on basal flanges, shoulders, and the sides of shallow concave sided bowls; the most complex designs were confined to the broadest decorative fields, especially the sides of labial flanged bowls with squared basal angles, Basal Angle Modification Mode F. Certain designs were considered appropriate only on the rims of vessels with Vessel Body Form Mode B. Likewise, particular kinds of texturing were considered more appropriate for narrow bands than for wide ones.

The only sharp clusterings of modes exhibited by the Early Tutishcainyo Complex are those producing the several categories of vessel form. It would go against the logic of the Early Tutishcainyo cultural pattern to set up plain ware
types as contrasted to decorated ware types or a crosshatched, incised type as contrasted to a diagonal-hatched, incised type.

The Divergent Early Tutishcainyo Material from Stratigraphic Cut 2, UCA-2

The sherd collection designated as Early Tutishcainyo from Stratigraphic Cut 2, UCA-2, is clearly more closely related to the type collection of Early Tutishcainyo from UCA-6 than it is to any other group of ceramics collected in the Yarínacocha area. It does, however, show enough differences to require special comment. The sample of sherds is too small to make a full modal analysis feasible. The majority of large, rim sherds and basal flange sherds are illustrated in Figs. 38 and 39.

These differ from the type collection of Early Tutishcainyo material in the following respects. The angle between the labial flange and the vessel wall is obtuse. In this respect the sherds resemble those from the southwestern end of Stratigraphic Cut 1, UCA-6, which were thought to come from the latter part of the Early Tutishcainyo occupation there. There is a lack of fine line texturing within the zones of the incised designs. The flanged rims lack the interior incised line which is an almost constant feature on the flanged rims from UCA-6. There are differences in design layout which are difficult to specify.
When we have access to a number of sherd samples intermediate between Early and Late Tutishcainyo, it should be possible to demonstrate the chronological position of this collection. A few hints, such as the absence of interior incised lines and the angle of the labial flanges, suggest that this sample is later than the Early Tutishcainyo material from UA-6, but at present the possibility that it is earlier cannot be fully excluded.

**Late Tutishcainyo Ceramic Complex**

The representative sample of Late Tutishcainyo consists of all sherds identified as Late Tutishcainyo from Stratigraphic Cut 1, UA-6. Certain sherds from other excavation units on that site are illustrated, but the tabulated sherds are entirely those of the type sample.

**CLAY:** Direct visual examination gave no indication that there was more than one mode of clay preference in Late Tutishcainyo ceramics. This is evidently the red firing, lateritic clay, available in all river and lake banks, which is still being used by the modern Shipibo potters.

**TEMPER:** A detailed analysis of the aplastic additions to Late Tutishcainyo pottery has already been presented.
A. Large, sherd temper. The most common tempering material is ground sherd, ranging somewhat larger than one mm. in diameter. Most of this ground sherd temper is coarse and falls outside the range of Early Tutishcainyo ground sherd temper, but in some sherds the temper is relatively fine. Though Late Tutishcainyo pottery shows considerable range in temper size, this range appears to be continuous and only a single mode of sherd tempering seems indicated by the data.

B. Sand temper. For purposes of chronological analysis four categories of sand tempering were distinguished, but these do not seem to represent mutually exclusive ideals of preference. There is a shift in the frequency of these categories through time, but what may be reflected is a shift in the availability of certain sand lenses and clay beds. Though in the future more detailed work may indicate the advisability of setting up several modes of sand tempering, present evidence does not justify setting up more than one.

FIRING: The wide range of color shown by Late Tutishcainyo sherds and even found on different areas of the same side of individual sherds indicates that the firing of Late Tutishcainyo pottery was poorly controlled with regard both to atmosphere and to temperature. Late Tutishcainyo pottery ranges from bright orange to dark gray. In bright orange sherds oxidation often penetrates through the whole
thickness of the sherd, but black cores are not infrequent. All of these data suggest that the people manufacturing Late Tutishcainyo pottery had no more than a single concept as to the proper way that pottery should be fired. Though Late Tutishcainyo sherds have considerable overlap with Early Tutishcainyo sherds in respect to surface color, core color, and hardness, fully oxidized sherds are more common in Late Tutishcainyo, and the modal hardness of Late Tutishcainyo sherds is higher in the Mohs Scale (Fig. 7 and Table 139). These observations indicate that compared to Early Tutishcainyo practices the firing temperatures were higher, resulting in harder, more completely oxidized ware.

THICKNESS: Except for the intentionally thickened areas such as rims, basal angles, and more occasionally vessel bottoms, there appears to have been a single conceptual norm for the thickness of Late Tutishcainyo Ware. Vessel thickness is relatively uniform and moderately thin (Table 140). It will be noted that the pottery averages about one mm. and a half thicker than Early Tutishcainyo pottery.

VEssel Body Form: A. Large, open mouthed vessel with concave flaring sides. This is obviously homologous to Early Tutishcainyo Vessel Body Form Mode A, but tends to be somewhat squatter.

B. Vessel with vertical, or slightly insloping,
convex sides, relatively tall in relation to its diameter.

This mode is precisely homologous to Vessel Body Form Mode B of Early Tutishcainyo.

C. Shallow, open bowl with concave sides. This mode is precisely homologous to Vessel Body Form Mode C of Early Tutishcainyo.

D. Large, spherical vessel with slightly constricted mouth and without point of inflection between side and base. This mode has no antecedents in Early Tutishcainyo.

E. Open bowl with straight, vertical sides.

F. Shallow, spherical bowl with convex, markedly incurving sides. This is homologous to Vessel Body Form Mode D of Early Tutishcainyo.

G. Shallow, hemispherical bowl homologous to Vessel Body Form Mode J of Early Tutishcainyo.

H. Shallow plate. This is homologous to Vessel Body Form Mode L of Early Tutishcainyo.

I. Closed bottle with single or double aperture of spout. This is homologous to Vessel Body Form Mode F of Early Tutishcainyo.

HORIZONTAL CROSS SECTION: There is only one mode.

A. Circular.

SIZE: As in Early Tutishcainyo, size does not seem to function as an independent dimension. As far as can be
determined each Vessel Body Form Mode shows a unimodal distribution for mouth diameter.

BOTTOM FORM: There are three distinct modes of bottom form.

A. An evenly convex, spherical section with no flattening at its base.

B. A convex, spherical section with a small base area modified by a round concavity surrounded by a slight ridge of clay (Fig. 50 e).

C. A generally convex bottom with a small, flattened basal area.

NECK FORM: There is a single mode consisting of a flaring, straight sided or slightly concave neck. This is homologous to the only mode of Neck Form in Early Tutishcainyo (Fig. 48 h).

LIP TREATMENT: There appears to be a single mode of lip treatment, a smooth, rounded termination to the outermost edges of rims and flanges. In general, the lip finish involves somewhat more thinning than is the case with Early Tutishcainyo lips, so that the profile is slightly sharper.

RIM MODIFICATION:

A. Zero modification.

B. Horizontal flange. This is homologous to Early Tutishcainyo Rim Modification Mode B.
C. Flange of clay bent downward and back against the wall of the vessel. This occurs with five variants in profile (Table 1). This is homologous to the Early Tutishcainyo Rim Modification Mode C.

D. A broad, flat, vertical strip of clay pressed against the upper edge of the outer surface of the vessel.

E. A broad, horizontal strip of clay pressed against the upper surface of plate rims.

F. An outward thickening of the rim of triangular cross section.

G. A rolled rim of circular cross section (Fig. 47 1).

H. A rolled rim of oval cross section (Fig. 47 m).

I. A sharply everted rim with marked terminal thickening.

J. Horizontal labial flange added a centimeter or so below the rim.

K. Broad, downwardly tilted, sublabial flange with straight upper surface.

L. Downwardly tilted, sublabial flange with concave upper surface.

BASAL ANGLE MODIFICATION: A. Zero modification.

B. Broad, horizontal basal flange. This is homologous to Basal Angle Modification Mode B of Early Tutishcainyo.

C. Short basal flange. This mode is homologous to
Basal Angle Modification Mode C of Early Tutishoainyo.

D. Convex, hollow basal shoulder with a sharp inflection between the side wall and shoulder and another between the shoulder and vessel bottom. This mode is precisely homologous to Basal Angle Modification Mode C of Early Tutishoainyo.

E. Ridge of clay with a profile of 90 degrees or greater and with the upper surface sloping downward and outward. This mode is not distinguishable from Basal Angle Modification Mode E of Early Tutishoainyo.

F. Long, horizontal lug extending nearly a quarter of the way around the vessel circumference. This mode is homologous to the Basal Angle Modification Mode H of Early Tutishoainyo.

NECK JUNCTURE MODIFICATION: A. The top of a Late Tutishoainyo double spouted bottle is modified into a raised, circular, cap-like area. This is quite similar to the double spouted vessel shape of Necropolis ceramics (Fig. 49 a).

SURFACE FINISH: Late Tutishoainyo pottery shows a single mode of surface finish. The surfaces are even, but are slightly rough to the touch, and are unpolished. In general, much less care was spent on the surface finish of Late Tutishoainyo pottery than was the case with Early Tutishoainyo pottery.

SLIP: A single example of zoned red slip was found on a shard of Late Tutishoainyo characteristics. This was
apparently in imitation of the red zoning on the Sanidine Tempered Ware traded into the Late Tutishoainyo Complex.

PAINTED DESIGN BEFORE FIRING: Dimension not utilized.

PAINTED DESIGN AFTER FIRING: Dimension not utilized.

RESIN COATING: Dimension not utilized.

INCISING: As in Early Tutishoainyo, incising is by far the most common decorative technique, however, in Late Tutishoainyo the incised lines are far less carefully standardized, and in general less carefully executed. The modal analysis of Late Tutishoainyo incising lacks the precision which was possible with Early Tutishoainyo materials.

A. A relatively broad, continuous line. As in Early Tutishoainyo, this mode was used as the horizontal boundary of decorative areas and particular design units, but it is also used for the shorter, vertical dividing elements in designs. These lines show a much greater variability in width than the Mode A incised lines of Early Tutishoainyo. Most tend to be shallower than the Mode A lines of Early Tutishoainyo, and most were executed with a jagged edged tool, so that the bottom of the incised line is markedly striated.

B. Lines consisting of rows of contiguous punctation. This mode is used less frequently than the corresponding mode in Early Tutishoainyo, and its use is not as specific. Such lines may be used as the major motif in a design (Fig. 45 d)
or to fill in the textured areas of a design (Fig. 45 i). In certain examples these lines are executed in a stab-and-drag technique, which is similar in its results to stab-and-drag decorated pottery of Southeastern United States. (Compare Fig. 43 h with Lake Borgne Incised.)

C. Shallow, thin, texturing lines are used in Late Tutishcainyo as in Early Tutishcainyo, but with less frequency and with less care of execution.

C1. Diagonal, individually executed, thin V-shaped lines. These are more widely spaced and less carefully executed than corresponding Incising Mode C lines of Early Tutishcainyo (Fig. 44 k, l, and i).

C2. Like C1, but executed with a bi- or tri-pointed tool so that several parallel lines are produced at a time. This is essentially a brushing technique rather than an incising technique, but the results are not easily distinguishable from Mode C1. This zoned, brushed incising is somewhat more common than the plain incising (Fig. 40 e and f; Fig. 42 d, e, and f).

C3. Light cross hatching. This mode, which is a common texturing device in Early Tutishcainyo, had only a few occurrences in the Late Tutishcainyo sample: on the upper surface of a plate rim (Fig. 46 a) and on a basal flange (Fig. 42 g).
D. Short, deep, incised lines executed with the same kind of tool as Mode A lines, but cut much more deeply into the clay. These occur only as short, rectangular indentations seldom more than twice as long as they are wide. Such lines are vertical, with reference to the design boundaries (Fig. 43 b; Fig. 47 i; and Fig. 45 b).

NOTCHING: A. Notching is much less carefully executed in Late Tutishcainyo than in Early Tutishcainyo. The individual notches tend to be shallower and more irregular. Also such notches tend to be more closely spaced than in Early Tutishcainyo. This treatment is among the most frequently used of all Late Tutishcainyo modes of decoration occurring on rims, basal angles, basal flanges, lugs, and on the ridge at the interior of horizontal plate rims.

PUNCTATION: Puncture is used with much greater frequency in Late Tutishcainyo than in Early Tutishcainyo. The individual impressions suggest that only a single form of tool was used. The punctation is a sharp, deep pit with small diameter. Such punctation occurs in rows, Mode A1 (Fig. 41 a, e; Fig. 42 i, n; Fig. 43 l; Fig. 47 e, j; Fig. 48 c, d); in zoned fields; Mode A2 (Fig. 50 f, g); or as unbounded clusters, Mode A3 (Fig. 44 k). Mode A is frequently used as a substitute for zoned, fine line incising on flange rims (Fig. 42 n; Fig. 52 o).
STAMPING: There are two modes of stamping in Late Tutishcainyo.

A. A hollow, circular impression corresponding to the only mode of stamping in Early Tutishcainyo. In Late Tutishcainyo the individual impressions tend to be of a smaller diameter. Such individual impressions are used as complete design elements (Fig. 50 k, s, and u), as is the case in Early Tutishcainyo, or are used to fill zones of a design (Fig. 50 h, i; Fig. 49 c; Fig. 52 e). As in Early Tutishcainyo, this is a rare mode of decoration.

B. Even, triangular impressions (Fig. 41 b; Fig. 45 e).

EXCISING: A. Shallow, circular pits. Only one occurrence in the sample. These circular, excised areas are treated in the same way as punctations (Fig. 49 b).

MODELING: A. Fluting. This corresponds exactly to Mode A Modeling in Early Tutishcainyo (Fig. 46 e). Only one example occurred.

APPLIQUE: A. Vertical, hemispherical strip applique (Fig. 44 d; Fig. 47 e).

B. Low, vertical strip applique. This is most frequently modified with notching (Fig. 44 c, e, f).

C. Low, horizontal or diagonal strip applique added to convex basal shoulders, Basal Angle Modification Mode D, or
to the interior edge of plate rims, Rim Modification Mode E (Fig. 44 a, b, g; Fig 46 j). These are also frequently notched.

D. Ring of strip applique (Fig. 44 h). One example occurred.

E. Circular button of clay. This appears only in conjunction with broad, horizontal plate rims, Rim Modification Mode E (Fig. 46 g, h, i). These are sometimes plain, and sometimes modified by circular stamping.

CORRUGATION: Dimension not utilized.

PERFORATION: Dimension not utilized.

TABS: A. Triangular extensions of flanged rims (Fig. 47 a, i).
B. Triangular extensions of basal flange (Fig. 42 e, j, k, m).
C. Tall, angular, nearly vertical extensions of rim (Fig. 50 b, c).

D. Sharply angular extension of basal flange (Fig. 50 a).

LUGS: A. Squat, thick, triangular lug added to basal angle (Fig. 41 i, j; Fig. 42 h, i).
B. Sharply projecting, narrow based lugs (Fig. 41 h; Fig. 42 b).
C. Broad, thin, angular lugs (Fig. 41 g).

HANDLES: A. Vertical strap handles (Fig. 50 k, n, o, p, q).
B. Vertical strap handle with outward projection at its base (Fig. 50 r, t).

FEET: The only possible modification in this sample
which could be classified as a vessel support involves the
series of small, conical nubbins on a miniature vessel (Fig. 50 l).

ANNULAR BASE: A. Low, circular, annular base (Fig. 50 d). There is only one example in the sample.

SPOUTS: A. Tall, tapering spout with everted lip and bridge attachment (Fig. 49 e,f,h).

B. Short, crudely modeled, conical spout with no bridge attachment (Fig. 49 g).

C. Like Mode B with bridge attachment (Fig. 49 j,k).

D. Short, contracting spout with heavily thickened rim (Fig. 49 i).

BRIDGES: Late Tutishcainyo bridges are too fragmentary to permit a modal classification (Fig. 49 e,f,j,k).

ADORNOS: A. Bird head adornos: only two specimens occur in the sample, and these are not particularly similar (Fig. 50 s,u).

DECORATIVE FIELD: A. Immediately below the rim on the interior of Vessel Body Form Mode A. This corresponds precisely to Decorative Field Mode A in Early Tutishcainyo, but it is much less frequently utilized.

B. The upper surface of labial flange, Rim Modification Mode B. This corresponds exactly to Decorative Field Mode B of Early Tutishcainyo, but is more frequently not decorated.

C. The outer surface of labial flange Rim Modification
Mode C. This corresponds precisely to Decorative Field Mode C of Early Tutishcainyo.

D. Total surface of the vessel side on bowls of Vessel Body Form Mode A. This corresponds to Decorative Field Mode D in Early Tutishcainyo, but is less frequently utilized.

E. Side of Vessel Body Form Mode B from a short distance below the labial flange to a short distance above the basal angle. This corresponds to Decorative Field Mode E in Early Tutishcainyo but is rarely used, and then usually with some unusual decorative mode such as fluting (Fig. 46 e) or lines of punctuation (Fig. 47 n).

F. The convex basal shoulder of pots of Vessel Body Form Mode A with Basal Angle Modification Mode D. This corresponds exactly to Decorative Field Mode F of Early Tutishcainyo and is frequently decorated in Late Tutishcainyo (Fig. 41 j; Fig. 43 b-k, n-q; Fig. 44 a-d; Fig. 52 a-g).

G. The upper surface of broad basal flanges, Basal Angle Modification Mode B. This corresponds exactly to Decorative Field Mode G of Early Tutishcainyo.

H. Total side of shallow bowls, Vessel Body Form Mode C. This corresponds exactly to Decorative Field Mode H in Early Tutishcainyo and is almost invariably decorated (Fig. 45 a-j).

I. Upper surface of broad sublabial flanges, Rim
Modification Modes H, I, and J (Fig. 46c, l-o; Fig. 47 g).

J. The outer surface of Rim Modification Mode D (Fig. 40 a-i; Fig. 41 a, b, d-f).

K. The lower segment of concave vessel walls, Vessel Body Form Mode A, extending down to and including the basal angle (Fig. 40 a-d; Fig. 44 i). This zone is almost invariable decorated.

L. The upper surface of Rim Modification Mode I (Fig. 47 d, e).

M. The total surface of the vessel wall, Vessel Body Form Mode F (Fig. 44 a; Fig. 47 e).

N. The upper surface of plate rims, Rim Modification Mode E (Fig. 46 a-e, g-k).

O. The upper surface of all lug forms (Fig. 41 c, g-j).

P. The outer surface of Spout Mode A (Fig. 49 c).

Q. The outer surface of Handles Mode A (Fig. 50 k, q).

R. The outer surface of tall, angular tabs, Tab Mode C (Fig. 50 b, c).

S. The bottom of Vessel Bottom Form Mode B (Fig. 50 e).

T. The uppermost edge of all rim forms (Fig. 40 h; Fig. 41 d; Fig. 47 a; Fig 48 h).

U. The lower edge of Rim Modification Modes C and D (Fig. 41 d).

V. The outermost edge of basal angles (Fig. 40 a-d;
Fig. 44 k; Fig. 45 c, h).

W. The outermost edge of basal flanges, Basal Angle Modification Mode B (Fig. 42 c, g).

X. The outermost edge of all forms of lugs (Fig. 41 j; Fig. 42h, i; Fig. 52 g).

Y. The outer edge of strip applique, Applique Modes B, C, and D (Fig. 44 a-c, e, h).

DESIGN ELEMENT: A. Continuous, horizontal line executed in Incising Mode A or B.

B. Short, vertical, incised line executed in Incising Mode A, B, or D.

C. Dot executed by notching or punctation.

D. Circle or triangle executed by stamping.

E. Short, diagonal line executed in Incising Mode A.

F. A band of two or three continuous, parallel, closely spaced, incised lines executed in Incising Mode A. This is frequently combined with short, horizontal rows of Punctation Mode 2 (Fig. 40 a-d).

G. Unbounded, horizontal band of diagonal hatching executed in Incising Modes C1 or C2 (Fig. 40 b, c, h; Fig. 42 d, e; Fig. 52 c, p).

H. Band of diagonal hatching executed in Incising Mode C1 or C2 and bounded by continuous horizontal lines, Incising Mode A (Fig. 42 f, j, m; Fig. 43 j; Fig. 51 b; Fig. 52 a).
I. Alternate rectangles of plain and textured clay. This corresponds to Design Element Mode H of Early Tutishcainyo; though in Late Tutishcainyo the texturing usually consists of short, vertical lines of equal weight executed in Incising Mode A or Mode B. This is a favored design element for convex basal shoulders, Basal Angle Modification Mode E (Fig. 43 c, e, g, h). and basal flanges, Basal Angle Modification Mode B (Fig. 43 a, m).

J. Complex scroll design which is evolved from Design Element Mode O in Early Tutishcainyo (Fig. 43 l, k, Fig. 52 f).

K. Line and trapezoid element obviously a modification of Early Tutishcainyo Design Element Mode L (Fig. 43 n).

L. A modified version of Early Tutishcainyo Design Element Mode I (Fig. 43 o).

M. Short, horizontal or vertical rows of spaced dots.

There are a number of other Late Tutishcainyo design treatments which are represented by material which is too fragmentary to permit a full analysis into modes of Design Element and Design Layout.

DESIGN LAYOUT: A. Repetition at halves, quarters, or eighths of the vessel circumference along the rim or basal angle. This layout occurs with tabs and lugs.

B. Continuous, closely spaced repetition. This is associated with short, vertical incised lines, Design Element
Mode B; dots executed by notching or punctation, Design Element Mode C; circle, Design Element Mode D; short, diagonal line, Design Element Mode E; half moon applique, Applique Mode A; vertical strip applique, Applique Mode B.

C. Continuous, uniform band. This occurs with Design Element Mode A, Mode G, and Mode H.

D. Continuous, infinite band designs generated by transverse reflection. This is used with Design Element Modes I and L.

E. Infinite band designs generated by a combination of bifold rotation and transverse reflection, Class 7 of Shepard's Classification of Infinite Band Designs. This occurs with Design Element Modes J and K.

There is insufficient material to analyse the larger, more complex Late Tutishcainyo designs. However, even with the fragmentary material at hand it is possible to contrast these designs with the similar broad band designs of Early Tutishcainyo. The differences in the nature of the soned texturing have already been discussed, as has the fact that Incising Mode B (contiguous punctation) is not used for the vertical boundary lines in Late Tutishcainyo designs. In Late Tutishcainyo designs the heavy boundary lines of the textured areas tend to come together in acute angles (Fig. 50 a, b, c, e; Fig. 44 j, k; Fig. 45 f), while in Early Tutishcainyo, such lines most typically
join at right angles.

Most of the comments made concerning the manufacture of Early Tutishcainyo can be repeated for Late Tutishcainyo. There is no evidence of coiling in vessel construction, but the vessels do show a marked tendency to fracture at the point of inflection, again suggesting that vessels were built in two sections. When compared to Early Tutishcainyo sherds, Late Tutishcainyo material is thicker, harder, has slightly rougher surfaces, and much more frequently shows orange surfaces and cores.

Summary of the Late Tutishcainyo Ceramic Complex

Late Tutishcainyo ceramics can be characterized by most of the comments already made concerning Early Tutishcainyo ceramics, but the degree of cultural structuring has been greatly reduced. Individual modes are executed with less precision and the number of mode combinations permitted is increased over the situation in Early Tutishcainyo. These two tendencies combine with the smaller sample size to decrease the adequacy of the modal analysis presented. Many Early Tutishcainyo design elements survive into Late Tutishcainyo, but the execution is invariably more cursive and slovenly.

Two modes of tempering still persist in Late Tutishcainyo, but, as in Early Tutishcainyo, there is no tendency
for clustering between particular modes of tempering and particular
modes on any other dimensions.

Absolutely plain vessels are somewhat more common
than is the case in Early Tutishcainyo, but there are very
few form categories which are typically or even frequently
undecorated. As in the case of Early Tutishcainyo, contrasting
plain ware with decorated ware or plain incision with zoned
hatching are not logical procedures, since in both instances
one would frequently be contrasting sherds from the same vessel.

Sanidine Tempered Ware Complex

The sample of Sanidine tempered pottery includes
all such pottery recovered from the excavations at UEA-6. A
small part of this is demonstrably associated with the Early
Tutishcainyo occupation. This small sample includes only
four sherds showing features of shape or decoration. Three of
these are illustrated (Fig. 55 d, k, l). These four examples
show certain points of similarity with Early Tutishcainyo
pottery. The rim treatments in Fig. 55 d, and l are not unlike
Early Tutishcainyo Rim Modification Mode C, while the broadly
spaced, carefully executed notches on the short basal flange,
illustrated in Fig. 55 k, are very similar to the notching
which occurs infrequently on Early Tutishcainyo basal angles.
The Sanidine tempered pottery which was traded in to the Late Tutishcainyo occupation at UCA-6 is much more numerous, and there is sufficient material to make a tentative modal analysis possible. It is almost certain that this trade ware does not represent a complete cross section of the ceramic culture from which it was derived, but only that small segment of the ware which was found to be desirable as an item of trade.

**CLAY:** Visual examination suggests that there is but a single mode governing the selection of clay for the manufacture of this pottery. This is a clay which to the naked eye appears distinct from all of the clays used in the pottery of the various ceramic complexes indigenous to the Yarinacocha area. Surface areas which are fully oxidized show a dark reddish brown color rather than the bright orange which is typical of all locally manufactured ceramics. A semi-quantitative analysis of the clays used in the Sanidine tempered pottery also indicates that it is different from the clays used in Late Tutishcainyo pottery (See the discussion in Appendix A).

**TEMPER:** There is but a single mode of tempering represented in this ceramic sample. This involved the addition of large quantities of fragments of Sanidine glass to the clay. There is a certain amount of variation as to the amount of temper added, but this variation appears to be continuous.
The fragments of tempering material are large, up to three mm. in length, and are sharply angular. It is clear that this tempering material has not been rolled or redeposited by water since the crystals are in mint condition. Their presence on the surface of the sherds gives the sherds a slightly sparkling, granular appearance, not unlike block maple sugar.

FIRING: A single mode of firing seems to have been used in the production of Sanidine tempered pottery. The firing was uncontrolled, and fire clouds are frequent on the surface, though the typical surface color is a medium reddish brown. The core of the Sanidine tempered pottery is incompletely oxidized and intensely black. The Sanidine tempered pottery averages softer than any of the other ceramics recovered from the excavations at Yarinacocha. In part this characteristic is a function of crumbling due to a superabundance of tempering material, but in part it also suggests a relatively low firing temperature.

THICKNESS: The pottery seems to show a single mode of thickness averaging around nine mm. This is considerably higher than the average thickness of either Early or Late Tutishcainyo.

VESSEL BODY FORM: In the sample of Sanidine tempered ware associated with Late Tutishcainyo the range of Vessel Body Form is very limited.
A. Almost all sherds come from relatively large, cylindrical vessels with vertical or slightly outflaring sides.

B. In the sample there is also one hemispherical bowl represented.

C. Sherds from two shallow plates occur.

HORIZONTAL CROSS SECTION: Only one mode, circular, is represented in the sample.

SIZE: The rather wide range of vessel mouth diameters associated with Vessel Body Form Mode A suggests that there may be three distinct modes of size associated with this form: one averaging around 20 centimeters mouth diameter; one averaging around 30 centimeters mouth diameter; and one averaging around 48 centimeters. The sample is too small for this suggestion to be fully substantiated.

BOTTOM FORM: The sample gives evidence of but a single form of vessel bottom, a continuously curving hemisphere, Mode A.

NECK FORM: Dimension not relevant.

LIP TREATMENT: Sanidine tempered lips vary continuously from sharply angled lip profiles (Fig. 54 a, g, e, j) to more gently curved lip profiles (Fig. 54 b, h). The sample is too small to establish whether this represents the rather inaccurate implementing of a single mode or two distinct conceptual tendencies, but the gradual intergradation suggests that the
former is the case.

RIM MODIFICATION:  A. Zero modification. This occurs with the open, hemispherical bowl (Fig. 55 b).

B. A slightly everted, straight rim. This mode is by far the most common and is invariably associated with Vessel Body Form Mode A. This rim treatment almost always is associated with a slight ridge of clay encircling the vessel on the outside at the juncture between the rim and the body. This ridge invariably has an incised line on either side (Fig. 54).

C. Horizontal strip of clay added to the upper surface of shallow plate, Vessel Body Form Mode C. This rim treatment is similar to Late Tutishealino Rim Modification Mode E.

BASAL ANGLE MODIFICATION:  A. Broad, horizontal basal flange. This occurs either at the basal angle or, in some cases, rather high up on the vessel. Such flanges are associated with both Vessel Body Form Mode A and with Vessel Body Form Mode B. Such basal flanges have a thick, rather squared edge (Fig. 55 a-c, e-h).

B. Short, stubby basal angle or ridge. Such basal ridges have a sharp, pointed profile (Fig. 55 i,j).

C. Zero modification. In a large number of cases Vessel Body Form Mode A appears to merge fairly gradually with the vessel bottom.
NECK JUNCTURE MODIFICATION: Dimension not relevant.

SURFACE FINISH: There is apparently but a single mode of surface finish represented in the sample. The surfaces are worked to a relatively high degree of evenness and regularity, but the large fragments of temper projecting through the surface give it a gritty, rather than smooth feel.

SLIP: A. A zoned, red hematite slip is found on some of the basal flanges of this ware (Fig. 55 b, f, g).

PAINTED DESIGN BEFORE FIRING: Dimension not relevant.

PAINTED DESIGN AFTER FIRING: Dimension not relevant.

RESIN COATING: Dimension not relevant.

INCISING: A. Sharp, narrow incision with a V-profile. This incision was executed when the clay was relatively dry, so that the effect of the incised line is quite different from that of Incising Mode A in Early or Late Tutishcainyo. In contrast to Early and Late Tutishcainyo, lines of the same weight are used both for bounding design areas and for texturing zones.

B. A broad, U-shaped incised line. This is rather similar to Mode A Incising in the Early and Late Tutishcainyo complexes. It occurs only once in a unique basal flange design (Fig. 55 h).

C. Short, broad incised lines shallow at one end and deep at the other. This incised treatment occurs only in conjunction with the short basal ridges, Basal Angle Modification
Mode B (Fig. 55 i, j).

NOTCHING: This dimension is not relevant to the sample of Sanidine tempered pottery associated with Late Tutishcainyo pottery, but as noted above does occur once in the small sample of Sanidine tempered pottery associated with Early Tutishcainyo.

PUNCTATION: A. Small, sharp punctations are used to terminate incised lines, Incision Mode A, in a single sherd present in the sample (Fig. 55 m), and in the centers of quadrilaterals on two vessels (Fig. 54 a; Fig. 55 b).

STAMPING: This dimension is not relevant.

EXCISING: This dimension is not relevant.

MODELING: A. A low ridge of clay was pinched up at the base of the common rim form, Rim Modification Mode B. Such ridges extend continuously around the full circumference of the vessel on the outside. They are always bounded on either side by an incised line of Incising Mode A (Fig. 54).

APPLIQUE: Dimension not relevant.

CORRUGATION: Dimension not relevant.

PERFORATION: Dimension not relevant.

TABS: Dimension not relevant.

LUGS: Dimension not relevant.

HANDLES: Dimension not relevant.

FEET: Dimension not relevant.
ANNULAR BASE: Dimension not relevant.

SPOUTS: Dimension not relevant.

BRIDGES: Dimension not relevant.

ADORNOS: Dimension not relevant.

DECORATIVE FIELD: A. A band ranging from one to three and one half centimeters wide extending around the circumference of the pot just below the modeled ridge of clay on Vessel Body Form Mode A. This is by far the most frequently decorated zone in the Sanidine tempered ceramics.

B. Zone on vessel wall below rim on Vessel Body Form Mode B.

C. The upper surface of broad basal flanges, Basal Angle Modification Mode A.

D. The juncture between the short basal ridges, Basal Angle Modification Mode B, and vessel side-wall. This zone is only decorated with incised lines, Incising Mode C (Fig. 55 i,j).

E. The outer surface of the common rim form, Rim Modification Mode B (Fig. 54 c).

F. The upper surface of common rim form, Rim Modification Mode B (Fig. 55 m).

DESIGN ELEMENT: A. Single, continuous, horizontal incised line.

B. Groups of three parallel, continuous, horizontal
incised lines (Fig. 55 a,f).

C. Individual, diagonal incised lines, Mode C Incising (Fig. 55 i,j).

D. Short, vertical incised lines, Mode A Incising (Fig. 54 b).

E. Rectangles executed in incised line, Incising Mode A (Fig. 55 b).

F. Alternating areas of textured and untextured surface, executed in incised lines, Incising Mode A. These occur in various shapes, the only one of which has been analyzed is that of a plain diamond on a textured background.

G. A short, diagonal line used as an element to generate a continuous band decoration, Shepard's Class 3 of Infinite Band Design.

DESIGN LAYOUT: A. Continuous band. This is used with Design Element Modes A and B.

B. Continuous repetition. This is used with Design Element Modes D through F.

C. Reflection along a series of equally spaced transverse axes. This is Infinite Band Design Class 3 in Shepard's classification. This is used with Design Element Mode G (Fig. 54 c,d,g; Fig. 55 m).
Summary of Sanidine Temper Ware Complex

A structural analysis of the Sanidine tempered pottery makes clear what seemed highly probable from other evidence, that this pottery is not part of the Late Tutishcainyo ceramic complex and was not manufactured at Yarinacocha. Few modes of the Sanidine tempered pottery are identical to corresponding modes in Late Tutishcainyo. Though some traits such as basal flanges are shared, the shared traits never show identical form.

Our sample of the Sanidine Tempered Ware is a poor basis for judgement as to the total nature of the complex from which it came. The sample is skewed by having passed through the filter of Late Tutishcainyo preferences in ceramics.

Shakimu Ceramic Complex

The sample of Shakimu ceramics analyzed includes all of the Shakimu pottery from Stratigraphic Cut 3, UDA-2. Shakimu sherds from other cuts at UDA-2, especially 4, 5, and 7, are used in some cases for illustrative material, and in certain instances show modes which are not present in the type sample. Such modes are listed in the discussion, but do not appear in the quantitative analysis of the type sample.

CLAY: On the basis of visual examination there seems to be but a single standard of clay selection operative in
Shakimu ceramics. This clay is not distinguishable from that used in Early or Late Tutishcainyo, or in any of the later, locally made ceramics.

TEMPER: There was a single standard of tempering for Shakimu. Coarsely ground potsherd was added. In many cases the areas of sherd surface preserved on the temper fragments are sufficiently large to permit the identification of the temper fragments as highly polished Shakimu ware. The size of the temper fragments is variable. There is some overlap in this respect between Shakimu temper and the temper of Late Tutishcainyo and Hupa-iya, but the central tendency for Shakimu temper size is considerably larger than that of either Late Tutishcainyo or Hupa-iya. Temper fragments five mm. long are not uncommon.

FIRING: Shakimu pottery shows a particularly wide range of surface color from a very light buff through varying shades of orange and reddish brown to true grays and blacks. Cores are usually darker than surfaces. On the basis of the continuous range of variation and the fact that individual large sherds show considerable color variation even on one side, it appears that there was but a single standard of firing. Another line of evidence which favors this conclusion is the fact that the various surface colors show no tendency to cluster with particular modes of shape or decoration, though the sherds
were analyzed in an attempt to detect such clusterings.

Shakimu pottery averages quite soft (Table 139), suggesting relatively low firing temperatures. On the basis of the data it would appear that Shakimu pottery was typically fired at somewhat lower temperatures than Early Tutishcainyo ceramics and at considerably lower temperatures than Late Tutishcainyo ceramics. The technical excellence of Shakimu pottery in other respects suggests that the low firing temperature habitually used was not a matter of technical limitation, but of conscious choice. Shepard has pointed out that pottery with a highly burnished, glossy surface tends to check or craze when fired at higher temperatures. In cases where such carefully burnished surfaces give the major aesthetic effect of the ceramics, the artisan may, by choice, fire the pottery at a low temperature. This explanation is true of the highly burnished wares in the early part of the Maya sequence, especially the Mamon ceramics, and this is probably the best explanation of the low firing temperature of Shakimu ceramics.

THICKNESS: There appear to be two standards of thickness for Shakimu pottery, though there is considerable overlap in their range.

A. The vessel sidewalls of small vessels average
about five and one half mm. in thickness.

B. The vessel sidewalls of vessels with large mouth
diameters average slightly higher than eight mm. in thickness
(Table 140).

VESSEL BODY FORM: There are 13 distinct Vessel Body
Form Modes present in the Shakimu ceramic sample. These are
illustrated in profile in Table 150, lettered from A to M.

A. A large vessel with straight, outwardly sloping
sides.

B. An open mouth vessel with slightly concave,
outwardly sloping sides.

C. A vessel with straight, slightly insloping sides.

D. A constricted mouth vessel with straight, markedly
insloping sides.

E. A constricted mouth vessel with convex, insloping
sides.

F. A shallow, hemispherical bowl.

G. A rather deep plate with even, spherical curvature.

H. A shallow plate with even, spherical curvature.

I. An open bowl with double curvature. The center
section is a deep hemisphere. The upper section is a shallower
spherical section of much greater radius. The line of inflection
between the two spherical sections is sharp and angular.

J. A shallow, open mouth bowl with broadly flaring,
concave sides. This is similar to Mode B, but tends to be shallower, with a more marked flare.

K. A shallow, open bowl with slightly convex sides, with a generally vertical orientation.

L. A deep, open bowl with sides which are straight starting at the rim to a short distance below and then which curve gradually toward a hemispherical bottom. Near the rim the walls of these vessels diverge 10 or 15 degrees from the vertical.

M. Deep, open basin with parabolic cross section. The upper part of the vessel wall is straight and curves off gradually toward the vessel bottom. Near the rim the walls of these vessels diverge about 40 to 45 degrees from the vertical.

HORIZONTAL CROSS SECTION: There is only one mode of horizontal cross section, circular.

SIZE: A study of the mouth diameters of vessels showing Vessel Body Form Mode B indicated that size is an independent, productive dimension in Shakimu pottery. For vessels of this shape there are at least two modes of size: Mode A, an average mouth diameter of 20 centimeters; and Mode B, an average mouth diameter of around 45 centimeters. It is probable that there is a third, Mode C, around 32 centimeters, but if so it is much less frequently utilized.

Distinct modes of size also appear to occur in Vessel
Body Form Modes $A^*$, $L$, and $M$ with a smaller modal mouth diameter around 20 centimeters and a larger modal mouth diameter in the vicinity of 36 centimeters. The smaller diameter can be considered as an expression of Mode $A$ while the larger diameter, that averaging 36, should probably be set up as a separate Mode D.

**BOTTOM FORM:** Shakimu vessels show a single mode of bottom form: an evenly curving, spherical section which is apparently somewhat flatter than the typical hemispherical bottoms of Early and Late Tutishcainyo.

**NECK FORM:** A. A single form of vessel neck is present in Shakimu ceramics. This is a short, slightly insloping neck with markedly concave sides (Fig. 62 a, b). There is no information as to what form of vessel body is associated with this neck.

**LIP TREATMENT:** There are two distinct modes of lip treatment.

A. A sharply angular, squared lip.

B. An evenly rounded lip.

Of the two, the angular form is far more frequently used. As was pointed out in the section on chronology, there is slight evidence that the shift from angular to rounded lips has chronological significance with the rounded lip treatment being more frequent in the latter part of the Shakimu occupation.
at UCA-2.

RIM MODIFICATION: There are 11 distinct modes of rim modification.

A. Zero modification. This treatment is extremely frequent. Modification Modes B through K include a series of additions to the rim, or thickenings of the rim, which are more easily illustrated than described. The characteristic rim profile produced by each of these rim modifications is illustrated in Table 150 and labeled B through K. The habitual patterns of association between Modes of Lip Treatment, Rim Modification, and Vessel Body Form are also shown in Table 150. These give the categories of rim sherd which are treated quantitatively in Table 151.

BASAL ANGLE MODIFICATION: A. Zero modification.
The typical basal angle for Shakimu pottery results from the juncture of the sidewall with the convex curvature of the base. No further modification is added. In both plain and decorated wares the point of inflection between side and base is not as sharp as is typical in Early or Late Tutisheainyo. A series of typical basal angles are shown in profile in Fig. 68 a, d, e).

B. In a few instances a broad strip of clay is added to the vessel at the point of inflection (Fig. 68 b).

C. Basal Flange: Basal flanges are relatively infrequent additions to Shakimu basal angles. Such flanges
average much shorter and thicker than the corresponding flanges in Early or Late Tutisheainyo (Fig. 70).

NECK JUNCTURE MODIFICATION: There is no available data on this dimension.

SURFACE FINISH: There appear to be at least two contrasting modes of surface finish, though this point can not be fully demonstrated due to the highly eroded nature of most Shakimu sherds.

A. There is an apparent tendency for the thicker ward, Thickness Mode B, to be associated with the larger mode of size, Size Mode B, and to show surfaces which are carefully smoothed, but less highly polished than smaller, thinner Shakimu sherds. This carefully smoothed, but not highly polished surface will be called Mode A.

B. Mode B Surface Finish is usually associated with thinner ware and smaller vessel size, and consists of a surface which is burnished to a high, even gloss quite similar to the glossy burnished wares of Early Formative Maya ceramics. This surface is only preserved in spots on the highly eroded sherds excavated, but is frequently fully preserved on areas of surface retained by the large temper fragments.

SLIP: A. A thick, red, hematite slip is applied to certain areas of some Shakimu pottery, always in zones
bounded by incised lines or excised areas.

B. An all-over white slip was found on one sherd of the Shakimu complex from Stratigraphic Cut 7, UCA-6 (Fig. 61 a). No such sherds were present in the type sample of Shakimu.

PAINTED DESIGN BEFORE FIRING: A. A single example of unzoned red painting occurs on a Shakimu sherd of unique shape (Fig. 64 a).

PAINTED DESIGN AFTER FIRING: Dimension not relevant.

RESIN COATING: Dimension not relevant.

INCISING: There is a single mode of incising in Shakimu pottery.

A. The incised lines are relatively deep with a rectangular cross section, being approximately as wide at the bottom as at the top. The incised lines are executed with extreme care so that there is no ridge of clay thrown up on either side. The width of incised lines varies somewhat depending on the scale of the total design, but this variation appears to be continuous rather than bimodal.

NOTCHING: This dimension is not utilized.

PUNCTATION: A. Relatively deep, circular punctation of small diameter. Such punctation occurs in four forms.

A1. Individual, discrete punctation (Fig. 60 e; Fig. 63 a; and Fig. 71 b).

A2. Rows of punctations filling bounded
zones. This mode occurs only once in the sample (Fig. 60 c).

A3. Individual rows of punctations (Fig. 61 g).

A4. Punctations joined to the end of incised lines (Fig. 65 e; Fig. 66 j, h, k; Fig. 67 b). This is the only mode of punctation which is relatively common in Shakimu ceramics.

STAMPING: This dimension is not utilized.

EXCISION: A. Very carefully executed excising removing a thickness of two to three mm. of clay. This was done with a broad bladed tool when the clay was fairly moist. The individual cut marks are frequently visible as broad, flat areas (Fig. 65 f; Fig. 66 e). This decorative technique is used very extensively to remove the background of design elements so that the positive area of the design stands in high relief. In this respect it is comparable to the fine line hatching and cross hatching used for the purpose of denoting background areas in Early and Late Tutishcainyo. In only a very few instances is Shakimu excision used to indicate the positive element of a design (Fig. 66 f, i, and n).

MODELING: This dimension is not utilized.

APPLIQUE: A. Small, hemispherical blobs of clay are used relatively infrequently as additions to the surface of the ceramics. These occur as the eyes of adornos (Fig. 72 a; Fig. 71 b), or as independent elements (Fig. 70 a).

CORRUGATION: This dimension is not utilized.
PERFORATION: Small diameter, vertical perforations occur in the lugs of a single vessel in the sample (Fig. 60 a).

TABLES: This dimension is not utilized.

LUGS: A. A relatively short, rounded lug with a sharp, vertical cut bisecting it. This occurs both on vessel lips (Fig. 60 d; e; Fig. 59 a), and also on basal angles (Fig. 60 c).

B. Relatively long, horizontal, sug-rectangular lugs with squared edges (Fig. 58 a).

C. Small, hemispherical lip lugs (Fig. 60 b).

D. Short, oval, horizontal lug (Fig. 72 c).

HANDLES: These do not occur in association with any sherds in the sample or with any other sherds from the excavation classified as Shakimu.

FEET: Dimension not used.

ANNULAR BASES: Dimension not utilized.

SPOUTS: A. Zoomorphic (Fig. 71 b). One example only.

B. Tubular spout with sharply everted rim (Fig. 71 a, c).

C.Crudely modeled conical spout with no rim modification.

These are formally indistinguishable from Mode B Spouts of Late Tutishainyo (Fig. 71 d).

BRIDGES: One Shakimu spout (Fig. 71 a) gives evidence of once having had a bridge attachment, but there is no data as to its form.
ADORNOS: A. Bird head adorno attached to the upper surface of a broad, rectangular lug, Mode B (Fig. 72 a). Only one occurrence.

DECORATIVE FIELD: A. From immediately below the rim to the basal angle of Vessel Body Form Mode J (Fig. 62 d,g,h,i).

B. From immediately below the rim to the basal angle of Vessel Body Form Mode K (Fig. 62 c,f).

C. From immediately below the rim to the basal angle of Vessel Body Form Mode D (Fig. 60 a).

D. From immediately below the rim to the basal angle of Vessel Body Form Mode E (Fig. 61 e).

E. From immediately below the rim to well down the side of Vessel Body Form Mode L (Fig. 63 c-i).

F. From immediately below the rim to well down on the body of Vessel Body Form Mode M (Fig. 65 a-g; Fig. 63 a,b).

G. From immediately below the rim to well down on the side of Vessel Body Form Mode F (Fig. 61 d).

H. From rim to a considerable distance down on the body of deep plates, Vessel Body Form Mode G (Fig. 61 g).

I. From the rim of shallow plates, Vessel Body Form Mode H (Fig. 61 f).

J. The inner surface of the bowls, Vessel Body Form Mode I, extending from the rim inward to the sharp break in vessel curvature (Fig. 69 b-g).
K. The outer surface of Rim Modification Mode C (Fig. 60 b,f).
L. The outer surface of Rim Modification Mode B (Fig. 62 a,b).
M. The outer surface of Rim Modification Mode D (Fig. 61 b).
N. The outer surface of Rim Modification Mode J (Fig. 61 j,k).
O. The upper surface of basal flanges (Fig. 70 a-j).
P. The upper surface of Lugs, Mode A (Fig. 60 e).
Q. The upper surface of Lugs, Mode B (Fig. 72 a,b).

DESIGN ELEMENT:
A. Individual, continuous, horizontal lines used in decorative fields associated with vessel rims.
B. Individual punctuation used on Decorative Field P.
C. Two continuous, horizontal, parallel lines used on Decorative Fields associated with rims.
D. Three continuous, parallel lines used in combination with Decorative Field J.
E. Element generated by transverse reflection into a continuous band of alternate, reversed triangles. (Fig. 60 c).

The rest of Shakimu designs, especially those on vessel walls, Decorative Fields A through J, are far too complex to analyze fully on the basis of the fragmentary material available.
DESIGN LAYOUT: 4. Continuous extension used with one or more horizontal lines.

B. Transverse reflection on equally spaced axes,

Infinite Band Design 3 in Shepard’s Classification.

The great majority of Shakimu designs do not follow any simply described rules of symmetry, and it will be impossible to further analyze these designs in terms of design layout until there is more and more complete Shakimu material available.

Shakimu sherd material offers few clues to vessel construction that have not already been mentioned. Again there is no evidence of coiling. Shakimu vessels show no tendency to fracture at the basal angle, suggesting that they were made as a single piece, and not formed in two segments as was the case with Early and Late Tutishcainyo. As was the case with the Tutishcainyo ceramics, basal flanges and lugs are poorly joined to the vessel bodies and there is a strong tendency for fracture at this plane of weakness.

Summary of the Shakimu Ceramic Complex

In many respects the Shakimu complex is the most highly developed and differentiated of all of the ceramic assemblages recovered in the Yarinacocha area. The workmanship is most careful (somewhat more so than in either Early Tutishcainyo
or in modern Shipibo pottery); the designs used are complex; the shaping of the rims is precise; and the surface finish is executed with extreme care. The pattern of mode clustering exhibited by the Shakimu material suggests relatively rigid cultural patterning comparable to that in Early Tutishcainyo. Shakimu pottery, on the basis of its mode clusterings, can be divided along the axis of decoration versus lack of decoration.

In the Shakimu Complex decoration is essentially coextensive with a complex combination of excision and incision. Certain form categories occur only in association with elaborate decoration. Other form categories most frequently occur without excised or incised decoration but show surfaces which are carefully finished.

It is my impression, which must be checked against a larger series of less eroded sherds, that the thinner sherds from smaller vessels show a higher burnishing than do the thicker sherds from larger vessels of the same shape. I feel that these data support the recognition of three wares for Shakimu: Shakimu Decorated; Shakimu Burnished; and Shakimu Culinary. The first two share some form categories but are distinctive for several. The second and third share most form categories but differ in modes of size, thickness, and surface finish.

Hupa-iya Ceramic Complex
The type sample of the Hupa-iya Complex consists of all sherds classified as Hupa-iya from Stratigraphic Cut 4, USA-2. It was mentioned earlier that there appears to be a small amount of chronological difference between the top and bottom of this cultural deposit. Such change is controlled for purposes of the synchronic, modal analysis. The very extensive Hupa-iya collections from Stratigraphic Cut 3, USA-2 were given a less thorough analysis but are compared to the type sample in terms of the frequency of certain decorative elements. This detailed comparison indicates the virtual identity of the two collections. One vessel form, deep cylindrical urn, did not occur in the type sample but was present in other of the Hupa-iya deposits at USA-2.

CLAY: On the basis of visual examination there is evidently but a single norm for the clay used in Hupa-iya ceramics, and it appears to be the same range of clay used in all of the other locally made ceramic complexes.

TEMPER: There is a single norm of tempering, a considerable quantity of crushed sherd was added to the paste. Temper particles tend to be somewhat larger than Late Tutishoainyo and somewhat smaller than those used in Shakimu. The average would appear to be in the two to three mm. range.

FIRING: Hupa-iya ceramics give evidence of being fired in an uncontrolled atmosphere. There is a tremendously
wide variation in color in the sherds of this complex, and a single shard frequently shows considerable difference in a small area. There is no tendency for a particular surface color to be associated with particular modes of vessel shape or of decoration. There is strong indication that Hupa-iya ceramics were fired at a considerably higher temperature than those of any of the previously described complexes. The local clays develop a blue-green color when fired at high temperatures, and this green clouding is quite common in Hupa-iya ceramics. Also Hupa-iya pottery averages considerably harder than any of the previously described ceramics (Table 139).

**THICKNESS:** There are apparently at least two modes of thickness associated with Hupa-iya ceramics.

A. One of these is associated with the open bowls, Vessel Body Form Mode A, and the modal thickness is around 6.5 mm.

B. The other thickness is associated with the globular cooking pots, Vessel Body Form Mode D, and is about 8.3 mm. in thickness (Table 140).

In each case there is also considerable variation in thickness which is related to vessel size.

**VESSEL BODY FORM:** There are only nine Vessel Body Forms present in the Hupa-iya collections, and of these only eight are represented in the type sample. The nine forms are illustrated in profile in Table 153, and are as follows:
A. Open, hemispherical bowl.
B. Slightly closed, globular bowl with convex sides.
C. Deep, spherical olla.
D. Low bodied, globular vessel with markedly convex sides.
E. Open vessel with outflaring, concave sides.
F. Broad, open basin with parabolic cross section.
G. Shallow plate.
H. Deep, biconvex bodied vessel with a sharp constriction between the upper and lower segments of the body.
I. Deep, cylindrical urn.

HORIZONTAL CROSS SECTION: A. Circular.

SIZE: Hupa-lya pottery gives clear evidence that there were strictly conceptualized modes of size. For Vessel Body Form Mode A there were at least three and possibly four modes for size.

A. Miniature, mouth diameter under 10 centimeters.
B. Mouth diameter 18 centimeters.
C. Mouth diameter 28 centimeters.

There is a possibility of a fourth modal diameter at 38 centimeters. The sample is not large enough to fully demonstrate this point.

Vessel Body Form Mode D shows three definite and one probable mode of size.
D. Mouth diameter $\approx 25$ centimeters.
E. Mouth diameter $\approx 22$ centimeters.
F. Mouth diameter around 32 centimeters.

There is probably a fourth mode of around 46 centimeters, but again the sherds are too few to give a complete demonstration. The shallow plates, Vessel Body Form Mode G, show three modes of size.

G. Plates with diameters of 12 centimeters.
H. Plates with diameters of 24 centimeters.
I. Plates with diameters of 32 centimeters.

The deep, biconvex vessels, Vessel Body Form Mode H, show two concepts of size.

J. Mouth diameter of 10 centimeters.
K. A mouth diameter of 20 centimeters.

The other modes of body form do not occur with sufficient frequency to make a discussion of modes of size profitable.

The data underlying this discussion of size modes is presented in Table 155.

BOTTOM FORM: A. Evenly curving, spherical section. This is by far the most common. Typical profile of such a bottom is illustrated (Fig. 96 g).

B. A flat, circular bottom with a fairly sharp break between side and bottom. This mode is relatively common;
148 examples were noted in the type sample. Direct evidence of its association with particular modes of Vessel Body Form was hard to obtain, but it appears that Mode B bottoms are most typically associated with Vessel Body Form Modes C, I, and D.

NECK FORM: This dimension not utilized.

LIP TREATMENT: There is but a single mode of lip treatment. The lip is flattened at approximately right angle to the direction of the rim, forming a subrectangular rim profile. The break between the flattened upper surface of the lip and the rim sides is slightly rounded and not sharply angular as is the case with many Shakimu rims.

RIM MODIFICATION: A. Zero modification.

B. The addition of a rounded coil of clay on the inner side of the rim.

C. The addition of a sharply angular ridge of clay to the inner edge of the rim.

D. The addition of a broad, vertical strip to the outer surface of the rim.

E. A broad, sharply flaring rim. There is considerable variation in this mode of Rim Modification, from rims lying at a sharply acute angle to the vessel body (Fig. 34 b) to everted rims which merge rather gradually into the vessel body.
(Fig. 85 a). This range appears to be chronologically significant variation within a single mode with the sharply everted rims being more common in the earlier part of the occupation and the less sharply flaring rims more common in the later part.

F. Broad, horizontal strip of clay added to the upper surface of plate rims.

G. A narrow horizontal labial flange. Added to Vessel Body Form Mode A. Does not occur in the type sample (Fig. 81 a).

BASAL ANGLE MODIFICATION: A. Zero modification. An even curvature between vessel side and vessel bottom.

B. A slight ridge and change in direction between vessel side and vessel bottom.

At all times during the Hupa-iya occupation at UCA-2 both modes were in use, but there is a definite tendency for Mode A to become more popular and Mode B to become less popular as the occupation progressed.

NECK JUNCTURE MODIFICATION: Dimension not applicable.

SURFACE FINISH: There is but a single mode of surface finish. The pottery is invariably rather carefully smoothed, but almost never gives evidence of a high, glossy polish.

SLIP: Dimension not utilized.

PAINTED DESIGN BEFORE FIRING: Dimension not utilized.

PAINTED DESIGN AFTER FIRING: Dimension not utilized.
RESIN COATING: Dimension not utilized.

INCISING: There is a single mode of incising in Hupa-ya ceramics. The incised lines are relatively broad compared to their depth and are U-shaped. Incising is executed with considerable care, but by no means as carefully as is the case with Shakimu ceramics. Lines tend to waver somewhat more, and there are occasional slips which are not fully eradicated (Fig. 73b). The incision was executed when the clay was relatively wet, and there is frequently a slight ridge thrown up on one or both sides of the incised line. Incising is by far the most frequently utilized decorative technique.

NOTCHING: Dimension not utilized.

PUNCTATION: A. Relatively deep, circular punctations of small diameter are relatively common. This single mode of punctation is used under several circumstances.

A1. At the end of almost all incised lines.
A2. In open areas between incised lines.
A3. In the center of applique pellets.

STAMPING: Dimension not utilized.

EXCISION: Dimension not utilized.

MODELING: Dimension utilized only in conjunction with adornos. See below.

APPLIQUE: A. Application of small, hemispherical
blobs of clay. These invariably have a central punctation and almost invariably an encircling, incised line. Such applique pellets are used as the eyes of zoomorphic adornos, as the center of decorations on lugs, and on handles.

B. Strip applique (Fig. 94 c-i). In some cases such strips clearly delineate the limbs of animals and the whole vessel is converted into a zoomorphic effigy (Fig. 94 c, d). There is insufficient material to make a complete analysis of strip applique.

CORRUGATION: There are no examples of a fully corrugated sherd, but one rim sherd (Fig. 90 g) shows clear evidence of intentional thumb impressions around its upper edge.

PERFORATION: A. Rather broad, vertical perforation is fairly characteristic of Hupa-lya. Such perforations frequently go through the blob applique on lugs (Fig. 73 a, d). It also occurs occasionally through vessel side walls, Vessel Body Form Mode C (Fig. 83d), and frequently through the noses or bills of zoomorphic adornos (Fig. 93 c-i).

TABS: Dimension not utilized.

LUGS: A. Relatively thin, horizontal lugs occurring at or near the rim of Vessel Body Form Modes A, G, and H. These show considerable range in shape, but have two tendencies.

A1. A plain, subrectangular outline (Fig. 74a).

A2. A subrectangular outline with triangular
outward extension at its center (Fig. 73 a).

B. Thick, heavy, horizontal lugs associated with Vessel Body Form Modes D and I. These are attached to the body at the point of its maximum outward expansion. Again, these show a certain amount of variation, but have the two basic tendencies of outline discussed for Lugs Mode A.

Bl. A simple, subrectangular outline (Fig. 95 l).

B2. A subrectangular outline with central outwardly projecting point (Fig. 95 i,j).

C. A low shelf of clay curved in the vertical axis and applied to the side of a vessel. This rare mode occurs only once in the sample.

HANDLES: A. Vertical strap handle. This frequently has a sharp, upward projection at its base. In the sample such handles are associated only with Vessel Body Form Mode H (Fig. 89 a-c,f-i).

B. Long, straight, horizontal handles projecting outward from the vessel body wall. This rare form of handle occurs only three times in the sample (Fig. 95 f,g).

C. A long, curved handle joined to the vessel at one end only. Only two examples occurred in the sample, and there is no evidence of their association with particular modes of Vessel Body Form (Fig. 95 p).
FEET: Dimension not utilized.

ANNULAR BASES: A. Low, carefully executed annular base. This mode is represented by a single sherd reconstructed in an inverted position (Fig. 96c).

SPOUTS: Dimension not utilized.

BRIDGES: Dimension not utilized.

ADORNOS: A. Solid birdheads (Fig. 93 a-g). These extend both upward and outward beyond vessel rims and are connected to the vessel by rather thin necks. All examples came from surface collections, and they are not represented in the sample.

B. Solid, animal head adornos applied to the side of vessel walls somewhat below the rim (Fig. 93 i,k; Fig. 94a). These take several forms, the most striking of which is the dolphin head effigy (Fig. 94a).

C. Hollow, zoomorphic adornos punched out from the inside of the vessel wall (Fig. 93 h,i,j,l,m).

DECORATIVE FIELDS: A. A circular field taking in all of the outer surface of vessels of Vessel Body Form Mode A except for a narrow band immediately below the rim. This is the most frequently decorated field in Hupa-lya ceramics.

B. A broad, horizontal band extending around the circumference of Vessel Body Form Mode B, the width of the band extends from a short distance below the rim to a short distance...
above the basal angle (Fig. 82 a, c).

C. A broad, horizontal band extending around vessels of Vessel Body Form Mode C a short distance below the rim (Fig. 83 a).

D. The broad, upper surface of everted rims, Rim Modification Mode E (Fig. 92 a, b).

E. The point of juncture between Rim Modification Mode E and Vessel Body Form Mode D (Fig. 84 f).

F. A broad, horizontal band extending around vessels of Vessel Body Form Mode D from the juncture of the rim and body to the basal angle (Fig. 85 b).

G. Broad, horizontal band extending around the vessel side wall of Vessel Body Form Mode E (Fig. 90 a).

H. The inner surface of shallow plates, Vessel Body Form Mode G, extending from the outer edge a short distance towards the interior. In cases where the plate has Rim Modification Mode F the width of the decorative band is that of the Rim Modification (Figs. 86-88).

I. Circular field taking in the whole underside of plates, Vessel Body Form Mode G (Fig. 86 a-e; Fig. 87 a-e-g).

J. The juncture between the upper and lower segments of Vessel Body Form Mode H (Fig. 89 a, b).

K. A broad, horizontal band extending around the lower body segment of Vessel Body Form Mode H (Fig. 89 a).

L. The line of demarcation between the body and
and Rim Modification Mode D on Vessel Body Form Mode I (Fig. 90 d).

M. The upper surface of Lugs Modes A and B (Fig. 95 a-e, g-l).

N. The outer surface of vertical strap handles, Mode A (Fig. 89 g-i).

**DESIGN ELEMENTS:**

A. Circle. Usually indicated by blob Applique Mode A.

B. Single, continuous, horizontal incised line.

C. Two continuous parallel, horizontal, incised lines.

D. Three, continuous, parallel, horizontal, incised lines.

E through I are complex design elements which are used to generate continuous, infinite band designs (Table 155). E and F are used with a combination of bifold rotation and transverse reflection to form a Class 7 Band Design in Shepard's classification. Designs generated by Mode G could be treated either as a case of continuous transverse reflection or of simple alteration. H is used in a combination of bifold rotation and translation. While I, depending on how the unit is analyzed, could be treated as simple translation, or as bifold rotation plus translation.

Most Hupa-iya design proves to be complex, continuous, non-symmetrical and non-divisible into discrete design elements. Certain frequently repeated clichés of incised design are
are tabulated as to their occurrence in the sample and in the Hupa-iya material from Cut 3 (Table 155). Until there is a more complete analysis of Hupa-iya design these should not be treated as formal modes.

DESIGN LAYOUT:  

A. Repetition, at the halves, of lugs, applique pellets, or other projections.

B. Continuous extension. This is used with single, or paired incised lines, or groups of three incised lines, Modes B, C, and D, and is typical of Decorative Fields D, E, H, and J.

C. Combination of bifold rotation and transverse reflection. This occurs most typically on plate rims, Decorative Field Mode H, but is also occasionally found on the sides of vessels, Vessel Body Form Mode D, Decorative Field F.

D. Continuous transverse reflection. This occurs on plate rims, Decorative Field H.

E. Bifold rotation and translation. This occurs on plate rims, Decorative Field H, and occasionally on vessels, Vessel Body Form Mode D, Decorative Field Mode F.

F. Single transverse reflection, usually with an applique pellet in center of the symmetrical design. This occurs relatively frequently on the upper surface of both modes of lug, but not all lug decorations are symmetrical.

G. Continuous asymmetrical band design not subdividable into discrete units. This is characteristic of
Decorative Fields B, C, F, G, K; and occasionally occurs on
Decorative Field H. The best preserved designs of this
nature are those found on spindle whorls (Figs. 97-99).

H. Continuous, circular design of incised lines
typical of Decorative Fields A and I. There is considerable
evidence from partially reconstructed pots that such designs
are frequently divided into halves or quadrants, but such
designs do not show symmetry among their various segments.

There is reason to suspect that Hupa-iya ceramics
were manufactured by the coiling method. In an occasional
specimen there is a tendency for a vessel, usually an open
bowl, Vessel Body Form Mode A, to fracture into elongate,
rectangular, horizontal sherds, though in most cases the
weld between the successive coils is completely obliterated.
As in the previously described complexes, the weld between
appendages such as lugs, handles, and adornos, and the vessel
is invariably poor. There is no attempt made to roughen
either of the surfaces to be joined in order to obtain a
stronger union. Handles are not riveted through the vessel
walls but are only attached to the wall with a weak weld.

The relative hardness of Hupa-iya sherds, their
tendency to make a "clink" rather than a "clunk" when dropped,
and the high incidence of a greenish surface color are all
apparently results of the relatively high firing temperature
used. All of these characteristics are useful in making a gross sorting of Hupa-iya material from sherds of other complexes.

Summary of the Hupa-iya Ceramic Complex

Hupa-iya ceramics are a well made, highly distinctive body of ceramics. The firing is more thorough than in any other pre-Shipibo pottery. The decoration is carefully executed and the surfaces are well finished, though in these respects the complex is inferior to both Shakimu and Early Tutishcainyo.

The structuring of Hupa-iya ceramics is rigid with respect to form. There are a relatively small number of form categories, each of which is sharply delimited from all others. The combination of this limited number of form categories with several modes of size yields a larger number of culturally defined units.

The contrast between decorated and undecorated ware, which is so clear in the Shakimu Complex, is weak in Hupa-iya. Certain form categories, especially open bowls and plates, are very commonly decorated and completely plain examples of these are rare. Vessel Body Form Mode D is frequently decorated, but such decoration is sometimes confined to the rim leaving the body plain. A few forms such as the shallow basins, Vessel
Body Form Mode F, are rarely if ever decorated. It would appear that almost any form category might be decorated or undecorated depending on the wishes of the potter, but that there was a far greater tendency to decorate some forms such as open bowls and plates. Under these circumstances it seems of doubtful utility to appose a class of plain ware with a class of decorated ware. The incidence of plain and decorated vessels is given for each form category (Table 154).

The design elements and layout of most Hupa-iya ceramics have thus far resisted formal analysis. What is clear from sherds and from the whole designs preserved on the spindle whorls is that the majority of designs are not repetitive, so that the individual elements are difficult to isolate. Most designs are not symmetrical. Only in designs used on relatively narrow bands, the rims of plates and occasionally on the sides of small pots, does one find band designs which are analyzable into component elements and patterns of symmetry. Save for these relatively few examples of infinite band design, Hupa-iya decoration shows less obvious cultural structuring than that of the other complexes of the area.

The Yarinococha Complex

The sample for the Yarinococha Complex consisted
of all of the material identified as Yarinacocha from site UCA-6.

CLAY: There is no evidence of more than one mode of clay, and the clay does not appear to be appreciably different than that used by the other ceramic complexes of the sequence.

TEMPER: There is a single mode of temper, a coarsely ground, poorly sorted, angular sherd temper.

FIRING: There is no evidence that the firing of Yarinacocha ceramics was sufficiently well controlled so that alternatives were available to the potter. The pottery shows a wide range of firing conditions, and a large sherd will show considerable variation in surface color. The pottery is relatively soft so that it is assumed that the firing temperatures were fairly low (Table 1). Orange surfaces are frequent.

THICKNESS: Thickness appears to vary according to vessel size, but there do not appear to be sharp breaks in the distribution of specimens along this dimension. On the basis of the present sample it would be premature to establish modes of thickness, though further research on more extensive samples may indicate that such modes exist.

VESSEL BODY FORM: A. A deep, cylindrical body with straight, vertical or slightly insloping sides.

B. A medium to deep vessel body with concave, slightly outflaring sides.

C. A relatively shallow body with straight, slightly
outsloping sides.

D. A relatively shallow, broad vessel body with slightly convex sides.

E. A very broad, shallow vessel body with straight, vertical sides.

F. A broad, flat plate with short, straight, sharply outsloping sides (a comal).

G. An even curving, convex sided vessel somewhat deeper than a hemisphere.

H. An evenly curving bowl somewhat shallower and more open than a hemisphere.

I. A shallow, evenly curving plate.

J. A relatively deep, slightly constricted vessel with convex sides.

HORIZONTAL CROSS SECTION: A. Circular cross section. This is typically associated with all of the Vessel Body Form Modes enumerated above except a couple of examples of Vessel Body Form Mode B which also show the open pouring spouts.

B. An elliptical cross section, only occurring in association with large examples of Vessel Body Form Mode B, and always with pouring spouts at the ends of the ellipse.

SIZE: The distribution of mouth diameters suggests that there are modal distinctions of size. This is especially clear for the Vessel Body Form Modes A through C. For vessels
of these shapes there are:

A. A modal size centering in the 20-30 centimeter range.

B. A modal size centering around 38 centimeters.

C. A third modal size in the 40 to 50 centimeter range.

Most of the other vessel forms appear to show a unimodal distribution with reference to mouth diameter or are too rare to make estimates of modal tendencies feasible.

BOTTOM FORM: A. A deep, evenly curving, hemisphere sharply demarcated from vessel body. This occurs only with Vessel Body Form Mode E.

B. A flat to slightly curving bottom, sharply demarcated from vessel body. This is typical with Vessel Body Form Modes A through D and F.

NECK FORM: No necked vessels were present in the sample.

LIP TREATMENT: Two modes of lip treatment are evident in the sample.

A. A sharply squared lip, planed off perpendicular to the axis of the vessel wall.

B. An evenly rounded lip.

RIM MODIFICATION: A. Zero modification.

B. A convex strip of clay added to the outer surface of the rim.
C. An angular ridge of clay welded to the outside of the rim.

D. A horizontal flange of clay projecting outward from the top of the rim.

E. A horizontal strip of clay added to the inside surface of plate rims.

F. A sharp eversion of the rim.

**Basal Angle Modification:** For those vessels which show a point of inflection between sidewall and base there appear to be at least three modes of basal angle modification.

A. Zero modification.

B. A sharply angular hollow shoulder.

C. A solid, external ridge of clay overhanging a concave, incurving surface (Fig. 105 i).

**Neck Juncture Modification.** Dimension not applicable.

**Surface Finish:** A single mode of surface finish is characteristic of all unslipped Yarinacocha ceramics. The surface is not very carefully smoothed or polished, so that cracks indicating the juncture of coils, and striations left by the scraping tool are frequently evident. The tool marks in all cases run horizontally around the vessel. In lieu of polishing, the surface was wiped with a wet rag or some other similar implement so that a floated surface was produced, which sometimes approached a true slip. The surface has a characteristic
soapy feel. This floated finish is the best diagnostic trait for separating Yarinaccocha ceramics from the ceramics of any of the other complexes described.

**SLIP:** An all over slip of a dark maroon, red ocre pigment occurs on a number of vessels, especially of Vessel Body Form Mode D, and partial slips of red covering only the decorative field also occur.

**PAINTED DESIGN BEFORE FIRING:** There are three modes of pigment used in painted design.

A. The deep maroon, red ocre pigment mentioned above as a slip.

B. A thin, brownish black paint of poor covering power.

C. A very thick, yellowish white pigment applied only as lines and dots.

The red and black pigments were applied over large areas while the white pigment, which was always applied last, was used for linear design or to bound and separate contrasting areas of color. In combination with the natural color of the sherd a possibility of color schemes using up to four colors arises, but no sherd recovered showed more than three colors, white on red; red, white, and natural with white lines separating the red areas from the natural areas; black, white and natural; and black, white, and red all occur (Fig. 106).

**PAINTED DESIGN AFTER FIRING:** The sample offers no
evidence for the utilization of this dimension.

RESIN COATING: The sample offers no evidence for the utilization of this dimension.

INCISING: A single mode of incising occurred in the sample, and was found only on one sherd. This was a carefully executed U-shaped groove.

NOTCHING: Dimension not utilized.

PUNCTATION: A single mode of punctation was found on the same sherd which showed the incising. This exhibited a row of punctations parallel to the incised line. The individual punctations were carefully executed with a relatively blunt tool held at a sharp angle to the surface of the vessel so that the shape of the individual depressions was sub-triangular (Fig. 104 f).

STAMPING: Dimension not utilized.

EXCISING: Dimension not utilized.

MODELING: Dimension not utilized.

APPLIQUE: Dimension not utilized.

CORRUGATION: Dimension not utilized.

PERFORATION: Dimension not utilized.

TABS: A single example of a triangular lip tab was found in association with a painted sherd (Fig. 106 a).

LUGS: Dimension not utilized.

HANDLES: Dimension not utilized.
FEET: Dimension not utilized.

ANNULAR BASES: Dimension not utilized.

SPOUTS: A. Open, triangular pouring spouts were a rare addition to Yarinacocha urns (Fig. 107 a through e).

BRIDGES: Dimension not utilized.

ADORNOS: Dimension not utilized.

DECORATIVE FIELD: There is insufficient material for a full analysis of Yarinacocha preference as to decorative fields. The favored field appears to be the complete vessel sidewall from immediately below the rim to the point of inflection, especially on Vessel Body Form Modes B (Fig. 106 i) and D (Fig. 103 c; Fig. 106 a, g). The upper surface of the one example of lip tab was also painted. The one example of incised and punctate decoration occurred on the outside surface of a vessel sidewall, Vessel Body Form Mode F.

DESIGN ELEMENT: A. Continuous, single horizontal lines.

B. Continuous, horizontal rows of dots.

The painted sherds are so eroded and so small that a full analysis of design element is impossible. What is preserved with reference to Yarinacocha design is illustrated in Figures 103 and 106.

DESIGN LAYOUT: The fragmentary nature of the Yarinacocha decorated sherds makes it unprofitable to discuss design layout.
The manufacturing procedures used in producing Yarinacocha pottery are somewhat more obvious than in the case of the previously discussed ceramic complexes. The less careful construction and finishing have left traces of the various stages of manufacture visible on the completed vessel. The pottery was clearly manufactured by the coiling process. The union of the coils was weak, and there is a definite tendency for the pottery to break along the coil junctures. The coil junctures were frequently imperfectly obliterated at the vessel surface, and remain as shallow crevices. After the vessel had dried somewhat it was scraped with a sharp, jagged edged tool, which left numerous horizontal striations encircling the vessel on both the interior and exterior. The surface of the vessel was then finished with a soft, very moist object which was wiped repeatedly over the surface. A wet scrap of cloth would have served very well for this purpose, though the modern Shipibo use a bracket fungus soaked in water. The floated surface produced in this way was insufficiently complete to mask the various surface imperfections.

Summary of the Yarinacocha Complex

The Yarinacocha Complex is far simpler than any of the preceding ceramic aggregations. This is true both in terms
of the number of dimensions utilized and the number of modes on each dimension. The majority of the pottery is starkly plain with a characteristic floated surface finish. The vessel reconstructions for the Yarinacocha Complex are less hypothetical than those of the other complexes, since they are in most cases based on quarter or half vessels. The form categories are clearly defined and relatively few in number. The execution of the individual modes of rim modification and of the modes on other dimensions shows less control than in the previous complexes.

Out of the Yarinacocha sample there are 45 sherds with red slip or polychrome painting. It seems justifiable to set up a Yarinacocha painted ware as contrasted to a Yarinacocha plain ware since the few painted rim sherds recovered indicate a range of rim modifications and vessel body shapes somewhat different from that of the plain ware. The material was not sufficiently extensive to characterize the structure of this painted ware in any respect.

Pacacooha Complex

The type sample of the Pacacooha Complex consists of all sherds so designated from Stratigraphic Cut 5, USA-2.

CLAY: There appears to be only a single norm for
the clay used in Pacacocha ceramics. This is apparently the same clay used in all the other ceramics indigenous to the Yarinacooha area.

TEMPER: There is only one mode of temper used in the Pacacocha ceramics. It is a relatively large, poorly sorted, shard temper with fragments up to four mm. in diameter. The temper is added in very large quantity and is poorly mixed with the paste, so that the paste has an uneven and contorted appearance. Flaws and air bubbles are frequent.

FIRING: There is apparently only a single mode of firing for Pacacocha ceramics. Firing is poorly controlled. The majority of surfaces are rather light colored, mainly in the light buff range. Cores tend to be much darker. The Pacacocha ceramics are the softest indigenous to the Yarinacooha area, so the firing temperature must have been relatively low and the firing of short duration.

THICKNESS: There are apparently at least two modes of thickness.

A. A vessel wall thickness of eight to 16 mm.

B. A much thicker vessel wall, well over one centimeter in thickness, associated with Vessel Body Form Modes A and F.

VESSEL BODY FORM: A. A deep urn with straight,
slightly outsloping sides (Fig. 109 d).

B. An evenly curving, globular vessel (Fig. 108 b-f; Fig. 109 c).

C. A shallow vessel with straight, insloping sides (Fig. 108 g).

D. A shallow, slightly concave plate (Fig. 108 a).

E. A biconvex sided vessel with a sharp constriction between the upper and lower segments of the body, similar to Vessel Body Form Mode H of the Hupa-iya Complex (Fig. 113 c, e).

F. A flat, circular, disc of clay with a very slightly raised rim (a comal). Only two examples were recovered (Fig. 109 a, b).

HORIZONTAL CROSS SECTION: Only one mode is evident; circular.

SIZE: The rather limited data does not suggest that there is more than one modal vessel size for any particular Vessel Body Form (Table 160).

BOTTOM FORM: Aside from the absolutely flat comals, all other vessels appear to have an evenly rounded bottom which, except for the case of Vessel Body Form Mode C, is not demarcated from the vessel sidewall.

NECK FORM: Dimension not utilized.

LIP TREATMENT: Lip treatment is not carefully executed. There would appear to be a single form, an evenly rounded lip.
RIM MODIFICATION: 
A. Zero modification.
B. A very slight eversion of the rim (Fig. 108 d-f).
C. A moderate eversion of the rim (Fig. 109 c; Fig. 110 i,j).
D. A slight, convex, external thickening of the rim (Fig. 110 h).
E. An angular, internal thickening of the rim.

BASAL ANGLE MODIFICATION: Dimension not utilized.
NECK JUNCTURE MODIFICATION: Dimension not utilized.

SURFACE FINISH: There appears to be a single modal tendency relevant to surface finish. Pacacocha surfaces are typically highly irregular with large lumps of temper sticking through the surface and with shallow pits in between. In part, this may be due to erosion of these very soft ceramics, but there is no indication that any of this pottery was ever carefully smoothed.

SLIP: 
A. A thick, dark maroon, red ocre slip. This slip is fugitive, since it is very soft and adheres very poorly to the vessel surface. It was definitely noted on 31 specimens in the sample, but with better preservation the percentage of sherds showing such slip would certainly be higher.

PAINTED DESIGN BEFORE FIRING: Dimension not relevant.
PAINTED DESIGN AFTER FIRING: Dimension not utilized.
RESIN COATING: Dimension not utilized.
INCISING: A. Shallow, U-shaped incision utilized.
only on adornos and figurines.

NOTCHING: A. Shallow, closely spaced, V-shaped notching utilized only on the terminations of adornos.

PUNCTATION: A. Shallow, circular punctation used only in the eyes of adornos.

STAMPING: Dimension not utilized.

EXCISING: Dimension not utilized.

MODELING: Dimension not utilized.

APPLIQUE: A. Plain, curved strip applique. This does not occur in the type sample, but there are two specimens from UCA-4 (Fig. 113 c; Fig. 114a).

CORRUGATION: Dimension not utilized.

PERFORATION: Dimension not utilized.

TABS: Dimension not utilized.

LUGS: Dimension not utilized.

Handles: A. Coarse, vertical, strap handles associated with Vessel Body Form Mode E (Fig. 109 a).

FEET: Dimension not utilized.

ANNULAR BASES: Dimension not utilized.

SPOUTS: Dimension not utilized.

BRIDGES: Dimension not utilized.

ADORNOS: Pacacocha adornos are highly distinctive and show a wide range of variation (Fig. 110 a, b, d-e; Fig. 111: Fig. 112 a-e, h, l, m; Fig. 113 d). The sample is not sufficient to establish a reasonable modal analysis of this variation.
DECORATIVE FIELD: In the type collection the only decorative field is the rim of Vessel Body Form Mode B in combination with Rim Modification Mode B.

DESIGN ELEMENT: In the type collection the only design element used is the adorno.

DESIGN LAYOUT: The small amount of available evidence suggests that adornos were paired and faced each other across the vessel mouth.

Pacacocha ceramics were manufactured by the coiling process, and there is considerable fracture along the individual coil lines, though the juncture is somewhat stronger and more thoroughly obliterated than is the case with Yarinacocha ceramics. Everything about the Pacacocha collections suggests that the pottery was the focus of little interest on the part of the society that made it. Very little care was expended on its manufacture and the results are lacking in precision.

Summary of the Pacacocha Complex

The Pacacocha Complex is by far the simplest recovered in the course of the work at Yarinacocha. The complex is characterized by poorly controlled execution of the individual modes. The number of mode combinations permitted is small and a small number of form categories result. Only two forms of
One, red slip, is difficult to treat, since the slip is fugitive and in most instances where it was noted only traces remained. It is clear that far more of the Pacacocha pottery once bore a red slip than can be demonstrated on the basis of the number of sherds which still show traces. Under these circumstances it is difficult to determine the association of the red slip with any particular form category, but it seemed to be somewhat more common on the rimless plates than might be expected by chance. Crude zoomorphic adornos were a relatively common addition to the rims of globular, constricted mouth vessels, invariably those with Rim Modification Mode B. On the basis of available data it would be difficult to estimate what percentage of such vessels bore adornos.

The Surface Collection of Pacacocha Material from UCA-4

In characteristics of surface finish, paste, and firing the sherds from UCA-4 are identical to those of the Pacacocha collection from Cut 5, UCA-2, though the UCA-4 sherds average somewhat thinner. The collection from UCA-4 does show certain features of shape and decoration which are absent in the type collection. A large number of plain body sherds were collected, but those offering no features of shape or decoration need no special attention. A tabulation of the remainder of the
collection follows.

1 complete human figurine (Fig. 114 a)
2 feet from human figurines (Fig. 114 g, h)
2 spindle whorls
1 strap handle from a large vessel (Fig. 114 e)
1 adorno of a style somewhat distinct from that typical
at UCA-2 and UCA-6 (Fig. 113 d)
2 rim sherds from vessels similar to Vessel Body Form
Mode H of the Hupa-iya Complex (Fig. 113 c, e)
1 rim sherd from a vessel with broad, everted rim (Fig. 113 a)
3 rims from large urns, Pacacocha Vessel Body Form
Mode A (Fig. 113 h, i)
9 rims from globular vessels, Pacacocha Vessel Body
Form Mode B, Rim Modification Mode A (Fig. 113 b)
1 rim from globular vessel, Pacacocha Vessel Body
Form Mode B, Rim Modification Mode B.
5 rims from constricted mouth bowls, Vessel Body Form
Mode C.
5 rims from plates, Vessel Body Form Mode D
4 sherds indicating large, flat bottoms
1 axe fragment (Fig. 125 c).

The Surface Collection of Pacacocha Material from
UCA-5
The large collection of sherds which the Shipibo women made for me at this site contained a far higher quantity of thick, coarse sherds than does the type sample of Pacacocho material, but was indistinguishable in paste, surface, and firing. Of the 102 sherds collected only 9 were rim sherds. The collection included:

4 rims from large urns, Pacacocho Vessel Body Form Mode A
2 rims from globular vessels, Pacacocho Vessel Body Form Mode B, Rim Modification Mode B
1 rim from a constricted mouth bowl, Pacacocho Vessel Body Form Mode C
2 rims from plates, Pacacocho Vessel Body Form Mode D
8 sherds from flat vessel bottoms
2 sherds with red slip
4 topia fragments.

The Surface Collection of Pacacocho Material from UCA-1

A fairly extensive collection of sherds was made at UCA-1, but almost none of these showed features of shape or decoration. In surface finish, paste, and firing these sherds were identical to those in the type collection of Pacacocho material, but the sherds averaged much thicker. There were no thin sherds from small vessels and the whole collection resembled
the thickest, coarsest sherds from Feature 1, T-33, UCA-2. Only three sherds gave indication or shape or decoration. One was a fragment of the neck of a constricted neck olla, a form not present in the type collection, one was from the rim of a large urn, Pacacocha Vessel Body Form Mode A, and one was from a flat vessel bottom.

**Pacacocha Materials from Nueva Paris**

An archaeological collection made by Tessmann, now at the American Museum of Natural History, contains a small number of sherds from a locality along the Ucayali designated as Nueva Paris. I have been unable to locate Nueva Paris on a modern map, and possibly the settlement has been washed away by the river. This group of sherds contains some which are unlike any recovered in the Yarinacocha excavations. These unique sherds have not been illustrated. The collection also contains several sherds which are clearly related to the complex which I have designated Pacacocha. Some of these have been illustrated (Fig. 111; Fig. 114 b,d,j). Figure 114b is of special interest in that it shows characteristics of both the Hupa-iya Complex and the Pacacocha Complex. This reinforces an impression, which may be derived from a study of vessel shapes, that Pacacocha is partially or wholly a development
out of the Hupa-iya Complex, but is separated from it by a considerable span of time and a great deal of deterioration in ceramic technology.

The Seriation of the Pacacocha Samples

The four collections of Pacacocha material made in the Yarinacocha area show considerable difference among themselves, chiefly in terms of the vessel shapes present, and in sherd thickness. It should be possible to seriate these on the basis of their mutual similarity. If the hypothesis that Pacacocha represents a development out of Hupa-iya is correct, then the Pacacocha sample from UCA-4 should be the oldest. It shows more points of similarity in vessel shape to the earlier complex than do any of the other samples, and the ceramics are thinner than any of the other Pacacocha materials. The type sample from UCA-2 is next in the seriated sequence on the basis of the large number of points of similarity to UCA-4 in vessel shape. The samples from UCA-5 and UCA-1 show the largest amounts of thick ware and the smallest range of vessel shapes. Of these the sample from UCA-1 is the most divergent and presumably the latest.

I would suggest that the small quantity of Pacacocha material from Nueva París represents a stage in the development still earlier than the sample from UCA-4.
Corrugated Ware Complex

It was originally decided to use all the Corrugated Ware sherds from Stratigraphic Cut 5, UCA-2 as the type sample of the Corrugated Ware Complex. When this material was studied, it was noted that there were only nine rim sherds present, so that the usual method of quantitative analysis was not applicable. It was then decided to discuss and illustrate all of the Corrugated Ware Complex materials from both of the major sites, and, because of the multiple sources of this collection, to forego a quantitative treatment. A small series of incised and appliqued sherds are included, as part of the Corrugated Ware Complex, because they agree with the Corrugated Ware Complex in distribution and show similar characteristics of paste and surface finish. Also one form of rim, an outwardly rolled rim, Rim Modification Mode E, is shared by Corrugated sherds and sherds with this particular style of thin line incision and applique. It is quite possible that the material thus lumped together spans a considerable time. In the discussion of Stratigraphic Cut 2 of UCA-6 it was pointed out that at least some of the Corrugated Ware had a reasonable degree of antiquity. On the basis of sherd material and photographs which Carneiro recently showed to me it is clear that the ceramics now being made by the Amahuaca are a continuation of the same
tradition as the Corrugated Ware here discussed, so that a significant time span is indicated. Obviously, a large series of good samples will be necessary to understand the internal chronology of this tradition.

CLAY: There is no indication that more than one kind of clay was used, or that it was different from that used in any of the other indigenous complexes.

TEMPER: The great majority of sherds which I have assigned to the Corrugated Ware Complex show a coarse, abundant, sherd tempering. There are, however, some plain, caraipa tempered shers from Cut 2 UCA-6, which are non-Shipibo and which otherwise resemble the plain ware of the Corrugated Ware Complex. The distribution of these sherds has been given in Table 55. One Corrugated rim sherd from Cut 1 at UCA-2 also showed caraipa temper. It is definitely not in the Shipibo style of corrugation. It would appear that caraipa temper was introduced into the Corrugated Ware Tradition during the latter part of its history, and that it never fully replaced the earlier mode of tempering. Modern Amahuaca ceramics show variability in this respect. 127

FIRING: Taken at face value, the sherd data suggest two modes of firing. Much of the Corrugated Ware, especially the sherds from particularly large urns, shows gray surfaces and
core, while much of the sherd material from smaller vessels is well oxidized. It appears that the firing practices for the huge urns were different than those for smaller vessels. The difference may be related to the technical problems involved in firing vessels three to four feet in diameter.

A. Nonoxidizing firing.

B. Oxidizing firing at a slightly higher temperature.

THICKNESS: The sample is insufficient for modal analysis.

VESSEL BODY FORM: Only three modes of Vessel Body Form can be fully demonstrated on the basis of the sample.

A. An open, hemispherical bowl.

B. A globular vessel with evenly curving, convex sides and a constricted mouth.

C. A huge urn with biconvex sides and a sharp constriction between the upper and lower segments of the body. It has a broad mouth and a conical base.

HORIZONTAL CROSS SECTION: Only one mode present, circular.

SIZE: Sample is insufficient for modal analysis.

BOTTOM FORM: Two modes can be demonstrated.

A. An even curving, hemispherical bottom associated with Vessel Body Form Modes A and B.

B. A conical bottom with a rather sharp point, associated with Vessel Body Form Mode C.

NECK FORM: Dimension not relevant.
LIP TREATMENT: Lip treatment in the sample is variable, in part depending on Rim Modification. The sample is of insufficient size for modal analysis. Most lips are evenly rounded, but little care is expended on finishing them.

RIM MODIFICATION:  
A. Zero modification (Fig. 115 b; Fig. 120 e).  
B. A slight, horizontal, outward extension (Fig. 115 a; Fig. 119 a).  
C. A gradually everted lip (Fig. 116 a; Fig. 119 c).  
D. A sharply everted lip (Fig. 115 c; Fig. 116 b; Fig. 119 b).  
E. An outwardly rolled rim of circular cross section (Fig. 118; Fig. 119 e; Fig. 120 f and g).

BASAL ANGLE MODIFICATION: Dimension not utilized.

NECK JUNCTURE MODIFICATION: Dimension not utilized.

SURFACE FINISH: There are two modes of surface finish.  
A. No further treatment after roughening the surface by corrugation.  
B. A smoothed, but not highly polished surface. This surface is characteristic of the interior of corrugated vessels and of the exterior of noncorrugated vessels. The surface finish is especially good on those specimens with incised decoration. The smoothness of Corrugated Ware Complex Surface Finish Mode B is about equal to that of the Hupa-iya Complex and shows far more care than was expended on the Yarinacocha or Pacacocha ceramics.
SLIP: Dimension not utilized.

PAINTED DESIGN BEFORE FIRING: Dimension not utilized.

PAINTED DESIGN AFTER FIRING: Dimension not utilized.

RESIN COATING: Dimension not utilized.

INCISING: A. Carefully executed, narrow, shallow, V-shaped incision.

NOTCHING: A. Closely spaced notching along the edges of strip applique. Executed with the same width tool as Incising Mode A (Fig. 119 f; Fig. 120 d).

PUNCTATION: Dimension not utilized.

STAMPING: Dimension not utilized.

EXCISING: Dimension not utilized.

MODELING: Dimension not utilized.

APPLIQUE: A. Strip applique used either horizontally or diagonally on the vessel surface. (Fig. 119 f; 120 a-d)

B. Circular bosses of clay. One example only (Fig. 120 e).

CORRUGATION: The Corrugated Ware Complex is characterized by a wide variety of techniques through which either part or all of the vessel's outer surface was roughened. The favored tool appears to have been the thumb. The corrugation ranges widely from deep, full thumb prints (Fig. 116 a) to deep thumb-nail incision (Fig. 115 c). The spacing ranges from highly irregular to carefully controlled. In certain instances, the corrugation is functional in that it is used to weld individual
coils of clay (Fig. 116 a). In other cases the vessels are constructed out of broad strips of clay, and the corrugation is purely decorative, with up to four rows of thumb prints occurring on a particular band of clay added to the vessel (Fig. 117).

If the material were more copious it might be possible to divide this tremendous range of variation into a number of discrete modes, however, a number of other complexes in South America which utilize corrugation show an equally wide and continuous range of implementation.

PERFORATION: Dimension not utilized.
TABS: Dimension not utilized.
LUGS: Dimension not utilized.
HANDLES: Dimension not utilized.
FEET: Dimension not utilized.
ANNULAR BASES: Dimension not utilized.
SPOUTS: Dimension not utilized.
BRIDGES: Dimension not utilized.
ADORNOS: Dimension not utilized.

DECORATIVE FIELD: A. The total outer surface of Vessel Body Form Mode A (Fig. 115 a,b).
B. Total outer surface Vessel Body Form Mode B (Fig. 115 c; Fig. 116 a,b).
C. Lower segment of Vessel Body Form Mode C (Fig 117).
D. Upper segment Vessel Body Form Mode C (Fig. 119 f).
DESIGN ELEMENT:
A. All over corrugation.
B. Nested rectangles executed in fine line incision (Fig. 120 d, f, g, i, j, k).
C. Nested circles or curved lines executed in fine line incision (Fig. 120 h, l).
D. Strip applique incised or notched (Fig. 119 f; Fig. 120 a, b, c, d).

DESIGN LAYOUT:
A. Continuous repetition in rows.

There is insufficient evidence to reconstruct the Design Layouts associated with other decorative elements.

A greater part of the ceramics of the Corrugated Ware Complex appears to have been manufactured by the coiling method, and on certain of the corrugated sherds this is particularly evident. Some of the larger urns were built up out of strips of clay or slabs of clay, about four inches wide, which were added in complete circles and not spirally. These strips are still evident in the large conical urn which formed Feature 1, T-33, UCA-6 (Fig. 117). The unions between the successive strips of clay were weak, and much of the breakage in this specimen occurred along the joint lines.

Technological standards, though not high, are well in advance of those of the Pacacocha Complex. Considerable skill was necessary for the construction and firing of vessels of
three or four feet in diameter.

Summary of the Corrugated Ware Complex

The illustrated examples of the Corrugated Ware Complex show almost all distinctive specimens recovered but probably do not nearly exhaust the variety of the complex. On the basis of such a restricted sample a summary characterization of the complex is probably unwarranted.

The Shipibo Ceramic Complex

The sample for the Shipibo Ceramic Complex includes all sherds so identified from Stratigraphic Cut 2, UDA-2. This cut, though unsatisfactory in most respects, did expose a deep and relatively rich Shipibo midden. The sample was analyzed in the usual manner, though less time was spent on a study of decoration. When I had finished the analysis, I was impressed with how meager this sample and the other samples of Shipibo pottery were. This slightness is evident when the bulk or number of sherds in the Shipibo sample is compared to the bulk or number of sherds in the better samples, such as the Early Tutishcainyo or Hupa-nya collections. It is also evident when the variety of Shipibo vessel forms definable in the excavated collections are compared with the variety of vessel
forms still in use in the houses adjoining the midden deposits.

In terms of both shape and decoration the Shipibo Ceramic Complex of San Francisco de Yarinacocha is one of the more elaborate encountered in the excavations and the archaeological sample is too small to encompass much of this elaboration.

The situation at San Francisco de Yarinacocha or at other modern Chama villages is ideal for a study in which a rigorous and complete analysis of excavated ceramics is compared to a full ethnographic account of the ceramic industry. Much could be learned here in terms of the relationship between an extant Tropical Forest community and the midden it leaves behind. I had originally intended to include such a study as a part of my field work at Yarinacocha, but I found that the prehistoric archaeology of the area fully engaged me for my four month stay. The material at my disposal is insufficient for the task.

I have not included illustrations of Shipibo ceramics in this report. Chama ceramics have been fairly extensively illustrated in previous publications, and to expand over this coverage would necessitate great increase in the number of illustrations. Such illustrations should accompany and be keyed to a thorough analysis of Chama ceramics from both the archaeological and ethnographic viewpoint.

CLAY: Nothing in the archaeological sample suggests the use of more than one kind of clay. Farabee's statement,
which my own observations support, is that the clay is taken from the river banks or lake shores.\textsuperscript{130}

**TEMPER:** A single mode of tempering is to be noted in the archaeological collections. This is an abundant cariapa temper. Farabee identifies the species of tree, from which the silica rich bark is obtained, as \textit{Licania utilis}.\textsuperscript{131} I collected no specimens of the bark. The bark is carbonized, ground, and added to the paste in considerable quantity. The cariapa temper is clearly identifiable with the naked eye, and under magnification the fiberous nature of the silica ash is even more striking.

**FIRING:** It is clear from the archaeological sample that at least two modes of firing are present.

A. A nonoxidizing firing in which both the surface and core are left a dark gray. This is associated with the unslipped, unpolished, culinary ware.

B. An oxidizing firing which gives most of the paste a red to buff color, but frequently leaves a thin, black core. This is associated with slipped and polished pottery.

In both cases the firing is at high temperatures, and the ware is very hard (Table 139).

**THICKNESS:** The archaeological sample supports the existence of at least two modes of thickness.

A. Sherds of unslipped, culinary ware show a modal
thickness of seven mm. with relatively little variation (Table 140).

B. Sherds from slipped bowls show a modal thickness of four mm. with relatively little variation (Table 140).

On the basis of observation of specimens still in use at San Francisco de Yarinacocha it is clear that there is a third mode associated with brewing urns, which would center well over one centimeter. No sherds from such vessels were included in the sample.

VESSEL BODY FORM: A. An open, hemispherical bowl.

B. A bowl with straight, inwardly sloping sides which curve under near the base.

C. A shallow bowl with evenly curving sides.

D. A closed, elliptical vessel with small aperture.

E. A deep urn with broad mouth and convex sides sloping in to a relatively narrow base.

HORIZONTAL CROSS SECTION: A circular cross section was the only form noted in the sample.

SIZE: The sample is of insufficient size to determine if there are modal units of size independent of Vessel Body Form.

BOTTOM FORM: A. A simple, flat, circular bottom.

B. A flat, circular bottom which rises sharply and then flares outward so that it forms a shallow S-curve with vessel body.
NECK FORM: Only one form of neck occurred in the sample.

A. A short, relatively broad neck, with straight sides which slope in toward the aperture.

LIP TREATMENT: Only a single mode is present in the sample. All lips are carefully finished and thinned down to a relatively sharp edge.

RIM MODIFICATION: A. Zero modification.

B. A narrow labial flange tilted slightly upward from the horizontal.

C. A sharply everted rim.

BASAL ANGLE MODIFICATION: Dimension not utilized.

NECK JUNCTURE MODIFICATION: Dimension not utilized.

SURFACE FINISH: A. A high polish in which the individual polishing strokes are visible. This is applied over slips and to surfaces to be slipped. It is also found on unslipped areas of partially slipped vessels.

B. A rough, unsmoothed surface. This is typical of the unslipped, culinary wares.

SLIP: A. A thick slip of white kaolin.

B. A slip of brick red hematite. This is applied as a yellow limonite and alters to the darker color during firing.

Slips are applied in a wide variety of combinations. A vessel may be given an all over slip of one color. It may
be slipped on the outside only. The outside may be slipped in one color and the interior in the other. The outside surface may be broken into horizontal zones with contrasting slips. A particular decorative field may be partially slipped so that the slipped area forms either the negative or positive part of the design, while the contrasting areas of the design are left in the natural color of the paste, which fires to a light tan or buff.

PAINTED DESIGN BEFORE FIRING: There are three modes of pigment which can be demonstrated from the sample.

A. A white kaolin, the same pigment as is used in the Slip, Mode A.

B. A brick red hematite, which is applied as limonite and altered in the course of firing. It is identical with Slip, Mode B.

C. A dark brown to black mineral pigment.

A fourth pigment, a light blue, was observed in some vessels still in use in the village but was not represented in the sample. The three basic pigments plus the use of the natural color of the vessel surface make possible a number of color combinations. The two most frequently used combinations are white on red and black and red on white, but one also frequently finds black on white, red and white on natural, black and white on natural, or white on natural. It is
frequently impossible to say that a vessel is characterized by a particular one of these color schemes. Especially with open bowls, one scheme will be used on the vessel exterior and another on the interior. In the case of large, constricted mouth vessels two color schemes may be used on different horizontal bands of the outer surface.

**PAINTED DESIGN AFTER FIRING:** Dimension not utilized in sample.

**RESIN COATING:** A. A spherical mass of resin is applied to the hot surface of the vessel as it is taken from the firing. The resin melts to an even, glaze-like coating. This treatment is applied mainly to white, slipped surfaces.

**INCISING:** A. Very thin, fine incision, cut through the slip of decorated pottery after the surface is well dried. This is used to increase the complexity of the decorated design.

B. Fairly deep, thin, V-shaped incision, used on the neck or upper body area of unslipped, culinary ware. The incised lines are used to execute designs in typical Shipibo style.

**NOTCHING:** A. V-shaped notches in the edge of the everted rims of unslipped ware.

**PUNCTATION:** A. Punctation executed with a sharp tool of large diameter, used in massed zones on necks and upper bodies of unslipped, culinary ware.
STAMPING: Dimension not utilized.

EXCISING: Dimension not utilized.

MODELING: Dimension not present in sample. It is used in Shipibo ceramics for the production of human effigy vessels and of the zoomorphic beer mugs used by children.

APPLIQUE: Dimension not present in sample. It is used in Shipibo ceramics for the production of human effigy vessels, indicating arms, breasts, sexual organs, etc.

CORRUGATION: A distinctive and highly regular form of corrugation which consists of evenly spaced, V-shaped notches in the lower edges of coils which have not been fully obliterated on the outer surface of the vessel. This is confined to the neck or upper body of unslipped, culinary ware.

PERFORATION: Dimension not utilized in sample.

TABS: Dimension not utilized in sample.

LUCKS: Dimension not utilized in sample.

HANDLES: Dimension not utilized in sample.

FEET: Dimension not utilized in sample.

ANNULAR BASES: Dimension not utilized in sample.

SPOUTS: Dimension not utilized in sample.

BRIDGES: Dimension not utilized in sample.

ADORNOS: Dimension not utilized in sample. Adornos are utilized as a part of the zoomorphic beer mugs used by children.
DECORATIVE FIELD:  
A. The total outer surface of Vessel Body Form Mode A. This is treated as a circular field.

B. The total interior surface of Vessel Body Form Mode A. This is treated as a circular field.

C. The total outer surface of Vessel Body Form Mode B, including the Vessel Bottom of Mode B. This is treated as a circular field.

D. The total interior surface of Vessel Body Form Mode B. This is treated as a circular field.

E. The outer surface of Vessel Body Form Mode B, excluding the sides of the vessel bottom, Bottom Form Mode B. This field is treated as an infinite band.

F. The sides of Bottom Form Mode B in association with Vessel Body Form Mode B. This field is treated as an infinite band.

G. The total outer surface of Vessel Body Form Mode C. This is treated as a circular field.

H. The total interior surface of Vessel Body Form Mode C. This is treated as a circular field.

I. The combined upper surface of Vessel Body Form Mode D and outer surface of Neck Form Mode A. This is treated as a circular field.

J. The outer surface of Neck Form Mode A. This is
treated as an infinite band.

K. The upper surface of Vessel Form Mode D excluding the vessel neck. This is treated as an infinite band.

L. The upper part of the vessel side wall Vessel Body Form Mode E. This field is treated as an infinite band.

M. The outer edge of everted rims, Rim Modification Mode C.

DESIGN ELEMENT: A. Continuous corrugation.
B. Continuous notching.
C. Continuous punctation.

All three of the above are used only with unslipped ware and Vessel Body Form Modes D and E.

D. A heavy line, executed either with paint or with Incising Mode B. Incising Mode B occurs only on unslipped ware.

E. A thin line, executed either with paint or with Incising Mode A (about one third the width of the Mode D lines in any particular design).

F. Solid blocks of pigment bounded by heavy lines.

The complex designs on Shipibo painted pottery are generated out of simple segments and by means of a very few rules. These designs are built up of heavy lines, Design Element Mode D. Such lines are straight in almost all cases. Where they change direction, they turn at an angle of either 90 degrees or 135 degrees. In respect to the boundary lines,
in the case of infinite band designs, or to two perpendicular lines cutting the circular fields into four equal quadrants, these lines lie at angles of either 90 degrees, 135 degrees, or are parallel. In terms of actual measurement with a protractor there is variation in these angles, but psychologically there appear to be only 90 degree angles and 135 degree angles in Shipibo designs. In cases where curved lines are introduced into the design these can be regarded as the rounding off of figures generated by the above rules.

A series of heavy lines following the above rules of interrelationship can be taken as a larger unit of Shipibo design. Such units are then reproduced to generate asymmetrical designs.

DESIGN LAYOUT: A. Transverse reflection between the quadrants of a circular decorative field. This organization of design occurs in every circular field that I have analyzed. Within each quadrant the relationship among the heavy lines is completely asymmetrical, but each quadrant is a transverse reflection of both adjoining quadrants.

B. Transverse reflection, Class 3 in Shepard's classification of infinite band designs.

C. Longitudinal and Transverse reflection, Class 5 in Shepard's classification of infinite band design.

D. Transverse reflection and bifold rotation, Class
of Shepard's classification of infinite band designs.\(^{132}\)

E. Complete asymmetry. Most Shipibo ceramic design is elaborated by the addition of fine lines, Design Element Mode E. These are used in the rather broad spaces between the Design Element Mode D lines. Such lines are again either parallel to the boundary or quadrant lines of the field, or are at angles of 90 or 135 degrees to them. Typically, the arrangement of these fine lines shows symmetry neither within a segment of the total design or between the segments of the design.

For purposes of tabulating the Shipibo sample, I have adopted certain arbitrary procedures necessitated by the nature of the Shipibo ceramics. The division between red slipped and white slipped sherds is based on the color of the outer surface, since, as was mentioned above, the outer and interior surfaces are frequently of different slip color. In discussing the decoration of the unslipped sherds I have counted as incised only the sherds which show only incision. Those which also showed corrugation or punctation are classified as corrugated or punctate (Table 163).

Except for the corrugated ware, it would be impossible to determine by visual inspection that the Shipibo pottery was manufactured by the coiling process. The sherds show a
very angular fracture, more like porcelain than like the rest of the ceramics from the Yarinacocha region and there is absolutely no tendency to fracture in horizontal lines.

Observation of the modern Shipibo pottery indicates that all Shipibo ceramics are manufactured by coiling and that great care is taken to obliterate the coil junctures. The intensive use of a rather broad polishing tool is clearly demonstrable from the vessel surfaces, and from observation we know that this is either a pebble or a synthetic polishing stone of fired clay.

Summary of the Shipibo Ceramic Complex

The modern Shipibo Ceramic Complex is an elaborate and well differentiated assemblage of pottery. The modes are clearly defined and executed with a high degree of precision. The pattern of mode combination is tightly structured. The most striking contrast in the ceramic complex is between the unslipped, cooking pottery, and the elaborated, slipped and painted ware used for all other purposes.

As was the case with the Early Tutishcainyo Complex, there is essentially no plain ware. The slipped ware invariably bears elaborate bichrome or polychrome designs; and the unslipped ware is decorated by punctuation, corrugation,
and incision. There are two basic color schemes, white on red, and black and red on white, but the frequent use of the unslipped ground color in combination with the other three colors, and the occasional use of blue with the white, slipped polychrome somewhat blur this basic dichotomy. The interior and exterior surfaces of a vessel are frequently given contrasting slips. There is considerable overlap in the use of the two basic color schemes, but the red slipped bichrome is more frequently used on smaller vessels, especially food bowls, while the white slipped polychrome is most common on beer vessels, water jars, and large brewing urns. The white slip is always given a resin coat after firing, but this is not the case with red slipped vessels.

A full analysis of Shipibo design is beyond the scope of the present work and deserves a monograph to itself.

Summary of the Ceramic Sequence

Fig. 128 presents a synopsis of the ceramic sequence of the Yarinacocha area. The major vessel forms of each complex are illustrated along with the percentage which each makes up of its complex. Indications are given as to the probable historical relationship among the several complexes. In some instances, such as the relationship between Early and Late
Tutishcainyo, the ties are fully demonstrated; in other instances, such as the proposed relationship between Hupa-iya and Pacacocha, these are little more than hunches. I have ordered this data according to my estimate of chronology which is discussed below.
Miscellaneous Ceramic Artifacts

Discs of Sherd

Discs chipped from potsherds are fairly common in the Early Tutishcainyo deposit at UCA-6. Table 164 shows the distribution of this class of artifact in Cut 1. Aside from these, the only specimen recovered was from Cut 3, UCA-2 (Fig. 53 j). This latter specimen apparently dates from fairly late in the sequence.

The range in size and workmanship of the Early Tutishcainyo discs is illustrated (Fig. 34 n-r). There is no clear indication of their purpose. Most are perforated, but some are not. The perforated specimens might have served as spindle whorls since the Early Tutishcainyo Complex lacked modeled spindle whorls. It is also possible that these objects might have been gaming pieces. Rowe mentions the use of sherd discs for this purpose in the Cuzco area.\(^{133}\)

Spindle Whorls

Hand made, modeled spindle whorls are a class of artifact which appears to have considerable value as a time marker on the central Ucayali. With the exception of one
specimen questionably associated with the Shakimu Complex (Fig. 53 k), spindle whorls make their first appearance along with the Hupa-iya ceramics. Spindle whorls are a reasonably common trait in Hupa-iya refuse. Tables 165 and 166 show the distribution of plain and decorated spindle whorls in Cut 4, UCA-2. Aside from these, one plain whorl came from Level 3, Unit 32, Cut 3, UCA-2. The majority of whole specimens and all complete or nearly complete designs are illustrated (Figs. 97-99). The decorated specimens are of greatest interest in that they give the only complete examples of Hupa-iya design layouts. The designs on the spindle whorls follow the same stylistic rules as those on bowls and pots. Table 167 gives measurements for the Hupa-iya spindle whorls.

It can be noted from the illustrations that the common Hupa-iya spindle whorl shape is spherical, but a few eccentric shapes were recovered. The workmanship on these objects is of high quality, and the best specimens were decorated with great care.

The one example of spindle whorl associated with the Yarinacocha Complex is of cylindrical shape (Fig. 107 g). The finish on the whorl is the floated surface typical of all other Yarinacocha Complex ceramics, and the provenience also indicates Yarinacocha associations.
The spindle whorls associated with the Pacacocha Complex are illustrated (Fig. 112 f,g,i-k,n,o; Fig. 114 f,k). The surface of these objects is uneven, pitted, and irregular, and, in fact, is identical to the surface on other Pacacocha ceramics. The shapes are poorly executed, and most specimens are definitely lopsided. Typical Pacacocha shapes include subspherical (flattened along the axis of perforation), biconical, cylindrical, and spool shaped. The Pacacocha Complex thus shares the cylindrical shape with the preceding Yarinacooha Complex and the biconical shape with the present Shipibo Complex.

All modern Shipibo spindle whorls are carefully made, biconical objects with a very sharp ridge separating the upper and lower halves. They are typically slipped with red and frequently have white painting in standard Shipibo white on red style. No specimens were recovered from the excavations, but I was able to observe a large number still in use. No illustrations are included, since these objects have been frequently illustrated in other publications.134

Fire Dogs (Topia)

Three examples of topia fragments are illustrated (Fig. 123). A single form seems to be represented by all of
the fragments recovered, that of a moderately tall cylinder with a moderate expansion or flange at both ends. Topia are no longer in use on the Central Ucayali, but the form of the archaeological specimens from Yarinacocha is precisely repeated in the ones still used by the Arawak speaking Piro up the Urubamba towards Cuzco. This form of topia has a widespread distribution both archaeologically and ethnographically in South America. Cruxent and Rouse cite solid topia as part of various of their Venezuelan styles ranging from their Period II through Period V. This form of topia is illustrated ethnographically for the Guianas by both Evans and Meggers and Farabee.

The distribution of this class of artifact in Cuts 2 and 4 of UCA-6 and Cuts 3 and 5 of UCA-2 has already been presented (p. 117; p. 122; p. 143; Table 105). In all four cases the pattern of distribution is compatible with Pacacocha associations, and in Cut 5, UCA-2, the Pacacocha associations are fully demonstrated. It is clear that most and probably all of these objects are the result of the Pacacocha occupations.

**Figurines**

Human figurines are not numerous in the collections from Yarinacocha.
Present evidence suggests that such objects were made only by the people responsible for the Pacacocha Tradition.

One complete but badly eroded example is part of the surface collection of Pacacocha material from UCA-4 (Fig. 114 a). Feet from two other specimens are part of the same collection (Fig. 114 g,h). All of these are identical to the Pacacocha sherds in paste and surface finish.

In the collection made by Tessmann, now at the American Museum of Natural History, there is one specimen from UCA-2 of particular interest. It is the head of a human figurine. The paste and firing suggest Pacacocha affiliations, but the surface finish is somewhat better than usual. Tessmann illustrated the specimen, but it is of sufficient interest to illustrate again (Fig. 114 c). A fragment from Cut 2 of UCA-2 may be the foot of a figurine and its characteristics are suggestive of Pacacocha derivation (Fig. 114 i).

Two fragments in Tessmann's collection from Nueva Paris are clearly in the Pacacocha Tradition in terms of their paste and firing. They are parts of human or animal figurines (Fig. 114 d,j).

Amorphous, Baked Clay Lumps

The tremendous quantity of amorphous, baked clay
fragments, which was characteristic of the middens in the Yarinacocha area, presents a major problem in functional interpretation. These unformed lumps of clay are different from the fired clay fragments which are clearly part of wattle and daub walls (Fig. 122) and from the fragments of fire dogs (topia). These amorphous lumps of clay are only partially fired and the surfaces in no case show the effects of smoothing or forming.

In various of the other alluvial, stoneless areas of the world synthetic stones of fired clay are an important cultural trait. This is true of the Central Valley of California, the Lower Mississippi Valley, and the Gran Chaco. In these instances the synthetic stones are well shaped. Though use as cooking stones in the stone boiling process seems to be the likely explanation for most of these objects, those of Central California and of the Poverty Point culture of Mississippi and Louisiana show a wide variety of forms. Apparently several discrete functions were involved. It is perhaps significant that these synthetic stone complexes are most fully developed in those cultures lacking a fully developed complex of ceramic vessels.

On the basis of a great familiarity with the baked clay objects of the Central Valley of California and a considerable acquaintance with those of the Lower Mississippi Valley, I can
state unequivocally that the clay lumps from Yarinacocha have nothing to do with this kind of development.

Though these clay lumps lack any obvious cultural patterning, they do seem to be a cultural rather than a natural phenomenon, and may be of considerable significance in the study of Tropical Forest archaeology. Meggers and Evans note similar occurrences in Ananatuba, the earliest complex in their sequence at the mouth of the Amazon.143 In the Yarinaochocha sequence these clay lumps are most characteristic of Early and Late Tutishcainyo, the two earliest complexes. After Late Tutishcainyo such lumps show a relative decrease in frequency. (This can be noted by comparing the number of lumps in each level with the number of sherds per level.) They are still relatively common in the Shakimu and Hupa-uya Complexes but seem to be of minor importance after that.

I would like to suggest the hypothesis that these clay lumps may be the residue of certain culinary practices which have been noted in various parts of Tropical South America. We have Roth's descriptions of edible earth and the use of clay to extract the starch from various crops.

Though the Otomac were essentially an agricultural people, ... they did not, however, store their harvests, but just enough for the purposes of sowing. Among all the nations they alone
knew how to make food and starch from the various fruits and roots which the others discard as being bitter, or but little wholesome. "The bread", says Gumilla, "is made as follows, its manufacture being woman's work: Each one has in the neighborhood of the river the necessary pits. In each pit there is fine chalk (grada) or picked clay, well kneaded and pounded by dint of constant water in which they keep it, after the manner of the clay which potters use in making fine earthenware. In the center of the said clay they bury the maize, fruits, or other grain, the substance of which they have to extract, and after a definite number of days the mixture arrives at maturity—i.e., the buried grain reaches the point of sourness (arric). When it is time they take out the clay, already kneaded and well mixed up with the starch, and place it on earthen pans specially made for the purpose. Kneading it a second time with a large quantity of water they pass it through a strainer, manufactured with this object, and the very liquid mass falls into other clean pans. Here it rests, the earthy sediment with the starch of the grain or fruit sinking to the bottom, and leaving the water clear on top. This water they drain off. They then take a large quantity of turtle or alligator fat, stir it up, and mix it with the sediment, to form rounded loaves, which are then put in the ovens. If no fat is available they content themselves without it. The heat of the
ovens dries up the moisture. If fat has been used the paste comes out of the oven soft; if not, as hard as a brick. Owing to the crunching of the earth during mastication it has been stated that the Guamo and Otomac feed themselves on earth” (G,I, 177).

It seems possible that this hypothesis could be tested by studies of groups still maintaining these practices, if any are extant, and perhaps by chemical analyses of the clay lumps themselves. So far no such analyses have been made, since the idea occurred to me only after the report was largely finished. If the hypothesis could be verified, it would be an important archaeological tool in tracing the distribution of various forms of starch utilization through lowland South America.

The lack of cultural patterning makes these objects difficult subjects for analysis and quantification. Simple counts of lumps per level are given for each of the major cuts in Tables 168 through 177. For two units, Unit 5 in Cut 1, UCA-6, and Unit 41 in Cut 3, UCA-2, scattergrams of individual weights per level and the total weight per level are presented (Tables 178 and 179). The two units selected make it possible to relate these data to each of the four early complexes.

None of these objects are illustrated since the illustrations would show nothing.
Stone Artifacts

Introduction

In contrast to the wealth and variety of ceramic materials recovered from the excavations at Yarinacocha, stone artifacts were rare. Carefully made, ground stone axes formed the only group of lithic tools represented by a fair sized sample. Aside from these, the total amount of consciously shaped, lithic objects recovered in the course of excavations and surface collecting could be held in one hand.

With a sample of this nature it is impossible to describe a lithic complex to go with each of the ceramic complexes analyzed above. In some instances individual specimens can be ascribed to a particular occupation with a fair degree of certainty, but for none of the occupations are such specimens sufficiently numerous to permit the full definition of a lithic complex. Under these circumstances, it seems best to treat the lithic material as a unit, giving the provenience for each excavated specimen.

Since the region around Yarinacocha is devoid of natural stone, all of the lithic material recovered in the middens had to be imported from some distance. The sources of this lithic material may give important information as to
the direction and nature of trade relations, so all of the stone in the middens, whether worked or unworked, was saved and taken back to the United States. An identification of all of this material is presented as a part of Appendix A of this report.

Stone Axe Heads

The absence of unfinished specimens of suitable raw materials and (with one exception only) of stone working tools, all suggest that the stone axes recovered in the Yarinacocha region were manufactured elsewhere, and traded in a finished state from a considerable distance. The fact that these axes are predominantly of igneous rock suggests that the manufacturing centers lay within the Andes. Most of the specimens are from the surface, but a sufficient number were recovered in context so that it is possible to make some generalizations as to the chronology of this artifact class.

It is assumed that these tools were used mainly for clearing agricultural land. It is noteworthy that the use of these tools spans the full sequence uncovered at Yarinacocha, since axes are definitely present in Early Tutischeinyo occupations, in Hupa-lya occupations, and in Pasacocha occupations, and there are probable associations for the other major occupations.
All of the specimens recovered in the course of the work at Yarinacocha fall into the general rubric of "T-shaped" axes, though an examination of the accompanying illustrations demonstrates that they show considerable variation in form. There is a hint of chronological trends in this variation, though the sample is too small to give a statistically valid confirmation.

An extremely well made form with long, downwardly pointing ears and a deep basal groove is best represented by Fig. 125a. The context of this piece (Level 7, Unit 6, UCA-6) is definitely Tutishcainyo and most likely Early Tutishcainyo. A similar specimen represented by a small butt fragment is also illustrated (Fig. 125 e). This is from Cut 6 of UCA-2, and could be associated with either Shakimu or Hupa-iya materials. A much battered fragment lacking both butt and bit is illustrated in Fig. 125 b. It does, however, still retain the grooves under the ears, and in this feature resembles the two specimens just discussed. It is from Cut 1, UCA-6, and is either Early or Late Tutishcainyo, more probably the former. The two associations with Tutishcainyo middens, and one possible association with Shakimu material suggest that this form of axe was traded into the Yarinacocha area early in the sequence.

A second form of axe differs both in general form and in details of manufacture. It has blunt, rounded ears
and a slightly convex base which is either ungrooved or has only a vestigial groove. The grooves under the ears give clear indication of having been made by the string cutting process. If this technique was used in the shaping of the ears of the previously discussed form, there are no indications on the completed specimens. Examples of this form are more numerous (Fig. 125 c, d, f-h; Fig. 127 a). In both Cut 3 and Cut 4 of UCA-2 there is clear indication of the association of this form with the Hupa-iya occupation, and the one large fragment from UCA-4 is clearly associated with the Pacacocha occupation there. These data suggest that this form of axe, with its string cut ears, was first traded into the Yarinacocha region during the Hupa-iya occupation, and continued in use for some time thereafter.

A third form, in which the base is thin and convex and the ears are only weakly demarcated from the body, is represented only by specimens collected from the surface (Fig. 127 f-h). It is impossible to attribute this form to any particular occupation.

There are a couple of oddities in the axe collection. The complete specimen illustrated in Fig. 127 c is obviously too small to have been used as an axe, though it might have served as an adze blade. Its shape, however, is typical of the second form of axe discussed. A fragment of an axe bit,
recovered from Cut 2 at UCA-2, is of a highly laminated, sedimentary rock. In its present condition it is so fragile as to be useless as a chopping tool. It is hard to imagine why an axe would have been manufactured from such inferior material.

The provenience data, material, and measurements of all axe heads are presented in Table 180.

There is considerable comparative material concerning "T-shaped" axes in South America. Such axes are common in westcentral South America, being particularly numerous in Ecuador, Peru, Bolivia, and Northwest Argentina. They have continued in use up to recent times in the Northern Chaco, and we have information on the method of hafting from this region. Rivet and Nordenskold have done distribution studies of the various forms of stone axes, but their works give no indication of the time depth of any particular form.

I could expand their map by using the fairly extensive collection of stone axes made by Tessmann in the Peruvian Montana, which is now at the American Museum of Natural History. A study of this collection indicates that all of the forms described above plus a number of forms not present in the Yarinacocha collections are widespread in the Peruvian Montana. I have not prepared such a map since these axes deserve more study than I have given them, and to include them here would further
expand an already unwieldy monograph.

Axe heads of the earliest form represented at Yarinacocha were recovered from the Cave of the Owls in the Huallaga Valley. It is well known that "T-shaped" axes occur in Highland and Coastal Peru. It is frequently stated that such an axe is typically or exclusively an Inca form. This particular statement has been repeated by Carneiro in a recent article. Since it seems unlikely that the whole Yarinacocha sequence is Post-Inca, it would be well to examine the published literature with reference to "T-shaped" axes in the Central Andes. The most important specimen is one described by Bennett, but not illustrated. The axe is associated with one of the Chiripa houses. Because of the importance of this piece and because it has never been illustrated, I have included a drawing of it along with the Yarinacocha axes (Fig. 127 i). The recent publication of Tello's manuscript on the excavations at Chavín de Huantar includes illustrations of a number of axes. Several of these are identical to the axes associated with the Early Tutishcainyo Complex. For purposes of cross dating, it would be useful if these could be associated with a particular occupation at this most important site. Unfortunately, the fill from which they came contained Chavín sherds, Recuay sherds, and Marañon sherds (I assume that this last category means one
of the complexes in the Reichens' Cajamarca sequence.\textsuperscript{154})

In any case, a pre-Inca date is indicated. A "T-shaped" axe with feebly developed ears is associated with one of Brown's non-ceramic and probably preceramic sites in the Tumbes area of the North Peruvian coast. For the Guayas Basin of Ecuador Estrada has indicated that such axes are later than the Chorrera and Tejar Complexes but predate Inca influence in this region.\textsuperscript{155}

On the basis of the preceding quick survey it is clear that the "T-shaped" axe occurred in the Southern Highlands well before the time of Christ, and this may well have been the case for the Northern Highlands. It is definitely inaccurate and misleading to refer to all such specimens as "Inca" axes.

Stone Artifacts other than Axes

Stone artifacts other than axe heads number only 10. All are illustrated in Fig. 124.

Fig. 124 a is a hammerstone of low quality flint, much used, and weighing 10 ounces. Its provenience, level 9, Unit 3, UCA-6, indicates Early Tutishcainyo associations.

The specimens illustrated in Fig. 124 b and h are both abrading tools of sandstone. The specimen in b is relatively coarse grained, and offered a broad, flat abrading surface. Its provenience, level 7, Unit 7, UCA-6, indicates Early Tutishcainyo
associations. The other abrader (Fig. 124 h) shows the kind of multigrooved form which in North American archaeology is usually designated as an awl sharpener. In Tropical Forest South America such tools were probably used to sharpen bone and hardwood arrow and spear points. The piece is of even, moderately fine grained sandstone. Its small size and multiple grooves suggest extensive use over a long period of time. It would appear that good quality whetstones were difficult to come by in the central Ucayali Valley and were cherished. The specimen was collected from the surface of UCA-2.

The specimens illustrated in Fig. 124 c,d, and e are all fragments of carefully ground and polished sandstone, in each case one surface is slightly concave as if it were the interior of a vessel. I suspect that they are fragments of sandstone dishes or trays. Tessman illustrates a nearly complete specimen of such a tray, and all of the present specimens could have come from such an artifact. Fig. 124 c is from the surface of UCA-2; Fig. 124 d is from level 16, Unit 18, UCA-6, a location which would be compatible with either Tutishcainyo or Yarinaccocha associations; and the fragment illustrated in Fig. 124 e is from level 8 of Unit 7, UCA-6, a provenience indicating Early Tutishcainyo associations.

Fig.124 f illustrates a carefully shaped, much used
block which appears to have been used as a polishing stone for finishing ceramics. The convex upper surface shows a high, use polish, while three of the sides show carefully shaped concavities which function effectively as finger holds. There is an Eskimo-like nicety to this tool, with regard to the care with which it is fitted to the grip. It would appear that good polishing stones were also hard to come by and much valued on the central Ucayali. The provenience of this specimen, level 4, Unit 15, UCA-2, indicates Hupa-iya associations.

Fig. 124 g illustrates a block of hematite which has been extensively ground on all of its surfaces, apparently to produce pigment. Its provenience, level 1, Unit 29, UCA-2, suggests association with the modern Shipibo occupation on the site, however, the modern Shipibo potters use a yellow limonite pigment for painting their pottery, which alters to hematite during firing.

The specimens illustrated in Fig. 124 i and j are the only two examples of flaked stone tools from the excavations. Both are of a cream to tan flint of rather poor quality. Fig. 124 i is an irregular flake with retouching along both of its longer edges. These edges show evidence of considerable use. Because of the slight concavity of its edges this tool would have functioned effectively as a spokeshave. The provenience, level 10, Unit 28, UCA-2, indicates Shakimu associations.
Fig. 124 j is a crudely flaked disc of stone which may have functioned as a scraper but shows little direct evidence of use. Its provenience, level 4, Unit 4, UCA-6 is suggestive of Late Tutishcainyo or Yarinacocha associations.
Functional Interpretations

Introduction

There are a number of factors which make the conjunctive approach as advocated by Walter Taylor relatively un.rewarding in the case of the Yarinacocha excavations. The nature and scope of the excavations themselves were not designed to give maximum information concerning house and village plan; the alteration of the middens made it difficult, and in some instances nearly impossible, to follow and interpret archaeological features; and the preservation was very bad, so that all materials except stone and pottery had completely disappeared from the middens. In spite of these limitations, it seems essential to attempt to put a minimum of flesh around the smashed and eroded sherds which make up the bulk of archaeological data in the central Ucayali. Such reconstructions must of necessity involve a considerable amount of speculation.

In this reconstruction I will treat each complex separately, attempting to utilize all available data which may bear on the various aspects of each culture.

Early Tutishoainyo

The one extensive Early Tutishoainyo midden excavated,
the lowest cultural stratum at UCA-6, gives considerable information on Early Tutishcainyo settlement pattern. The excavations did not expose the full extent of the Early Tutishcainyo midden but did reveal a continuous blanket of refuse up to 18 inches deep and extending at least 55 feet in one axis and 40 feet in the other. Two edges of the midden were found, but there is no indication that the excavations came anywhere close to the other two edges. I think it probable that the settlement which produced this midden consisted of more than one house. As was mentioned earlier, the midden did not grow equally in all areas suggesting several sources of refuse.

There were no indications in the Early Tutishcainyo midden that the occupation was intermittent, or that several discrete periods of occupation were involved. All evidence suggested that the 18 inches of midden were laid down during a continuous span of years. It would be difficult to put a precise estimate on the number of years necessary to deposit a midden of this magnitude under the condition of rainfall and preservation found in the Yarinacocha area. In terms of the quantity and thickness of midden left by the fairly large group of Shipibo that has been living at San Francisco de Yarinacocha for the last 40 or 50 years, I feel that a couple
of centuries would not be an excessive estimate. To reduce this estimate one would have to invoke a really dense concentration of people in a small area.

It would appear that the Early Tutishcainyo midden is the result of a long continuous occupation by a fairly large social group, certainly more than an extended family, and probably in the 100 to 200 person range. Without information on the number or arrangement of houses, it would be fruitless to speculate on the structure of this social group.

The few post molds encountered were insufficient to suggest a pattern. The possibility that pile dwellings were used should be investigated further. Though there is little evidence on house plan, it is clear that the houses had closed wattle and daub walls. There seem to be at least two patterns of adaptation to the mosquito menace of the Amazon Basin. One of these is a closed, deliberately smoke filled house with wattle and daub or bark slab walls, and the other is an open house without walls in conjunction with a mosquito bar. The people of the Early Tutishcainyo occupation were apparently utilizing the first alternative. It is a somewhat irrelevant but highly probably inference that they suffered a good deal from sore eyes.

There is some information on the nature of Early Tutishcainyo economy and a number of other inferences may be
made with a certain degree of probability. The occurrence of fish bone and fish scales in a fairly large number of Early Tutishcainyo sherds suggests that, then as now, fish were a major part of the diet and the principal source of protein. The importance of fishing indicates the use of some efficient form of canoe, either dugout or bark. The high degree of permanence of the community, in an area where neither hunting nor gathering are very productive economic patterns, suggests intensive agriculture. The lack of the specific ceramic forms associated with the processing of bitter manioc suggests that sweet manioc, or perhaps sweet potato and New World yam were the staples. The presence of stone axes, which were traded in from a distance and presumably at considerable expense, is an indication that such tools were necessary for clearing agricultural land. The available evidence suggests an economic pattern not markedly different from that of the modern Shipibo.

The complexity of the ceramic complex, and the care with which the individual pots were made and decorated all speak of a people with a secure economic basis. It would also appear that there was considerable interest in art style as expressed through material culture, and that ceramics were a major focus of this interest. The number of distinct form categories present in the ceramics suggests that culinary
practices and the etiquette of food serving were well developed. It seems likely that each of these forms served a specific function.

An attempt to specify the function of each of the form classes must remain highly speculative. I would suggest that the large, labially flanged vessels, which are the most common Tutishcainyo ceramic form, were cooking pots. I would also think that the differences in the form of the basal angle might well have functional significance. I would identify the shallow, concave sided bowls as individual food bowls. The vessels with tall, slightly insloping sides rather resemble cups, and I suspect that this was their function. The closed, double spouted bottles were probably water bottles used to bring water from the stream to the village and to store it until needed. I believe that the huge, straight sided urns, represented by only three sherds, were brewing urns. This is is a crucial inference, since such an early date for beer in the Amazon Basin would have considerable historical importance. My reasoning follows. The size indicated by the mouth diameter of these vessels is larger than that needed for an ordinary cooking pot, but compatible with a batch of beer. This vessel shape is rare in the midden, possibly because only a few brewing urns were needed in the village at any one time. It is true that today Shipibo treat their brewing urns with care
since their great size makes them difficult to form and to fire. The urns are not moved around much and have a very high life expectancy. Though a number of urns were in use in the village of San Francisco de Yarinacocha, I did not find one sherd from such an urn in my excavations. It is probable that the earlier people took equally good care of their brewing urns. Finally, the presence of cup form vessels, which will stack neatly without spilling their contents, suggests to me the presence of both alcoholic beverages and the Tropical Forest pattern of drinking bouts.

Evidence of trade objects indicates that contact with some surrounding groups was at least occasionally amicable. Considering the importance of stone axes to the economy, stable trade relationships would seem necessary. The small amount of sanidine tempered trade ware indicates that some pottery was habitually imported from outside the social unit. It is difficult to see how any strictly utilitarian needs were fulfilled by this particular aspect of the Early Tutishcainyo trade relations. Aesthetic or prestige factors seem to be a more reasonable explanation for this trade in ceramics. This interpretation reinforces the earlier suggestion that Early Tutishcainyo society had a secure economic base. It will be interesting to discover on the basis of further work whether the stone axes and the sanidine tempered pottery had the same
source or were introduced along separate trade routes.

Late Tutishcainyo

There is no evidence of major change in subsistence pattern, group size, or settlement pattern between Early and Late Tutishcainyo. The deep, dense Late Tutishcainyo midden at UCA-6 indicates an intensive occupation of long duration. The size of the village area was not determined by the excavations, but all indications were that Cut 1 was close to the eastern and southern boundaries, and that the settlement extended a considerable distance to the North and West. There is no direct evidence that wattle and daub construction continued into the Late Tutishcainyo occupation, but its occurrence in the following occupation in the Yarinacocha area, Shakimu, suggest that such was the case.

The basic pattern of form categories present in Early Tutishcainyo is retained to a large degree in Late Tutishcainyo but with some modification in the details of vessel shape. The shallow, concave sided bowls, those I have identified as individual food vessels, show the least modification in both shape and decoration. The deep bowls with insloping sides, those which in Early Tutishcainyo I have suggested served as cups and probably beer mugs, also show relatively little
modification. In this particular vessel category it is sometimes impossible to distinguish an Early Tutishcainyo rim sherd from a Late Tutishcainyo rim sherd. The large, deep, concave sided vessels, which seem likely candidates for cooking pots, show a more rapid modification through time, with labial flanges largely disappearing and basal flanges becoming rarer. New varieties of rim modification and basal angle modification replace the earlier forms. A large, wide mouth vessel with convex sides is added to the repertoire of pots perhaps indicating the introduction or development of an additional pattern of food processing. Water bottles with paired spouts continued, and are somewhat better made and more common than in Early Tutishcainyo.

The details of ceramic manufacture permit some interpretative comment. Late Tutishcainyo ceramics show less variability as to temper. Most potters have by this time settled on a fairly coarse, sherd temper. In terms of firing, the Late Tutishcainyo pottery is superior to that of Early Tutishcainyo. It is more consistently oxidized and harder. Incised decoration is executed with far less care than the incised decoration of Early Tutishcainyo pottery. This might be construed as an indication of a less secure economic base and consequently of less time to be spent on niceties of
None of the other evidence supports this view, and the increased trade in ceramics suggests a large economic surplus. I would suggest that the decline in interest in incised decoration is the result of the exhaustion of the artistic possibilities of the relatively simple and strictly structured decorative tradition of Tutishcainyo. In other words, it illustrates Kroeber's concept of pattern exhaustion. Perhaps as a compensation, Late Tutishcainyo pottery shows elaboration in plastic adornment such as fancy lugs and tall angular rim tabs. These elements of ceramic decoration are carefully made and show considerable technical control. It would appear that in Late Tutishcainyo ceramics aesthetic emphasis was on plastic adornment and refinement of shape, rather than on incised decoration.

Trade with outside groups continued and expanded over the level maintained by the Early Tutishcainyo community. By sherd count four or five per cent of the pottery broken by the people of the Late Tutishcainyo occupation was the exotic Sanidine Tempered Ware. It is clear that the Late Tutishcainyo economy permitted a sufficient outflow of goods to balance the import of this large quantity of ceramics.

Shakimu
The only Shakimu component discovered was that at UA-2. It is rather difficult to interpret the evidence as to the size and nature of the midden without further excavation. Cut 3 gave the only indications of a deep, concentrated midden, but most of the other cuts showed that a thinner layer of Shakimu refuse was scattered over most of the area of the site, extending for at least a third of a mile along the bluff. The essential identity of the Shakimu material from all areas of the site suggests that all of the Shakimu occupation here was roughly contemporaneous. One feasible explanation of the nature of the midden is that it represents a large community of several hundred people which remained at this locality for a century or so, and that the differences in midden depth represent functional differences among the several areas of the site. Perhaps there was also systematic disposal of rubbish at designated spots. The original function of the deep, excavated pit in Unit 28, Cut 3, has not been explained, but it was rapidly filled with trash once it ceased to serve this function.

Aside from the indication that the Shakimu community was of considerable extent, there is no direct evidence as to village layout. Likewise, evidence of house plan is lacking, but it is certain that at least some of the houses had wattle and daub walls.
Direct evidence concerning the economy is lacking. There is no indication of extensive change from the subsistence patterns of Early and Late Tutishcainyo, and, if my suppositions about Early Tutishcainyo are correct, then it is probable that the makers of Shakimu pottery lived as root crop farmers, with sweet manioc as a staple, and greatly augmented their supply of protein by fishing.

Functional interpretations of Shakimu vessel forms must remain highly conjectural. Most of the large, concave sided urns may have served as cooking pots, while some of the largest examples could well have been used as brewing vessels. I would guess that the smaller, concave sided vessels were individual food bowls. I would identify the vessels with straight, slightly insloping sides (Fig. 60 a-c) as cups and beer mugs. Certain of the other forms, such as the compound profile vessels which resemble inverted World War I helmets, offer no clues as to their probable functions.

Certain characteristics of Shakimu ceramics may offer clues to the social patterns of the people responsible for them. For the first time in the sequence the ceramics show a contrast between a plain ware and a carefully decorated ware. A large percentage of Shakimu pottery received no decoration other than careful polishing. A smaller segment
was elaborately decorated with complex, excised designs executed with a high degree of technical control. I would suggest that relatively low percentages of decorated sherds, and a maximum contrast between decorated and undecorated ware is likely to be indicative of a stratified society. A material culture in which some members of a particular class of objects receive far more attention and elaboration than other objects in the same general class seems compatible with a value system in which certain members of the class of humans are thought worthy of receiving far more attention and veneration than other members of the class of humans. Whatever explanation, this proposition would seem to find support in the data of New World Archaeology. For societies for which we have independent evidence of strong stratification, one finds a high percentage of plain, or plain, slipped ware, and a relatively small percentage of ware which is elaborately decorated. This is true of Moche\(^{160}\) and of the Classic Maya.\(^{161}\) It is also true of Marajoara, which Meggers and Evans have judged to be a stratified society on the basis of other lines of reasoning.\(^{162}\) It would appear to be true if we compare the largely egalitarian Pueblo societies of contact times with the highly stratified societies of the Lower Mississippi Valley. In the first case all vessels of a particular shape were usually decorated or treated in the same way, while in the second case most vessels
of a particular shape might be plain, but those that were decorated were decorated with a high degree of elaboration and technical competence. 163

The converse of this proposition would be that societies which decorate all vessels of a particular class, or which decorate no vessels are probably egalitarian. In the first case the percentage of decorated pottery, judged either by shard count or vessel count, should be high, as in the case of Early Tutishcainyo, while in the second case the percentage of decorated ware would be almost zero as in the case of the Pacacocha Complex. Fischer has recently suggested another set of criteria by which one might separate the artistic products of an egalitarian society from those of a stratified society. 164 In the first case the art style should consist of a series of similar or identical design elements in co-ordinant relationship, while in the second case the design should consist of smaller numbers of major elements with a large number of minor elements in a subordinate relationship to them. Since the fragmentary nature of Shakimu pottery and the non-repetitive nature of most Shakimu designs make the complete restoration of Shakimu designs impossible, it is difficult to evaluate Shakimu art on the basis of Fischer's criterion. What is preserved suggests that smaller elements, especially scrolls, are in a subordinate relationship to the
large masses of the design. The lack of a simple symmetrical relationship between design areas also is indicative of the lack of strictly co-ordinant relationships in the design. In terms of both sets of criteria discussed there is a suggestion that the society responsible for Shakimu pottery had some degree of social stratification, since these people made a relatively small percentage of elaborately decorated ware and since, in so far as we can judge, the relationship between design elements was not strictly co-ordinant. Using the same criteria, Early Tutishcainyo should be judged to be made by an egalitarian society, since all pottery was decorated, and in almost every case the individual design elements were repetitive and in a completely co-ordinant relationship.

In terms of artistic excellence, judged either by elaboration or control of execution, and probably in terms of social complexity, the culture responsible for the Shakimu ceramics must be judged as the climax development in the central Ucayali, though available evidence would suggest that denser populations were maintained during the following, Hupa-iya occupation.

Hupa-iya

The only Hupa-iya component encountered was at UCA-2.
here it was by far the most important component in terms of thickness of midden, amount of area covered by the midden, and number of sherds recovered. The evidence analyzed in the previous chapter suggests that all of the areas of Hupa-iya midden at UCA-2 were contemporaneous. The Hupa-iya midden is discontinuous, but areas of dense occupation occur for a distance of at least a third of a mile along the bluff. This was a large community. I would suggest that several hundred people were involved. The depth of the midden in most of the cuts, indicates that the occupation was of long duration. Two to three centuries seems a conservative estimate. The Hupa-iya occupation at UCA-2 was thus the most considerable encountered in the Yarinacocha region.

There is no direct evidence concerning village layout or house plan. Since the number of cubic feet of dense Hupa-iya midden excavated was large, the absence of indications of wattle and daub walls may be significant and not just the result of sampling error. If wattle and daub houses were no longer constructed there is no indication of what kind of house replaced them.

There is some evidence of a change in subsistence pattern. The series of vessel shapes in the Hupa-iya Ceramic Complex is markedly different from that of the previous occupations.
on the central Ucayali. This fact would suggest a change in the pattern of food processing, and possibly a change in the nature of the foods used. In a later section of this monograph I will argue that there is a close historical relationship between Hupa-iya ceramics and the members of the Barrancoid ceramic tradition in Venezuela and British Guiana. In fact, I feel that Hupa-iya is clearly a member of the Barrancoid Tradition. It is geographically rather far removed from the other described members, but is not particularly divergent in form.

All members of the Barrancoid Tradition from the earliest style, Barrancas, to late examples such as the later part of Mabaruma appear to share a basic set of vessel forms. These vessel shapes have survived up to the ethnographic present in certain parts of British Guiana, and on the basis of Roth's, Im Thurn's, and Gillin's ethnographic descriptions, we are certain of the present function of each of these vessel shapes. It is a reasonable assumption to project these functions backward on the archaeological manifestations of these particular vessel shapes. If this is true for the Venezuelan and Guiana members of the Barrancoid Tradition, it should also be true of the Ucayali member of the Tradition, Hupa-iya.

The most important of these identifications in terms
of subsistence economy is that of the squat, globular pot
with broad mouth and thick, everted rim. In northern British
Guiana this is the "Buck Pot" or tumai'ene. 170 It is
intimately associated with the processing of bitter manioc,
and is used under the manioc press in order to catch the juice.171
It is also the basic cooking pot in which "pepper pot" is made.

The squat vessel with everted rim which is so common
in all of the Hupa-iya midden excavated would have been
identified as a cooking pot without recourse to the ethnographic
literature, but it seems probable that it is specifically a
"Buck Pot", and may well have functioned as such on the central
Ucayali. If this is the case, it would follow that the whole
pattern of bitter manioc agriculture and the elaborate processing
methods which were developed in northern South America were
introduced into the central Ucayali at this time. The "Buck
Pot" implies not only bitter rather than sweet manioc, but also
some form of basketry press. If this interpretation is correct
then the increased efficiency of bitter manioc over sweet manioc
may explain the apparent increase in population at the time of
the Hupa-iya occupation.

There is one factor which might cause one to question
the hypothesis that a fully developed pattern of bitter manioc
utilization was introduced into the central Ucayali at this
time. Hupa-iya lacks ceramic forms which can be readily identified
as comals. It is possible that the round plates, which are relatively common in the midden, functioned as comals.

Following the ethnographic identifications from British Guiana, the other major Hupa-iya shapes should have served the following functions. The open bowls, which are by far the most common of Hupa-iya vessel forms, are individual food bowls. These are called sapura by Roth,¹⁷³ and karupu by Gillin.¹⁷⁴ The deep, cylindrical urns, which are rare in the middens, are brewing urns. (Compare Fig. 90 d with Roth, Plate 83 C.)¹⁷⁵ The bi-convex vessels with strap handles, which are common in Hupa-iya and in Venezuela and British Guiana, are water jars. Roth has recorded the name samako for these.¹⁷⁶ The broad, shallow basins (Fig. 91 a,b) are "Buck Pot" lids. Gillin notes that there are modal units of size for particular vessel shapes, and that these are functionally significant.¹⁷⁷ It will be remembered that clear definition of modes of size was characteristic of Hupa-iya. Miniature vessels, which are frequently met with in Hupa-iya, may be the work of children learning ceramic procedures.¹⁷⁸

A characteristic of much Hupa-iya ceramics, especially of the food bowls, is that they have perforated lugs or adornos. The vessels could be suspended by string from the rafters of the houses, providing safe storage of food against ants and other ground living vermin.
Hupa-iya ceramics are better fired than any other ceramics in the area, modern Shipibo ceramics excepted, and are technically competent in other respects. Hupa-iya decoration, though complex, is not as carefully executed as Shakimu decoration. The high percentage of decorated vessels and the lack of clear distinction between plain and decorated wares suggest that we are dealing with a more egalitarian society than was the case with Shakimu. Since I have been unable to break down the Hupa-iya style into a series of discrete elements, it is difficult to say whether the design layouts illustrate the co-ordinant repetition of elements or a complex relationship between elements of unequal importance. At any rate, the Hupa-iya style of decoration is markedly different from that of any of the previous ceramic complexes on the central Ucayali.

For the first time modeled, ceramic, spindle whorls become common, suggesting that a textile industry in cotton achieves importance. It seems probable that skirts for women and cushions, which are essentially ambulatory mosquito bars for men, were also woven. It is possible that large mosquito bars were also woven. If so, their presence could be associated with the switch from walled to open houses. Even if mosquito bars were not used, the cushma could be wrapped around the sleeping individual. Once the problem of night insects is ameliorated, a wallless house provides far more pleasant living
conditions on the central Ucayali than does a closed one. The spindle whorls are of the type associated with Central Andean drop spindles, and it seems certain that the central Ucayali textile industry is of Andean derivation.  

More stone axe heads were recovered from the Hupa-iya midden than from any other of the excavations. It would appear that forest clearing and agricultural activities were at their maximum at this time.

All the evidence suggests that the culture of the makers of Hupa-iya ceramics was a particularly successful adjustment to the central Ucayali region.

Yarinacocha

The evidence of a Yarinacocha occupation was largely confined to UDA-6, though scattered sherds were recovered from UDA-2. The full extent of the Yarinacocha occupation or occupations at UDA-6 was not determined. What is clear is that the occupation or occupations were of an entirely different degree of intensity than those of the earlier complexes discussed. Instead of a thick body of refuse, the component consisted of a thin scattering of sherds, and only in pits which the community dug into the earlier midden were Yarinacocha sherds particularly common. In fact, most of the usable ceramic material from the
Yarinacocha component comes from such intrusive pits. On the basis of information given me by Robert Carneiro concerning modern Amahuaca mortuary practices, I believe that each of these pits represents a funeral.

The Yarinacocha pattern of cultural deposition suggests that the social groups involved were small, and that the duration of any occupation was short. Before I critically examined the results of the 50 years of Shipibo occupation at UCA-2, I would have guessed that the occupations lasted no more than a year or two, but on the basis of the Shipibo data I would now estimate that a decade or two of midden deposition is involved.

There is no data as to Yarinacocha village layout or house plan, but it would appear that the village covered a small area. The one human burial, definitely identified as such in the excavations, was most likely of Yarinacocha derivation. It was a primary, flexed inhumation. There is little direct evidence as to the precise function of most Yarinacocha ceramics. It seems likely that the large, concave sided and straight sided urns served as cooking pots and brewing urns. The small, hemispherical bowls were probably individual food bowls. The relative rarity, as compared to cooking pots, would suggest a partial reliance on some form of perishable container such as the calabash. The small, straight sided
vessels with slightly insloping sides (Fig. 105 i) was the one complete vessel recovered in the course of the excavation. My Shipibo workmen unhesitatingly identified it as a beer mug, and their opinion, along with a couple of other lines of speculation, has been the basis for my identification of similarly shaped vessels in some of the other complexes as beer mugs.

The functional identification of the large, circular platters with upturned sides, which are a common part of Yarinacocha ceramic remains, is more secure. These are identical in all respects to the large communal comals still in use in the Tropical Forest Regions of southeastern Colombia. It seems likely that the Yarinacocha examples were used for making manioc bread from bitter manioc pulp. If there is some doubt about the presence of bitter manioc in the preceding, Hupa-iya, occupation, it seems fairly certain that bitter manioc was utilized by the people responsible for the Yarinacocha ceramics.

Yarinacocha ceramics are largely drab and utilitarian. Compared to any of the previous ceramic complexes, the execution of Yarinacocha ceramics is shoddy in the extreme. One might infer that the economic basis for the society was less secure. At least, far less time was expended on the manufacture of pottery.

Most Yarinacocha pottery is starkly plain, but a
part of it carries polychrome decoration. The sherds are highly eroded, but what survives of the vessel painting indicates that complexity of design and skill of execution were not high. If the previously stated hypothesis about the meaning of a small group of decorated ceramics set off from a larger group of plain ceramics was correct, it would appear that the people responsible for Yarinacocha pottery clung to some measure of social stratification even in these more difficult times. There is some reason for a suspicion that the Yarinacocha pottery represents a much later and highly degenerate complex in the same tradition as the Shakimu Ceramic Complex. The range of vessel shapes in the two complexes shows several points of similarity.

The presence of a spindle whorl indicates that the spinning of cotton continued, though possibly on a smaller scale.

All of the evidence available indicated that in the time between the Hupa-iya and Yarinacocha occupations on the central Ucayali there was a marked decline in cultural level. This is clear from the reduction in size and permanence of community and from the lowering of quality and complexity of material culture. In a later section of this monograph I will discuss possible causes for this major event in the culture history of the area.
Pacacocheha

Several components are known which produce pottery related to the type sample of the Pacacocheha Complex. There was evidence of Pacacocheha occupation at both UCA-2 and UCA-6, and three of the other sites recorded are single component sites of related occupations. Tessmann's collection from Nueva Paris also indicates a similar occupation at that point. These collections show considerable diversity among themselves, and I suspect that they represent an appreciable time range. It is necessary to speak of a Pacacocheha Tradition to encompass this variation.

All of the Pacacocheha middens which I examined were of small extent and little depth, but on the basis of the quantity of sherds recovered, UCA-5 may be an exception to this statement.

As with Yarinacochea, pits filled with smashed ceramics seem to be characteristic of the complex, and the most useful part of the ceramic collections comes from such pits. Again these probably are the residue of drinking bouts following funerals.

All of the data with the possible exception of UCA-5 indicate small communities and occupations of short duration.

The globular vessels with plain or slightly everted rims
are probably cooking pots. The open, hemispherical bowls are probably food vessels. The vessels with straight, insloping sides (Fig. 108 g) are clear prototypes of modern Shipibo beer mugs and probably served that function. The large, straight sided urns were probably for brewing. The comals used by the people responsible for the Pacacocha Complex again give clear evidence for the use of bitter manioc.

Pacacocha pottery is plain. The only adornment occurs in the form of crude, modeled adornos, and red slip. The technological competence of the pottery is even inferior to that of the Yarinacocha Complex.

Clay figurines seem to be relatively common in the complex, but I would not hazard a guess as to their function. Spindle whorls are present in quantity and indicate that cotton textiles were of importance. The introduction of such new traits as fire dogs, figurines, and a new style of comal, as well as the presence of stone axes in Pacacocha middens indicate that outside contacts continued during the time of this occupation.

It appears that the factors which lead to a sharp decline in cultural level between the Hupa-iya and Yarinacocha occupations were still operative during the time of the Pacacocha occupations.

The Corrugated Ware Complex
The sample for this complex is very small, and all of the following remarks must be evaluated with that point in mind. On the basis of the components excavated at UCA-2 and UCA-6 it would appear that the people responsible for these ceramics lived in the smallest groups and were the least sedentary of any of the archaeological communities encountered on the central Ucayali. A small scattering of sherds on the surface, and an occasional buried urn are all that remain.

There is no direct evidence of architecture, but one might infer that the houses were flimsy and of a temporary nature. A community may have consisted of no more than one house.

It was mentioned above that the large buried urn excavated at UCA-6 probably represents an urn burial or an urn in which the ashes of a dead person were mixed with beer so that they could be consumed by relatives. 

No comals were recovered. It is possible that this is a function of the smallness of sample, but since such forms are absent among the modern Shipibo, the lack may be genuine. If so, it probably indicates the disappearance of bitter manioc from the agricultural economy. The modern Shipibo do not raise it. I would suggest that bitter manioc was replaced by sweet manioc on the central Ucayali because of the very laborious and time consuming preparation required by the former. The amount
of labor involved might be an important factor in the case of a people such as the Shipibo, among whom women show a good deal of independence and exercise considerable social control. The large conical based vessels were clearly brewing urns, and the globular vessels with everted rims were probably cooking pots. The great size of some of the vessels indicates a considerable technical competence but the pottery is poorly fired.

Considering the small size of the sample, this pottery shows a wide range of decorative treatment. The pottery also shows close similarities in form and decoration to a number of ceramic complexes at considerable distance from the central Ucayali. Among these are the Guarani pottery in the La Plata Delta, 186 the corrugated wares of Venezuela, 187 and some of the incised and applique wares found by Meggers and Evans in the late complexes at the mouth of the Amazon. 188 It would appear that during the time of the Corrugated Ware occupations of the central Ucayali long distance cultural contacts were numerous, and were effective instruments of cultural change.
Cultural Comparisons

Introduction

In 1958 I published some preliminary comments on the possible affinities of the several ceramic complexes discovered at Yarinacocha. These remarks need expansion and modification in the light of the completed study of the collection. Also, there are a number of recent, major publications on the archaeology of Lowland South America which were unavailable at the time. In spite of considerable very recent work in various parts of Lowland South America, the three earliest ceramic complexes at Yarinacocha are still isolated cultural phenomena showing no close relationships to other known cultures. Any comments on the affinities of the complexes in the Yarinacocha sequence must remain tentative until more has been accomplished in the study of Amazon Basin archaeology.

The discussion of similarities will progress from the earliest complex to the latest.

Early Tutishcainyo

The Early Tutishcainyo Ceramic Complex is a highly distinctive and odd combination of ceramic traits. Almost all Early Tutishcainyo pottery is decorated, a characteristic
which is itself unusual for Lowland South American ceramic traditions. The style of decoration is unique both as to design layout and as to the specific way in which grooved incision, lines formed by contiguous punctation, and fine line hatching and crosshatching are united to produce the design. The shapes are equally outre. The occurrence of both well developed labial flanges and even more extreme basal flanges on vessels of composite silhouette has no close parallels in the other known ceramic complexes of South America. The bizarre nature of the total configuration of ceramic features exhibited by the Early Tutishcainyo Complex should be held firmly in mind in the course of the following discussion.

Since there is no other complex in South America with which to compare the totality of Early Tutishcainyo, I must fall back on a series of comparisons of individual traits. This is a questionable procedure at best. The final impression left by such trait by trait comparisons is largely the result of the traits chosen by the author and the emphasis which the author puts upon them. By carefully selecting his trait list the author can make an apparently strong case for relationships between complexes which are not closely related. It is a prejudice of mine that the basic vessel shapes which predominate in particular ceramic complexes will offer the best line of evidence
for tracing rather remote historical relationships. If this is so, then the first series of comparisons which ought to be made are to the Saladoid Ceramic Tradition of Venezuela and the Antilles. The Saladoid Tradition or Series is characterized by vessels with a composite silhouette. The bottoms of the vessels are convex, the sides of the vessels are concave, and the two zones are divided by a well marked basal angle or keel. The two most common Early Tutishcainyo vessel shapes conform to this basic pattern, though the heavy labial and basal flanges partially mask their silhouette. If the basic similarity in vessel shape between Early Tutishcainyo and the Saladoid tradition is indicative of historical connection, such a connection must have been considerably earlier than the earliest Tutishcainyo or Saladoid pottery now known, since the two groups of ceramics have diverged widely in most other respects.

With respect to vessel shape, one should also compare Early Tutishcainyo to Momil I. In my preliminary report I mentioned that there were a number of traits shared between Momil, on the lower Sinú in northern Colombia, and Early Tutishcainyo. Among these occurrences were basal flanges, zoned crosshatching, and the use of dry pigment in the grooves of incised decoration. My first analysis stressed the traits just listed which were relatively rare in Momil, and which made their appearance at the beginning of Momil II. In reviewing this
material it now seems more significant to emphasize certain common traits in Momil I, which were similar to Early Tutishcainyo. These include the shallow bowls with convex bottoms and concave sides (Compare type 0 in the Reichel-Dolmatoffs' classification of rim forms with Fig. 31 of the present report.) and the concave sided bowls with broad, labial flanges (Type J rims in the Reichel-Dolmatoffs' classification). The Momil labial flanges are close to those of Early Tutishcainyo in profile, but are only rarely decorated. The Reichel-Dolmatoffs illustrate only one example which is relatively close to Early Tutishcainyo in decoration.

Another complex in which composite silhouette vessels form a significant element, and which shows other points of similarity to Early Tutishcainyo, is the ceramic material from San Agustín.

The San Agustín ceramic style is perhaps the most divergent of Highland Colombia, and it may well be the oldest so far known. In spite of the fame of the type site, the ceramic material has not received an adequate description. There are several points of similarity between Early Tutishcainyo and the ceramics known for San Agustín. Concave sided, composite silhouette bowls appear to be a rather common shape at the site. These usually show a very sharp basal angle or keel marking the break between the side and the base of the pot. Certain of these
are quite similar in outline to the most frequent shape in Tutishcainyo ceramics. This similarity in shape is emphasized by its frequent combination with broad labial flanges. Such flanges in San Agustín ceramics sometimes carry elaborate incised decoration. The occurrence of an incised line immediately inside the mouth of such vessels is also a striking parallel to the almost unvarying presence of such a line on similar Early Tutishcainyo vessels. I know of no other appearance of this feature in South America. The use of zoned crosshatching in San Agustín is another point for comparison. The solid, hipped tripod legs illustrated for San Agustín are also similar to one Early Tutishcainyo example (Fig. 36 a).

If the particular form of composite silhouette vessel, which I have been discussing with reference to the Saladoid, Momil, and San Agustín ceramics, were common in other major ceramic traditions of South America, it would not form a valid basis for comparisons between Early Tutishcainyo and the other three ceramic groups. Aside from the aforementioned examples, this vessel shape appears to be rare or absent elsewhere in Lowland South America. It is of minor significance or absent in the rest of the major ceramic series defined by Cruxent and Rouse for Venezuela. With the exception of some occurrences in the Taruma and Rupununi Phases, it is absent in the known ceramics of British Guiana. With the possible exception of the Arísté
Phase, it does not appear significant in the ceramic groups defined at the Mouth of the Amazon. It is apparently absent in the Santarém and Konduri styles somewhat farther up the Amazon.

The preceding comparisons suggest to me that Early Tutishcainyo, Saladero, Momil I, and possibly the ceramics of San Agustín may have all derived from a single ceramic tradition. However, the differences among them are so great that the split must have occurred much earlier, well back in the second millenium or possibly even in the third millenium B.C.

In terms of the ultimate origins of Early Tutishcainyo I feel that the previous comparisons of vessel shape are the most significant which can be made. There are also certain similarities of decorative style which I believe to be of importance. With regard to stylistic parallels, I would look first to the Chavinoid site of Kotósh in the Peruvian Highlands near Huánuco, and to the Cave of the Owls in the Huallga River Valley near Tingo María.

Of recorded Highland sites pertaining to the Chavin horizon, Kotósh in the upper Huallga basin near the modern town of Huánuco is the closest to the Montaña. In the preliminary report I stressed the possibility of a relationship between certain of the ceramics from Kotósh and the Early Tutishcainyo
materials of Yarinacocha. Since that time I have come across further data which strengthens this possibility. Tello has published a brief account of the site and illustrated some of the material from it. 204 A large part of the ceramics are typical of Chavín horizon sites in both Highland and Coastal Peru. There is however a minority ware which is characterized by finely executed, zoned hatching. 205 The boundary incisions are broad grooves and the hatching is thin, fine line incision. The designs were rubbed with dry red pigment after firing. These sherds have no close parallels in other known Chavín collections but are close to Early Tutishcainyo in both design layout and execution. My original estimate of the relationship between the two groups of ceramics was based on Tello's one plate of illustrations in his American Antiquity article. Since that time, I was permitted to examine the collections from Kotosh at the Chicago Natural History Museum, which Collier was kind enough to show me. This contained one sherd of the zoned hatching and the actual sherd confirmed my previous impression of a degree of likeness. Rowe has in his possession photographs of three drawings of whole pots from Kotosh. I was permitted to examine and copy these. Two of the vessels are large, flaring, concave sided bowls. One of these is decorated in the fine, zoned, hatching style and resembles Early Tutishcainyo bowls in both shape and decoration. I
have since noted that a sketch of the same bowl appears in Carrón's general work on Chavin. This particular shape has no close parallels in other Chavin materials. There is no available evidence which would suggest that the Chavinoid elements at Kotosh were not contemporaneous with the stylistic elements which are strongly suggestive of Early Tutishcainyo, in fact, the two styles are blended in the second vessel for which I have seen an illustration. This evidence is far from conclusive, but one possible interpretation would be that the non-Chavinoid elements at the site of Kotosh represent influence from an alien culture rather closely related to Early Tutishcainyo.

The Cave of the Owls, lying to the West of Yarinacocha and at a somewhat higher elevation, is the closest known archaeological site to Yarinacocha in terms of absolute distance. The ceramics from this spectacular cave site have recently been described elsewhere, and their similarities to the various complexes of the Yarinacocha sequence have been discussed. It was concluded that the early material at the Cave of the Owls is most closely related to Late Tutishcainyo, but the carefully executed zoned hatched incision of the Cave of the Owls Fine Ware is reminiscent of the zoned hatching of Early Tutishcainyo. This similarity is strengthened by the use of red pigment in the incised decoration of both ceramic complexes.
It might be noted that there are certain bits of evidence which suggest a temporal correlation of at least part of the Cave of the Owls ceramics with Highland Chavin materials.

I feel that the comparisons just offered are likely to be of real significance as we come to know more about the culture history of South America. In each case a combination of several modes is involved in the comparison. One could prepare an almost endless statement in which all features occurring in Early Tutishcainyo are listed along with their occurrence in other ceramic complexes of South America. The following selected string of comparisons grades from fairly specific similarities which may have historical significance, to shared traits which are general, or which have such erratic distributions according to our present knowledge that they are hard to evaluate. Though these may not be very significant at present, I feel that they should be placed on the record.

There are some striking similarities in spout form, bridge form, and in the placement of spouts, between the spouted water bottles of Early Tutishcainyo and those of some of the early members of the Barrancoid series in Venezuela. The Tutishcainyo spout from Cut 3, UCA-2 (Fig. 53 e) is even more strongly suggestive of La Cabrera, Barrancas, or El Palito forms.
The only other major similarities between Early Tutishcainyo and the Barrancoid series would appear to lie in the extensive use of highly developed labial flanges in the earlier members, especially Barrancas. Barrancas labial flanges are wide and heavily decorated but are not stylistically similar to Early Tutishcainyo.

The rather frequent use of labial flanges in the Chanapata ceramic materials of the Cusco area is faintly reminiscent of Early Tutishcainyo practice, as are certain of the design layouts, however, the similarities are not close. If one had to compare the single rendering of the jaguar theme in Early Tutishcainyo (Fig. 33e) to any Andean renderings of this life form, one would most probably look to those of Chanapata or Pucara rather than to Chavín style, but in no case is the resemblance very convincing.

There are certain similarities in rim treatment and design layout between Early Tutishcainyo and the materials from the Santa Elena Peninsula of Coastal Ecuador, which Bushnell designated as Pro-Guangala. These similarities were noted in the preliminary reports and were also remarked on by Estrada. Estrada illustrates a wider selection of such rims. These materials date from immediately after Valdivia on the Ecuadorian coast and are thus very early.
There are similarities between the small collection of sherds from Macás, in the Ecuadorian Montaña and the Early Tutishcaingyo materials. These involve both flanged rim profile and the use of zoned, crosshatching. Fine crosshatched areas are bounded by broader incised grooves. These similarities are to be noted in only part of the sherds described by Bushnell, those which he calls One-colour Incised Ware. The sherds which he illustrates are too few and too small to permit comparison of design layout with the Early Tutishcaingyo materials. Another major component of the Macás collection is what Bushnell calls the Red-banded Incised Ware. This zoned red material shares certain features of shape and design layout with Early Tutishcaingyo, but zoned red painting does not occur in Early Tutishcaingyo. Other ceramics from Macás are described, but these are rather miscellaneous, and for the most part show no similarities to the ceramics of the Yarinacocha region, though one of the illustrated spouts is similar in shape to certain Late Tutishcaingyo specimens. One stone axe fragment illustrated by Bushnell is very like the stone axes of the Yarinacocha sequence.

Zoned crosshatching executed by incision is important in the earliest Valdivia material, in Mogi I, and is somewhat less so in the Ancón series of ceramics. It also occurs in the Monjasuaco Phase in the Ecuador Highlands. Fine, zoned crosshatching, rather similar in effect to that
of Early Tutishcainyo is a minor element in the Ananatuba Phase, the earliest known ceramic complex at the south of the Amazon, and in other of the ceramic traditions which precede Marajoara there. \[224\] Zoned crosshatching is also found in Venezuela in the Río Guapo and El Mayal styles. \[225\]

The use of contiguous punctations to form incised lines is a peculiarity of Early Tutishcainyo ceramics which is to a degree shared by the relatively crude pottery of El Cerillo in the Parana Delta, but the two ceramic groups are completely dissimilar in all other respects. \[226\]

The use of basal flanges on vessels occurs in several areas of lowland South America. In the preliminary paper I mentioned the occurrence of basal flanges in Momil II, \[227\] and other occurrences are to be noted in Río Napo, \[228\] and in Santarém ceramics. \[229\] In none of these cases is the form and placement of the basal flange similar to the form this element takes in Early Tutishcainyo, and in no other known ceramic complex of South America is this element so common or well developed.

The occasional occurrence of well developed vessel legs in Early Tutishcainyo is noteworthy in that it is the only occurrence of this trait in the Yarinacocha area. The few specimens show a wide range of forms. The small, solid examples (Fig. 36 b, e) are comparable to the tetrapodal supports in
in Valdivia\textsuperscript{230} or some of the small tripod feet in Momil\textsuperscript{1}.\textsuperscript{231} The one solid, hipped leg (Fig. 36 a) resembles some specimens from the beginning of Momil II and also certain examples from Tlatilco.\textsuperscript{232} It is also the one which is most similar to the San Agustín specimen. The hollow specimens (Fig. 36 c, d) are similar to certain examples which appear at the beginning of Momil II.\textsuperscript{233} The latter two forms of legs might be regarded as suggestive of Mesoamerican influence in Early Tutishcainyo, but for reasons discussed below I feel that it is unsound to emphasize such sources at present.

The use of shell tempering in Early Tutishcainyo ceramics is a trait which is of little use in either dating or in determining cultural relationships. Linne's map of tempering practices in South America shows that the examples of shell tempering known at that time were few and of scattered distribution.\textsuperscript{234} Since the time of Linne's publication, other examples have come to light, but these do not clarify the picture. Along the coast of Venezuela the majority of occurrences of shell tempering are within the context of the Dabajuroid Series and thus relatively late in the Cofxent and Rouse chronology, but the trait also occurs earlier in the Río Guapo style.\textsuperscript{235} In the area of British Guiana the trait is unique to the ceramics made within the Alaka Phase and thus relatively early.\textsuperscript{236} The trait has recently been reported in the Lower Amazon.\textsuperscript{237}
The use of centrally perforated discs of sherd, presumably as substitutes for modeled spindle whorls, is a trait which Early Tutishcaínyc shares with the pre-Marajoara cultures at the mouth of the Amazon and several of the relatively early cultures of Venezuela. Clear evidence for the use of wattle and daub architecture, as noted in Early Tutishcaínyc, is a trait which has been too infrequently recorded in the archaeological literature of South America to be of much comparative value at present. Evans and Meggers illustrate similar daub fragments from the Abay Phase.

In retrospect, I feel that the preliminary report much overemphasized the similarities between Early Tutishcaínyc ceramics and those of lower Mesoamerica. These similarities of vessel shape, rim treatment, and decoration are striking from a purely formal point of view. They are not, however, well localized and concentrated in any particular known Mesoamerican complex, and their occurrence covers a wide time span. The fact that those traits in which Early Tutishcaínyc most resembles the ceramics of lower Mesoamerica do not occur in a similar form anywhere between El Salvador and the Peruvian Montana makes it more difficult to accept the possibility of close and direct historical connections.

I am convinced that the similarities between Formative Mesoamerican ceramics and those of Chavin in Peru, of Chorrera
and Tejar in Ecuador, and of Momil II in Colombia are evidence of direct historical connection, and indeed of extensive North to South migrations. However, the similarities which these complexes show to Mesoamerican ceramics are not those which are marked in Early Tutishcainyo. North to South migrations out of Mesoamerica and into South America were probably a very important factor in the culture history of South America, but, like any other explanatory hypothesis, this particular one can be overworked. I fear that I did so in the preliminary report. I would now suggest that an assessment of the meaning of the definite formal similarities which do exist between Early Tutishcainyo and the Late Formative Cultures of Lower Mesoamerica should be deferred until we have more information from the intervening areas.

Late Tutishcainyo

The cultural comparisons for Late Tutishcainyo can be dealt with in a more summary fashion. The major affinities of Late Tutishcainyo are with the complex which preceded it at Yarinacocha. Almost all of the stylistic features of Late Tutishcainyo can be regarded as the results of gradual modification of Early Tutishcainyo ceramics. The point has been emphasized that the transition is lacking in the sites excavated, but should be present somewhere in the immediate Yarinacocha area. Technologically
Late Tutishcainyo ceramics are an improvement over those of Early Tutishcainyo, and the technological procedures of Late Tutishcainyo are better standardized. There is a definite deterioration with regard to incised decoration. This tends to break down, and the carefully executed hatching of Early Tutishcainyo has a rather sloppy counterpart in Late Tutishcainyo. The Late Tutishcainyo hatching is in some cases so coarse as to resemble brushing, and was in some cases so executed, but it does not particularly resemble the brushing described for other areas of South America. At the same time plastic decoration increases in complexity.

Zoned, circular stamping done with a bone or reed is a rare innovation in Late Tutishcainyo (Fig. 50 h, i). This has its parallels in various Chavin Horizon ceramics in Highland and Coastal Peru. It also occurs in San Agustin ceramics. This trait is found in most of the Venezuelan styles in or influenced by the Arauquinoid Series. There are other ceramic styles in the Central Amazon which are certainly related to the Arauquinoid Series and which also show circular stamping. The Venezuelan and Brazilian occurrences would appear to be too late to be significant.

The one example of zoned red painting which occurs on a sherd of Late Tutishcainyo manufacture would appear to be an imitation of the zoned red painting of the Sanidine Tempered Ware
which was traded into the Yarinacocha area from some unknown source during the Late Tutishcainyo occupation.

The two examples of adornos which occur in the Late Tutishcainyo collections are so simple that comparisons are difficult. One (Fig. 50 s), in its crudity and lack of style, rather resembles the adornos described by the Reichel-Dolmatoffs for Momil II. 249

The spouts of Late Tutishcainyo are distinctive from those of Early Tutishcainyo. As was mentioned above, there may be a rather close similarity between Mode A of the Late Tutishcainyo spouts and one described by Bushnell from Macas in the Ecuadorian Montana. Certain of the Late Tutishcainyo spouts are also somewhat suggestive of those illustrated by Evans and Meggers and by Estrada for Chorrera, in the Guayas Basin of Ecuador, though the surface finish appears better in the Chorrera specimens. In one case of a Late Tutishcainyo spouted vessel it is possible to obtain some idea of the relation of the spouts to the vessel as a whole. In this particular fragment (Fig. 49 a) two spouts projected from a raised, circular area on the top of a round, closed vessel. This raised circular cap with double spout is a specific feature which Late Tutishcainyo shares with the group of ceramics which used to be called Paracas Necropolis. 253 This odd feature of shape also appears early in coastal Ecuador in Chorrera and perhaps
even in Valdivia Ceramics. It is present in Barrancas, the earliest Barrancoid style on the Lower Orinoco in Venezuela.

The fine ware from the Cave of the Owls near Tingo Maria, Peru, shows a number of points of close resemblance to Late Tutishcainyo. These concern both vessel shape and rim treatment. The rare, strap handles of Late Tutishcainyo are very like those of the Cave of the Owls material, and one large sherd from the Late Tutishcainyo deposit at UCA-2 would appear to be a Late Tutishcainyo copy of a Cave of the Owls form (Fig. 51 b).

What appear to be Late Tutishcainyo rims also appear at the Cave of the Owls. There is, thus, a suggestion of both contemporaneity and considerable mutual influence between the major occupation at the Cave of the Owls on the Huallaga and the Late Tutishcainyo occupations at Yarinacocha. Since there are possible cross ties between the major occupation at the Cave of the Owls and the Chavinoid occupations in Highland Peru, a date of not later than 500 B.C. is suggested for Late Tutishcainyo. This chronological estimate, tenuous as it is, is probably the most accurate we have for any point early in the Yarinacocha sequence.

Sanidine Tempered Ware
This ceramic complex is known only from the small sample of material which was traded into Tutishcainyo occupations in the Yarinacocha area. At present there is no way of knowing whether the sample is an adequate representation of the complex from which it was derived. It is also impossible to demonstrate the area in which this pottery was made.

This ceramic complex shares a number of features with the Tutishcainyo tradition, and is closer to Tutishcainyo ceramics than to any other known ceramic complex in South America. However, in the range of vessel shapes which it shows, in its rim shapes, and in decorative techniques, this complex deviates widely from the norms of either Early or Late Tutishcainyo, and the relationship would appear not to be a particularly close one. In certain characteristics of rim profile and vessel shape the Sanidine Tempered Ceramics are more similar to the Shakimu Complex. It would be tempting to suggest that the Sanidine Tempered Ware might be somehow related to the prototypes for Shakimu ceramics, but until we know more about the Sanidine Tempered Ware and where it was made, such speculations are premature.

Shakimu

The Shakimu Complex shares certain important traits with the preceding two occupations. Most vessels have slightly
concave sides and a point of inflection between the sides and the base, but these tendencies are not as strongly marked as in either Early or Late Tutishcainyo. The basal flange still occurs, but it is much rarer and not as large or elaborate. Vessel spouts continue to be made in forms related to those of the Late Tutishcainyo Complex. In most other respects the Shakimu materials represent a marked departure from the previous ceramic complexes in the Yarínacocha area.

The most striking aspect of the Shakimu Ceramic Complex is its great emphasis on highly polished surfaces. Because the ceramics from the excavations are highly eroded, it is difficult to tell what percentage of Shakimu sherds originally had highly polished surfaces, but for those sherds which retain any of the original surface the percentage is very high. Less care was taken in polishing the larger vessels. A major part of the aesthetic effect of Shakimu pottery seems to have been in the highly lustrous surfaces.

Where preserved, the polished surfaces of Shakimu ceramics are strongly reflecting and have a smooth, waxy feel. Their surface appearance and texture is fairly similar to the highly burnished wares of the Maya Formative in the Peten. This comparison with Mamon and Chicanel is made for descriptive purposes and no historical connection is implied. Lustrous
surfaces have no antecedents in the sequence at Yarinacocha prior to Shakimu, and the effect is not again achieved until the recent, Shipibo ceramics. Shakimu polishing was used to produce an even finish and no attempts at differential burnishing were noted.

To the West, the lustrous surfaces typical of Shakimu would seem to have their closest analogies in the polished black wares of the Chavín horizon, and in the highly polished plain wares which make up a significant percentage of the Valdivia ceramics. To the North, in the Venezuelan area, the most extensive use of glossy surfaces seems to have been in the Barrancoid series, most especially in Los Barrancos, but in this instance it was usually done in conjunction with incised decoration and was differential. Plain, burnished ceramics do not seem to have formed a major part of any of the other ceramic complexes known for the Amazon Basin.

There are close similarities in rim profile and vessel shape between the common form of Chiripa Yellow on Red painted ware and one of the very common form categories in the Shakimu Complex, but other marked resemblances between Shakimu and that very early style of the Southern Titicaca Basin would seem to be lacking.

The excised decoration which appears on Shakimu vessels
is the most elaborate and frequent form of decoration in the complex. The practice of cutting away the negative area of a ceramic design has a far flung and sporadic distribution in the New World. Engraved excision is a very prominent trait in the earliest Caddian ceramics of East Texas and in the Xolalpan Phase of the Teotihuacan sequence in the Valley of Mexico. Excision is also an important aspect of the decoration of Tlatilco ceramics at a much earlier time in the Valley of Mexico. Very fine examples of designs with excised backgrounds occur on ceramics of the Mirafloras Phase of the Kaminaljuyu Sequence in Highland Guatemala. Excision forms a small part of the rare decorated materials in the very early Monagrillo style on the Pacific coast of Panama. The trait is elaborately developed and relatively common in the Valdivia ceramics, the earliest yet known for Coastal Ecuador. The occurrence of excision in Quimbaya and Tairona ceramics in Highland Colombia are well known. Excision is a minor element in the early Tocuyanoid ceramic materials of the Venezuelan Andes, and is a major technique in ceramics of the later Araquinoid Series in the Llanos and Middle Orinoco regions of Venezuela. It is a minor element in the Los Barrancos ceramics of the Lower Orinoco. In the Amazon Basin the trait of excision of the negative areas of a design has its greatest development in the Marajoara Phase at the mouth of the Amazon, and is present
elsewhere in the Amazon Basin in those complexes which appear to have a close historical relationship with Marajoara. Of these, the ceramics on the Río Napo are the most important.275 The Acauan Phase at the mouth of the Amazon shows a somewhat cruder form of excising, and Meggers and Evans believe that its relationship to the excising of Marajoara is a rather distant one due to cultural contact before the ancestors of either cultural group had reached the Lower Amazon.276

On the basis of available evidence the earliest occurrences of the trait of excised ceramics are those in Valdivia in Coastal Ecuador and in Monagrillo in Panama, and there is a definite possibility that these two occurrences are historically related.277 It would be very difficult to attempt to construct a hypothesis which would account for the derivation of all of the other New World occurrences of this trait from these earliest sources. Indeed, it is by no means clear that all of these diverse occurrences are historically related. It is not an easy task to decide which, of the numerous occurrences of excision in South America, the Shakimu ceramics most resemble.

My first impression was that the excision as practiced by Shakimu potters was similar to that of Marajoara. A more careful examination has indicated to me that this is not the case. In the first place, the technique is different. The Marajoara excision was done when the clay was fully dry, in some cases
perhaps even after firing. The excised areas show multiple, sharp scratches going in a number of directions. The final effect is rather close to engraving and to the scratched out backgrounds of Xolalpan tripod vessels. The design layouts of Marajoara ceramics are rigidly symmetrical, usually combining transverse reflection and bifold rotation. By way of contrast, the Shakimu excision was done when the clay was still fairly plastic and was done with a broad, gouge-like tool. The impressions of such a tool are clearly visible in some sherds. The individual tool marks are carefully oriented and are usually parallel with one another inside a particular excised area. There are a number of sherds which are of sufficient size to show that Shakimu designs, if they are symmetrical at all, are organized on a less rigid set of principles than are Marajoara designs. Most of the design elements of the two ceramic groups are not particularly similar when they are examined closely, but there are minor exceptions, such as the use of the step motif (Fig. 65 g). What Shakimu and Marajoara share is a very high level of finish and very careful execution.

The polychrome ceramics of the Río Napo area are clearly related to those of Marajoara, and they contain a fair number of excised specimens. The excision of the Río Napo materials is consistently less carefully executed than that of Marajoara. This is indicated in all of the paired illustrations in Meggers'
and Evans' recent report, and the Río Napo collections of the American Museum of Natural History, which I examined at some length, also show this falling off of technical excellence. Though they are geographically much closer to the Yarinacocha area than are the Marajoara materials, the Napo excised specimens are much less similar to Shakimu than are the Marajoara specimens.

Because of Willey's statement to the contrary, it is necessary to emphasize that the Shakimu use of excision is not very similar to that in the Marajoara tradition, and if there is any historical relationship between the two, it is a very distant one.

The use of excision in ceramic styles of the Arauquinoid series in Venezuela shows certain points of similarity with Shakimu excision. The combination of parallel, fine line incision with broader, excised areas produces some vague resemblances in design layout. The strongly rectilinear nature of Arauquinoid design, the rigid symmetry and strict repetition of elements, and the harsh angularity of the incised lines all contrast strongly with Shakimu practices. The final impression is that the two complexes are not closely related in the use of this trait.

It is difficult to see any points of similarity between the excising produced as a part of the Quimbaya ceramic tradition and that of Shakimu. The excision of Acauan is equally lacking in points for valid comparison.
The excising which makes up a significant part of Valdivia ceramic decoration seems to me to show more points of similarity with Shakimu than any other South American occurrence of the trait. The Valdivia excised pottery is entirely monochrome and the Shakimu pottery is almost entirely so. The relationship of the decorative field to the vessel is similar in both complexes. The quality of the excision is the same. In both cases it was executed while the clay was fairly moist. The work is carefully done. A similar kind of tool seems to have been used in both cases. The tool marks within the excised areas are largely parallel within any particular area. The design layouts of both ceramic complexes share a rather loose organization and a free flowing quality. There are a number of design elements unique to each complex, but a minority group of Valdivia designs are remarkably similar to a very common form of Shakimu design. I suspect that the similarities between Shakimu and Valdivia are more likely to be of genuine, historical significance than those between Shakimu and any of the other known complexes having excised ceramics. If this is the case, the contact could not have been direct, since the Valdivia Culture on the coast of Ecuador should be at least several hundred years earlier than Shakimu. One might propose that cultures related to Valdivia might have survived somewhere in the Montaña long after they were replaced on the coast of Ecuador by cultures, such as Chorrera,
of Mesoamerican derivation! Such a culture, evolving out of
the Valdivia style, might have influenced Shakimu or even
become Shakimu. This idea is approximately what Estrada has
proposed in his discussion of these problems. It has a
certain logic on its side but as yet lacks any evidence to
support it.

The zoned red painting, which is a relatively rare
addition to Shakimu excised decoration, could well be derived
from the Sanidine Tempered Complex, which existed somewhere in
the Peruvian Montaña at an earlier time. One need not look
outside of the Umayali drainage for a source.

The one example of a modeled adorno, which was recovered
in my sample of Shakimu ceramics, has a vague resemblance to
the early examples of modeling which occur rarely on Saladero
pottery. This may be nothing more than an extreme simplicity
in both cases.

The unsatisfactory state of our knowledge concerning
Shakimu relationships can be summarized. Shakimu is similar in
a number of traits to the two known cultures in the Tutishcainyo
tradition; sharing basal flanges, concave sided bowls, and closed
pouring spouts with Late Tutishcainyo. On the other hand, it is
so distinctive in most of its modes that it can not be said to be
closely related to Late Tutishcainyo. One could interpret this
situation in several ways. One possible explanation would be
that Shakimu represents a further evolution in the same basic
tradition as Late Tutishcainyo, but is separated from it by a
very great lapse of time. Another would be that Shakimu is a
member of a completely different ceramic tradition with only
minor influence from some late member of the Tutishcainyo
Tradition. I suspect that the latter explanation comes closer
to the truth, and that if Shakimu does not represent a completely
new ceramic tradition it at least was the result of very strong
cultural influences from outside of the Tutishcainyo Tradition.
On the basis of purely formal comparisons, the most likely
source for such influence would be in Valdivia culture or in
some culture very like Valdivia, but there are formidable
difficulties of chronology involved in such a solution. At
present the data necessary to solve these problems are lacking.

Hupa-iya

Hupa-iya ceramics show a complete break with all
previous pottery on the Ucayali. Hupa-iya presents a completely
new range of vessel shapes, and has a repertory of decorative
devices completely distinct from those of Shakimu. These facts
indicate that this culture was introduced into the Middle Ucayali
from some outside source. It is unlikely that such a complete
discontinuity in the ceramic tradition could have been caused by
anything short of a major migration of peoples. The identification of the source of this migration will be of great importance to the ultimate understanding of the culture history of the Upper Amazon.

In my preliminary report I stated that it seemed likely that the Hupa-iya ceramics are a divergent member of the Barrancoid Ceramic Series of Venezuela and British Guiana.235 I now feel even more strongly that this is the best interpretation of the data.

The similarities between Hupa-iya ceramics and the various ceramic complexes of Venezuela and British Guiana which have been classified as Barrancoid are many and striking. There are basic resemblances in vessel shape. Cruxent and Rouse point out that the surfaces of Barrancoid pottery tend to be convex, and that while there may be an inflection between the side and base of the vessel, it is not sharply marked because of the general convexity. They are contrasting Barrancas ceramics with the Saladero ceramics, but this characteristic also sets off Hupa-iya from the preceding ceramic complexes on the central Ucayali.236 The characteristic kind of decoration in both Hupa-iya and Barrancoid ceramics in general is smoothly executed, brad-line incision. The actual width of the incision varies considerably, but the grooves are always U-shaped and relatively shallow
compared with their width. In both groups of ceramics applique is also of relatively great importance. The additions of small, hemispherical pellets of clay, typically with a central punctation, and often with an encircling groove, is a very frequent part of the decorative treatment. Such pellets often indicate eyes. In most of the Barrancoid styles there is a tendency for incised lines to end in definite dots or punctations. This is particularly true of Los Barrancos. This mannerism is also completely characteristic of Hupa-iya. (It should be mentioned that dots finial also occur much earlier on the Ucayali in Early Tutishcahnyo, though by no means as frequently.) The incised lines are relatively broadly spaced, and a single decorative field frequently covers almost the whole outer surface of the vessels. There is a free flowing and curvilinear quality about the design layouts in both groups of ceramics.

It would be difficult to decide which of the several Barrancoid styles and Barrancoid influenced Saladoid styles show the closest similarities to Hupa-iya in terms of individual sherd comparisons. In each style there are some sherds which could be lost in the Hupa-iya collections. An adorno illustrated for the El Agua Style is very similar in style to Fig. 93 J. El Agua is in the Saladoid Series, but strongly influenced by the Barrancoid Tradition. The plain lug illustrated for El Palito, could have come from Hupa-iya, as could a number of
The use of hollow adornos pushed out from the walls of the vessels is a peculiarity of the Río Guapo style which can be reproduced in the Hupa-iya materials, and the use of applique pellets is strikingly similar in the two ceramic groups. Two of the handles illustrated for the Irapa Style (a Barrancoid influenced, Saladoid style) can be duplicated in the Hupa-iya collections (Fig. 89 a, i). The more Barrancoid materials illustrated for the Ronquin style show some striking similarities to certain Hupa-iya sherds, for instance, a handle and a lug. A Ronquin adorno is similar in style to the dolphin adorno from the Hupa-iya collections (Fig. 94 a). Here the use of the applique pellets is also very close to Hupa-iya.

It appears to me that among the Barrancoid styles, Mabaruma and Los Barrancos show the highest degree of fit with Hupa-iya when comparisons are made in terms of total ceramic complexes. The Mabaruma style from northwestern British Guiana is better described than are any of the other Barrancoid materials so far reported, and it will be worth examining the similarities between Hupa-iya and Mabaruma in detail. The relatively simple repertory of shapes which Evans and Meggers illustrate for their types Aruca Incised and for Koberimo Plain come close to exhausting the complement of shapes exhibited by Hupa-iya. With the addition of the shape which
they illustrate as number 4 for their type Akawabi Incised and Modeled\textsuperscript{297} all of the major vessel form categories of Hupa-iya have their Mabaruma parallels. It can thus be said that there is only one rare vessel form in the Hupa-iya Complex that is not present in the Mabaruma Phase. The reverse of this statement is not true, for there are some forms in Mabaruma which are not represented in Hupa-iya. Bowls with extreme labial flanges and annular bases are not found. I will have more to say about the lack of extreme labial flanges.

The means of decoration used by the two complexes are largely identical. The use of incised lines, the addition of punctation to incised lines, the use of small, circular, applique pellets with central punctation and encircling lines, the use of strip applique in combination with incision, and the use of adornos, all take identical or nearly identical form in the two groups of ceramics. Hupa-iya, however, lacks certain modes such as red and white slipping which are utilized by Mabaruma.

In terms of design elements and design layout there are very strong similarities, but again the Mabaruma Phase ceramics show a considerably wider range than do the ceramics of the Hupa-iya Complex. This is not surprising considering that the Mabaruma Phase embraces a much larger block of time. Many specific similarities occur, such as the persistent use of two or three parallel lines on the upper surface of various modes of rim modification. Other
specific similarities are documented below. The elements which Hupa-iya lacks includes the group of adorns which Evans and Meggers have termed "non-Barrancoid" and a series of design elements using closely packed, incised lines or closely packed zone punctuation. This series makes up only part of their "type" Kaituma Incised and Punctate, and only part of their "type" AruKa Incised. One can make a general statement that Hupa-iya lacks all those Mabaruma decorative elements which can be duplicated in the Apostadero Style as defined by Cruxent and Rouse on the Lower Orinoco. These Apostadero elements are demonstrably late both in the Lower Orinoco and in northern British Guiana.

In the decorative fields utilized the two ceramic groups are similar. There is the preference for the total outer surface of hemispherical bowls, and the upper surface of the thickened rims of plates.

Another specific combination of modes occurring in both ceramic groups is the consistent association of vertical, strap handles with the biconvex vessel form, Vessel Body Form Mode H in my classification or Vessel Shape 4 of Akawabi Incised and Modeled in the classification of Evans and Meggers. This is evidently an old pattern of association in the Barrancoid Series, since it may be noted in some of the sherds illustrated by Cruxent
and Rouse for Barrancas, the earliest member. Some of these similarities should be documented in terms of individual sherd comparisons.

Certain sherds illustrated for the type Akawabi Incised and Modeled could not be sorted readily from a collection of Hupa-iya materials (Fig. 94 f; Fig. 89a). Even closer similarities in design are found in Evans' and Meggers' type Kaituma Incised and Punctate. Compare Evans' and Meggers' Fig. 42 a with Fig. 87 a in the present report; Fig. 42 e with Fig. 96 d in the present report; Fig. 45 c with Fig. 87 b in the present report; or Fig. 76 c with Fig. 87 b in the present report. These last similarities seem too close to be accidental.

Considering the complexity of its decoration, the Los Barrancos Style has not been very fully illustrated. However, Osgood and Howard have presented a useful quantification of rim profiles. The great majority of Osgood's and Howard's categories of rim profiles can be precisely duplicated in the Hupa-iya materials. These include the slightly constricted bowls D and E; open bowls T, Q, S, R, I, M, U, and V; and plates N and W. Together these make up between 60 and 70 per cent of all Los Barrancos rims. There is likewise a high degree of concordance between the Los Barrancos rim profiles illustrated by Cruxent and Rouse and those of Hupa-lya, but Cruxent and Rouse have not quantified this material.
Rouse has stressed that an unvarying feature of Los Barrancos decoration is the use of an incised boundary line a short distance below the rim on the outside of decorated bowls. This is also a constant feature of Hupa-iya design.\(^304\)

A major argument against the acceptance of Hupa-iya as a member of the Barrancoid Series has been the nearly complete lack of labial flanges in Hupa-iya. Extreme labial flanges are most characteristic of the earliest members of the series such as Barrancas,\(^305\) the earliest segment of the Mabaruma Phase,\(^306\) and La Cabrera. In Los Barrancos, which is a direct outgrowth of Barrancas, there is a definite tendency for a reduction of such flanges in size and a decrease in their number.\(^306\) There is also a tendency to break such flanges into very long, highly decorated lugs extending most of the distance around the vessel.\(^309\) I would suggest that the long, decorated lip lugs of Hupa-iya are a further development in this trend, and are homologous to the labial flanges of Barrancas.

I believe that the strong similarities which Hupa-iya shows to Los Barrancos and to the middle range of the Mabaruma Phase are significant both in terms of cultural relationship and in terms of dating. The Carbon 14 date for Los Barrancos is about 600 A.D.\(^310\) I feel that the wave of migration responsible for Hupa-iya left the Lower Orinoco sometime during the transition
between Barrancas and Los Barrancos. Allowing time for migration, I would date the Hupa-iyá occupation at Yarinacocha as extending from 500 to 800 A.D. I believe that the middle range of Mabaruma would also date in this general time range. This is in contrast to Evans’ and Meggers’ estimate that the early part of the Mabaruma Phase did not start until 500 A.D. Evans and Meggers state that early Mabaruma is derived from Los Barrancos rather than Barrancas. Their statement is made questionable by the fact that the extreme, broad labial flanges, which are so prominent in both early Mabaruma and Barrancas, are missing in Los Barrancos.

All the existing evidence suggests to me that Hupa-iyá is a simplified and stripped down ceramic style within the Barrancoid Series, and that its presence in the middle Ucayali is due to a rather rapid migration out of some point in Venezuela or British Guiana into the central Amazon and then from there up to the Ucayali. As a member of this Series, it is not particularly divergent. In terms of vessel shape it differs from Los Barrancos less than does El Palito.

It should be noted that I do not find the treatment of the somewhat Barrancoid adornos in the Arauquín Style particularly similar to any Hupa-iyá materials. Since Cruxent and House have expressed the contrary opinion, I have compared the two styles with special care. The eye treatment in the Arauquín adornos
is consistently somewhat different from the form which Hupa-iya shares with most of the earlier styles in the Barrancoid Tradition.

There are two major difficulties which stand in the way of the acceptance of a theory of a major migration from northern South America into the Amazon Basin. The first of these is the alleged lack of Barrancoid materials elsewhere in the Amazon Basin. The other difficulty is the lack of evidence for such a migration along the two most plausible routes. These will be considered in turn.

In a recent review Meggers stated flatly: "Except for a slight spill-over into adjacent British Guiana, ceramic styles that can be related to the Barrancoid series, typical of the early periods in the eastern Venezuelan center, have not been identified anywhere outside of Venezuela. Although knowledge of the Amazon area is by no means complete, the fact that known complexes completely lack Barrancoid affiliations is probably significant."316 While it is true that no ceramic complex clearly in the Barrancoid Tradition has been isolated and fully described in the central Amazon Basin, there are data available which suggest that Meggers' statement is somewhat extreme.

From four of the areas of the central Amazon, for which we have some archaeological information, there are indications of a strong
Barrancoid influence. Both Easby and Palmatary in their analysis of Santarém ceramics note that there is a fair quantity of pottery from the area in a style different from the classic Santarém Style. Easby calls this the "Unrelated Ware". Palmatary calls it "A Ware Having a Rough Surface and Geometrical Decoration", and notes that it is concentrated in certain sites. Since there is good reason to believe that the Santarém Style was extant at contact time in the area, it is a reasonable assumption that the non-Santarém Style was somewhat earlier. As yet there is no stratigraphic evidence to support this assumption.

The illustrations which Palmatary has published indicate that this non-Santarém material is quite clearly related to the Barrancoid Tradition. Compare the elaborate decoration of the flanged, hollow rim with flanged rims which Cruxent and Rouse illustrate for Barrancas. The treatment of the scroll design in Palmatary's illustrations of the non-Santarém Style is also quite typically Barrancoid. She illustrates vessel shapes and some lugs and adornos which conform to the Barrancoid Tradition and not to the Santarém Style.

From a number of sites in the region around the mouth of the Río Trombetas Hilbert has recovered a vast quantity of the style of ceramics which Nimuendaju originally called Kondurí. From the generally homogeneous material Hilbert picked out certain stylistic tendencies which were not characteristic of Kondurí as
a whole and which were concentrated at only a few of the sites. He has called these tendencies "Estilo Globular". Again, it is a reasonable assumption that Konduri proper is the latest style in the area and that "Estilo Globular" is somewhat earlier.

Several of the sherds illustrated by Hilbert as typical of the "Estilo Globular" show Barrancoid characteristics. More recently, Hilbert has worked on the middle Amazon around the mouth of the Rio Negro. Here he has developed a two-phase sequence, Guarita Phase followed by Itacoatiara Phase.

The later of the two styles is in ware largely tempered with sponge spicules. Many of the decorative mannerisms are definitely reminiscent of the Araquinioid Series of the Middle Orinoco and Llanos, but four of the adornos which he illustrates are somewhat Barrancoid in feeling. These suggest influence from a relatively pure Barrancoid Style.

Recently Hanke has published on fairly extensive sherd collections from various sites along the Amazon (Solimoes) above Manaos. Her illustrations are not good, but it is possible to recognize three distinct styles of ceramic decoration. One style, involving grooved decoration in combination with painting, appears to be essentially the same as Hilbert's Guarita Phase; the second style, involving fine line incision in angular, geometric design, is like Hilbert's Itacoatiara Phase; the third style, which occurred at several of her sites, but which seemed to be most
concentrated at the locality of Mangueira near Teffé, appears to me to be essentially pure Barrancoid in its decorative mannerisms. The exaggerated labial flanges of Barrancas are present, and the combination of hemispherical applique with punctation and incised line is specifically Barrancoid. I suspect that if the Mangueira locality were competently excavated, a pure Barrancoid component could be isolated.

The data from all of these areas suggest that Barrancoid influence is widespread in the middle and lower Amazon Basin, and make it probable that complexes in a pure Barrancoid Tradition will be encountered when more work is done in these regions. There are other stray finds, illustrated by earlier writers on Amazonian archaeology, which also suggest this probability.

The other difficulty with the migration theory is that there are two probable routes connecting Venezuela with the central Amazon Basin. One is up the Orinoco, through the Casiquiare Canal, and then down the Río Negro. The other is through British Guiana, up the Essequibo River and its tributary the Rupununi, and then across to the Tacutu, and down the Branco. Evans and Meggers have done extensive field work in the portage area of the second route, and more recently Evans, Meggers, and Cruxent have surveyed the upper Orinoco near the mouth of the Ventuari. In neither case was the slightest archaeological
trace of a Barrancoid migration encountered. This negative evidence can not be completely disregarded, but it should be remembered that a fairly rapid migration by canoe would not leave much in the way of obvious archaeological remains. Some relatively early sites would be lost through erosion. Others would be buried under ant deposited earth, and so might not be encountered in the first archaeological survey of an area. A more important consideration is the specific pattern of ecological preference exhibited by all of the known early Tropical Forest Cultures. There seemed to have been a high degree of economic adjustment to the lower flood plains (the region of oxbow lakes) of the major rivers. This adjustment seems to have related both to the fishing resources and to the kinds of agricultural farm land available. It is unlikely that migrating groups with this pattern of adjustment would have lingered in areas which were less suited to their subsistence practices. A migration of this kind could not be expected to leave many recognizable sites. I feel that the work in neither area has been sufficiently extensive or intensive to rule out the possibility of migrations between the Orinoco Basin and the Amazon Basin at a fairly early time. Rouse also feels that the work of Meggers and Evans has not been sufficiently intensive to be taken as negative evidence. In commenting on a similar distribution problem he said: "The
reviewer doubts that a single series of excavations such as Evans and Meggers', in a country so large as British Guiana is sufficient to eliminate this possibility."  332

The previous discussion comes close to exhausting the obvious similarities between Hupa-iya and other known archaeological complexes in South America, but there are certain vague resemblances to the recent ceramics made by the Arawak speaking tribes of the Upper Xingu and traded to all the other tribes of that area. The large, relatively shallow pots of Hupa-iya are somewhat similar to Xingu pots used in processing bitter manioc.  333 The small bowls decorated with inward facing adornos and with lugs in the form of legs and tails from the Upper Xingu also suggest Hupa-iya forms.  334 In light of my earlier suggestion that the spread of Hupa-iya ceramics was accomplished through a migration of Arawak speaking peoples, it is interesting to note that the peoples of that linguistic family are the only pottery makers on the Upper Xingu, and so presumably introduced the manufacture of ceramics into that area. Actually, equally good or better comparisons could be made between Pacacocha and the Xingu ceramics. I would suggest that both Hupa-iya and the Upper Xingu ceramics evolved from a Barrancoid Style ceramic complex. The modern Xingu ceramics having had more time to change are naturally more
divergent.

The ceramics of Chimay on the Río Beni in lowland Bolivia and the Lower Valarde materials on the Río Mamoré in lowland Bolivia are worth mentioning for a few similarities which they show to the Hupa-iya materials. These include the extensive use of simple hemispherical bowls and the fairly extensive use of incised decoration, appliqué decoration, and adornos. The similarities are not specific, and the lowland Bolivian complexes show several traits which set them apart from Hupa-iya: the use of tetrapodal supports; the use of notched, appliqué ridges; and in the case of the Lower Valarde materials, the extensive use of painted decoration. In this discussion I am following the chronological arrangement proposed by Nordenskiöld which placed the Chimay material as contemporaneous with the Lower Valarde, rather than the arrangement more recently put forward by Bennett and repeated by Howard which places Chimay as later than Lower Valarde. It seems to me that the existing evidence supports Nordenskiöld's position more strongly. These finds are of importance because of their cross ties with the Tiahuanaco Horizon and because of their probable linkages to Arawak speakers.

One of the most distinctive traits of the Hupa-iya Complex is the use of carefully made and elaborately decorated spindle whorls, usually spherical but occasionally showing
elaboration in shape. With the exception of La Cabrera, such modeled spindle whorls are not characteristic of the Barrancoid Styles of Venezuela or British Guiana. The spindle whorls of the Caño del Oso Style somewhat resemble Hupa-iya examples. Elsewhere in lowland South America carefully decorated ceramic spindle whorls are particularly notable in the Marajoara Complex, the Acauan Complex, both at the mouth of the Amazon, and in the materials from Mound Hermann in lowland Bolivia. In none of these instances are the forms of the spindle whorls or the nature of the decorative elements very close to the Hupa-iya specimens.

This more detailed reexamination of the possible affiliations of the Hupa-iya Ceramic Complex has not dissuaded me from the idea that the Hupa-iya Complex was brought into the Ucayali Valley by a major migration of Arawak speaking peoples out of the Orinoco Basin. There are several lines of evidence which would associate at least the initial spread of the Barrancoid ceramics with the expansion of speakers of Arawak. This is the identification favored by Rouse. Arawak is the only linguistic family found both in the Orinoco drainage and in the Ucayali drainage.

Yarinacocha

As one proceeds in the sequence from the Hupa-iya
to the Yarinacocha components, there is a major cultural discontinuity of a kind which seems to have chronological significance elsewhere in Tropical Forest South America. All of the earlier components excavated are relatively deep and extensive middens containing large quantities of cultural material. The Yarinacocha Complex and subsequent occupations on the Ucayali are represented by shallow middens of limited extent. The majority of the Yarinacocha and Pacacocha sherds recovered came from sherd concentrations in intrusive pits. This discontinuity in the sequence at San Francisco de Yarinacocha suggests a drastic reduction in size and permanence of settlement subsequent to the Hupa-iya occupation. A similar, marked decrease in intensity and duration of occupation can be noted between Marajoara and Amaz at the mouth of the Amazon. There will be a more complete discussion of this phenomenon in the concluding section of this paper.

Yarinacocha ceramics are obviously separable from the ceramics of the preceding cultures on the Ucayali by their great reduction in the number of modes of shape and decoration. Yarinacocha ceramics are technically competent, but there is little attempt to achieve either the highly polished surfaces of the Shakimu ceramics or the nearly ubiquitous decoration of the other ceramics which preceded it on the Ucayali. Much of what is new in the Yarinacocha Complex can be regarded as the result
of a decreasing interest in elaborate ceramics. This may reflect a less efficient utilization of the natural resources of the area with a concomitant decrease in the amount of time that could be expended in the manufacture of ceramics.

The basic vessel shapes of Yarinacocha show definable resemblances to the shapes of the Shakimu Complex, suggesting that the Yarinacocha Complex may in part at least, be derived from the earlier culture through a long period of ceramic deterioration. The similarities between Yarinacocha and Shakimu include: rim profile (compare Fig. 102 a with Fig. 58 b), the slightly concave sidewalls of the vessels, and the fairly sharp break between the side and the bottom of the vessel (compare Fig. 100 with Fig. 58 a). The floated surfaces which are typical of Yarinacocha, and of no other ceramic complex on the Ucayali, might well be regarded as an attempt to achieve the slick surfaces typical of Shakimu with a minimum expenditure of time and effort.

The Yarinacocha Complex is particularly striking in its complete lack of any form of modeled decoration and the extreme rarity of incised decoration. On the other hand, the bichrome and polychrome painting, which is the only significant form of Yarinacocha decoration, has absolutely no antecedents in any of the previous ceramic complexes on the Ucayali.

It is difficult to discuss the style of the painted
ceramics because of the extremely eroded character of most of the examples recovered. What is most characteristic of Yarinacocha painted decoration is the use of a fairly heavy red to maroon slip over much or all of the vessel surface. To this red slip may be added bounding lines and designs in a very thick, heavy, creamish white paint. The white paint was always applied subsequent to the red. A rather weak, black pigment was applied to some specimens as a third color, frequently bounding the areas of white. Such white on red pottery seems to be fairly widespread in the upper Amazon. I have seen individual specimens from the Madre de Dios region of southeastern Peru, and from the Ecuadorian Montaña. The latter specimen is in the collection of the American Museum of Natural History. The rather crude white on red pottery illustrated by Nordenskiöld from the site of Rurrenabaque on the Río Beni in eastern Bolivia appears to be related.348 One well preserved specimen, which is sufficiently similar in shape, surface treatment, and slip color to be a Yarinacocha trade piece, was recovered from the Cave of the Owls on the Huallaga River to the West of the Ucayali.349 This specimen gives us our best idea as to the design layout of Yarinacocha polychrome decoration.

There is one group of ceramics described for Tropical Forest South America which shows very strong similarities in shape
and apparently in surface finish to the Yarinacocha Complex. The ceramics recovered by Becker-Donner in her archaeological and ethnographic survey of the Rio Guaporé have not been illustrated in sufficient detail to make comparisons easy, but a number of the larger and cruder burial urns appear to be identical to concave sided vessels of the Yarinacocha Complex.350

This particular kind of urn in the Yarinacocha Complex also bears a certain resemblance to some of the plain specimens of the Marajoara Complex at the mouth of the Amazon. Such urns are not often illustrated or present in museum collections, but Palmatory has published pictures of straight sided, rolled lip urns which appear similar to certain Yarinacocha examples,351 and Meggers and Evans have also illustrated similar forms.352

Another similarity between the Yarinacocha Complex and Marajoara is the use of cylindrical spindle whorls in both. There is only one example of a spindle whorl from the Yarinacocha occupations, but its associations are unquestionable, both because of its provenience and because of its characteristic surface finish. Its shape resembles some of the examples illustrated by Meggers and Evans.353

The large, shallow pans with outsloping sides, which are a common part of the Yarinacocha Complex, have no antecedents in any of the previous cultures on the Ucayali. These are almost
certainly comals (manioc griddles), and the identical form is still in use in the Tropical Forest region of southeastern Colombia where this kind of comal is typical of the Tucano speaking peoples and of the adjoining Arawak speaking groups with whom they frequently intermarry. I have no idea as to the nature of the cultural contact which brought this trait into the middle Ucayali, but the similarities in form are too great to be accidental.

There is one other peculiarity of Yarinacocha ceramics which deserves discussion. This is the occurrence of shallow, open pouring spouts of "cream pitcher" type. Such pouring spouts are not common in South America. There are examples from the Upper Xingu, the Guaporé, and in the enigmatic fiber-tempered San Jacinto materials of Colombia where they are relatively common. Such spouts are more widespread in Mesoamerica, occurring with fair frequency in Tlatilco, and in various phases of the Kaminaljuyú sequence. They are especially typical of the Teotihuacan influenced Esperanza Phase. The erratic distribution of this trait in time and space makes speculation about it unprofitable at present.

Pacacooha

As was the case with the Yarinacocha Complex, the
Pacacocha ceramic materials were recovered from small, localized, midden deposits of negligible depth, and in both instances the most rewarding and extensive sherd collections came from intrusive pits. These similarities in the nature of the known components of the two cultures suggest that the societies responsible for them were of about the same level of complexity and of comparable size. If anything, the available evidence would indicate a further reduction in the intensity and/or duration of Pacacocha occupations when compared to those of the previous cultural complex in the area.

Though similar in cultural level to the Yarinacocha Complex, the Pacacocha materials, in so far as they are known, show few resemblances in form. Those similarities which can be noted between the ceramics of the two complexes are largely of a negative nature. Both complexes show a limited range of shapes and a limited number of decorative techniques and decorative elements. Of the two the Pacacocha Complex is definitely the less elaborate. It emphasizes simple, uninflected, globular vessels, most usually without elaboration of base, shoulder, or rim. In these tendencies it stands far closer to the Hupa-iya Complex than it does to the intervening Yarinacocha Complex. The use of adornos in the Pacacocha Complex is relatively frequent, and is certainly the most characteristic form of
decoration. This is a trait which also suggests a relationship with the Hupa-iya Complex. At first glance the Pacacocha adornos do not much resemble the more carefully made examples of the Hupa-iya Complex, but some of the same principles of construction are used in both kinds of adornos, and in the American Museum of Natural History collection from Nueva Paris, another Ucayali site from which Tessmann obtained material, there is an adorno which would seem to form a link in the development of one style into the other, being about half way between (Fig. 114 b). The occurrences of biconvex bodied vessels in the Pacacocha Complex along with its occasional use of plain, everted lips and strap handles are also reminiscent of Hupa-iya. It is safe to say that the Pacacocha Complex shows more points of similarity to the earlier Hupa-iya Complex than to any other complex known on the Ucayali.

In addition to the above mentioned ties between Pacacocha and Hupa-iya, there are a couple of traits in which Pacacocha ceramics foreshadow those still being made on the Ucayali by the modern Chama. The bowl with insloping sides (Fig. 108 g) is similar to the form of Shipibo beer mugs. Pacacocha spindle whorls are about half way between the spherical form typical of Hupa-iya and the sharply biconical form typical of the modern Shipibo.

Comparisons between the Pacacocha ceramics and various complexes outside the Ucayali drainage also indicate some interesting
similarities. Pacaccoha adornos show a resemblance to certain of the examples on modern Arawak pottery from the Upper Xingu.

In their crudity and amorphous nature and in their use of multiple applique units, the elaborate Pacaccoha adornos have a general resemblance to the Gorobal Phase adornos on the Ventuari in Venezuela, to the Apostadero adornos on the Lower Orinoco, and to the non-Barrancoid style of adorno in the Mabaruma Complex of British Guiana. Pacaccoha adornos, like most of the styles listed above, sometimes show what Evans and Meggers have so aptly called "Mr. Magoo" eyes.

The figurines and figurine fragments of the Pacaccoha Complex have no known antecedents on the Ucayali but are similar to materials from the Mojos region of lowland Bolivia and the Guianas. The one nearly complete human figurine recovered is quite close to specimens recovered by Nordenskiöld from Mound Hernmark and from the later component at Mound Valarde in the treatment of the arms and head. The more elaborate human head from Tessman's collection from Yarinacocha (Fig. 114 a) can best be compared to an example from the Rupununi Phase in British Guiana, as can the animal foot fragments. A similar treatment of animal feet also occurs in the Mazagao and Aru Phases at the mouth of the Amazon. In the Amazon Basin human figurines have their greatest elaboration in the Maraçana and Santarém Styles, but the finely made examples of these styles
show little resemblance to the Pacacocha specimens.

The form of comal which is typical of the Pacacocha Complex is like the crude forms which appear in the lowest levels of the earliest known Tropical Forest Cultures of northwestern South America, Momil I in Colombia, and Saladero in Venezuela. Such comals were made with relatively little change in form up to the contact period in various parts of northern South America. Apparently this form of comal does not appear in the Amazon Basin until relatively late prehistoric times.

The topia, or solid clay pot rest, is a trait which should ultimately prove to be of great utility for tracing cultural relationships and for dating in most of lowland South America. Meggers and Evans presented the known distribution of the trait as of 1957. This picture has been considerably expanded on the basis of the work of Cruxent and Rouse in Venezuela, and by their own work in British Guiana. On the central Ucayali the typical form of topia, used in groups of three, appears in the Pacacocha Complex. They are not in use among the Chama at present, but ethnographic specimens of identical form have been collected among the Arawak speaking Piro further upstream. The form of these artifacts is remarkably constant over much of lowland South America. The specimens illustrated by Evans and Meggers for Wai Wai and Taruma Phases in British Guiana
could be interchanged with the Pacacoche specimens. Over much of its range this trait appears to be a marker of relatively late time, but in Venezuela it has considerable time depth in the Barrancoid and Saladoid Series, occurring in the earliest known style of each, and thus dating well before the time of Christ. The sudden appearance of the Venezuelan form of both comal and topia in Pacacoche middens suggest that there was a further wave of cultural influence entering the Amazon Basin from northern South America at this time.

To sum up the preceding remarks, one might suggest that the Pacacoche Complex was an extremely crude, simplified, and attenuated development out of the Hupa-iya Complex, and was separated from it by a considerable lapse of time. Pacacoche pottery was manufactured as a part of a way of life which permitted much less in the way of elaboration of material culture than was possible earlier. It also appears that during the period in which the Pacacoche Complex existed on the Ucayali there was a lively exchange of specific cultural traits throughout most of lowland South America. The Pacacoche Complex was in part a result of such diffusion.

The Corrugated Ware Complex

There is only a small amount of material available from
this complex or series of occupations, but what there is shows a number of points of similarity to ceramics in other parts of South America. From the point of view of meaningful cultural comparisons, it is, next to Hupa-nya, the most satisfactory of the complexes at Yarinacocha. The trait of corrugation is very widespread in South America and appears to span a wide range of time. The very ancient examples in terminal Valdivia and the immediately post Valdivia Cultures of Coastal Ecuador seem to be too early to be relevant to the present discussion. Aside from these, the trait seems to be a time marker of relatively late times. In Venezuela it appears to be earliest in the El Palito Style, which Cruxent and Rouse date as falling in their Periods II and III, but otherwise it is almost entirely confined to styles of Periods IV and V, \(^\text{382}\) that is, late precontact times and postcontact times. At the mouth of the Amazon it is characteristic of the Formiga \(^\text{383}\) and Acauan \(^\text{384}\) Phases, which are both prehistoric, and occurs rarely in the Arau Phases, a culture which continued into historic times. \(^\text{385}\) Corrugation is characteristic of the Río Palacios materials excavated by Nordenskiöld. \(^\text{386}\) It is especially common and well developed in the Arroyo Malo materials in the La Plata Delta of Argentina excavated by Lothrop, \(^\text{387}\) and is equally typical of other archaeological manifestations of protohistoric and historic Guaraní culture. \(^\text{388}\)

If we set aside the late Valdivia and immediately post
Valdivia examples from Coastal Ecuador, all South American corrugation appears to be sufficiently alike so that it seems probable that all derive from a single source of cultural influence. In various of the contexts in which it occurs, this trait shows about the same wide range of variation from shallow, fingernail incision to deep, true corrugation. Compare Arroyo Malo examples with the Guaribe examples from the Llanos of Venezuela, and with the range exhibited by the Corrugated Ware Complex on the central Ucayali. In terms of surface treatment it would be very difficult to sort sherds from these three widely separated complexes once they were mixed. These near identities in surface treatment are further emphasized by the fact that they occur on identical vessel forms and even with very similar rim treatment. Compare the vessel shapes in the Arroyo Malo Complex, the Rio Palacios Complex, and the Corrugated Ware Complex at Yarinacocha. (It is difficult to enter the cursory illustrations of Guaribe vessel forms into these comparisons.) In a very large number of instances corrugation or other related forms of surface texturing seem to be associated with broad, convex sided pots, and most especially with huge urns having conical bottoms. It has often been assumed that this complex of traits was spread by the migrations of Tupí-Guaraní speaking peoples, and it still seems
likely that much of its more southerly distribution can be explained in this way. However, the relatively early occurrence of this trait in Venezuelan styles, such as El Palito, and its occurrence in various areas beyond the probable range of direct Tupi-Guarani influence, would seem to rule out any such simplistic hypothesis as a total explanation of its final distribution. At present the trait does seem to have considerable value as an horizon marker for late times and as our knowledge of lowland South America increases it should be of very great importance in the tracing of specific cases of diffusion and migration.

There are two other traits of ceramic decoration which are almost certainly part of the Corrugated Ware Complex. Each of these is represented by only a handful of sherds in the collections from the central Ucayali, but the distribution of these traits elsewhere in lowland South America is of sufficient interest so that they are worthy of extended consideration.

One of these two is the use of strip applique, scored with thin line incision across the axis of the applique strip. Such strips may be part of abstract designs or may form limbs or especially eyebrows of anthropomorphic and zoomorphic effigy vessels, as in the case of the Valencia Style of Venezuela. The specimens from the excavations at Yarinacocha
are too fragmentary to show the use to which they were put in design layout. Outside of Venezuela the distribution of this particular form of applique work is extensive. Only some of the more fully reported examples will be given. It is well developed in lowland Bolivia in the earlier complex at Mound Valarde, as well as in the Chimay materials. It is extremely common in the Konduri materials on the lower Trombetas, and in the Santarém ceramics where it is extensively used both in abstract design and to form various parts of zoomorphic figures. At the mouth of the Amazon it occurs occasionally on Marajoara sherds in a not very characteristic form, but is more typical of the Aruá materials. One Aruá example is nearly identical to a specimen from Yarinacocha. Compare Fig. 119 f with Meggers and Evans Fig. 198 a. This trait is also to be noted in Mazagá ceramica. Outside of the Amazon Basin this trait occurs in late times in the Guayas Basin in a form which strongly suggests Amazonian influence and in association with huge urns with conical bases. Estrada has already noted and illustrated the similarities between Queveno and Santarém ceramics. In Colombia the trait is characteristic of Tierradentro ceramics, of Tairona ceramics, and of the later periods in the Sinú River valley, Tierra Alta and
Betancourt, all late cultures giving other evidence of influence from the Amazon Basin.

The occurrences in Venezuela are numerous and I made a table of those culled from Cruxent and Rouse. As in the case of corrugation, the preponderance of the occurrences are in late styles of Periods IV and V.

The other decorative mannerism which appears to belong with the Corrugated Ware Complex is the use of sharp, fine line incision to form geometric designs, occasionally curvilinear but more frequently in nested, rectangles, diamonds, or frets. This kind of incision is present in the collection from Mound Hernmark in lowland Bolivia. It also occurs in the collections made by Becker-Donner along the Guaporé on the Brazil-Bolivia border. On the central Amazon it is present in the Itacoatiara Phase, the later of the two recently defined by Hilbert for the Manaus region, and in the similar material collected by Hanke upstream from Manaus. It is present in the Komduri Complex at the mouth of the Trombetas. This kind of incision is common in the Majagao Complex and has been given the name Uxy Incised by Meggers and Evans. In Venezuela such incision is rare, but the painted designs of the Memo Style of the Venezuelan Llanos would appear to be related.

The three major characteristics of the Corrugated Ware
Complex do not form a tight knit complex throughout the tropical lowlands of South America, though they do occur together in several of the complexes noted. All three appear to be useful as late horizon markers and indicate an increase in the amount of contact between Tropical Forest Cultures in later prehistoric times. Urn burial is another trait which makes its appearance on the Ucayali at this time. At least, the large, corrugated urn from UCA-6 was partially buried in the same way as the Amua Urn burials. In most areas of lowland South America urn burial is characteristic of the later part of the local sequences, and the sequence on the Ucayali fits well with this generalization.

The Corrugated Ware Complex shows a number of traits which have no antecedents in earlier complexes on the Ucayali, and which have close parallels in a larger number of late cultures elsewhere in tropical South America. The material from the Ucayali is too scanty to permit one to say with certainty which of these other cultures it most closely resembles, but, as was noted above, particularly strong resemblances are to be found in the Guaribe Style in the Llanos of Venezuela, the Arua Phase at the mouth of the Amazon, and Arroyo Malo ceramics in the La Plata Delta. If these comparisons do not provide a good explanation of the precise origin of the influences which
gave rise to the Corrugated Ware Complex on the Ucayali, they
at least confirm in a very definite way the dating of the Complex,
which I arrived at on the basis of stratigraphy. It is worth
repeating that, though these materials are the most recent
pre-Shipibo ceramics recovered on the Ucayali, there is
evidence from Cut 2 at UCA-6 and from Cut 5 at UCA-2 that
they have an appreciable antiquity, and are separated from
the modern Shipibo ceramics by considerable lapse of time.

Earlier I made the suggestion that the people responsible
for the Hupe-iya and Pacacocha Ceramic Complexes were of Arawak
speech. It seems likely that they were the ancestors of the
modern Campa. On the basis of information on modern Amahuaca
pottery making, which Carneiro recently showed to me, there
is an even stronger probability that the makers of the Corrugated
Ware Complex were of Panoan speech. I suspect that they represent
a stage in Panoan ceramics and culture, before the riverine
Panoans, the Chama, were much differentiated from the non-
riverine groups such as the Amahuaca and Cashibo. The break
between Pacacocha and the Corrugated Ware Complex would appear
to represent the influx of Panoan speakers into the central
Ucayali. In terms of the total distribution of Panoan and in
terms of the similarities between the Corrugated Ware Complex
and the ceramics of lowland Bolivia and the Guaraní region, I
would suggest that the movement was from the South and East.
Shipibo Ceramic Complex

The problem of the antecedents of the technically fine and aesthetically elaborate ceramics still being made on the Ucayali by the Chama groups of Panoan speech was one of the major questions which motivated this particular piece of research. It is now possible to give some definite answers to this question. The style of painted decoration, which makes modern Chama pottery so distinctive, and several of its technical characteristics, such as high firing and cariapo temper, did not develop on the central Ucayali, but were introduced from some outside source in relatively late times. However, some characteristics of the modern Chama Ceramic Complex, especially the surface treatment of the cooking pots, do seem to represent continuities out of the previous ceramic complex, the Corrugated Ware Complex. In short, Chama slipped wares, both with regard to form and to decoration, are derived from a ceramic tradition outside of the central Ucayali, while the form and decoration of the unslipped, cooking pots appear to have developed from the Corrugated Ware Complex. As mentioned above, it is likely that the Corrugated Ware Complex is to be identified with the ancestors of the modern Chama, before they accepted the series of ceramic traits which make their fine wares so distinctive.

At present it is impossible to date precisely the time
at which these distinctive ceramic traits were introduced into the central Ucayali. It was clearly subsequent to the Corrugated Ware Complex. occupations of the area which we have encountered, and it was certainly before the middle of the last century. Marcey's description of Chama ceramics makes it clear that they were already making pottery of the modern type and trading it upstream to the Arawak speaking Piro. It is possible that a thorough search of the records of the various missions which were established from time to time on the Ucayali, and excavations at several of the mission sites would go far toward the solution of this dating problem, but such work remains to be done.

The characteristics of modern Shipibo ceramics, which set them apart from all earlier pottery in the area, are cariapé temper, high firing temperature, polychrome painting with black and red on a white slip, an elaborate decorative style involving the combination of broad and narrow painted lines, the use of a resin coating after firing, and a series of distinctive vessel shapes including constricted necked ollas and broad, open bowls with clearly defined bases. Even at the present state of our knowledge, it is possible to specify the source of these traits with a fair degree of certainty. We can be certain that this complex did not come from farther upstream on the Ucayali, since in recent times this kind of pottery has been diffusing gradually upstream, with the Arawak speaking Piro first buying the Chama Style
fine ware and in more recent times manufacturing it for themselves. Since most contact in the Amazon Basin is along the rivers, and since the Chama are strongly riverine in their orientation, it is unlikely that these traits were diffused overland from the headwaters of the Juruá to the East of the central Ucayali. The conclusion is that the Chama received these innovations in ceramics from tribes farther downstream on the Ucayali and on the mainstream of the Amazon. One can go even further and name the particular tribe which was most likely to have been the source of all of these traits. The Tupi-speaking Cocama made and still to a degree make pottery with all of the characteristics mentioned above. Stylistically their pottery is somewhat distinctive in that many of the recent examples of the black and red on white polychrome use floral and zoomorphic designs. Such designs are clearly the result of recent acculturation, and some of the Cocama pottery recorded as recently as Girard’s work in the Peruvian Montaña shows purely geometric designs much more like modern Chama style. There are other specific features of pottery making which the Cocama and Chama share, such as the use of a special potter’s hut. The case is very strong that these distinctive traits of Chama pottery and Cocama-Omagua pottery on the lower Ucayali and Amazon have a single source. Girard has made a much more
detailed artistic and technological comparison between Cocama-Omagua pottery on the one hand and Chama pottery on the other and his conclusion is that they are directly connected historically. He goes on to state that these stylistic and technological traits were diffused from the Chama to the Tupi-speaking people. This is in direct opposition to the conclusion that I have formed as to the direction of the diffusion. It will be well to review some of Girard's major points in an attempt to locate the basis of this difference of opinion. In the first place, it is Girard's contention that the Cocama-Omagua are on a level of culture lower than that of the Chama, so that diffusion from the higher to the lower culture would be reasonable. In a definition of cultural stages in terms of community size, elaboration and tightness of social structure, or of successful competition with the surrounding tribes the Tupi-speaking tribes would appear to have been on a much higher level of culture than any of the other Montana tribes. Concerning the social organization of the Chama, Steward and Métraux wrote: "The aboriginal Panoan sociopolitical unit was the household." While Métraux's statement concerning the Cocama-Omagua social organization pictures a more complex society with large villages, chiefs, and the beginnings of social stratification. Girard presents no evidence which effectively counters these statements.

Girard's second point is that white slipped, polychrome
ceramics are typical of the Chama but only of those Tupi-Guarani groups which were immediately adjoining the Chama. This is not true. The white slipped bichromes and polychromes are typical of the Tupinamba. Such pottery was found among the Guarani of the Upper Paraná and even among such far flung Guarani groups as those of the La Plata Delta and the Chiriguano. Girard is correct that such pottery is missing among some of the simpler Tupi speaking peoples such as the Parintintin and Cawahiba, but it was quite typical of the more complex and sedentary groups.

A third point made by Girard is that if the Chama had acquired their ceramic complex from the Cocama, they would have acquired the trait of corrugation on their utility ware. The answer to that is, of course, that they have corrugation. As was stated above, corrugation makes up a significant part of the decoration on the culinary ware recovered in the archaeological sample, and specimens were still in use in San Francisco de Yarínacocha. Tessmann illustrates specimens, and in the face of this evidence, Girard's denial of corrugation and finger nail incision to the Chama is rather odd.

Looking at the same evidence from the other direction, it is quite clear that such white slipped polychrome pottery is much more out of place among the Panoan speaking peoples of South America than it is among the Tupi-Guarani. In fact, among the
Panoan speaking peoples of Peru and Bolivia it is found only among the Chama, that is, those inhabitants of the main stream of the Ucayali who were accessible to influence from the main stream of the Amazon. All of this evidence indicates to me that the Chama received this style of pottery along with a number of other ceramic traits from the Cocama through the process of trade and diffusion and possibly by acquiring Cocama women as slaves. Contact at missions may also have been a factor.

This gradual diffusion of the white polychrome style ceramics up the Ucayali and its major eastern tributary is a process which is still going on. Among the rawak speaking Piro on the Urubamba it would appear that such pottery is being made today.

In the middle of the last century Marcy claimed that all such pottery was obtained from the closest group of Chama, the Conibo.

Farabee repeats this statement but collected and illustrated some Piro pieces in this style which seem to be locally made.

The similarity between modern Chama pottery and Marajoara ceramics has been commented on by a number of writers. These similarities appear to me to be sufficiently close so that there is strong suggestion of real historical connection. Meggers and Evans have discussed this problem and reviewed the relevant literature. The traits which suggest an historical relationship between Chama pottery and Marajoara...
pottery are precisely those traits which the Chama probably received from the Tupi speaking Cocama. The question which must now be answered concerns the relationship of the major Tupi occupations along the central and upper Amazon to the spread of Marajoara-like culture along the Amazon and its tributaries. The solution of this question must wait for the full publication of Maggers and Evans materials from the Río Napo, and of the Marajoara-like complex recently described by Hilbert in the Manosas area. Archaeological work within the Cocama-Opagua territory would also be of great help in clarifying the situation. My hunch is that modern Cocama ceramics are a direct historical development out of those central and upper Amazon cultures in the Marajoara Tradition.

Summary Statement on Chronology

Since there is no basis within my own data for an absolute dating of the central Ucayali sequence, the only way that such a dating can be assayed is through the cultural comparisons outlined above. Willey has presented a series of chronological alignments for all of South America, and Cruzen and Rouse have made a chronological arrangement for Venezuela. These are useful as points of departure and comparison.
I would suggest a date of from 1000 to 800 B.C. for the duration of the Early Tutishcainyo occupation at UDA-6. This takes into account the similarities of Early Tutishcainyo with Momil I, with Highland Chavin, and with Saladéro.

A duration from 500 to 300 B.C. is indicated for the Late Tutishcainyo occupation at UDA-6 by several lines of reasoning. Granted that it has developed in the same basic ceramic tradition as Early Tutishcainyo, and granted the rather slow rate of evolution probable under conditions of Tropical Forest culture, 300 years does not seem like an excessive length of time to separate the two major occupations at UDA-6. In many respects Late Tutishcainyo is markedly different from Early Tutishcainyo. As was mentioned earlier, the Tutishcainyo occupations at UDA-6 would appear to partially fill this gap. The probability of close cross ties between Late Tutishcainyo and the early occupation at the Cave of the Owls on the Huallaga and between this Cave of the Owls occupation and Late Chavinoid manifestations in the Peruvian Highlands also suggest a date of around 500 B.C. Certain similarities in spout forms and in bottle forms between Late Tutishcainyo and the Chorrera Culture of the Guayas Basin are also compatible with such a dating.

The Shakimu occupation at Yarinacocha is assumed to date from 100 B.C. to 100 A.D. Such a dating is suggested by
the stratigraphic relationship of this culture to the two earlier major occupations in this region. The similarities between Shakimu and the Valdivia Culture of Coastal Ecuador would suggest a much earlier dating for Shakimu and for the beginning of the whole sequence.

The Hupa-iya occupation should have lasted from 500 to 800 A.D. As was pointed out earlier, there is good stratigraphic evidence from Cut 2 at UCA-2 that the Hupa-iya occupation at this site was separated from the preceding Shakimu occupation by a considerable lapse of time. A date of around 500 A.D. was arrived at by the comparisons with Period III Styles in Venezuela, and the Carbon 14 date on the Los Barrancos material was taken as a good basis for this estimate.443 The lack in Hupa-iya of the series of ceramic traits (corrugation, scored strip applique, urn burial, fine line incision) which are widespread in the Tropical Forest areas of South America in late times, and which are typical of many of the Period IV Cultures in Venezuela, suggests that it is definitely earlier than 1000 A.D. Some of these traits are already present in the Lower Valarde Complex in lowland Bolivia by 1000 A.D. The dating here is fairly accurate in terms of cross ties with Tiahuanaco Culture.445 It would appear that some of these late horizon markers were already widely diffused by 1000 A.D., and that their absence in the Hupa-iya
Complex is probably significant in terms of dating.

It seems likely that the Yarinaochoa, Pacacocho, and Corrugated Ware occupations fill the time span between 1000 and 1500 A.D. As was pointed out earlier, these cultures show similarities to Period IV styles in Venezuela and to the Late Prehistoric and early Historic Cultures at the mouth of the Amazon. The similarities between the cultures of this part of the Yarinaochoa sequence and those of Period IV in Venezuela indicate that this part of the Yarinaochoa sequence is the temporal equivalent of Cruxent and Rouse's Period IV in Venezuela.

It seems likely that the series of ceramic influences which are characteristic of modern Chama pottery diffused into the central Ucayali at some time between 1500 and 1800 A.D. but the dating can not at present be specified more precisely.
The Significance of the Yarinacocha Sequence to an Understanding of Tropical Forest Culture

The most important conclusion to be derived from the archaeological work at Yarinacocha is that there is a great time depth for sedentary, presumably agricultural societies in the Upper Amazon Basin. Even if the estimates of dating presented in the previous section should turn out to be too generous, the length and complexity of the sequence would indicate a minimum of 1500 to 2000 years of cultural development. It is also worth emphasizing that throughout this long developmental sequence, there were a number of indications of outside influence working on the cultures in the Yarinacocha region. Trade pottery from an outside source is to be noted in the very earliest complex, and becomes a really significant part of the Late Tutish-cainyo Complex. Each of the subsequent occupations at Yarinacocha shows strong evidence of cultural elements brought in from other areas of the Tropical Forest lowlands. This picture of continuing external contacts working on the Yarinacocha sequence suggests that there is an equally great time depth for Tropical Forest Culture in other areas of the upper Amazon. The Yarinacocha sequence is unlikely to be unique in this respect.
I believe that from early Tutishcainyo on through all of the subsequent occupations we are dealing with complexes within the general economic and cultural pattern known as Tropical Forest Culture. The diversity of the complexes within this sequence both with regard to level of social complexity and with regard to cultural content is great. This wide range of diversity should stand as a clear warning to anyone who would oversimplify the developmental picture of Tropical Forest Cultures and the prehistory of lowland South America in general.

Before I attempt to place the Yarinacocha sequence within the framework of a wider developmental scheme, it will be necessary to define the way in which I am using certain terms. Such expositions are tedious but necessary, since certain of the terms which I must use have been previously used in various senses by different authors and even in varying senses by the same authors.

By the Tropical Forest Cultural Pattern I mean a basic pattern of economic adjustment to the Tropical Forest environment involving primarily the practice of root crop agriculture by the slash-and-burn method. This is one of the two major patterns of food production developed in the New World prior to Western contact. There is a growing body of evidence that this subsistence basis for culture was developed
at a very early time in northwestern South America, independently of the other major agricultural pattern of the New World, the maize-beans-squash pattern, which is clearly Mesoamerican in origin. 446 I propose to designate as Tropical Forest Cultures all cultures whose economic base is a part of the development and spread of this basic pattern of root crop agriculture. Cultures which are basically Tropical Forest have in the course of their development shown a wide range of levels of complexity, from extended family groups with a highly impermanent residence to elaborately organized, sedentary societies of at least a couple of thousand people. In my usage Tropical Forest Culture does not refer to any particular level of complexity within this spectrum, but to the total spectrum.

The term Tropical Forest Culture has been used in the past by workers in the area in at least two conflicting ways. Both usages are inherent in the organization of the *Handbook of South American Indians, Vol. 2*, with some writers treating Tropical Forest Cultures as a widely branching historic tradition with specifiable cultural content, 447 and others treating it more as a level of cultural development. 448 Meggers and Evans, in their theoretical discussion of the meaning of the sequence on Marajó, have emphasized the idea of cultural level almost to the exclusion of the idea of cultural content and relatedness. Tropical Forest Culture has come to be an evolutionary stage or level of culture.
The term Circum-Caribbean has likewise been used with a number of connotations; as a geographical designation, as descriptive of a level of cultural organization, and as descriptive of an historical entity. All of these shades of meaning are inherent in the organization of the *Handbook of South American Indians*. Since that time, the term has been used more and more specifically to refer to a certain level of cultural organization. If the term is to be used, I would suggest that it be confined to those cultures along the north coast of South America which are historically derived from the eastward movement along the Venezuelan Andes and the Caribbean coast of people practicing the maize-beans-squash pattern of agriculture. This follows the distinction made by Cruxent and Rouse between the Western, maize based cultures and the Eastern, manioc based cultures. The dichotomy made by the Reichel-Dolmatoffs in their recent work parallels this. This distinction can be made consistently and involves considerable cultural content beyond the subsistence pattern. This distinction separates two historically distinct and meaningful cultural patterns. Following this usage the high level Arawak cultures of the Antilles are clearly Tropical Forest rather than Circum-Caribbean, since Rouse's work demonstrates beyond any doubt that these cultures are a development out of the Tropical Forest Pattern.
"Formative" is a term which has been carrying a very heavy burden of meaning in recent discourses on American Archaeology. In various contests it is used as a purely temporal designation of the time period from 1500 B.C. to the time of Christ; as a label for a particular developmental stage of culture preceding the most elaborate artistic manifestations in a particular tradition; and finally, to designate a series of historically related cultures in Mesoamerica, Colombia, Coastal Ecuador, and Coastal Peru which share maize based agriculture, a number of ceramic and artistic traits, and which are crucial to the problem of the transporting of the Mesoamerican pattern of maize based culture to South America. The ambiguous way in which the term "Formative" has been used has contributed in large degree to insufficiently clear conceptionalization of some basic problems of cultural dynamics. Reichel-Dolmatoff has circumvented this problem by defining several kinds of "Formative" cultures, and his own usage in this respect is completely clear. I would prefer to use the term "Formative" to designate a particular developmental stage within a cultural tradition regardless of dating or of the cultural affiliations of the complex involved.

The decision as to whether there was a single origin or multiple origins for agriculture in the New World is of considerable significance to this present discussion. If there
was a single origin for all of the ceramic using, agricultural societies of Nuclear America, then there is less need for a rigorous distinction between "Formative" as a developmental stage and "Formative" as a designation for the cultural tradition linking Mesoamerica and the northwestern part of South America. In that case the developmental "Formative" would more or less coincide with a single historical tradition. A growing body of evidence would indicate that such is not the case.

Two major bodies of data indicating the priority of manioc based agriculture over maize based agriculture in northern South America are the excavations carried out by the Reichel-Dolmatoffs at Momil on the lower Sinú in Colombia and the work of Gurxent and Rouse at Saladéro on the Lower Orinoco in Venezuela. In both sites there is strong evidence of bitter manioc cultivation well back in the first millenium B.C., or earlier. In both instances comals, of the kind which with very little modification continued to be used for the processing of bitter manioc up until contact times and beyond, were found in large numbers. The specificity of this class of artifact indicates that we are already dealing with a fully developed and highly stabilized pattern of bitter manioc based agriculture. The deep and extensive middens also suggest a fully efficient subsistence pattern based on agriculture.
The dating of the lowest levels of the Momil midden is not completely secure since there are no radiocarbon dates published. The Reichel-Dolmatoffs have estimated that the beginning of the occupation was about 1000 B.C.\textsuperscript{459} Elsewhere I have expressed the opinion that if the Mesoamerican traits, the appearance of which marked the beginning of the second half of the occupation, have a precise chronological value, they should date the middle point of the occupation at about 1000 to 800 B.C.\textsuperscript{460} This being the case, a date of 1500 B.C. for the first agricultural settlement at this site seems reasonable.

The recently published dates on the Barlovento shell midden on the Caribbean coast of Colombia do not necessarily provide a lower limit to the Momil occupation,\textsuperscript{461} since in Venezuela Cruxent and Rouse have noted a considerable lag in cultural development in coastal and island cultures as compared to riverine cultures.\textsuperscript{462} Very primitive Archaic type cultures lacking pottery survived in coastal Venezuela long after fully agricultural societies with elaborate ceramics had established themselves on the Central and Lower Orinoco. It may well be that the more simple economy characteristic of Barlovento and the relatively simple ceramics which accompanied it survived along the Colombia coast for some time after complex societies based on developed agriculture had established themselves along the major rivers. Even if the Barlovento occupation should prove to be older than
all of Momil I, the two Barlovento dates still correspond rather well with the Reichel-Dolmatoff's original estimate.

An excellent and internally consistent series of Carbon 14 dates simplifies the discussion of the chronology of the early manioc agriculturists in the Lower Orinoco Basin. We have here clear indication that two completely distinct societies were practicing bitter manioc agriculture in the Lower Orinoco as early as 800 to 900 B.C. In both of these cultural traditions there is definite indication of a sedentary way of life of long standing. Also to be emphasized is the fact that in both of these cultural traditions the earliest known ceramics are of considerable technical competence and show in both their shape and decoration a high degree of artistic elaboration. The Saladero component at the Saladero site is more developed in terms of ceramic technology, while the Barrancas component is more remarkable in terms of decorative elaboration, but neither represents a fumbling or experimental level of ceramic manufacture. Both had a long history of ceramic development behind them.

I will return to the implications of the developed ceramics later, but at this point it is necessary to expand on some of the points inherent in the data on cultivated plants. In the first place, the dating of these two occupations makes
them approximately contemporaneous with the earliest introduction of maize into South America. The evidence from Momil suggests that maize agriculture was not introduced into the lower Sinú until the beginning of the second half of that long occupation. The archaeological picture that Cruxent and Rouse have presented for Venezuela indicates that the introduction of maize is progressively later than that as one goes from West to East along the northern sections of Colombia and Venezuela. The earliest dated occurrence of maize based agriculture in Venezuela would appear to be in the Tosuyano Style at around 200 B.C. The sum of this evidence indicates that intensive manioc agriculture was being practiced in the lower reaches of the major river valleys in northern Colombia and Venezuela before maize agriculture was introduced into these sections of northern South America. The final implication is that these early examples of root crop agriculture represent a completely different tradition of agriculture than that of the Mesoamerican derived maize-beans-squash pattern, and that there were at least two major hearths of agriculture in the New World.

It is possible to say more about the nature of the pattern of manioc agriculture which was being practiced by peoples of the Saladero and Barrancas Complexes on the Lower Orinoco and by people of the Momil I Complex on the Sinú well
back in the earlier half of the first millennium B.C. The use of the same kind of comal which was in use with bitter manioc in northern South America and the Antilles at the time of the contact indicates that the bitter form was already in use in northern Colombia and Venezuela by 1000 to 800 B.C. There is also reason to believe that the most developed form of flour preparation, that using the tipiti, was already being practiced.

Dole, in her recent study of the distribution of various forms of manioc flour preparation, noted that on distributional grounds the center of the spread of the tipiti seems to be in northern South America, with an extension out into the Antilles. Its distribution in the Amazon Basin is limited. It is found mainly along the main streams, so that its introduction would appear to be relatively late in precontact times. Both geographically and historically the pattern of distribution of the tipiti appears to agree rather well with that of the comal. It is therefore an attractive assumption as a working hypothesis that historically as well as ethnographically the two elements form part of the same complex of food preparation. It is interesting that a third elaborate device in the complex of food preparation, the toothed manioc grater, may well have been present in the lowest levels of Moquil I since the flint microblades, which were a significant feature in the lowest levels of Moquil.
could well have functioned as the teeth in such graters.

A number of simpler methods of manioc preparation are to be noted in the marginal areas of the Amazon Basin (those areas away from the main streams), and it is Dole's assumption, with which I concur, that these represent earlier methods of flour preparation.

I have dwelt on these matters at some length, because of their implication that the form of bitter manioc cultivation and preparation which was being practiced in the Lower Orinoco and Lower Sinú at 800-1000 B.C. was not just a moderately developed one but was indeed the most elaborate, the most efficient, and the last to be developed within the South American pattern of root crop agriculture.

It would appear that these earliest known Tropical Forest Cultures must have a tremendously long period of experimentation in root crop agriculture lying behind them. Until recently anthropologists have tended to treat the start of agriculture as an Athena-like event with the first cultivated plant coming one day and permanent towns along with vast increments in population appearing the next. In recent and sophisticated publications one can find such statements as: "Wherever it has been introduced there is an almost immediate and revolutionary change in the culture; where it has not penetrated, the culture never advances..."
The excellent work of MacNeish in Mesoamerica presents an entirely different picture. The nick point at which plant cultivation starts to make a significant difference in population size and stability is preceded by a long period in which the primitive cultigens provided a rather minor part of the diet and do not greatly influence the way of life of the people cultivating them. This long stage of incipient agriculture was well expressed in the "Preformative Stage" of the original Willey-Phillips developmental scheme for the New World. This long period would seem to represent the time necessary for the major cultigens to accumulate sufficient mutations, which would be disadvantageous to wild species but advantageous from the point of view of human utilization, so that the plants become truly efficient sources of food. There must also be sufficient time for the practice of selective propagation to take advantage of the genetic plasticity of the original plant and of new mutations as they come along. Considering the level of Tropical Forest agriculture when we first find it at the Saladero Site and at Moaí, one would expect that a minimum of 2000 or 3000 years of experimental root crop agriculture lay behind it. Such an estimate is not excessive when compared to the length of time this process is known to have taken in other areas.

It may be of some interest to hypothesize concerning the early part of the development of South American Tropical
Forest Culture, using the scraps of archaeological and distributional data available. The wider distribution of sweet manioc from Tamaulipas in Mexico south throughout Tropical America, and its present dominance in the Tropical Forest areas of South America mainly among groups which are off the main streams and of relatively low culture suggests that its use is of considerably greater antiquity than bitter manioc. There is botanical evidence that the bitter manioc is the more highly developed cultigen and hence a later form, since bitter manioc never sets seed while sweet manioc occasionally does so.

There is further distributional evidence which would suggest that crops other than manioc may have been the original subjects for experimentation in root crop agriculture in South America. The Gê groups of the East Brazilian Highlands, especially the Eastern Timbira, have often been regarded as basically hunting and gathering peoples who have only recently acquired agriculture from their more advanced Tupi and Arawak speaking neighbors. Steward and Faron have recently made statements to this effect. Ninuendaju, who knew these Indians better than any other ethnographer gave a number of reasons for rejecting the hypothesis that agriculture was a recent introduction among the Eastern Timbira. Among the more significant is that fact that at least one of their major cultivated plants, a creeper...
of the genus *Cissus*, is a fully developed cultigen and is found only among these peoples. Eastern Timbira agriculture is based mainly on the sweet potato and a New World species of cultivated yam. One might make a case that the emphasis on sweet potato and yam is a case of differential diffusion from neighboring tribes with more typical patterns of Tropical Forest agriculture. Another possibility and one which seems far more likely to me and which Nimuendajú's data supports is that Gê agriculture represents a very early and simple form of root crop agriculture which spread through much of South America before manioc was brought under cultivation. The peculiar elaborations of Gê settlement pattern and Gê social structure seem far more explicable in the context of a long standing dependence on agriculture than in the context of a hunting and gathering economy which acquired basic agricultural practices from more advanced tribes only in very late prehistoric times. Though they maintain an agricultural economy the Gê groups lack pottery.

It seems likely that experimentation with the vegetative propagation of root crops was wide spread in northern South America between 4000 and 5000 B.C. Among the first crops which were turned into satisfactory cultigens were the sweet potato and the yam. (For the present we need not concern ourselves with
the problem whether this pattern of root crop cultivation was historically related to the ancient root crop cultivation of Southeast Asia, as has been suggested by Sauer.\textsuperscript{478} Before ceramics had become important in northern South America, the earlier forms of root crop agriculture were providing a sufficient increase in available food to cause expanding population and the outward migration of root agriculturists through much of lowland South America. Recent evidence from Valdivia in Ecuador and Monagrillo in Panama indicate that pottery was widespread in northwestern South America by 2000 B.C.\textsuperscript{479} so I would suggest that the original expansion of sweet potato and yam agriculturists took place well before that time.

I suspect that a second expansion of Tropical Forest agriculture took place starting around 2500 B.C. By this time ceramics were associated. The major crop in this second wave was probably sweet manioc. Essentially this is the agricultural pattern which survives in a number of the peripheral Tropical Forest groups, especially those of the Peruvian Montaña. I believe that Early Tutishcainyo represents one branch of this expansion.

The final and most efficient pattern of Tropical Forest agriculture, based on bitter manioc, had been attained in Venezuela and Colombia by 1500 B.C. The higher level of agricultural productivity led to population
expansion and further waves of colonization. One of these migrations has been clearly traced through the Antilles. Here there is clear evidence of the Arawak speaking agriculturists gradually pushing back and eliminating the earlier non-agricultural peoples. Archaeologically, this migration is marked by the spread of ceramics in the Saladoid Series. The best estimates on the dating of the population movement into the Antilles suggest that it started around the time of Christ. The archaeological evidence for a corresponding southward migration of bitter manioc agriculturists is less copious, but the ethnographic distributions of contact times indicate that such an expansion took place. In an earlier section of this monograph I have reviewed that evidence that there is a close historical relationship between the Hupa-iya Ceramic Complex at Yarinacocha and the Barrancoid materials of Venezuela and the Guianas, I would here suggest that this relationship is explained by the southward expansion of bitter manioc agriculturalists. Again peoples of Arawak speech seem to have been the major groups involved, but in this case the ceramics which they carried were of the Barrancoid Tradition. To date the only fully defined ceramic complex in the Barrancoid Tradition within the Amazon Basin is the Hupa-iya Complex, but, as I have pointed out above, there is considerable scattered evidence for other such complexes in the central Amazon Basin.
The assumption made here is that these three waves of expansion of peoples practicing Tropical Forest root crop agriculture were the result of the process outlined by Childe. "The growth of neolithic population was eventually limited by contradictions in the new economy. The expansion in numbers involved expansion in space. Additional families could be supported only by cultivating fresh plots... Food-producers within the limits of barbarism must keep budding off daughter villages. The world-wide expansion of the neolithic economy bears witness to this process. In practice of course the food-producers often expanded at the expense of food-gatherers." To Childe's statement I would add that more efficient food producers often expanded at the expense of less efficient food producers. People practicing the more advanced forms of Tropical Forest agriculture, giving higher yields per acre and thus supporting larger populations, progressively pushed the people following earlier, less efficient patterns into the more remote, less desirable areas of lowland South America. Thus at contact times we find the pattern emphasizing the sweet potato and the yam in the East Brazil Highland, the pattern emphasizing the cultivation of sweet manioc along the western periphery of the Amazon Basin, while intensive bitter manioc cultivation was dominant on the main streams.
Most of the ideas basic to the preceding reconstruction of the origins and dispersals of Tropical Forest agriculture are to be found in Sauer's stimulating book, Agricultural Origins and Dispersals. When this book first appeared in 1952, there was little in the way of archaeological evidence which could be used to buttress Sauer's ideas that root crop agriculture was extremely early in northwestern South America. Since that time, the archaeological investigations of the Reichel-Dolmatoff's and of Cruxent and Rouse have completely vindicated the essential logic of Sauer's position. Cruxent and Rouse have already commented on the importance of Sauer's contribution.

I believe that the long sequence of sedentary, ceramic cultures which was discovered at Yarinacocha can best be explained in terms of the priority of root crop agriculture over seed crop agriculture in South America.

It might also be suggested that the general similarities observed by Evans, Meggers, and Estrada among three other early ceramic complexes of northern South America; Valdivia, Barlovento, and Monagrillo; may be due to the expansion of an early form of Tropical Forest agriculture rather than a North to South expansion of an essentially shellfish gathering economy as they suggest. Specifically, I would offer as a hypothesis for further testing that all three of these cultures represent colonies of sweet manioc agriculturists, members of the second wave of Tropical Forest
Culture expansion discussed above. It is worthy of note that all three lie within Sauer's hypothetical hearth of root crop agriculture.

Sauer makes other suggestions concerning the Tropical Forest pattern of agriculture. That the New World pattern of root crop agriculture is ultimately derived from the early root crop agriculture of Southeast Asia has been neither confirmed nor disproved by archaeological data uncovered since 1952. Sauer very ably presents all of the cultural, botanical, and zoological data which tend to support his idea. Some of the arguments, especially the one concerning cotton, are strong ones and have yet to be refuted. Quigley's discussion of fish poisons gives weight to the possibility of PreColumbian contact. Since the truth or falsity of this hypothesis is not particularly relevant to the further arguments of this paper, we can best leave the question open. Another of Sauer's points is that the origin of seed crop agriculture in the New World was largely due to the stimulation from the earlier pattern of root crop agriculture. Recent work in the Tamaulipas region and at Tehuacan by MacNeish suggests that such is not the case. It would appear that the idea of propagating seed plants arose independently within the pattern of seed collecting which had considerable antiquity in the Great Basin of Western United States.
and on the Mexican Plateau.

Sauer's idea as to the origins of seed crop agriculture in Mesoamerica might, however, apply to the derivation of the rather odd assemblage of plants cultivated on the coast of Peru during the second and third millennia B.C. \[496\] I would suggest that this pattern was developed from a very early off shoot of South American root crop agriculture which was progressively modified to fit a new environmental niche. To quote Sauer.

"It may be as simple as this: where climatic advantage shifted from the root plant to the seed plant, the attention of the cultivator shifted from the former to the latter. Instead of selecting root variants to meet the local situation, he began to select the attractive weeds." \[497\]

A final point which Sauer makes is that root crop cultivation is more basic to the subsistence economy of the highland areas of the Central Andes than is seed crop cultivation. \[498\] The root crop cultigens which are adapted to this cold climate have been under cultivation for a long time and are efficient food producers. Tropical Forest agriculturalists may have entered the Central Andean Highlands from the East before Mesoamerican agriculturists introduced the pattern of maize-beans-squash agriculture into the Peruvian coastal strip. The early dates which have recently been published for Chiripa and Galuyu
Cultures in the South Highlands and the lack of similarities between these ceramic complexes and the early ceramics of the Coast and North Highland of Peru, make Sauer’s suggestion worthy of much more serious consideration than it has received. It will be of interest to get full information on the economy of these two early South Highland cultures.

In the preceding section I have discussed some of the implications of the hypothesis that Tropical Forest Culture has a high degree of antiquity and was widespread in the Amazon Basin in early times. The archaeological evidence for this position is, to me, convincing, and a full review of the botanical evidence strikes me as even more compelling. Sauer’s summary of these points makes a full review unnecessary, but what is most striking is the number of the basic crops in this pattern which, under long cultivation, have lost the power to set seed. These included most of the starchy tubers, and such important plants as the peach palm and the pineapple.

In the face of all of the above evidence the concept of a uniform agricultural stage, a monolithic Formative, underlying all ceramic using, agricultural societies of the New World does not seem probable. On the other hand, this statement does not deny that colonies of Mesoamerican farmers invaded northern South America and brought with them a large number of significant
cultural traits, the most important of which was the pattern of maize-beans-squash agriculture. It also appears certain that some of the early ceramic complexes of northern South America are closely related to, and in fact derived from, the early Formative ceramics of Mesoamerica. This set of cultural influences was certainly basic to the rise of civilization in Coastal Peru, and the basic similarities between Mesoamerican and Central Andean civilization, which were the result of this early spread of Mesoamerican type Formative Culture, make it profitable, for certain purposes, to treat the two civilizations as if they were both developed from the same cultural base. Many of the problems of Central Andean civilization can best be understood in this light, but there is a residue of elements in the earlier phases of Andean cultures, especially those of the south coast and south highland which seem to represent a different tradition. For reasons discussed above this residue may well be explicable in terms of an early spread of Tropical Forest Culture into these areas, well before the arrival of Mesoamerican Formative in the North Coast of Peru.

The problem of the number of distinct ceramic traditions represented in Nuclear America during the second and third millennia B.C. is a question which must be kept separate from
the question of agricultural origins. It is clear that the pattern of seed crop agriculture is far older in Mexico than is any ceramic tradition, and I have in the above paragraphs presented data which would suggest that the beginnings of root crop agriculture in South America are far earlier than the earliest ceramics. The possibility must be kept in mind that though agriculture had two hearths in the New World, ceramics may have but one. A single invention of pottery in the New World or the diffusion of the idea of pottery making from some point in the Old World with a subsequent dispersal of all New World ceramics from a single source is a concept that is satisfying in its neatness and simplicity. It may be that such a single source for all New World ceramics will ultimately be discovered. At present, however, the earliest known ceramic complexes in various parts of the New World, and especially those of Mesoamerica and northern South America, show no tendency to converge on such a single source. The recent work of Porter, Willey, the Reichel-Dolmatoffs, Evans and Meggers, and Coe gives clear indication that certain ceramic complexes of the Andean area of South America are of Mesoamerican derivation either in part or completely. In fact, it is these ceramic similarities which give the best evidence of the southward migration which brought the pattern of seed crop agriculture
into South America. It does not follow, however, that if some of the relatively early ceramics of South America were derived from Mesoamerica, all the early ceramics of South America must have been derived from Mesoamerica. Unless each alleged case of Mesoamerican-South American ceramic connections is examined in detail and evaluated purely on its own merit, the uncritical acceptance of the hypothesis of a monolithic Formative is likely to prove as big a stumbling block to unraveling New World Culture History as was the previous uncritical denial of early cultural influence from Mesoamerica to Peru.

The two most recent treatments of this problem are by Evans, Meggers, and Estrada,\textsuperscript{509} and by Coe.\textsuperscript{510} These differ somewhat in their interpretation. Evans, Meggers, and Estrada apparently would derive all the early pottery of northern South America out of Mesoamerica even though at present there is no ceramic complex in Mesoamerica dated as early as their own Valdivia material in Coastal Ecuador.\textsuperscript{511} Coe is more selective, emphasizing the Mesoamerican similarities in only a limited range of South American ceramics for which a strong case can be made. Coe separates Valdivia from the group of ceramics which he regards as Mesoamerican derived, but also regards the Early Guanape ceramics of the North Coast of Peru as completely unlike any early Mesoamerican ceramics.\textsuperscript{512} On this last point
I must differ with Coe. I also differ with Evans, Meggers, and Estrada in that I fail to see any similarities between Valdivia and Early Guanape which are sufficiently close to suggest a historical relationship. 513 I have examined carefully and critically all of the published description of Guanape materials and of Valdivia materials. While there are certain general resemblances, which are mainly related to a rather low level of ceramic technology, the striking differences in the repertory of shapes of the two complexes appear to rule out the possibility of a close historical connection. My failure to appreciate the merits of the demonstration of close relationship between Valdivia and Early Guanape is not entirely a personal idiosyncrasy. On two occasions I have discussed this matter with Collier, who is thoroughly familiar with the Guanape ceramics, and he also fails to see that the two groups of pottery are very much alike. I have belabored this point only because it seems to me that Early Guanape definitely belongs in that group of South American ceramics which shows strong Mesoamerican influence.

There are four groups of South American ceramics for which there is, what is to me, convincing evidence of Mesoamerican derivation on an early time level. One of these groups includes Early Guanape, the Aldas series, and the earliest
materials at Ancón. In fact, all of the ceramics of Lanning’s Initial Pottery Period on the Peruvian Coast seem to me to be closely related to each other and to be Mesoamerican derived. Such Mesoamerican influence continues and becomes more diverse in a number of the subsequent ceramic complexes of the Chavín Horizon in Peru. The second group of ceramics includes Chorrera and Tejar in the Guayas Basin of the Pacific Lowland of Ecuador. The third group of ceramics are those of Momil II in the Sinú River Valley in Northern Colombia. The fourth group, which is probably derived from the third, includes Reichel-Dolmatoff’s First Painted Pottery Horizon of Northwestern Colombia and the related Tocuyanoid Series of Venezuela. I will cite or review the data which I regard as crucial in each of these four instances.

The specific traits of decoration which are shared by such Mesoamerican ceramic complexes as Tlatilco and the most developed ceramic groups of the Chavín Horizon have been given in detail by Porter and by Willey. Zoned rocker stamping with broad lined incision bounding the textured areas and the stirrup spout are but two of the most obvious of these similarities. Much less emphasis has been placed on a comparison of the more common vessel forms, and it is in these that there are indications that even the earliest ceramics of coastal Peru are a branch of Mesoamerican Formative ceramics. There is a
great similarity among a number of the early ceramic traditions known from Mexico and Guatemala. The earliest ceramics from Chiapa de Corzo can be taken as typical of a number of the basic tendencies in vessel shape. Dixon has presented a clear statement on the range of vessel shape and the frequency of each kind of vessel from Pit 50, representative of the earliest ceramics from the site, and these give a firm basis for the comparison of vessel shape between Mesoamerica and such Peruvian complexes as Early Guanape and the Aldas Series. I find it hard to believe that the similarities in the ranges of vessel shapes made are entirely fortuitous. The Early Guanape and Aldas material is more restricted, but the high percentage of the egg shaped, neckless ollas in both groups and the identity of lip treatment is strong evidence for historical relationship. The straight sided cylindrical bowl, common at Chiapa de Corzo, is not represented in the earliest Guanape material, but is, of course, one of the shapes most likely to be decorated in the Ancón Rocker Stamped Style. It appears that the earliest pottery of the North Coast of Peru is of Mesoamerican derivation and that the contact was maintained between the two areas for a considerable length of time after the initial influence of Mesoamerican seed agriculturists was felt on the coast of Peru.
Turning to the Guayas Basin and the Santa Elena region of coastal Ecuador, we find a situation more difficult to interpret. To date the earliest ceramic culture known from the Pacific lowland of Ecuador, and perhaps the earliest ceramic complex yet known in the New World, is Valdivia. As was pointed out in the above discussion, the Valdivia Complex shows a range of vessel shapes which does not suggest close relationship to any known Mesoamerican ceramics. Likewise, the designs used in decoration are not similar to any of the early pottery complexes of Mesoamerica. Two early Mesoamerican elements have, however, been attributed to the Valdivia Complex. These are rocker stamping and the stirrup spout. The position of these elements within the Valdivia Complex is not clearly established, as both are absent in the best described cuts of Valdivia refuse so far published.526 Both elements are rare in Valdivia and the seriation of the early ceramic cultures of Ecuador, published by Estrada, indicates that both appear late in the Valdivia cultural continuum.527 One possible interpretation would be that Valdivia survived long enough to be influenced by the first wave of Mesoamerican colonists who settled the coast of Ecuador.

The recent publications of Evans and Meggers528 and of Coe529 leave no doubt about the reality of the strong Meso-
American influences in the ceramic cultures which follow Valdivia in Coastal Ecuador. These influences are particularly strong in the ceramic material which has been designated Chorrera. There are difficulties in discussing the precise nature of these influences. A full description of Chorrera ceramics has not yet appeared in print, and the relationship between the Machalilla ceramics as described by Estrada, and the Chorrera ceramics as described by Evans and Meggers is not entirely clear from the published sources. Without more detailed publications it is difficult to decide if Chorrera is a completely Mesoamerican complex transported to Ecuador through colonization or merely shows a number of Mesoamerican ceramic traits integrated into an indigenous ceramic complex. Certainly some of the vessel shapes illustrated by Estrada for Chorrera have no close parallels in the known early ceramic complexes of Mesoamerica. These elements include spouts with loop handles, and spouts and whistles connected by bridges. These rather distinctive vessel forms are non-Mesoamerican and non-Chavín.

The Reichel-Dolmatoffs’ discussion of the appearance of Mesoamerican influence in Mochí is clear and detailed and needs few comments for the purposes of this exposition. The ceramic traits most strongly indicative of Mesoamerican
derivation all appear at the same time and in conjunction with a number of other cultural elements also suggestive of origin among the seed crop farmers farther to the North. There is thus at least a suggestion of a partial replacement of population on the site at this time by groups of maize farmers moving in from the North. That this replacement was not complete is indicated by a fair amount of ceramic continuity from the lower to the upper layers of this midden. The only other points which need emphasizing are that the earliest ceramics on this site, those associated with the pattern of root crop agriculture, are not specifically Mesoamerican in either form or decoration, and that these earlier ceramics were established on the site long before the first Mesoamerican elements appeared.

Cruxent and Rouse in their discussion of the chronology of Venezuela indicate that the cultures whose ceramics give some indication of Mesoamerican influence and whose artifact assemblage gives the suggestion of a maize based rather than a manioc based agricultural economy appear first in the West of Venezuela and only at a time subsequent to the first appearance of Tropical Forest economies in the Orinoco Basin. 533

To sum up the previous discussion, it can be stated that the ceramic complexes of northern South America which give unequivocal evidence of Mesoamerican derivation are not the
earliest ceramic complexes of northern South America. With
the exception of Early Guanape on the north coast of Peru,
these Mesoamerican derived or influenced complexes are intruded
into areas in which ceramics of various other traditions are
already intrenched. In these areas there is a suggestion of
fusion between the intrusive Mesoamerican complexes and the
indigenous ceramic complexes. The above discussion does not
support the hypothesis that the ceramics of Nuclear America
were spread from a single source as the result of the expansion
of Formative culture out of Mesoamerica.

A review of the recent C 14 dates suggests that
pottery may appear earlier in northern South America than it
does in Mesoamerica. If one takes the trouble to list all of
the ceramic complexes of Mesoamerica which are either securely
dated by C 14 or which can be dated by cross ties, one finds
that those 2800 years old or older are not particularly numerous:
Chiapa I; 534 Jocotz by its cross ties to Chiapa I; 535 La Venta I; 536
Tlatilco; 537 possibly Early Zacatenco; 538 Pavón by comparisons
with La Venta and Lower Tres Zapotes; 539 possibly the water
bottles of Maní; 540 possibly the lowest levels at Yarumela. 541
Much of the C 14 dating in the last few years has tended to
reduce estimates on the age of Formative cultures in Mesoamerica.
This is especially true of the Yale series on the Kaminaljuyú.
sequence and the Pennsylvania series confirming the Goodman-Martines-Thompson correlation. As was mentioned above, a number of these early ceramic complexes of Mesoamerica are somewhat similar. La Venta, Lower Tres Zapotes, the "Olmec" material at Tlatilco, Chiapa I, and Ocós all give evidence of a historical connection in terms of vessel shape, modes of decoration, and design layout. Pavón and Mamon are also apparently related to the same tradition, but less closely. The only major, early ceramic tradition of Mesoamerica which stands somewhat apart from this grouping in both vessel shape and in modes of decoration is that represented by Early Zacatenco and the subsequent cultures of the Valley of Mexico, the "Olmec" influence at Tlatilco excepted.

If a similar list is prepared for South America it would include: Valdivia; Monagrillo; Moni I, by a line of evidence discussed above; Saladero; Barrancas; Early Tutishcanyo, by several lines of evidence discussed above; Qaluyu; Chiripa; Chanapata, by cross ties with Chiripa. All complexes having suggestions of Mesoamerican derivation have been excluded from this list. It can be seen that the list is longer and that the older dates are older than any now held to be acceptable for Mesoamerica. Perhaps the most important point is that the ceramic complexes on this list show a much
greater divergence among themselves than do the early ceramic complexes of Mesoamerica. There is thus the strong implication that ceramics were manufactured among the Tropical Forest agriculturalists of northern South America before they became an element in Mesoamerican Formative Culture, and that pottery may well have originally diffused from the root crop agriculturalist to the seed crop agriculturalists. If this is true, the Mesoamerican elements in South American ceramic traditions represent a secondary diffusion in the reverse direction.

More C 14 dates and more exploration may alter the picture presented above, and the question should not be regarded as settled. I feel that the chances that it will be upset are not good, since Mesoamerica has already been more thoroughly explored than northern South America, and since the more recent (and presumably more accurate) dates have all tended to increase our estimates of the age of pottery in northern South America and to decrease our estimates of the age of ceramics in Mesoamerica.

The import of both of the preceding arguments, that concerning plant cultivation and that concerning ceramics, is that Tropical Forest Culture is a major cultural tradition in its own right and not just a pale reflection of the Mesoamerican seed based agricultural tradition. Ceramics of a medium to high
level of competence are an integral part of Tropical Forest Culture at least as early as their first appearance in Mesoamerica with the seed based agricultural societies. It will ultimately be necessary to explain this ceramic tradition either in terms of independent invention within the Tropical Forest Tradition or in terms of diffusion from some other area. The available C 14 dates make Mesoamerica an unlikely source for such a diffusion.

It is a further extension of the point of view expressed above that the culture history of the Orinoco Basin, the Amazon Basin, and the Upper Basins of the Paraná and Paraguay, and the Antilles is best understood as the working out of the inherent potential of the Tropical Forest Cultural Pattern rather than in terms of the gradual infiltration of Central Andean Civilization. Given the basic pattern of root crop agriculture and the agricultural potential of certain of the lowland areas of Nuclear America, a considerable degree of cultural evolution was possible. Rouse's analysis of the archaeology of the Greater Antilles indicates that the relatively complex cultures of this area are due to the flowering of a cultural tradition in the Tropical Forest Pattern. It was the full realization of the potential of root crop cultivation rather than the proximity to Mesoamerica which gave these
societies their distinctive nature. Likewise, both archaeological evidence and ethnographic evidence indicate a fair range of cultural complexity in the Amazon and Orinoco Basins. The possibility that such complex cultures of lowland South America might be nothing more than fully evolved Tropical Forest Cultures has in most cases not been given serious consideration. I suggest that this hypothesis deserves a more comprehensive testing than it has received so far.

When I state a belief that the most important factor in the prehistory of lowland South America was the internal evolution of Tropical Forest Culture, I am not denying that there has been considerable diffusion of cultural elements into the area. A number of elements of Amazonian culture are clearly derived from the Andes. Such a list is best headed with corn and can be extended to a number of other items. The rocker pestle of the Montana and the whole textile industry in that area are particularly obvious examples. It is evident that this diffusion of Andean elements into the Amazon Basin is a process of relatively long standing. Nordenskiöld's work at Mound Valarde and at Chimay gives clear archaeological evidence of the intrusion of Tiahuanaco traits into cultures of Tropical Forest type. In no case, however, do the intruded elements of Andean Culture appear to be basic to the successful
adaptation of the more complex Amazonian cultures.

It is clear that the evolution of root crop based agricultural societies in the Amazon Basin has followed a different course than the evolution of agricultural societies in the Central Andes or in Mesoamerica. It is also clear that this difference in the course of evolution is largely environmentally determined. In the concluding sections of this paper I will utilize an evolutionary model for Tropical Forest Culture in the tropical lowlands of South America and the Antilles which will attempt to explain the major features of the several important sequences so far developed for these areas.

The longest and best documented sequences in the tropical lowlands of South America are that of Meggers and Evans on Marajo, 555 that of Cruxent and Rouse at Saladero and related sites on the Lower Orinoco, 556 that of Howard at Ronquin on the Middle Orinoco 557, and my own sequence at San Francisco de Yarinacocha. The sequence in the Sinú River Valley of northern Colombia is of great importance, but is geographically marginal to the area now under discussion, and shows much more influence from the Mesoamerican pattern of seed crop agriculture. 558 The sequence developed by Evans and Meggers in the northwestern section of British Guiana is also of significance to the present discussion. 559 For reasons
alluded to above, I believe that Evans and Meggers have underestimated the duration of the sequence, but the general tendency to be discussed below is well illustrated by the sequence from Maburuma to Koriabo.

The basic trend to be noted in the above sequences can be outlined as follows. There is an initial period of occupation, in which village size is moderately large and during which the stability of individual settlements is high. Pottery is well made, and well standardized (Amaratuba in the Marajo sequence\(^560\)) to elaborately decorated (Early Tutishcainyo, in the Yarinacocha sequence, Saladero and Barrancas in the Lower Orinoco sequence, Momil I in the Sinú sequence,\(^561\) Early Marajoara in the Northwest British Guiana sequence\(^563\)). There follows a period in which populations appear to increase. Pottery is more frequently and/or more elaborately decorated, village size increases and the permanence of settlement is in most cases even more marked than in the preceding segment of sequence. In this group I would place Mangueiras, Formiga, and Acuau at the mouth of the Amazon.\(^564\) I would also place Marajoara here as a fine specimen of fully developed and fully adapted Tropical Forest Culture, even though, as Meggers and Evans clearly demonstrate, it did not develop on Marajo Island; and though they argue that it developed outside the Tropical
Forest environment. I will not insist on this last point, as the current state of our knowledge on the origins of Marajoara Culture would not appear to support dogmatism on either side. In the Lower Orinoco Los Barrancos is a typical example of this group of cultures. In northern British Guiana the later Mabaruma developments do not show this increase in elaboration. In the Sinú the indigenous Tropical Forest Culture has already fused with intrusive elements of Mesoamerican seed crop agriculture, so that the further developments in this area are no longer typical. In the Yarinacocha sequence this group of cultures is well represented by the Shakimu and Hupa-iya Complexes.

The next segment of these Tropical Forest sequences is less simple to characterize. There is a decrease in the complexity of ceramic decoration and in the percentage of pottery decorated. Ceramic technology in general shows a decline and a less careful standardization of ceramic modes. The archaeological evidence indicates that social groups were much smaller and that they remained in one place for much shorter periods of time. Certain elements of ceramic decoration became very widespread, and, in some cases, almost universal, in the lowlands of South America suggesting that there was a higher level of cultural contact throughout the area. The decrease in size of social
group was coupled with a larger number of distinct cultural

groups in each area. This was a time of cultural Balkanization.

On Marajó this era was characterized by the appearance of the
Arum Phase. In British Guiana the intrusion of the Koriabo
Phase, and its interaction with the later elements of Mabaruma
Phase, which was also being heavily influenced from other
directions, are typical phenomena of this segment of time.

In the Lower Orinoco this segment is characterized by the
intrusions of the Guaraguapo and Apostadero Styles, both of
which were strikingly less elaborate than the preceding Los
Barrancos ceramics. In the Yarinacocha sequence these
tendencies are well represented by the Yarinacocha, Pacacocha,
and Corrugated Ware Complexes. The rapidity with which these
complexes replaced each other and certain other evidence cited
above suggest that there were several distinct ceramic traditions
existing side by side in the Ucayali Valley at this time.

Another feature of this late segment of Tropical
Forest Cultural development was an expansion of the area actively
utilized by Tropical Forest Cultures both within the Amazon
Basin and adjacent to it. Part of this spread of Tropical Forest
Culture was at the expense of Andean type culture. This expansion
will be documented and interpreted below.

The curve of cultural development shows a similarity
in profile in all of the sequences. The early cultures show a relatively high level, and there follows a long period during which the level of culture remains stable or, more typically, rises still higher. There is then an abrupt shift to cultures with a less stable settlement pattern, smaller groups, and a less elaborate material culture, at least in so far as it is represented in the surviving remains. It is not an over simplification to say that several of these Tropical Forest sequences show clear evidence of sharp cultural decline in their later segments. There can be no doubt about the reality of this cultural decline or the fact that it was widespread in the Tropical Forest regions of South America.

Meggers and Evans, 572 and Meggers573 have presented a clearly argued and well documented explanation for this decline of Tropical Forest Cultures. They maintain that this decline and, more significantly, the low level of Tropical Forest Culture in general, is to be explained entirely in terms of the limitations of the Tropical Forest environment. Their argument may be paraphrased somewhat as follows. Tropical Forest soils are extremely poor. Slash-and-burn agriculture is the only method of agriculture which is well adapted to these poor soils. The land available for the practice of slash-and-burn agriculture, that is, virgin forest or relatively mature second forest growth,
is soon exhausted in any one area, and the agricultural potential in any one area is too small to support social groups of any size. These factors necessitate that social groups be small and that they move frequently. The total result of these factors is that complex cultures can not develop under Tropical Forest conditions, and that a complex culture which enters such an environment will quickly decline. Meggers codified these generalizations into a series of law-like statements concerning the limiting effect of Tropical Forest environments in various parts of the world on the course of cultural evolution within such an environment. William Coe has questioned the applicability of such a law to the tropical lowlands of Mesoamerica, and there has been a lively printed exchange of ideas on this particular aspect of its application. I do not intend to discuss the general applicability of Meggers' formulation. My only question concerns its adequacy to explain the characteristics of the generalized sequence of South American Tropical Forest Culture presented above. It is impossible to take exception to Meggers' statements on the low fertility of Tropical Forest soils. A point which she neglects is the high efficiency of manioc even under conditions of low soil fertility. In terms of calories per unit of cultivated land it sometimes compares favorably with corn production in Iowa.
It is obvious that the agricultural potential of a particular area will set an upper limit to the population which can be supported in that particular area on the basis of an agricultural economy. It likewise follows that this limit will be lower in any area of low agricultural potential and considerably higher in an area of better soils. It is clear that given aboriginal patterns of agriculture, the Coastal Valleys of Peru could permanently support more persons per square mile than could the Tropical Forest. The upper limits of population possible in the two areas are separated by a large factor. Stated more simply, no area within the lower elevations of the Amazon Basin could have supported a population density close to that supported in the Chicama, Viru or Rimac Valleys of Coastal Peru. The high level of social and political control which went with these dense populations in the Coastal Valleys of Peru should not be expected anywhere within the Tropical Forest of the Amazon Basin.

The question still remains as to the limits which the combination of root crop agriculture and Tropical Forest soils set on population size and population stability. Ganneiro has recently presented a method for giving a precise rather than a general answer to this question. His findings show that the conditions stated by Meggers to be the prime factors in limiting Tropical Forest cultural development are compatible in a typical area of Tropical Forest, the upper Xinga, with completely
sedentary agricultural settlements of up to 2000. Permanent settlements of this size should have been able to support the level of cultural complexity exhibited by Los Barrancos, Hupaiya, or indeed Marajoara. Carneiro's work leaves one with the strong suspicion that the factors invoked by Meggers do not in themselves explain completely the widespread decline of culture in the Tropical Forest area. The limits set by the agricultural potential of the Tropical Forest area were considerably higher than population level and the cultural level exhibited by the Tropical Forest Cultures in the later part of most of the important sequences.

It seems to me that there is an even more basic difficulty in accepting Meggers' explanation of the level of Tropical Forest Cultures in South America. The profile of cultural development exhibited by the sequences is not predictable on the basis of the hypothesis. If the limitations of the Tropical Forest soils were the sole factors responsible for the low level of such cultures as Arun or Pacacocha, then we might expect that this low level of culture would be more typical of all areas of the Tropical Forest and of the full length of all of the sequences. As we have seen, the major sequences reviewed show a long period of relatively high culture in which there is some evidence of a gradual increase in cultural complexity. It
is only near the end of each sequence that there is a sharp decline in the level of culture. This terminal period of low culture is a relatively small segment of each of the sequences. The C 14 dates in the Lower Orinoco sequence give an unequivocal demonstration of this point. The record of deposition in Cut 3 at UCA-2 gives definite indication that the part of the San Francisco de Yarinaochocha sequence from the Yarinaochocha occupation up to the Modern Shipibo occupation occupied much less time than did the segment from Early Tutishoainyo through Hupa-iya. Likewise, Meggers and Evans have indicated that the Aruñ occupation on Marajo covered only a relatively small part of the span of agricultural occupation on that island. If the limitation of agricultural potential alone were responsible for the low level of Aruñ and Pacacocha Complexes one would expect that no Tropical Forest cultures could ever have evolved above that level.

As a part of her interpretation of Tropical Forest Culture Meggers has stressed both the uniform cultural level of ethnographically known Tropical Forest Cultures and the uniform nature of the Tropical Forest environment. I wish to take exception to both of these assumptions.

Let us first consider the problem of the uniform level of Tropical Forest cultures. It is true that among those Tropical
Forest tribes for whom we have the best ethnographic material
there is some similarity in community size. None have villages
of 1000 inhabitants or more; but even among the few Tropical
Forest societies which remain largely unacclulturated, there is
a considerable range in group size and group stability. There
has been a tendency to regard the surviving Tropical Forest
groups as typical in all respects of Tropical Forest culture.
It must be remembered that the groups which survive today are
those occupying the areas least attractive to white occupation
and generally those most removed from the major rivers. The
Tropical Forest groups which inhabited the banks of the Amazon
and the lower reaches of its major tributaries have in most
cases been exterminated or assimilated to mestizo culture. The
accounts we have indicate that these mainstream peoples were
typically much more numerous, had a more elaborate material
culture, had larger and more stable social groups, and in some
cases had considerable in the way of organized government and
an organized religious system. Groups of 1000 or larger were
not uncommon. This is true of the Cocama-Omagua\textsuperscript{531} and the
Tapajo.\textsuperscript{532} The accounts of these tribes as they existed
during the sixteenth and seventeenth centuries are certainly
inadequate by modern standards of ethnography, but they are
rather consistent about such matters as population size and
and complexity of social organization. If we had a modern type account of Tapajo or Cocama society as they existed in 1600, the difference in level between these cultures and a modern Tropical Forest group, such as the Wai Wai or Barama River Carib, would be striking. Much of the uniformity of surviving Tropical Forest groups is an artifact of deculturation, of the type so well discussed by Steward and Faron for the region of Panama, of the preservation of Tropical Forest Culture only in the less favorable parts of its original range.

Meggers has stressed the uniformity of the Tropical Forest region with regard to its utilization by Indians practicing the Tropical Forest Pattern of root crop agriculture. In terms of soils she may be nearly right, though it seems likely that the recent alluvial soils along the major rivers are somewhat better than the leached laterites back from the main streams. With regard to other resources essential to the practice of a Tropical Forest economy her statement may be questioned. To demonstrate this point it is necessary to take a careful look at the nature of this economy. The key crops in the New World pattern of root crop agriculture are bitter manioc, sweet manioc, the sweet potato and some New World species of yam. Manioc and the other root crops are excellent sources of carbohydrates but will not in themselves
provide a balanced diet. Manioc is particularly deficient
in this respect. Sauer has emphasized this deficiency
of root crop agriculture throughout the world and contrasted
it with the nearly balanced diet provided by the maize-beans-
squash pattern of agriculture developed in Mesoamerica.

In other words, the farmer following the maize-beans-squash
pattern of agriculture may be a full time cultivator, while
the diet of the root crop farmer must be supplemented by some
other form of activity.

The fat and protein deficiencies in the diet provided
by root crop agriculture can be eliminated by use of the products
of hunting and fishing. The distribution of the fish and game
resources of the Tropical Forest region are by no means uniform.
The Tropical Forest is a poor area for land mammal hunting.
The important species are either relatively rare, as in the
case of the tapir; migratory and of unpredictable distribution,
as in the case of the peccary; or difficult to hunt, as in the
case of various kinds of monkeys. Also the concentration of
a number of people in a particular area of the jungle for any
length of time tends to disturb and drive off the game animals.

The protein and fat resources of the major rivers of
the Tropical Forest area are, by way of contrast, exceedingly
rich. A number of varieties of fine food fish are plentiful.
These include such efficient sources of meat as the paiche (Arapaima) and the huge catfish, as well as many smaller species which are significant by reason of the fantastic quantity in which they occur. The riverine reptiles of Tropical Forest South America are also a food source of great significance. Various forms of crocodilians are or were common and extensively utilized. Of even greater significance were the riverine turtles, which congregated in fantastic numbers during spawning time, and which were intensively exploited both for meat and for the fat which could be rendered from their eggs. The cultural patterns involved in the hunting of these turtles and in the collecting and rendering of their eggs have received full treatment in a number of works on the Tropical Forest and need not be described here, but the economic importance of turtle harvesting to the groups involved can not be overestimated. Other species of turtle, such as the mata mata, though nongregarious and thus more difficult to exploit, were highly regarded as meat sources and much sought. The manatee was intensively hunted for meat, as one animal would furnish a great quantity of food. The larger South American rodents such as the Capybara are semiaquatic and most common in the immediate vicinity of the rivers. The Shipibo typically hunt these from a canoe at night.
It is the lower reaches of the major rivers in which the fantastically rich riverine resources are to be found. The oxbow lakes bordering the major rivers in their alluvial flood plains are apparently more productive of fish, turtles, and aquatic mammals than are the rivers themselves. The upper courses of the major rivers are less plentifully stocked with fish. In the regions away from the major rivers fishing is no longer a significant subsistence activity and a total reliance must be placed on land mammal hunting to add the necessary protein to the root crop diet. The Tropical Forest is by no means a uniform environment for root crop agriculturalists.

It is suggested that adaptation to this range of environmental richness has led to the differences in level of cultural complexity observable in the Tropical Forest. In the flood plains of the major rivers the protein deficiencies of the root crop diet can be completely compensated for with a relatively small expenditure of time and effort. Turtle hunting and egging, fishing, and the hunting of manatees and other aquatic and semiaquatic animals are extremely rewarding in terms of pounds of food per man hours expended. In such areas populations can expand up to and beyond the limits set by agricultural productivity. Carneiro has demonstrated that these limits can be accurately calculated for any given area,
and that even given the poor Tropical Forest soils these limits are much higher than the typical Tropical Forest community in the ethnographic record. Populations can be large enough and sufficiently sedentary to support a relatively complex culture. In short, riverine Tropical Forest Cultures are not incompatible with the level of social complexity implied by such archaeological remains as Marajoara or Tapajo's archaeology. In the upper reaches of the major rivers fishing is less productive and somewhat more reliance might be placed on hunting. In these regions social groups were smaller and society less complex. Still it was and is possible to support groups of the size and complexity represented by the ethnographic Witoto or Tucano groups. In areas away from the major streams reliance must be placed on hunting rather than fishing to supplement the diet. If these areas are Tropical Forest rather than savannah, the inhabitants are forced into a seminomadism by the necessity of following game. Agricultural productivity is reduced, leading to a still greater reliance on hunting and a greater nomadism. This vicious circle of diminishing returns is not a hypothetical possibility, but is well represented by a number of nonriverine Tropical Forest groups. Holmberg's picture of life and hunger among the Siriono contains all of the elements of the hypothetical model. Such tribes as the Cashibo and Shiriana are apparently
equally representative. Carneiro has indicated to me that the returns which the Amahuaca get from forest hunting, mainly of monkeys, are far higher than the situation which Holmberg pictures for the Sirionó. The returns are still lower by a large factor than those of fishing and hunting in flood plain environment.

In the ethnographic map of South America as of 1560, the adjustment of diverse Tropical Forest cultures to these different ecological niches was precise, and this precision of ecological zoning continues today in those areas where aboriginal cultures function. In the middle Ucayali the riverine orientation of the Chama contrasts sharply with the forest adaptation of the Cashibo. The Chama confine their economic activities almost entirely to the flood plains and almost never get out of sight of the major rivers or lakes, while the Cashibo stay out of the flood plains except for raiding. Linguistic evidence indicates that the split between the Cashibo and their closest Chama relatives, the Shipibo, was relatively recent; yet at present the gulf between the settlement pattern, social organization, and material culture of the Cashibo on the one hand and the Chama on the other is vast.

The distribution of the different levels of Tropical Forest cultures, which is recorded for the contact period, and
which still, to a degree, is observable today, can be understood only in terms of the working out of cultural processes over a considerable period of time. In the final pages of this monograph I wish to present a model of cultural dynamics which will attempt to relate some of the data on Tropical Forest archaeology currently at our disposal to the ethnographic picture of Tropical Forest Culture. Certain of these relationships should already be apparent to the reader, but it may be useful to repeat and bring together some of the salient points.

The South American representatives of Tropical Forest Culture (as here defined) show a considerable range of cultural complexity both from viewed as functioning cultures at the time of contact and when viewed as archaeological complexes. The ethno-archaeological map shows that the more complex Tropical Forest cultures, those with the largest social units and the most complex social structure, were riverine or coastal. More specifically, the distribution was largely within the alluvial flood plains of the major rivers. Steward's and Parson's map of population densities shows this. 392 Lede's and Steward's orientation of Tropical Forest Culture and the important cultural dichotomy between riverine and nonriverine groups. 393 This same grading from complex to simple cultures can be demonstrated on...
various lines of evidence. Linne noted it solely on the basis of the ceramic complexes within the Tropical Forest. He is worth quoting on this point.

Primitive sphericalness in clay vessels is generally met with among tribes that have been driven off the great highways [rivers], who have become isolated and found their abode beyond the range of influences from later cultures...

Within the area of the Amazon basin primitive, spherically shaped ceramics generally occur only on the upper reaches of the tributaries. On the Negro, Marañon, Ucayali and Madeira rivers it is not met with, because these rivers formed highways for higher civilizations. 594

If we turn to the archaeological evidence, we find that all of the long sequences within the territory of Tropical Forest Culture are within the flood plains (meander belts) of major rivers. This is true of the Lower Orinoco sequence, 595 the Ronquín sequence, 596 the Marajó sequence, 597 and the sequence in the lower Sinú, 598 and the sequence at Yarinacocha. Archaeological investigations in the upper reaches of major rivers have, to date, produced sequences of lesser but still significant length. Such work is best exemplified by the Evans, Meggers, and Croxent expedition to the Upper Orinoco and Venturi. 599
Archaeological work in the upper reaches of lesser rivers, as exemplified by Evans and Meggers' survey in the Upper Essequibo, or along minor rivers, as exemplified by Meggers and Evans' work in Brazilian Guiana has, to date, produced sequences of still shorter span. Work in areas away from rivers altogether has produced indications of still shorter and less intensive Tropical Forest occupation, as is witnessed by Evans' and Meggers' work in the Rupununi Savannah.

All of the above evidence indicates that Tropical Forest culture, at least during the earlier segments of its evolution, was essentially a flood plain adaptation. Reichel-Dolmatoff is specific in emphasizing that the adaptation is to the oxbow lakes within the flood plains of major rivers.

Compact village sites are located not directly on the banks of the main rivers but rather on the shores of large lagoons, backswamps, or oxbow lakes, which are connected with the river by channels. Only with intensified maize cultivation, and on a later time level, do the settlements tend to move away from this type of semi-aquatic environment and go toward the foothills and inland savannas.

Sauer has spelled out the importance of fishing to the early stages of root crop agriculture, and suggested that
the initial adaptation would be to the flood plain environment.  

Cruxent and Rouse emphasize the point that the Lower Orinoco is an area particularly favorable to Tropical Forest agriculture, but do not generalize from this observation.

The statements of Reichel-Dolmatoff and much of the discussion above indicate the advantages of a riverine environment to Tropical Forest agriculturalists. There is one point, however, that even Sauer and Reichel-Dolmatoff have missed.

Roth mentions the intensive cultivation of the banks of the major rivers and adjacent oxbow lakes between high and low water mark. These areas are planted progressively as the level of the river goes down during the dry season. Not only is the soil in this zone improved each year by a fresh deposition of silt, but it is unnecessary to clear these areas of trees. When one is faced with the prospect of felling jungle with only a stone axe, the existence of even relatively small areas of fertile soil which require no clearing is a major factor in land utilization patterns.

The evolution of Tropical Forest Culture in South America and the Antilles was a process that was parallel to, but in some respects different from, the evolution of cultures based on the pattern of maize-beans-squash cultivation. Though there was considerable exchange of cultural elements between
these two cultural traditions, the configurations of the two developments remained distinctive. The basic difference is that the Tropical Forest Culture failed to produce a "Classic" and a "Postclassic" development in Willey and Phillips' sense of the words. Meggers has rightly specified the basic cause for this difference. The Tropical Forest areas of South America could not support a density of population sufficient for the social diversification, and specialization of labor typical of Classic and Postclassic developments. I feel, however, that it is worth adding some refinements to this general statement.

Within the evolution of Tropical Forest Culture I recognize four stages, a Tropical Forest Preformative, a Tropical Forest Formative, a Tropical Forest Regional Florescent, and a Tropical Forest Invasionist. In this discussion I am relying heavily on the definitions and conceptualization of Willey and Phillips and of the Reichel-Dolmatoffs.

The Tropical Forest Preformative is thus far a hypothetical stage as far as archaeological remains are concerned. I have already suggested that the farming in the preceramic cultures of Coastal Peru may be a derived extension of such a Tropical Forest Preformative Stage. It is also possible that some of the non-ceramic shell midden cultures of Coastal Venezuela and Guiana, such as Manicuare and Alaka, were experimenting
with root crop agriculture, but so far no direct evidence of this has been uncovered. In terms of definition the Tropical Forest Preformative is a stage in which root crop agriculture is present, but in an incipient form. Not all of the major root crops are under cultivation, and those that are present have not been much improved by selective propagation. Much of the food is derived from other sources such as the collecting of wild nuts and roots. Fishing and, where possible, shell fish collecting are of great importance. Pottery is not present. Except in cases where we find preserved vegetable remains, it will be difficult, if not impossible, to identify the archaeological remains of Tropical Forest Preformative cultures. In most instances they would be indistinguishable from Archaic Stage sites, though in the future, pollen studies of lacustrine silts may be of some help. Such a stage is a necessary antecedent of the fully effective root crop agriculture of the following stage. I have suggested that there was considerable expansion of population even at this primitive level of agricultural development, and that the modern Ge groups of East Brazil are remnants of such an expansion. Indeed, the culture of such groups as the Eastern Timbira exemplify the hypothetical stage much better than any known archaeological complexes. The agriculture of the Eastern Timbira is more
important and more efficient than it should have been in the hypothetical norm, and in the course of several thousand years the major root crops of these people, the sweet potato and the New World yam, have been made highly effective cultigens. Otherwise the Eastern Timbira fulfill the definition.

Cultures of the Tropical Forest Formative Stage had highly productive root crop agriculture. This high productivity was probably first achieved on the basis of sweet manioc cultivation, with the cultivation of bitter manioc and the elaborate complex of preparation which goes with it representing a later increase in efficiency and specialization. Communities were large and stable. Agriculture was of great importance, but there was also a complete dependence on fish, turtle, cayman, and aquatic mammals to make up the protein and fat deficiency in the root crop diet. As well as having highly developed agricultural practices, these groups were already highly specialized in terms of fishing and aquatic hunting. It is probable that fish poisoning was already present. That this adaptation to aquatic resources is ancient is not a matter of speculation. There is already good archaeological evidence. The faunal remains from Monil indicate a great utilization of cayman and especially of turtle; fish bones are less well represented in the excavated collections but it is possibly a result of differential preservation.
and of excavation technique. Many fish bones will go through a wire mesh sufficiently fine to catch almost all reptile bones. Among the mammals present the semiaquatic Capybara is the most important. For Early Tutishcainyo we have evidence of the extensive utilization of fish, because of the fish scales and fish bones inadvertently included in the paste of Early Tutishcainyo pottery. The most typical cultures of this stage are intensely riverine in their adaptation, and, for reasons given above, this specialization was to the flood plains of the major rivers. I suggest as a hypothesis for further investigation that such divergent cultures as Barlovento, Monagrillo, and Valdivia represent an adaptation of root crop economy to a shore environment in which shell fish collecting and sea fishing replaced the riverine protein resources.

Pottery was present in the Tropical Forest Formative. The earliest known forms in the various areas were well developed and indicate several diverse ceramic traditions. The source, or sources, for Tropical Forest Formative ceramics can not be specified at present, but the available evidence reviewed above gives little support to the idea that these ceramics were derived from Mesoamerica. The centrifugal forces inherent in any neolithic economy were strong during this stage, with colonies moving outward into all suitable land. While sweet
manioc cultivation was being spread by the outward movements of colonists, the more efficient bitter manioc pattern was being perfected in what was apparently the hearth land of Tropical Forest agriculture, the Orinoco Basin. The bitter manioc cultivators of the Orinoco and Sinu Rivers were already more advanced than the contemporary sweet manioc cultivators in the Amazon Basin, such as the people responsible for Early Tutishcainyo. Archaeological complexes representative of Tropical Forest Formative are Monil I, Saladero, Barrancas, Early Ronquin, Ananatuba, Early Tutishcainyo and Late Tutishcainyo. It is worth reemphasizing that in the outward expansion of Tropical Forest Culture the lands which were sought and occupied were the flood plains of the major rivers. Until such areas were fully populated, there was no attempt to utilize the less desirable areas in the upper reaches of the major rivers and the jungles back away from the rivers.

The Tropical Forest Cultures of the Regional Florescent Stage show two distinct tendencies. One of these developmental trends was the evolution of more efficient and elaborate cultures in the riverine environment. The cultures within the flood plains of the major rivers were approaching maximum efficiency in their exploitation of this particular environmental niche. Populations were approaching the limits
set by the carrying power of Tropical Forest soils. Likewise, political and social complexity increased in response to the problems of denser populations. Material culture also showed considerable elaboration and refinement. In the archaeological remains this total increase in complexity is reflected both in ceramics and in an increase of the size and permanence of settlement. Outward expansion of population from northern South America through the Tropical Forest lowlands continued. In many instances this expansion appears to have been associated with the spread of bitter manioc agriculture into the Amazon Basin. Evidence has been reviewed above suggesting that the people involved were of Arawak speech and that they were disseminating ceramics in the Barrancoid Tradition.

I regard as typical examples of Tropical Forest Regional Florescent Cultures Los Barrancos, the Chicoid cultures of the Greater Antilles, the Marajoara-like cultures of the Central and Upper Amazon, Marajoara itself, and Shakimu and Hupa-iya in the Yarinacocha sequence. These last two are somewhat parochial compared to the others.

This aspect of the Regional Florescent is the Tropical Forest equivalent of the Classic Stage in the maize-beans-squash agricultural traditions, but it does not reach as high a level of cultural complexity as does the Classic Stage in the seed crop
agricultural tradition.

The trend of cultural development sketched above is applicable only to the flood plain areas of the major rivers or to other particularly favored zones such as sea coasts. A completely different pattern of cultural adaptation was going on concurrently in the regions away from the meander belts of the large rivers. This second trend led to a lowering rather than raising of cultural level. At present it is difficult to discuss the dynamics of this development. It is not clear to what extent the Tropical Forest of the Amazon Basin was inhabited prior to the earliest expansions of root crop agriculturalists. There is little archaeological evidence which is relevant to the question. Pure fishing cultures are conceivable in the Middle Amazon Basin and certain recent groups, such as the Mura, come close to practicing such a pattern, but these and other groups with rather primitive culture within the Tropical Forest region may represent deculturated Tropical Forest agriculturalists rather than a truly early level of occupation. The lack of success of hunting economies in a Tropical Forest environment suggests that hunting groups may have avoided these regions in early times before population pressures started to mount. It is altogether possible that the original Tropical Forest agriculturalists moved into a largely unpopulated region as they spread through
the Amazon Basin.

As long as there were areas of unoccupied flood plain, Tropical Forest occupation stayed close to the major rivers. As populations built up in the more desirable areas and as further waves of more efficient agriculturalists migrated in from the North, the smaller, weaker communities were gradually pushed up stream or away from the main streams. As they were forced into a less favorable environment, their material culture and their social organization underwent a marked decline. As fishing became less reliable as a source of protein, it was necessary to devote more and more time to hunting. Reliance on hunting enforced a seminomadism, or a fragmentation into very small groups. These changes led to a deterioration in agricultural practices. Along the minor rivers these changes led to only a moderate reduction in cultural level, but in the jungle areas away from the rivers this cycle of cultural deterioration led to very primitive cultures such as the ethnographic Sirionó. Though some nonriverine inhabitants of the Tropical Forest may represent an earlier stratum of occupation, the evidence for deculturation is fairly clear for others.

The two major trends of the Tropical Forest Regional Florescent Stage are the building up of relatively large and
and complex social units in the flood plain areas, and the occupation of the less desirable areas of the Tropical Forest by groups with a simplified and attenuated version of Tropical Forest Culture.

The concept of an Invasionist Stage was developed by the Reichel-Dolmatoffs for Colombia. The situation in Colombia which they were analyzing appears to be just one aspect of a cultural phenomenon which was widespread in South America, so that the concept can be extended to a much wider area without doing injury to its definition. Its characteristics, as they define it, are a decrease in general level of culture, considerable evidence for warfare and cannibalism, and certain distinctive ceramic traits such as particular styles of burial urns and particular kinds of modeled and incised decoration.

I would regard the increase in warlike activities as the key point of the definition. This is not to say that intergroup hostilities were not present in earlier stages. The Tropical Forest complex of cannibalism and trophy heads may well go back to the very beginnings of Tropical Forest Culture. What I am suggesting is that as population pressures increased in the Tropical Forest and as cultures of markedly different levels of complexity came into close proximity, constant warfare became the single most important factor to which cultures
had to adjust if they were to survive.

The reasons for an increase in warfare are to be found in conditions inherent in the development of Tropical Forest Culture. The low level, seminomadic, Tropical Forest groups dependent on hunting and rudimentary agriculture were in direct contact with the much more populous groups occupying the riverine areas. Essentially, the riverine groups utilized only the rivers, lakes, and that part of the land which was under cultivation at any particular time. Hunting within the jungle was of minor importance, and concepts of ownership of jungle land were but weakly developed, if at all. The less populous hunting groups held all of the jungle areas almost up to the river banks. Their adaptation was to the jungle as such, and extensive tracts of jungle were necessary to support relatively small groups of such people. The situation offered possibilities of conflict over hunting rights in the zones immediately adjacent to the rivers, but one may suspect that basically it was a complete incompatibility of way of life and of value systems which gave rise to intense hostility between these two kinds of cultures. A variety of kinds of minor incidents, such as suspicion of witchcraft, can lead to protracted conflict between two groups when neither regards the other as close to human.
This pattern of hostility between sedentary, agricultural, Tropical Forest groups and less sedentary groups depending more on hunting can be documented repeatedly in the ethnographic accounts of surviving Tropical Forest Cultures. Huxley gives an excellent account of the hostility of the Urubú toward the nomadic Guajaja, and also gives considerable information on the psychological factors involved, and concerning the agricultural Indians' reaction toward the jungle and its inhabitants. The perpetual conflicts between the sedentary, riverine groups along the lower Xingu and the more nomadic Northern Cayapo are well described by Nimuendaju. Nimuendaju gives a clear description of the relationship between the mainstream, intensely agricultural Omagua, and their less civilized, backwater neighbors, the Tukuna. The Omagua located their villages in the islands within the main stream of the Amazon as a defensive measure, while the Tukuna eschewed the shores of the Amazon from a justified fear of the Omagua. The relationship between the agricultural, riverine Tucano and the wandering Macu of southeastern Colombia is equally hostile, with the former occasionally enslaving the latter. I have already alluded to the Shipibo attitudes toward the Cashibo. Marcy gives an excellent account of the Chama stereotype of Cashibo culture and of the crucifixion of a Cashibo unfortunate enough to fall into Chama
These attitudes on the part of the Chama have not changed appreciably in the last 100 years, and my Shipibo friends were still eager to attribute all possible vices to their Cashibo neighbors to the West. The important point to emphasize is that these intense, long standing hostilities follow the marked cultural cleavages between riverine and non-riverine groups.

I believe that the marked decline in cultural level noted in several of the Tropical Forest sequences is an indication of the onset of a high level of warfare. I suspect that at the beginning hostilities were usually between riverine and forest groups, but that as war patterns became more fully developed and cultural specializations related to warfare more fully intrenched, conflicts between cultures on about the same level of development became common. Vayda has recently made a good case for the economic importance of warfare to slash-and-burn agriculturalists, and the material he presents is completely compatible with the model I have presented.

In these wars the advantage was not always to the more sedentary, more populous riverine groups. Though they had superiority of numbers and a stronger and more complex social structure, they were far more vulnerable to attack. Small parties of the forest Indian could launch hit and run raids,
or snipe at people involved in agricultural work. The forest Indians, due to the broad expanse of their territory and to their seminomadic way of life, were better able to escape retaliatory raids. They were also far more at home in the jungle than the riverine Indians. By continuous guerrilla tactics the forest groups were frequently able to wear their more numerous enemies down and thus to expand their own territory.

This section of my discussion is in complete agreement with the model of Tropical Forest cultural evolution recently presented by Carneiro, but there are other points on which we diverge markedly. The sharp decline in culture from Marajoara to Aruá or from Hupa-iya to Yarinacocha may well represent the conquest of the territories by less sedentary but militarily more effective groups. The expansion of the Carib in the Lesser Antilles at the expense of the Arawak, or the more recent expansion of Northern Cayapo at the expense of sedentary Tropical Forest groups are concrete examples which show that this model is by no means purely hypothetical or farfetched.

The increase in warfare had repercussions throughout the whole Tropical Forest region and beyond. Groups displaced from their own land in turn displaced other groups. This stage is marked by a very high level of intergroup contact and of
migration in all directions. During the Regional Florescent Stage a number of highly distinctive local ceramic styles developed and only the Barrancoid Tradition was truly widespread. During the Invasionist Stage a number of ceramic features became almost universal in their distribution in Tropical Lowland South America. Among these are corrugated and fingernail incised ceramics; conical based brewing urns; urns in the form of seated humans; urns with a removable lid in the form of a human head; coarse strip applique with scoring or cross scoring; crude human figurines; certain specific mannerisms in the treatment of the limbs of such figurines; and fine line incision in the form of nested rectangles or scrolls. Many of these distributions have been discussed already in plotting the possible relationships of the Pacacocha, Yarinacocha, and Corrugated Ware Complexes. Imbelloni has discussed the distribution of anthropomorphic urns at length, and the Reichel-Dolmatoffs have recently covered some of these traits in their article on a late, intrusive complex in the Sierra de Santa Marta area. Such a high level of close stylistic similarities over great distances could have been achieved only under conditions of almost continual migration.

While, during the Formative and Regional Florescent Stages of Tropical Forest Culture, most group movements appear
to have been out of Venezuela and Colombia into the Amazon Basin, the Invasionist Stage was a time of major migrations in the opposite direction. Such important Period IV styles of Venezuela as those of the Arauquinoid Series appear to represent the intrusion of Amazon Basin influences into Venezuela. In Colombia there was a definite expansion of Tropical Forest type culture at the expense of cultures in the Andean Tradition. Much of this northward spread of Amazonian type culture seems to have been an aspect of the expansion of Carib speaking peoples. Further south in lowland South America the migrations of Tupí-Guaraní speaking peoples seem to have been a major factor in the dissemination of certain widespread elements of Tropical Forest Culture. I have already suggested that the expansion of the Panoan speakers into the central Ucayali occurred as a part of this Stage. The movement of the Chiriguano and their Arawak speaking vassals against the southwestern flank of the Inca Empire in immediately precontact times was a typical example of late Tropical Forest expansion.

Even the Central Andes was not exempt from this expansion of Tropical Forest Culture. A number of the culture elements listed above as typical of the Invasionist Stage of Tropical Forest Culture are diagnostic of the Milagro-Quevedo Cultures of the Guayas Basin. Estrada has argued that the
sudden appearance of this cultural tradition in the Pacific Lowlands of Ecuador marks the invasion of the Cayapa-Colorado into this region. These are peoples who today maintain a Tropical Forest pattern of culture. The Kuelape Culture of the Utubamba region of Highland Peru has a number of features of vessel shape, modeling, and incision which suggest Tropical Forest influence, and some of the elements of this ceramic style are those which were disseminated as a part of the late Tropical Forest Expansion.

The lowering of cultural level which was evident in the Tropical Forest at the beginning of the Invasionist Stage was not necessarily a permanent phenomenon. By contact times certain Tropical Forest groups had adjusted to conditions of continuous warfare and were able to maintain relatively complex societies and elaborate material cultures under these conditions. The Tapajó were one such example. Certain of the Tupi and Arawak speaking groups of the Central Amazon were also close to the maximum level of Tropical Forest complexity at contact times. On the basis of ethnographic evidence it would be possible to discuss the nature of the cultural adjustments to war at some length. The Omagua occupation of island locations in the Amazon has already been mentioned. Murphy has discussed certain changes in Mundurucú social structure which were adaptive
to conditions of extreme intertribal warfare. The whole Carib concept of manliness and the gruelling male initiation ceremonies typical of Carib society were also adaptive in terms of effectiveness in war. A full treatment of this subject would require a separate monograph, and these few suggestions should be sufficiently suggestive for the present purposes.

The Invasionist Stage of Tropical Forest Culture was in many ways parallel to the Postclassic Stage in the areas of high civilization, but, while the Postclassic was in many ways a constructive development leading to larger and more complex social units, the Invasionist Stage was in most areas initially destructive. The reasons for this difference are worthy of brief comment. I have already mentioned the difficulties involved in conquering or even in conducting punitive raids against the nonriverine Tropical Forest groups. The difficulties remain today, so that some of these groups are still not under effective political control of the central governments. On the other hand, the nonriverine groups had the power to harass and, in some cases, to destroy the riverine groups, but they lacked the bureaucratic elaboration necessary to conquer or to exploit them systematically. At the southern fringe of the Tropical Forest such mechanisms were developing in very late precontact times. The relationship between the Mbaya lords and their Arawak
serfs is a well known and much discussed case in point. It is worth emphasizing that here it was the less numerous, migratory, hunting and gathering Mbaya who dominated the more numerous, more sedentary and more civilized Arawak farmers. Until such mechanisms for social control were fully established, war could only be disruptive in its effects. The total ecology of the Tropical Forest was not conducive to the development of such mechanisms.

There are interesting similarities between the course of cultural development sketched for the Tropical Forest Regions of South America and segments of culture history elsewhere in the world. The original form of Tropical Forest Culture was adapted to and could occupy only a very narrow environmental niche within the broad expanse of the Tropical Forest Region. The remainder of the Tropical Forest was only casually utilized and not effectively controlled. This uncontrolled area was filled, or finally became filled, with people on a much lower level of culture. These less civilized groups were, nonetheless, able to compete militarily on even or better than even terms. In the course of extended hostilities, the level of culture of the intensive agriculturalists was lowered and their territory contracted, while the level of culture of the forest groups was somewhat raised. The same general model seems to hold for the expansion.
of Middle Mississippi Culture along the bottom lands of the major rivers of Eastern United States followed by a subsequent contraction and collapse in the face of pressures from Woodland and indigenous Southeastern groups who had continued to occupy the remainder of the territory. The relationship between the Anasazi and Athapascan speaking peoples in the Southwest of the United States followed a similar pattern of ecological zoning and subsequent hostility. Finally, the initial expansion of Danubian Neolithic only into the areas of well drained, loess soils can also be brought in as comparative material. In this case the remainder of Central Europe was left to the indigenous peoples of Mesolithic culture, who ultimately became partially acculturated to Neolithic culture and very hostile. The latter part of the Central European Neolithic was marked by intensive warfare and a temporary decline in cultural level.

The above discussion suggests the possibility that the decline, which Meggers and Evans, the Reichel-Dolmatoffs, and I have noted to be typical of a number of South American Tropical Forest sequences is due to the effects of warfare rather than to the direct, unmodified effects of the environment.

It can not be emphasized too strongly that the concepts presented above as a part of a conceptualization of Tropical Forest culture history are developmental stages and not time
periods. The Reichel-Dolmatoffs, when they presented this set
of developmental stages for Colombia, did bracket them with
dates, but with the extension of these stages to all of the
Tropical Forest areas of South America these temporal implications
are no longer possible. At present it appears that during the
early part of the cultural evolution Colombia and Venezuela
were ahead of the Amazon Basin, so that at any particular point
in time, the Venezuelan cultures would be at a somewhat more
advanced stage. On the other hand, the patterns of warfare
typical of the Invasionist Stage appear to have developed in
the Amazon Basin and spread north into the Orinoco and Northern
Colombia. Thus the Invasionist Stage would appear later in the
northern area. These temporal discrepancies are most obvious
when one notes that the Regional Florescent Stage of Tropical
Forest Culture lasted to contact times in the Greater Antilles.
In the Lesser Antilles the transition from Regional Florescent
to Invasionist was caused by the Carib invasion in immediately
precontact times.

In the interpretation of Tropical Forest Culture
presented above I have at several points found myself in dis-
agreement with the interpretation presented by Meggers and Evans. 639
These areas of disagreement have developed only gradually as I
have analyzed my own material and compared its implications with
the model presented by Meggers and Evans and with other recent work in Tropical South America. The precision and clarity with which Meggers and Evans have presented their hypotheses concerning Tropical Forest culture history have made it possible to check my own data against predictions based on their hypotheses.

Meggers and Evans maintain that Tropical Forest Cultures have a relatively shallow time depth compared to Central Andean Civilization, and that most elements of Tropical Forest Cultures have derived from Andean culture. My position is partially that presented by Sauer in 1952 and reaffirmed by Cruxent and Rouse in 1959. We would maintain that root crop cultivation has a greater time depth in South America than does the pattern of seed crop cultivation, derived from Mesoamerica, which ultimately triggered the rise of Andean Culture. It now appears possible that Tropical Forest Culture contributed at least as much to the initial development of Andean Culture as Andean Culture ultimately contributed to the Tropical Forest area.

I feel that the long and complex sequence at Yarinacocha is strong evidence that the second position is more nearly correct. Its most important implication is that Tropical Forest Culture has considerable time depth in the Upper Amazon. The absolute dating of the Yarinacocha sequence is not yet secure, but several lines of reasoning indicate to me that I have not
seriously, if at all, overestimated its length. I believe that the early Tropical Forest cultures on the Ucayali are related, though not very closely related, to the earliest known Tropical Forest cultures of Venezuela and Colombia.

My disagreement with Meggers and Evans, if it does nothing else, should provide the basis for further research. If I am correct about the time depth of Tropical Forest Culture in the flood plain regions of the Amazon Basin, then further work in the Central Amazon should give evidence of sequences of a length and complexity at least comparable to that of the Yarinacocha sequence. If, on the other hand, the considerable time depth in the Yarinacocha region is due to colonization from the Andes, then further work in the Andes should provide us with a source for the odd ceramic assemblage I have called Tutishcainyo. On a more specific level, Meggers has recently denied that there are Barrancoid ceramic complexes in the Amazon Basin. I, on the other hand, maintain that Hupa-inya is definitely in the Barrancoid Tradition and that there are scattered finds indicating other Barrancoid ceramic groups within the Amazon Basin. Again, further work in the Central Amazon should establish the truth of one of these positions. If this report serves as an effective stimulus to more archaeological work in the Amazon Basin, and to work which
is more sharply focused on specific problems, then it will
have fulfilled its major purpose. I feel certain that the
picture of Tropical Forest culture history which will emerge
from such work will be more complex than anyone has yet suggested.
Appendix

Mineralogy and Petrology of Artifacts and
Unmodified Rocks from Archaeological Sites
Near Pucallpa, Peru

By

John S. Phillips
Introduction

A brief mineralogic and petrologic study was made on a collection of 34 Indian artifacts, two types of pottery, and over 300 unmodified rocks from archaeological sites on Yarinacocha, near Pucallpa, Peru. Two weeks were spent on the laboratory work during the summer of 1959 at the request of Donald Lathrap of Harvard University.

A petrologic classification of the specimens was made using a binocular microscope. This was supplemented by 29 X-ray diffraction patterns recorded on strip charts, seven qualitative X-ray fluorescence determinations, and a study of five thin sections with the petrographic microscope. The principles of the use of X-ray diffraction for qualitative and quantitative mineralogy determinations are described by Klug and Alexander. The method of X-ray fluorescence analyses for elements is described briefly by Behr and Zingaro. The study of rocks in thin section is described by Wahlstrom. Emphasis was placed on the petrology of the stone axes and the mineralogy of two types of pottery.

Petrology of the Stone Axes

Sixteen of the 23 axes examined are made of igneous rocks of the dacite-andesite compositional range. Three additional axes are made from igneous rocks classified as latite porphyry,
rhyolite, and basalt. These axes are made of igneous rocks which have an aphanitic groundmass with phenocrysts (one to five mm.) of plagioclase, hornblende, and, less commonly, quartz. The porphyritic texture and the aphanitic groundmass indicate that these rocks are from extrusives or shallow intrusives. Flow structures were noted in some specimens which suggest that the rocks came from volcanic flows.

A semi-quantitative estimate of the quartz content of these rocks was made by X-ray diffraction. This was obtained by making an X-ray diffraction strip chart of a powder sample of the rock. A known weight of ground quartz was then added to a known weight of ground rock sample, this was thoroughly mixed, and another X-ray diffraction strip chart was made. A comparison of peak heights for quartz on the two diffraction strip charts provides an approximate quantitative estimate of the quartz content. For four stone axes of dacite-andesite composition, the quartz content was found to be 10 to 25 per cent. Thus, although the rocks megascopically appear to be andesites, they are probably nearer to dacite in composition. Plagioclase is the predominant feldspar and hornblende is the major ferromagnesian mineral. Most of these rocks are relatively unaltered but a few contain chlorite, epidote, and calcite formed from hornblende and plagioclase.
Three of the stone axes are made from rocks of probably metamorphic origin, although one of quartzite might be of sedimentary origin. One of the best axes of the collection (UCA-2 T-29/7) is coarse grained quartz-sillimanite rock which would be derived from an area of strongly metamorphosed sediments. (Excellent axes made of sillimanite were noted by the writer in collections at the Governor's Place in Santa Fe, New Mexico.) A second axe (UCA-2 T-20/5) is coarse grained quartzite and the third is made of arkosic quartzite.

An axe (UCA-2 T-9/10) with a non-symmetrical taper to the cutting edge is made of siltstone. The softness and inherent planes of weakness in such a rock make it an undesirable material for making axes.

Unmodified Rock

The over 300 unmodified rocks, which were recovered in the excavations, consist of the following types:

- Sediments 72%
- Volcanic 18%
- Iron Oxides 7%
- Metamorphic 3%

The sedimentary types are represented as follows:

- Sandstone 35%
The sandstones are typically fine grained and light colored. Red and arkosic sandstones are also abundant. Clay forms the cementing material frequently. Quartz overgrowths are common in the friable, white sandstones.

Much of the quartzite is probably metamorphic in origin, but since it occurs as rounded pebbles it is included with the sediments. Much of the quartz is probably igneous in origin, but it also occurs as rounded pebbles.

The cryptocrystalline quartz was probably utilized by the Indians for scrapers and other flaked implements. It most likely originated in lithified soil zones or as a secondary feature in volcanic rocks. The common occurrence of cryptocrystalline quartz in volcanic rocks is probably due to the greater solubility of silica glass as compared to quartz in groundwater.

The miscellaneous category of sedimentary rocks includes one piece of petrified (silicified) wood. Such fossil wood is common in continental sediments and volcanic terranes. The miscellaneous category also includes arkose, mudstone, carbonaceous
shale, and possible tuff.

One third of the volcanic rocks are of andesite-lacite composition and texture similar to the axes made of volcanic rocks. The remaining two thirds are more silicic and range from granite to monzonite in composition. From the X-ray diffraction pattern, one fine grained cobble with disseminated pyrite is tentatively classified as a phonolite. Many of these volcanic rocks are well rounded indicating that they were probably deposited in continental sediments before they were carried to the archaeological site by the Indians.

A small percentage of the unmodified rocks are definitely granitic gneiss pebbles. Some specimens classified as arkosic sandstone may actually be granitic gneiss since they might be confused easily when dealing with small specimens.

The numerous pieces of iron oxides were probably used by the Indians as a "paint" rock. The yellow iron oxides are goethite and the red iron oxides are earthy hematite. Since the possibility existed that these iron oxides were from the oxidized outcrop of sulfide orebodies, several samples were qualitatively analyzed by X-ray fluorescence for copper, lead, zinc, and manganese.

No copper or lead were detected in the five samples analyzed and only a trace of zinc was present. Two samples tested for manganese contained several percent of this element. It is
unlikely that the "paint" rock is from the oxidized capping of a base metal orebody but may be derived from the weathering of basalt or manganiferous siderite.

Thirteen of the rocks contain minute specks of a green secondary mineral believed to be chrysocolla. This would not be unusual because traces of copper are commonly observed in arkosic continental sediments.

Pottery

Two distinctly different types of pottery were compared by means of X-ray diffraction. One type is characterized by a temper of sanidine, the other by a temper of sherds (Late Tutish-cainyo body sherds). Hereafter they will be referred to as sanidine-and sherd-tempered pottery respectively. Three samples of each type of pottery were gently crushed and sieved. The fraction which did not pass through a 60 mesh sieve included the tempering material.

This fraction of the sanidine tempered pottery consists of glassy angular sanidine and a subordinate amount of quartz. This fraction of the sherd tempered pottery consists mainly of quartz, an illite-type mica, and a small amount of potash feldspar. Fragments of older pottery which are clearly recognizable macroscopically have been used as a tempering material. The coarse
Material is heterogeneous and also includes black chert and rounded quartz grains.

The fraction that passed through a 200 mesh sieve was agitated in water, permitted to settle for 30 seconds, and then a sample was collected by settling on a suspended glass slide. This fraction of the sanidine tempered pottery consists largely of sanidine and a moderate amount of quartz. One sample displayed a weak illite-type mica X-ray pattern as well. This fraction of the sherd tempered pottery consists of abundant quartz and an illite-type mica. The latter was identified by X-ray diffraction on the basis of a broad 9.94 Å peak, a sharp 4.46 Å peak, and a moderate 2.56 Å peak. The 3.33 Å peak is obscured by the 3.34 Å peak of quartz.

One sample of each type of pottery was further compared by using a still finer fraction. This was prepared from the fraction which passes through a 200 mesh sieve. This was agitated in water and the supernatant suspension was poured off. This suspension was centrifuged at low speed for five minutes which settled the coarser particles. The cloudy supernatant water was poured off and centrifuged for 20 minutes at high speed to settle the clay fraction. This fraction was mixed with a small amount of water and placed on a glass slide. When dry, an X-ray diffraction pattern of this film was taken (Figs. 129 and 130). The sanidine
tempered pottery yielded weak X-ray diffraction peaks for sanidine and quartz only, indicating that the clay mineral is poorly crystallized. The clay fraction of the sherd tempered pottery consisted of an illite-type mica and a small amount of quartz. The iron and manganese content of the two clays was compared by X-ray fluorescence since their color was distinctly different. They contain similar amounts of iron but the sanidine tempered pottery contains two to three times more manganese, although the manganese content is small in both types of pottery clay.

Conclusions

Most of the stone axes were made from dacite-endesite volcanic rocks. It seems probable that the raw material for the axes was derived from a nearby area of volcanic rocks. Quaternary-Miocene undivided volcanic rocks are shown to be present about 120 miles to the west of Pucallpa according to the Geologic Map of South America published by the Geological Society of America, 1950. However, these volcanics would be difficult to reach from Pucallpa because of the mountainous terrain which would have to be crossed. Similar volcanics also occur some 350 miles to the south, and this area may have been more accessible by river routes. It is likely, however, that areas of volcanics occur nearer the site, which have not been shown on the generalized map referred to above.
The fine grained texture of such rocks, their uniform hardness, and the absence of planes of weakness all contributed toward making a suitable raw material for axes. Flow structure in the volcanics would be likely to result in the formation of flat, rock slabs during weathering. Such a shape would facilitate the making of axes.

That only a single axe made of quartz-sillimanite rock is present in the collection suggests that a supply of this type of material was not readily available and may have been brought in from a more distant source. However, a small area of pre-Cretaceous metamorphics is shown to be present about 50 miles northeast of Pucallpa according to the Geologic Map of South America.

The two groups of pottery examined are distinct. Not only are the tempering materials completely different mineralogically and texturally but also the clay matrix is different. In the sherd tempered pottery, the principal clay mineral is an illite-type mica. While the clay of the sanidine tempered pottery cannot be characterized mineralogically, its X-ray diffraction pattern is distinctly different and represents poorly crystalline material. The proportion of quartz is also much greater in the clay size fraction of the sherd tempered pottery.

Sanidine is a relatively rare mineral, thus, it is
quite possible that the source of this tempering material may be deduced when the geology of the region is well known. Sanidine occurs in and associated with soda- and potash-rich igneous rocks, such as rhyolite, trachyte and phonolite, which have cooled rapidly. When igneous rocks of similar composition cool more slowly, the sanidine inverts to orthoclase and/or albite, frequently as exsolution intergrowths. Thus the most common occurrences of sanidine are in volcanic rocks and in dikes intruded at shallow depth, in xenoliths in such rocks, and in tuffs associated with such volcanic activity. Thus the most likely source of the sanidine is in tuff where it might weather out like sand or from phenocrysts of sanidine which have weathered out of volcanics or dikes.

The small proportion of quartz in the coarse fraction (+60 mesh) of the sanidine tempered pottery suggests that it may have been present in the clay and that the sanidine may have been derived from rocks undersaturated in silica. If such is the case, this would further limit the possible sources of the sanidine since undersaturated rocks are also quite rare. If possible source areas of sanidine were found, another limiting test would be comparison of the Na₂O/K₂O ratio of the sanidine in the pottery to that in the possible source area.

The reason that sanidine was a desirable tempering
material is not obvious. It would be stable up to high temperatures (well above 1000° C.) and would undergo no polymorphic transition or significant volume change during firing. It may have been favored because of the artistic touch provided by the mirror-like cleavage surfaces of glassy sanidine.