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May 19, 1969

Miss Elizabeth K. Ralph
Museum Applied Science Center
for Archaeology
The University Museum
University of Pennsylvania
33rd and Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Miss Ralph:

I have received your report and am very happy with what you found. I was sorry not to have seen you on your way back, due to all the work I have had, but hope to see you one of these days, should I be going to Philadelphia.

With kind regards,

Sincerely,

Ignacio Bernal
Director General

IB/cbc

COLORADO
STATE
UNIVERSITY
FORT COLLINS
COLORADO
80521

department of sociology and anthropology

Beth Ralph

Please reply
saying I am
staying away - but
perhaps we can
work out a
trial time
next year
Fred

March 31, 1970

Dr. Froelich Rainey
University Museum
33rd and Spruce
Philadelphia, Pennsylvania 19104

Dear Dr. Rainey:

Since it proved to be impossible to make the Cesium magnetometer tests of the shaft tombs before we left Mexico, I'm now wondering what chance there is of getting this work done at some later time. I'm afraid the whole business got a little un-stuck, but I'd still like very much to go ahead with it later if this can be done.

After talking to you about the middle of February, I wrote immediately to Mike Coe in care of Bernal's office, suggesting dates and telling him how we could get in touch by phone - and I even wrote to Bernal himself, to ask that the letter be given to Mike. These must have reached Mexico City at least two days before Mike's arrival, but unfortunately Mike's letter wasn't given to him. A week later, after he'd left Mexico, the letter was sent over to Matos' office, and for all I know it's still there.

After I got back to Ajijic on February 19 and made the series of phone calls which revealed the foul-up, I started trying to get in touch with Mr. Harris himself. I sent messages to him via two routes, and subsequently Matos reported that Mr. Harris said he would be at San Lorenzo until about the middle of March. (We never heard directly from Mr. Harris.) We delayed our departure from Mexico until March 22, checking frequently with Matos, but during the last few days before our departure communications seemed to break down. We were unable to reach Matos by phone, and we didn't receive from him the phone call or telegram which would give a definite date for Mr. Harris. Finally we had to leave, as much in the dark as ever, and there the matter rests at present. Incidently, it was on instructions from Bernal, who seemed a little vague about the whole thing, that I tried to chase it down through Matos.

The question now is whether the tests I'm interested in can be made later - and if so, when. My husband and I will probably be in Guadalajara again for about a week in early May but we won't have a vehicle, so that isn't much help. It now seems possible, however, that we may be able to return to Mexico for a considerable period starting next September. We've located a number of looted shaft tombs in an area about two hours' drive from Guadalajara, so no time would be lost in locating places for the tests. It would be best to make them during the dry season (usually October through April), because

the whole area is a vast mud-hole during the summer and early fall, so perhaps something could be worked out for the next field season. Would this be possible? I'm genuinely sorry that things didn't seem to work out this time, and I'd still like very much to go ahead with the tests. I think it's a promising idea, and I don't want to abandon it.

Another thing - do you know if thermoluminescence tests are now being made more or less routinely? I worked with George Kennedy at UCLA about ten years ago, but since then I've lost track of developments in the field. I have three sets of "triplets" - charcoal, obsidian, and pottery from the same level. I've arranged to have obsidian hydration and Carbon 14 tests made at UCLA, which is interested in series of dates for West Mexico, and I'd like if possible to have thermoluminescence tests made of the sherds. I'm quite sure UCLA isn't doing work of this kind, but I seem to recall reading that it was being done at the University of Pennsylvania.

I'd appreciate it very much if you could tell me what might still be worked out with regard to the Cesium magnetometer tests. I'm afraid that neither INAH in general nor the Departamento de Monumentos Prehispánicos in particular is a completely reliable partner in communications problems or last-minute arrangements. Perhaps next time we can simply work things out among ourselves, and then descend on the Municipio de Etzatlán and go to work.

Sincerely,

Betty Bell

Betty Bell

April 7, 1970

Mrs. Betty Bell
Dept. of Sociology and Anthropology
Colorado State University
Fort Collins, Colorado 80521

Dear Mrs. Bell:

Dr. Rainey has gone to Europe, so I am replying to your letter of March 31st. I am sorry that there was such a mix-up about Mr. Harris and for the inconvenience that it caused you.

We think that it will be best if we plan to do your survey with our cesium magnetometers next winter, or late fall. Please let us know the exact date that would suit you the best, and we will see if we can manage it then.

Sincerely yours,

Elizabeth K. Ralph

EKR/ek
cc: Dr. Froelich Rainey

COLORADO
STATE
UNIVERSITY
FORT COLLINS
COLORADO
80521

department of sociology and anthropology

Betty Ralph
Please confirm
that we will
be down
there
JSO

May 31, 1970

Dr. Froelich Rainey
University Museum
33rd and Spruce
Philadelphia, Pennsylvania

Dear Dr. Rainey:

It's now certain that we'll be in Mexico for at least a year, and more probably two years, starting this September. We'll be living in our house near Guadalajara, so if something can still be worked out about the Cesium magnetometer tests, we'll be only about three hours' drive from the scene of operations.

It would probably be best to wait until around the first of the year in order to make certain that the dry season is fully under way, and any time between then and the end of April would be suitable from the standpoint of weather conditions. As I told you earlier, we've already located several looted shaft tombs, so it wouldn't be necessary to spend any time looking for test sites. All of these are in one rather small area, but if a variety of locales is desirable it wouldn't be difficult for us to find more in another known shaft-tomb area about ten miles away, in which the subterranean structures might be a little different. If a completely different locale would be useful for the tests, there are shaft tombs near the base of a volcano (apparently active until less than 2000 years ago) about a half-day's drive from Guadalajara. With a little advance notice, we could also explore this area for looted tombs.

I'm sorry that things couldn't be worked out during this past winter. If it's still possible to make the tests, then any dry-season date which is convenient for the technician will suit us. My husband and I will be teaching at the University of Guadalajara, but I'm sure we can always get away for a few days if we know about it a bit in advance.

Sincerely,

Betty Bell

Betty Bell

AHA
Jan Hall
Dec. 1-15

June 4, 1970

Dear Dr. Bell:

Dr. Rainey is away for about six weeks in Italy. However, I will bring your letter of May 31 to his attention upon his return to the office.

Sincerely,

David Crownover
Executive Secretary

Dr. Betty Bell
Colorado State University
Fort Collins, Colorado 80521

August 5, 1970

Dr. Betty Bell
Dept. of Sociology and Anthropology
Colorado State University
Fort Collins, Colorado 80521

Dear Dr. Bell:

Dr. Rainey has asked me to reply to your letter of May 31, 1970, and to say that we shall definitely plan to do the cesium magnetometer survey at your site in 1971.

Please let me know when would be the best time for you. Perhaps, we could start in early January before classes resume. Could you tell me also approximately how large an area should be tested so that we may estimate how much time to allow.

Sincerelyyyyours,

Elizabeth K. Ralph

EKR/ek

COLORADO
STATE
UNIVERSITY

department of sociology and anthropology

FORT COLLINS
COLORADO
80521

August 17, 1970

Miss Elizabeth K. Ralph
Museum Applied Science Center for Archaeology
The University Museum
33rd and Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Miss Ralph:

Thank you for your letter. Needless to say, I was very pleased to learn that the cesium magnetometer tests will be made.

As far as I know at the moment, early January would be fine. The Christmas holiday season in Mexico always extends until January 6, but I don't know the date on which classes resume. In about two weeks, after we get to Mexico, I can be more definite about the exact date, but I'm quite certain that something can be worked out for early in January.

With regard to the area to be tested, the looted shaft tombs are scattered over an area of perhaps four square miles. They occur in clusters, however, so I suppose that the total area to be surveyed intensively wouldn't be more than one square mile and perhaps somewhat less.

I'll write to you again in two or three weeks, and let you know definitely about the date.

Sincerely,

Betty Bell

Betty Bell

Apartado 84
Ajijic, Jalisco, Mexico

September 20, 1970

Miss Elizabeth K. Ralph
Applied Science Center for Archaeology
The University Museum
33rd and Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Miss Ralph:

I'm sorry to have taken so long to write again, but the dust is just now settling after a more than usually complicated move.

I find that the Christmas vacation in Guadalajara will end on January 3. I won't be teaching until I've finished some work now on hand, but my husband will teach on Tuesday, Wednesday, and Thursday of each week. This would give four days, Friday through Monday, during which we could be in the field, and if the tests take a little longer, he can arrange his work if he has a few days' advance notice. I have no idea, of course, as to how long it might take to test a dozen or so looted tombs. If it will take substantially longer - something on the order of eight days or more - it might be better for us, if the technician's schedule permits, to go out to the field (it's too far to commute daily) for the requisite number of four-day periods. We'll meet him at the plane, of course, and take care of local transportation and put him up while he's here. I think there are several flights each day from Los Angeles direct to Guadalajara.

If I seem to be tying this to my husband's schedule, it's in part because Mexican village authorities, who must have at least courtesy calls in connection with this work, have a very strong preference for dealing with men; in part because my husband is completely bi-lingual, and my command of Spanish, while passable, is by no means that good; and in part, admittedly, simply because he's interested in the tests and would like very much to see them made. We talked to some of the local authorities last spring, when we went out to locate the looted tombs, and they seemed to be both interested and cooperative.

Any time in January which can be worked out will suit us very well, though it will be helpful if we can know the dates a little in advance. (After February 12, my husband's teaching schedule may change to something even less convenient for field work.) An excavation permit won't be required for this work, but I think it would be well to have some kind of official paper to hand around if need be, so I will write to the Instituto Nacional de Antropología e Historia in Mexico City and ask for a letter identifying us and explaining our work.

Please give Dr. Rainey my most sincere thanks for undertaking to arrange the tests. I know there's no guarantee that the cesium magnetometer will prove to be successful in locating unlooted shaft tombs, but I hope very much that it will be.

Sincerely,

Betty Bell

Betty Bell

Apartado 84
Ajijic, Jalisco, Mexico

October 15, 1970

Mrs. Betty Bell
Apartado 84
Ajijic, Jalisco
Mexico

Dear Mrs. Bell:

Thank you for your letter of September 20th. Since it is now time to make specific plans, I should like to trouble you with a lot of questions and suggestions.

First of all, we shall be arriving with, at least, 100 kilograms of equipment, and there will be two of us -- myself and an electrical engineer (Bruce Bevan). At the site, we shall need two workmen to help and possibly more if there is a need to cut any brush. The main reason for my coming is that I speak a little Spanish and I have had a lot of experience in doing magnetometer surveys.

In view of the cost of getting there, it would not be practical to work for only four days, or at successive intervals of four days. Also, since this is a new site, if we do find anomalies, the first few will have to be excavated in order to interpret them. Dr. Rainey is quite insistent about the need for follow-up excavations.

Is there a hotel nearby where Bruce and I could stay and continue throughout the weeks? If we have any success, we should allow 2 to 4 weeks for the survey.

May I trouble you to send me the exact location and name of the site so that we can try to find out something about the geology of the region beforehand? Volcanic regions are usually too magnetic and cause confusion. Photographs and maps of the site would also be helpful.

Are there some publications about the site, especially about the excavations and time period that we could read ahead of time? Could you tell us also what is known of the size, shape, depth, and materials of the tombs?

Another minor question is whether you are using the metric or English system of measurement.

In case we are doubtful about the soil conditions at the site, it would be extremely helpful if you could send us a sample of soil (about 1/2 kg.) from the excavations - one representative of the average soil conditions below the surface. A sample (100 g. or less) of the material of the tombs would also be helpful but not essential.

To avoid travelling with unnecessary clothes, can you tell us approximately what the temperature will be, how bad the ticks are, if any, etc.

We shall probably both be coming from Philadelphia. Therefore, we shall have to land first in Mexico City and go through customs there. Two years ago, when I worked at San Lorenzo, Dr. Bernal sent one of his assistants to the airport to facilitate the customs formalities. Do you want to arrange for him to do this or shall I write to him directly? At any rate, I shall have to send to either you or him the requisite lists and values of our equipment well in advance.

One minor point is that we need to charge the magnetometer batteries every night. If there is no electricity where we stay near the site, we shall require a generator - 110 or 220 v with a capacity of 1000 watts.

Should we plan to arrive in Guadalajara on Thursday, January 7 , or would another time be better?

Sorry to bother you with so many questions.

Sincerely yours,

Elizabeth K. Ralph

ER/jc

October 30, 1970

Miss Elizabeth K. Ralph
Applied Science Center for Archaeology
The University Museum
33rd and Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Miss Ralph:

I was very pleased to learn that things are under way. I'll try to answer your questions in such a way as to provide information instead of confusion, and maybe the best place to start is with the site itself.

This isn't an archaeological site in the usual sense of that term; it's an area which has been heavily pot-hunted for years, and no controlled work has ever been done there. Archaeologists would like very much to work there, but unfortunately there's a hitch: this is a shaft-tomb area, and no archaeologist has ever been able to locate an unlooted tomb. The pot-hunters find them with depressing regularity, and by their own admission they look for certain surface indications, but nothing will persuade them to part with the information. By the time a tomb has been opened and looted of all or most of its contents, the ground has been thoroughly trampled for yards around, and it's useless to look for clues. Since this is so, the only hope seems to be finding an instrument which is capable of detecting the subterranean burial chambers, and about a year ago I started wondering if the cesium magnetometer could be used for a problem exactly the opposite of the one for which Mike Coe was using it st San Lorenzo. I wrote to Mike, then to Varian, and finally to Dr. Rainey, and the response was at least a guarded optimism.

The burial chambers contain a distinctive assemblage of offerings - large, hollow, pottery figurines (from about 14 inches on up to, rarely, as much as 30 inches in height), small, solid figurines, polychrome pottery, slate-backed pyrite mirrors, and conch-shell trumpets - and it's the big figurines which are the lure for pot-hunters. They're great favorites with collectors of Pre-Columbian art, and cost at least $1,000 each (usually more) on the antiquities market. This is many times what the pot-hunter gets for them, of course, but his take is high enough in local terms to make this a very lucrative business. There must be thousands of these figurines in both public and private collections, but without exception they're looted material. It would be very nice indeed to be able to locate the first unlooted shaft tomb, but more importantly, finding a way to locate them consistently would help to undercut a rather nasty illegal business.

The area I'd like to have tested is in the Etzatlán basin (sometimes called the Magdalena Lake basin), about 60 miles due east of Guadalajara. I'll try to find a sufficiently large-scale map to be of use to you, but meanwhile, if you have access to a detailed map of West Mexico, look at the area just north of the town of Etzatlán. The Volcán Tequila is about 25 miles east-northeast of the basin, and the Volcán Ceboruco about 60 miles northwest. (Mexico uses the metric system; I'm just more used to feet and miles.) The basin is flat and at an altitude of about 5,000 feet, and is surrounded irregularly by hills and mountains ranging on up to about 9,000 feet (the height of the Volcán Tequila). Originally the basin, which is probably about five miles square, was filled with a lake which was drained artificially about 60 years ago. The shaft tombs are located around the edge of the basin - obviously on the shores of the old lake - and they occur in clusters, the locations of which are known. We've already located looted tombs for the tests in one of

these clusters, and we'll go back in the next few weeks and probe some others. The area isn't brushy in the sense of having a dense cover; there is a little scattered brush, but nothing even approaching the dense vegetation of the Gulf Coast, for example. It tends to be a rather thorny kind of scrub, however, and it's best removed by someone who doesn't mind getting stuck.

The shaft tombs in general appear to be much what I've indicated on the enclosed rough sketch, with some minor variations from area to area within West Mexico. The shaft is about three feet in diameter - or perhaps square. There's some dispute about the shape, and by the time the pot-hunters have finished their work, it's hard to tell. It's said in some areas that the upper part of the shaft funnels out to a diameter of about six feet and that this upper portion is lined with small stones, but I frankly don't know if this is true in the Etzatlán basin. There are also gaudy reports from some areas of retainer burials arranged in a square around the mouth of the shaft, but I certainly can't vouch for this.

The shafts of known looted tombs range from about 10 feet to as much as 45 feet in depth. There may be only one chamber, but very frequently there are two; three-chambered tombs are extremely rare, but last winter a pot-hunter in the Etzatlán basin volunteered the information that he had dug a tomb with four chambers (with, so he claimed, a total of 86 of the large figurines). The chambers are roughly rectangular in shape, and have rounded ceilings. They range in size from chambers large enough for only two or three extended bodies, to some which are known to have contained 10 or 12 bodies and all their offerings. In concrete terms, this means from about six to 12 or 15 feet in length, and four to six feet in height. It's reported from a shaft-tomb area in southern Nayarit that some of the tombs there have what are called claraboyas - small, round openings (small tunnels, apparently) connecting the chambers of adjoining tombs. It's said that there may also be a vertical claraboya extending from the chamber to the surface, separate from the shaft but roughly parallel to it. I know of nothing of this kind in the Etzatlán area, but it might be kept in mind.

The stratum labeled "tepetate" on the sketch may well be the key to this whole operation. For a long time it was hypothesized, in true anthropological fashion, that the depth of the shaft was related to the importance of the burials: the deeper the shaft and the more work expended on the tomb, the more important its occupants. It now seems quite clear, however, that the builders of the tombs simply dug down until they reached this stratum, and far enough into it so that there would be a few feet of the material above the chamber. If there is more than one chamber, generally they follow the slope of the stratum in such a way that there is about the same amount of tepetate above the ceiling of each. Tepetate is pretty much an all-purpose term in Mexico, applied - depending on the area - to compact strata of various kinds of material. The shaft-tomb area of West Mexico follows the transverse volcanic axis from southern Nayarit through west-central Jalisco and into Colima, and here tepetate is identified at least loosely as a water-deposited volcanic tuff. (Shaft tombs are unknown elsewhere in Mexico, and are probably the result of water-borne diffusion from northern South America, where they are abundant in northern Colombia and Ecuador - and where even less is known about them.) I don't know the exact geological terms, but the material I've seen identified as tepetate appears to be a conglomerate - small stones cemented together with a material which resembles coarse concrete. It breaks quite readily upon a sharp blow with a hammer, which of course makes it seem fairly logical as a matrix of chambers which were being dug with stone tools. Recently, however, I've heard that an archaeologist has expressed the opinion (though not yet inprint) that the tepetate of the shaft-tomb area is a rhyolitic material. I don't know the basis for his opinion, but you might ask him about it if you're interested: Dr. Joseph Mountjoy, Department of Sociology and Anthropology, University of North Carolina, Greensboro. It would be depressing to find that we've all just been repeating some original mistake in identification, but it could be so.

I think we can provide the samples of soil and tepetate, but I believe that at least the soil sample will have to pass through the hands of the U.S. Department of Agriculture before it reaches you. If you can find out where I have to send it and what paperwork has to be done, I'll get started on it. There's an open looted tomb in the cemetery of a little town near here - quite shallow and conveniently equipped with a ladder - and it will be easy to get samples there. However, it might not be wise to assume too confidently that the material is exactly the same as where you'll be working, so we'll try to find some hardy soul in the Etzatlán basin who is willing to descend again into his handiwork, and get samples there too.

With regard to publications, they're few and far between, mainly because archaeologists have never been able to get a grip on the area. In fact, I've included all this detail simply because there's so little in print. I'm enclosing a list of the few items which might be helpful here. Stan Long's dissertation is the most useful, for he worked in the looted tombs around the basin - trying to make a cultural reconstruction and also salvaging material for dating. (Stan would have been the best source of first-hand information, but he died a few years after completing this work.) I have a copy of the dissertation, and I'll send you his sketch maps but set aside the relevant parts of the text for you to read after you arrive, because the local copying machine charges the equivalent of 40 ¢ a page. Peter Furst's dissertation is largely a cultural interpretation of shaft-tomb material, but it includes the information on the southern Nayarit area which I mentioned earlier. In addition, I wrote the section on the archaeology of Nayarit, Jalisco, and Colima for Volume 10 of the Handbook of Middle American Indians, but it won't be in print for several months, so I'll send you copies of manuscript pages which might be helpful. I don't know of any photographs of the Etzatlán area or of looted tombs, but we'll take some when we go back within the next few weeks. Most of the Carbon 14 dates on the shaft tombs are falling within the first two centuries A.D., and some of the publications on the list will provide details about the kind of material tested, and so on.

With regard to purely practical matters, the nearest place you can stay is the town of Etzatlán, about five miles - mainly by a bumpy dirt road - from where you'll be working. Etzatlán is the main town in the municipio, but still just a small Mexican town with whatever that means in the way of accomodations. We'll look them over, pick out the most presentable, and make arrangements for you. There'll be electricity there, but if there seems to be any conceivable doubt about the matter, we'll try to round up a generator. All this means, of course, that you'll need a vehicle, which we'll provide. If we can't get a jeep for you, you can take our GMC carry-all. It has four-wheel drive and a four-speed transmission, and it's inelegant but useful. The weather in January should be warm and sunny, with nights going down to about 50 degrees. This doesn't seem very cold, but small Mexican hotels never have central heating, so you may have to ask for an extra blanket or else bring a heavy coat or something that you can throw over the bed at might. About the worst insect pest in Mexico is the garapata - you may have met it already - which is a small tick-like creature. I don't know if they're found around Etzatlán, and we'll ask, but there are apt to be a few wherever there's any brush at all. Apart from this possibility, there shouldn't be any great bug problem in the dry season. With regard to help, that can no doubt be obtained quite easily. There are several little settlements scattered around the basin, and we'll inquire in the one in which we're already acquainted and see what we can line up in advance.

Unless you have a particular reason for coming via Mexico City, you can come direct to Guadalajara by way of a connection at San Antonio. I think the Mexico City - Guadalajara connection usually involves an overnight stop in Mexico City, with all that means in the way of inconvenience. With reagrd to getting your things through Customs - this is a period of great uproar in INAH, because the heads of all the departments and even the director of

INAH itself will change in about a month, when the new president of Mexico takes office. I know most of the present archaeological officials, but I don't yet know who'll be replacing them, and it will be impossible to arrange for any official representation until after the new people take over. All in all, in view of the situation in Mexico City, it might be better and easier for you to come direct to Guadalajara if you can. I've talked to the people in the Instituto Jalisciense de Antropología e Historia (an agency of the state government), and they'll be glad to help officially with Customs here. Why don't you send me a copy of your lists, so that I'll have them however it turns out?

A few weeks ago I wrote to INAH to ask about an official letter covering this work, and Arqueólogo Matos (who has been practically running Monumentos Prehispánicos for the past few years) replied that the present officials are unable to grant permits for work which won't be done until after the new people have taken over. The tests have been discussed with INAH since early this year, however, and I've been assured informally that there will be no problem about permission. It will just be a matter of close timing, given the period of confusion which follows the change-over in office, plus the long Christmas vacation during which very little gets done. I'd like to ask what's contemplated in the way of excavations, because I'll need to tell INAH. I don't quite know whether you mean excavations in the archaeological sense, or simply to obtain soil or rock samples. In either case, I should be present when any digging is done, inasmuch as the permit will be in my name. My husband and I will spend at least four days each week - Friday through Monday - in Etzatlán, and I can stay over in between whenever the progress of the work seems to make this advisable.

By the way, what expenses are being covered by the Applied Science Center? I dislike asking questions about money, but no doubt it's better to get things clear at the start and prevent later embarrassment. A friend in Guadalajara who saw Dr. Rainey at a recent meeting seems to expect him here in January in connection with this work. Is this so, or was there just a breakdown in communications somewhere? Our friend speaks passable English, but I have the impression that he may have got things a little garbled.

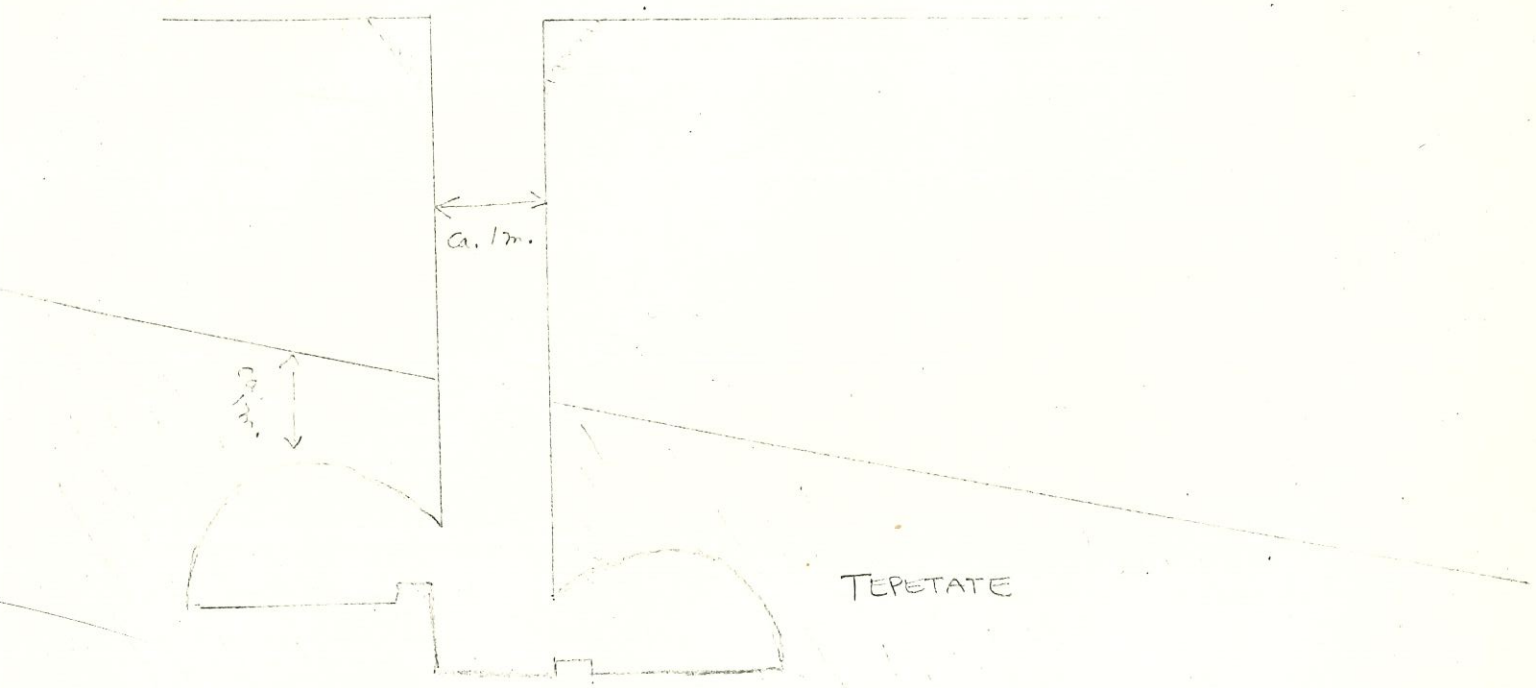
This letter is much longer than I intended at the start, and very likely I've given you more than you need to know - but I hope I've also managed to include the information that you do want. If not, I'll try to provide it. Whichever way your arrival plans turn out, we'll pick you up at the Guadalajara airport - January 7 is fine - and we're looking forward to meeting you and Mr. Bevan.

Sincerely,

Betty Bell

Betty Bell

I hope you won't be offended if I say that being addressed as Mrs. Bell creates an embarrassing problem for me, because this is a previous married name. I got my Ph.D. in the name of Betty Bell, and saw no reason to change my professional name when later I remarried. If I'm addressing you incorrectly, please tell me.



As far as anyone can tell, there's always about a meter or so of tepetate above the chambers; the depth of the shaft is simply a result of the depth at which the stratum lies. The shafts are filled with dirt and small stones. It's sometimes said that the top of the shaft can be detected on the surface by a shallow circular depression - but I think if it were really that simple, some archaeologist would have been able to find an unlooted tomb long since.

References - such as they are

Corona Núñez, José

1954 Diferentes tipos de tumbas prehispánicas en Nayarit. Yan 3:46-50. Instituto Nacional de Antropología e Historia, 6a Epoca, Volumen 4. México.

1955 Tumba de El Arenal, Etzatlán. Jalisco. Informes No. 3, Dirección de Monumentos Prehispánicos, INAH, México. [This has a highly schematized drawing of a three-chambered tomb in the Etzatlán basin.]

Covarrubias, Miguel

1957 Indian art of Mexico and Central America. Alfred A. Knopf, New York. [Pretty much the same drawing of the same tomb, plus a little assorted information, but the reference is easier to obtain.]

Disselhoff, H. D.

1932 Note sur le résultat de quelques fouilles archéologiques faites a Colima (Mexique). Revista del Instituto de Etnología de la Universidad Nacional de Tucumán. Tucumán, Argentina. (25º Congreso Internacional de Americanistas) [This illustrates some types of shaft tombs in Colima, but it's very hard to obtain.]

Furst, Peter T.

1965 Radiocarbon dates from a tomb in Mexico. Science 147, 3658: 612-613. [This is a tomb in the Etzatlán basin.]

1965 West Mexico, the Caribbean, and northern South America: some problems in New World interrelationships. Antropológica 14: 1-37. Instituto Caribe de Antropología y Sociología de la Fundación La Salle, Caracas, Venezuela. [Rather small amount of general information.]

1966 Shaft tombs, shell trumpets, and shamanism: a culture-historical approach to problems in West Mexican archaeology. Ph.D. dissertation, UCLA. [Some information about shaft tombs in southern Nayarit.]

1967 Tumbas de tiro y cámara: un posible eslabón entre México y los Andes. Eco 26: 1-6. Instituto Jalisciense de Antropología e Historia, Guadalajara. [Evidence for possible contact.]

Long, Stanley V.

1965 Shaft-tombs and hollow figurines from the Magdalena Lake Basin of Jalisco, Mexico. Ph.D. dissertation, UCLA. [Probably the most useful reference.]

1967 Form and distribution od shaft-and-chamber tombs. Revista de la Universidad de los Andes, No. 1. Bogotá. [I have this reference.]

Long, Stanley V. and R. E. Taylor

1966 Chronology of a West Mexican shaft tomb. Nature 212, 5062: 651-652. [Largely with regard to C14 dates.]

1966 Suggested revision for West Mexican archaeological sequences. Science 154, 3755: 1456-1459. [C14 dates for the shaft tombs placed in a chronological framework with other West Mexican dates.]

Entirely on C14 dates, and more technical

Berger, Rainer, G. J. Fergusson, and W. F. Libby

1965 UCLA Radiocarbon dates IV. Radiocarbon 7: 336-371

Berger, Rainer, and W. F. Libby
1966 UCLA Radiocarbon dates V. Radiocarbon 8: 467-497.

1967 UCLA Radiocarbon dates VI. Radiocarbon 9: [I have the page reference somewhere.]

Berger, Rainer, R. E. Taylor, and W. F. Libby
1966 Radiocarbon content of marine shells from the California and Mexican West coast. Science 153, 3738: 864-866. [Basis for the revision of West Mexican C14 dates.]

Deevey, Edward S., Richard Flint, and Irving Rouse, eds.
1963 Radiocarbon. The American Journal of Science: 1-349.

Fergusson, G. J., and W. F. Libby
1963 UCLA Radiocarbon dates II. Radiocarbon 5: 1-22.

I have all the issues of Radiocarbon listed, plus two or three others which include UCLA C14 dates on the shaft tombs.

November 12, 1970

Dr. Betty Bell
Apartado 84
Ajijic, Jalisco
Mexico

Dear Dr. Bell:

Thank you very much for your letter of October 30 with all of the helpful information.

I have borrowed four "Import Authorizations" from our Department of Geology, but please send the samples (addressed to me) to the University Museum. If you can send a sample each of soil, tepetate, and the small stones found in the tepetate, that would be fine. I think that 100 grams of each would be enough. If it is easier for you to send them collect, that is O. K.

I have just checked with a travel agent about flights to Guadalajara, and we can take the same "locals," stopping at Atlanta and San Antonio en route and arrive in Guadalajara at 5:20 p. m. on January 7. Or, we can fly direct from New York City to Guadalajara, arriving at 12:40 a. m. on January 7. This latter (not a daily flight) is a bit early in the morning (or late at night) so that I imagine that you would prefer that we take the former, but please let me know.

I have enclosed four copies of the lists of equipment which we plan to bring. There may be a few slight changes between now and January.

After I wrote to you on October 15, Dr. Rainey went to California, and there he happened to talk to the friend you mentioned (Sarazano?), possibly to others. At any rate, Dr. Rainey became interested in your project and in the site. Therefore, he plans to come too, probably for the first few days or so. He and a friend, Sam Carpenter, will be flying down in Carpenter's private plane. They hope that it will be possible to do some aerial photography over the site.

Our Museum plans to cover the expenses of Dr. Rainey, Bruce Bevan, and myself (plus the two workmen, if absolutely necessary). Dr. Rainey assumes that the excavations are entirely your responsibility. However, he is quite insistent that some tests be carried out if we find some promising anomalies with the magnetometer.

I hope that these arrangements are O. K. with you. I am sorry that I cannot be more specific about Dr. Rainey's plans, but no doubt the details will sort themselves out.

Sincerely yours,

Elizabeth K. Ralph

EKR/c
Encs.

December 2, 1970

Miss Elizabeth K. Ralph
Applied Science Center for Archaeology
University Museum
33rd and Spruce Streets
Philadelphia, Pennsylvania

Dear Miss Ralph:

The samples went off to you by air, and I hope they arrived safely. And I just discovered, to my great dismay, that I told you the Etzatlán basin was east of Guadalajara, when it's 60 miles west. I don't know why I did this, except that last winter I was working northeast of Guadalajara, and I must have got used to pointing my nose in that direction when writing about archaeology. My most sincere apologies.

I'm enclosing a rough diagram of the location of the samples, which come from a three-chambered tomb and the area around it. This is the general area known as El Arenal, about two miles from the little settlement of Sta. Rosalía and roughly eight miles almost due north of the town of Etzatlán. (I've got the direction right this time.) The area of the tombs consists of a small, low ridge which is thickly covered with shafts - most of them now re-filled because of the danger to cattle and to wandering pedestrians on dark nights. (And also, I suspect, because of wandering curiosity-seekers.) Not all of these re-filled holes were actually tomb shafts, however, so the pot-hunters themselves don't have a perfect score.

There are two three-chambered tombs at El Arenal, both still open, which - so the pot-hunters assert - have all three chambers on the same level. The depths are said to be about 13 and 17 meters. There are several two-chambered tombs, and a good many small, one-chambered tombs. These notes and comments come from pot-hunters who admittedly dug the area, and I think they're probably pretty accurate because there would be no reason for lying to us.

The tomb from which the samples came is said to be 17 meters deep, and this seems to be a pretty accurate measurement. The sides of the shaft have washed down, and there is now about two meters of debris in the bottom, sealing the entrances to the chambers. The pot-hunter who went down into the shaft for the samples reported to us that it would take a long time to haul all the stuff up in buckets, so he dug down in it until he was sure he was getting material from around the area of the chambers. This is sample no. 3, which looks to my untrained eye rather like decomposed sandstone. The plan was to take samples at five-meter intervals in the shaft, and no. 2, which appears to be the same material, is from five meters above the debris (about seven meters above the bottom of the shaft). Another sample, the missing no. 1, was taken another five meters above, but the bag fell back down the shaft in the process of extracting the collector on his half-inch rope, and I didn't have the heart to send him back to the bottom for it. (The 13-meter three-chambered tomb was in even worse condition for getting into.) No. 5 contains material from back-dirt piles around the 13-meter shaft, said to come from within the tomb chambers; it contains numerous fragments of bone, so this is probably correct. No. 6 is a rather random assortment of small stones from the surface; no. 7 is surface soil from near the 17-meter shaft, but far enough away to be certain that it isn't back-dirt.

I don't know whether this says anything about the geology of the area, but there is a fairish amount of mining for opals (and also kaolin). These aren't the usual and familiar variety, but the so-called Mexican opals - clear and shot through with various colors, instead of opaque. I have a jar full of them in chunks of the matrix. As far as I know, there's no mining of metals nearby, though I believe there is some about 20 miles to the south.

I've been told that the local office of the Secretaría de Recursos Hidráulicos has some good large-scale maps of the area, and I'm trying to find out if it's possible to have them reproduced. The Guadalajara office of the Plan Lerma, a federal regional-development agency, has excellent aerial-photographic coverage of the entire region, Photo copies of the mosaics are very difficult and costly to obtain here, but they're readily available for study in Lerma's headquarters. I also have a large outline map of West Mexico with a grid which gives the code numbers of the aerial-photographic coverage available in Mexico City (this was part of a Mexican Army project to map the entire country by air). If you want photographs for study later, we can pick out the numbers and I can arrange to order them through INAH.

My husband talked to several people in INAH when he was in Mexico City last week, and he reported that there was a thick fog of uncertainty regarding the change of personnel, so I think it would be better to come directly to Guadalajara. An early-morning arrival wouldn't be any problem for us, but I'm afraid I'd better condemn you to the milk-run and an afternoon arrival because of getting someone to help with Customs. I've discussed the matter of Customs with the people in the Instituto Jalisciense de Antropología e Historia, and they assure me there will be no problem about getting official assistance. IJAH is both the state archaeological agency and a branch of INAH, but its personnel won't change in the current game of musical chairs. I'll also send a copy of your equipment list to Matos in Mexico City, so that INAH can have a copy for its own files. If you know in advance that Dr. Rainey and Mr. Carpenter are going to bring certain items with them, it might help to let me know in advance too, so that we can arrange a separate Customs clearance for them. By the way, it would be well to bring along any film that you'll need, because it's very expensive here. Polaroid in particular - either black-and-white or color - is fantastically high.

I'm enclosing the map and some tomb diagrams from Stan Long's dissertation, and I'm also getting copies made of some pages from my Handbook article which I'll send in the next day or so. I think Stan's diagrams are no doubt accurate, because he went down into the looted tombs himself. The enclosed Polaroid photographs are lousy, because my husband was so used to taking color Polaroid that he processed these too long, but they may give you an idea of the setting. If I find in the next few days that it's possible to get the Recursos Hidraúlicos maps reproduced quickly, I'll send them; if not, I'll have them here when you arrive. For some reason, good large-scale maps are scarce here, and these are the only good ones I've been able to get track of. Geográfico Militar in Mexico City has some good maps, but they're virtually impossible to get because they too were part of an Army mapping project and are listed as "classified" - even though they're just ordinary good maps. (I have no idea why they're harder to get than the air photos.)

When we were back in Etzatlán recently, we talked again to the municipio officials, who seem to be very enthusiastic about the work - if only to prove to the federal authorities that there really is some legitimate archaeological work in their area. They say that they can put a vehicle at your disposal, but we'll have enough back-up possibilities to make certain that you do have one. The local accomodations look no more like the Hilton than they did before, but we'll pick out the best of what there is. We've tentatively arranged for two workmen, whose wages I'll pay.

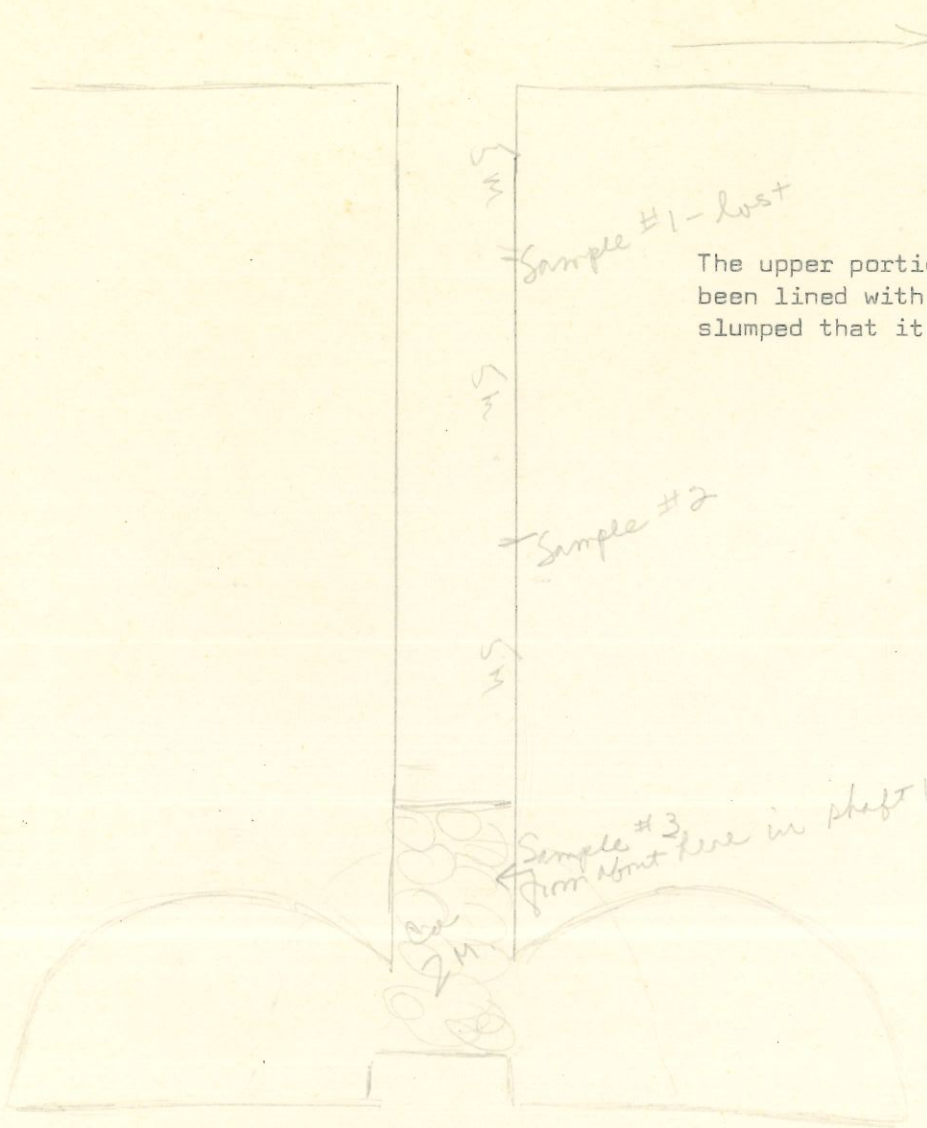
I can't think of any other odds and ends at the moment, but no doubt I will soon. We're looking forward to your arrival, and we've got our fingers crossed for the success of the tests.

Best regards -

Betty Bell

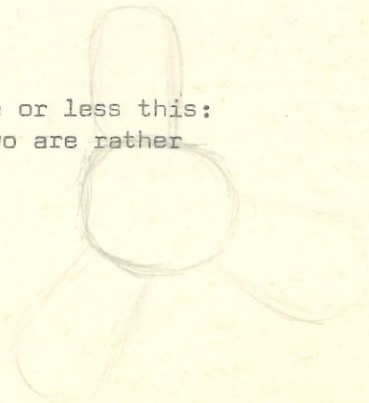
Betty Bell

Obviously not drawn to scale.



The upper portion of the shaft appeared to have been lined with small stones, but so much has slumped that it's impossible to be certain.

The ground plan is supposed to be more or less this: the chambers aren't equidistant, but two are rather closer together.



December 9, 1970

Dr. Betty Bell
Apartado 84
Ajijic, Jalisco, Mexico

Dear Dr. Bell:

Thank you for your letter of December 2nd and all of the helpful information. The samples have arrived in Philadelphia, and hopefully our broker will have them out of customs in a day or two. Probably, we shall test them over the weekend.

It would be helpful to have some large scale maps of the area if you are able to obtain them without too much trouble.

Bruce Bevan and I are now planning to arrive in Guadalajara at 5:20 P.M. on January 7th on Mexicana Airlines from San Antonio. However, Dr. Rainey, Mr. Sam Carpenter, and a co-pilot are planning to arrive in Carpenter's private plane on the same day, and they shall be bringing our equipment. Dr. Rainey or I will send you their flight plan as soon as it is known. In case we do not arrive at the same time, it would be best for you to meet them and help the magnetometers through the customs. Bruce and I can take a taxi or bus since we shall have only personal possessions.

May I trouble you too to make hotel reservations for the five of us - five separate rooms - at any hotel that is convenient for you? Please send me the name of the hotel.

Another question: Is there an airfield closer to the site where a small plane can land? If so, what is it called?

At the moment, Rainey and Carpenter plan to travel with us by land on January 8th to look at the site on foot, then they would like to return to Guadalajara or a closer airport and fly over the site for an aerial view and to take a few photographs.

Sorry to bother you again with so many questions.

With best regards,

Beth Ralph

EKR:sm

Applied Science Center for Archaeology

THE UNIVERSITY MUSEUM • UNIVERSITY OF PENNSYLVANIA
33rd & SPRUCE STREETS • PHILADELPHIA 4, PENNSYLVANIA
Froelich Rainey, Director EVergreen 6-7400 (Area code 215)
Elizabeth K. Ralph, Associate Director
~~EVergreen 6-0100 Exth~~ 8168 (Area code 215)
Cable Address "Antique"

December 15, 1970

Dr. Betty Bell
Apartado 84
Ajijic, Jalisco, Mexico

Dear Dr. Bell:

Things seem to change here a little every day. I hope that you received my letter of December 9th. If not, it has probably been delayed by the railroad strike.

The samples arrived safely and we hope to measure them this week. Thank you too for your good descriptions of them. Dr. Rainey, Sam Carpenter, and copilot now have to following flight plan:

Jan. 6. lv. Wilmington, Dela. and fly to Redenberg, Alabama
Jan. 7. Redenberg to Guadalajaro (6-1/2 hours flying time plus fuel stops). Arrival - about 5:00 P.M.

On commercial airlines, Bruce and I will fly to San Antonio, Texas on January 6th. We have some business to do there on the morning of the 7th, and then will arrive in Guadalajaro at 5:20 P.M.

Dr. Rainey will bring the equipment with the possible exception of the batteries. We have to do some tests on the batteries in a vacuum to find out if they will hold up in a non-pressurized plane.

We are looking forward to seeing you.

With best regards,

Beth Ralph

Beth Ralph

EKR:sm

P.S. I tested the rocks, etc. this morning. The rocks are very magnetic. The soil and tepetate are not. The latter consists of sand — mostly quartz.
If the rocks are scattered all over the surface, it does not look too promising for the magnetometer, but we shall come anyway.

United 39-67-99
Sent 2/9/71

BISON
INSTRUMENTS
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January 4, 1971

Dr. Elizabeth K. Ralph
MUSEUM APPLIED SCIENCE CENTER FOR ARCHAEOLOGY
33rd & Spruce Streets
UNIVERSITY OF PENNSYLVANIA
Philadelphia, Pennsylvania 19104

Dear Dr. Ralph:

Over the Holidays I shortstopped your letter of December 23, 1970 to Kathy Karkula, so that I could send my thanks to you for sending on the MASCA Newsletter. I certainly do hope that the newsletter will prove to be valuable as a form of advertising.

We would be very happy to loan you both a Model 2350 and a seismograph. We are certainly very curious about the application of our instrumentation to archaeological investigation. We feel that the use that you and your associates would put it to would give us a sort of field test that we desire.

Please give us sufficient time to plan the release of this equipment for your use. A minimum of thirty days would be desirable.

Again, many thanks for your kindness.

Cordially,

Axel M. Fritz, Jr.
President

AMF:jmo

Knob
Handle screws
plate - away

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P R E S I D E N C I A M U N I C I P A L .

Etzatlán, Jal., Enero 9 de 1971.

Of. No. 24
EXP: XVI/971.

ASUNTO :- Recomendando Arquéologos.

C. PDTE! DEL COMISARIADO EJIDAL
DELEGADO MUNICIPAL
Santa Rosalía, Mpio. Etzatlán, Jal.

C. ADMINISTRADOR HACIENDA
San Sebastián, Mpio. Etzatlán, Jal.

Tengo el honor de dirigirme a usted para presentar a sus finas atenciones a los portadores del presente que forman un Grupo de Arquéologos procedentes de Estados Unidos de Norteamérica,- quienes vienen autorizados por el Departamento de Arqueología, para hacer estudios de investigación al respecto, bastante le agradezco tenga a bién el brindarle toda clase de atenciones, orientaciones y en su caso garantías para el buen desempeño de su misión.

Por anticipado doy a usted las más expresivas gracias rogándole recibir mi atenta consideración.

Atentamente
SUFRAGIO EFECTIVO. NO REELECCION
El, Presidente Municipal

Agustín Pérez Meza

Roberto López Santiago Sric

Petty
GEOPHYSICAL ENGINEERING COMPANY

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512-226-5131 CABLE:PETTYCO. TELEX: 076-7417

"Progress Through Excellence Since 1925"

January 28, 1971

Mr. Axel M. Fritz
Bison Instruments, Inc.
3401-48th Avenue North
Minneapolis, Minnesota 55429

Dear Mr. Fritz:

Thanks very much for the opportunity of using your model 1570A Signal Enhancement Seismic System.

The system performed admirably during the five days that I was able to use it in Mexico, and I left it with Dr. Ralph for any future tests which she might want to conduct.

Before leaving San Antonio, we were able to make suitable adaptations with a filter which we had available so that we could also investigate the possibilities of the reflection method. Unfortunately, the terrain conditions were not adaptable to this method; but I still feel that this instrument (or the Model 1570B) should provide useful reflection information under more favorable conditions.

The signal enhancement feature is most effective and you are to be complimented on the engineering excellence of the unit we used.

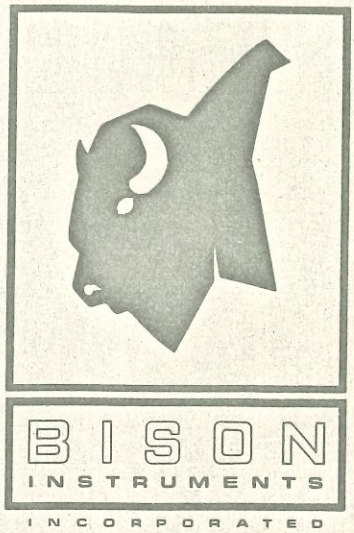
Very truly yours,

W. Harry Mayne

W. Harry Mayne
Vice President
Technical Services

WHM:bjp

cc: Dr. Elizabeth Ralph



February 10, 1971

Mr. W. Harry Mayne, Vice President
Technical Services
PETTY GEOPHYSICAL ENGINEERING COMPANY
P. O. Drawer 2061
San Antonio, Texas 78206

Dear Mr. Mayne:

Thank you for your letter of January 28, 1971. We would like to see you come up with the application of our instrumentation to commom depth point shooting, perhaps the Pre-Columbian sites.

I am not sure that we mentioned this before, but our 1570B Signal Enhancement Seismograph has substantially more resolution than does the 1570A. The 1570A and the 1570B are identical with respect to principles of operation. Both provide the signal enhancement feature to yield all of the advantages we talked about in our brochure. The critical difference lies in the greatly improved waveform resolution on the 1570B. The number of digital time samples along the waveform has been increased from 96 on the 1570A to 256 on the 1570B, with a corresponding increase in the precision with which travel times can be rendered. The number of digital samples along the vertical axis has been increased from 16 to 256. The seismic waveform, with the 1570B, now appears on the display as a nearly perfect continuous signal and (we feel) a faithful reproduction of the seismic wave. The vertical steps that you saw on the waveforms in the 1570A CRT are no longer present.

We also plugged in several operational improvements. We eliminated the reset button which prepared the 1570A for receiving the next seismic signal during the enhancement process. We now have automatic reset. The summation of successive impacts can now be accomplished as rapidly as the impacts can be repeated. The sweep speeds on the 1570B are 25, 50, 100, 250 and 500 milliseconds.

We also have a larger version of our signal enhancement seismograph that has a memory of 1,026 by 1,026, plus some manipulation that allows us to pick any part of the waveform and center it in the CRT, and then gives us a chance to amplify it vertically five times and horizontally ten times. It also has a delay time from 0 to 9.99 seconds, so that we can have more hope of doing reflection work on shallow depths. We finally managed to prove to ourselves (we have always felt that it was capable of doing reflection work) that reflections were possible and have come up with one true reflection record which proved out after

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running it through the computer. We did a lot of work in the field last summer, and are only 20% through our records to date, one of the disadvantages of being a very small company.

We do appreciate very much your kind comments. I hope we have a chance to meet in the future.

Most cordially,

Axel M. Fritz, Jr.
President

AMF:jmo

February 23, 1971

Mr. Hugh R. Sharp
9140 DuPont Building
Wilmington, Delaware 19898

Dear Mr. Sharp:

Please excuse our delay in sending you prints of some of the aerial photographs taken over Lake Magdalena. They are enclosed with a list of tentative identifications.

We had hoped to have our report ready to send too, but it probably will not be completed for another week or so. In this, we have summarized what we did this winter, and have inclined a few suggestions for work there in the semi-wet season. I hope that we can have another joint expedition there about mid-September.

With best regards,

Elizabeth K. Ralph

EKR/ek

February 23, 1971

Mr. W. Sam Carpenter III
1060 DuPont Building
Wilmington, Delaware 19898

Dear Mr. Carpenter:

Please excuse our delay in sending you prints of some of the aerial photographs taken over Lake Magdalena. They are enclosed with a list of tentative identifications.

We had hoped to have our report ready to send too, but it probably will not be completed for another week or so. In this, we have summarized what we did this winter, and have included a few suggestions for work there in the semi-wet season. I hope that we can have another joint expedition there about mid-September.

With best regards,

Elizabeth K. Ralph

EKR/ek

February 25, 1971

Dr. Betty Bell
Apartado 84
Ajijic, Jalisco
Mexico

Dear Betty,

Perhaps, you are wondering if all of us in Philadelphia have disappeared. Fro is in Europe so your good letter to him is sitting on my desk until he returns about March 9th.

Bruce and I keep getting interrupted in putting the report together. We seem to have included 40 photos and figures and it is taking time to redraw some of the latter, have the large ones photographed, etc. Also, Bruce has not quite finished the geological section. Can we trouble you for two photographs, preferably with negatives? We do not have black and whites of the Precision Cesium magnetometer (the one that Ramon carried plus Andreas with sensor) in action and one of the seismograph in action, preferably with Harry Mayne. For laughs, we could include the one of you and me looking at the grids, if you would like that. If so, please send that negative too. At any rate, we shall not hold up the report for these missing pieces, and hope to send it not later than next week. We have included 10 of the best aerial shots.

About our wealthy friends, Sam's address is as follows:

W. Sam Carpenter III
1060 DuPont Building
Wilmington, Delaware 19898.

I thought it best not to mention money-matters to them until Fro returns.

I, too, am missing our happy and warm days together in the field, but hope that there will be more in September.

With best regards,

Beth Ralph

EKR:sk

March 10, 1971

Mr. Axel M. Fritz, President
Bison Instruments, Inc.
3401 48th Avenue North
Minneapolis, Minnesota 55429

Dear Mr. Fritz:

Thank you very much for the loan of one of your Model 1570 A Signal Enhancement Seismographs. As Harry Mayne has already written, we were very pleased with its performance, and regret only that the sites were not more appropriate for its use. However, we did have enough practice with it to learn to appreciate how much more satisfactory it is to use than other seismographs with which we have experimented in the past. We are now eager to try out your Model 1570 B.

I hope that you received the unit in reasonably good condition. We had to replace the on-off knob screws with larger ones, and we removed the handle in order to pack it into a suitcase to bring it out of Mexico. The "one-way" screws defeated us in replacing this. Also, we discarded the aluminum plate since it was pretty much battered.

We use a good many battery-powered instruments, mostly magnetometers, and we always feel happier if there is some external indication of the condition of the batteries. Are you thinking of including this in your new models?

I have enclosed a copy of our Mexican report. A few figures are missing. We shall send them as soon as they are ready.

Sincerely yours,

Elizabeth K. Ralph

EKR/jc
Enc.

March 10, 1971

Mr. W. Harry Mayne, Vice President
Petty Geophysical Engineering Company
P.O. Drawer 2061
San Antonio, Texas 78206

Dear Harry:

Somehow or other a month has elapsed since we left Mexico, but, at last, we have most of our report assembled. It is enclosed except for two missing figures.

We do appreciate your bringing the Bison seismograph and showing us how to use it. Probably, we could have done more clever experiments at Santa Gertrudis if you had still been with us. I hope that you can join us again in the "wet" season.

With best reggrds,

Elizabeth K. Ralph

EKR/jc

Enc.

BISON
INSTRUMENTS
INCORPORATED

March 16, 1971

Elizabeth K. Ralph, Associate Director
MUSEUM APPLIED SCIENCE CENTER FOR ARCHAEOLOGY
The University Museum
University of Pennsylvania
33rd & Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Dr. Ralph:

Thank you for your letter of March 10, 1971. Also, many thanks for your kind comments on the equipment. We do feel it's a substantial contribution to the field of shallow exploration seismology, and, "yes", we do have substantial updating of the signal enhancement seismograph in our Model 1570B. In the "B" version we do have a battery indicator along with a memory that is 256 bits by 256, versus the old "A" memory of 100 by 16.

We will have a display up at the Northeastern Section of the Geological Society of America Meeting coming up at the end of this week in Hartford, at the Hartford Hilton. If you are around in that area, please look us up. I would like very much to have the opportunity to meet you and to discuss some of the work that you've been doing.

Thank you again for the nice comments on our equipment and the very complete report from your work in Jalisco.

Most cordially,

Axel M. Fritz, Jr.
President

AMF:jmo

$ 400/mo

Model 1570

~~612-588-9471~~ 612-926-1846

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× Now that I look at it again, I see that she omitted everything except the name.

March 16, 1971

Dear Beth:

I'm sorry to have taken so long to answer, but apparently the postal system has been having another tantrum. (Like two weeks to get a letter just from Laredo.)

I'm enclosing the prints and negatives, and also a copy of an interview into which I managed to insert the Center's name. The little girl who did the interview didn't get the thing exactly straight, but at least she managed to get the Center's name right. It's more than I expected; almost her first question was, "When you go out to dig, do you find things?" Not always, dear, not always.

The only photographs of the whole apparatus in action are middle- to long-distance shots, so I'm also including a picture of Ramón carrying the magnetometer and one of Andrés carrying the sensor. There are two negatives of Harry Mayne with the seismograph but I can't find any prints, and I have a vague recollection that someone took them for something or other.

When copies of the report are available, I'd like very much to have one. I'll need information about the instruments before I give a brief report at the SAA meeting in early May, and for the moment I'm postponing my report to INAH until I can put in exact information about what was used in the tests. I'll also need information about the rocks and the composition of the soil and tepetate - do I hound you or Bruce for that?

The weather has been very warm for the past couple of weeks - it's fiery in Guadalajara - and Pablo says it'll stay this way until the rains start in early June. Our guest house is finally getting almost habitable, but right now it's hung up waiting for the village plumber to finish his work in the bathroom and the bar. I gave him the advance he asked for last Saturday, and he's been "sick" ever since. Ah, Mexico. Anyhow, our semi-permanent work on the poor little casita will soon be done, and you're most welcome to use it whenever you come back.

How are the tacos in Philadelphia? I haven't had any since we got back from Etzatlán, and I find that I'm getting hungry for them. Some weekend before the rains start, Bill and I plan to go back to Sta. Rosalía and dig up our two cheerful bandits and some horses, and go up to that place in the cerro that has the white stone and the tomb cut into rock. Phil Weigand at Stony Brook is supposed to send me some site-location maps of the area as soon as he has them ready, and I hope they arrive before we see Andrés and Ramón again. They might provide a good basis on which to fish for more information. Anyhow, I'll let you know what happens. And let me know what develops on your end of the line with regard to any further work.

I've got to make a few notes with which to spell-bind this Thursday night, so I'd better get at it. This week I'll be talking about the Olmec, among others, and I'll be sure to mention what a lovely place San Lorenzo is.

Hope we'll see you again soon -

Patty

Best to Fro - and tell Bruce that his figurines finally materialized and I'll write to him about sending them.

March 31, 1971

Dr. Betty Bell
Apartado 84
Ajijic, Jalisco
Mexico

Dear Betty,

Many thanks for your letter and the newspaper report of your lecture -- sounded great! The photographs which you sent are just what we wanted, so we have included two for each instrument in our report. Your copies and the negatives have been mailed to you.

Also, about two weeks ago, we sent you four copies of our report (in two separate packages) -- hope that they have reached you by now. Dr. Bernal was here last week, and we gave him a copy of the report. I did not have a chance to talk to him except in a big reception line, but I suspect that Fro mentioned the bulldoser idea to him. I hope that you do not mind. Bulldosers and drag-line shovels seem to appeal to Fro. Harry Mayne was also here last week for a short visit.

At the formal dinner for Dr. Bernal, we had one taco each as an appetizer, which, of course, made me hungry. In the meantime, I have found packaged tacos (shells) in my local market, and have been experimenting to find the best filling for them. I must return to Etzatlán to consult the signora. Our return, if wanted, is more or less scheduled for mid-September.

We are still waiting for the daffodils and leaves to appear here, but it is beginning to feel like spring.

With best regards,

Elizabeth K. Ralph

EKR/jc

P.S. Have enclosed photo and information about Attex and Scrambler. Please let me know if they will all fit into your truck.

27-X-71

Dear Fro:-

I doubt this will arrive while Bernal is still there. I got him on the phone last night, and he didn't seem to think it necessary to make a special effort to get it to him before he leaves.

Betty will be back a week from today, and we'll be in touch soon thereafter.

Best regards

Bill

sociedad de estudios avanzados del occidente de méxico, a.c.

apartado postal 1-4035 **guadalajara, jalisco**

Ralph
ASCA

[B O R R A D O R sujeto a cambios tanto de fondo como de estilo por los investigadores principales, y a la revisión del Consejo Ejecutivo de la Sociedad de Estudios Avanzados]

26 de octubre de 1971

SOLICITUD DE AUTORIZACION DEL
INSTITUTO NACIONAL DE ANTROPOLOGIA E HISTORIA
PARA LA REALIZACION DE INVESTIGACIONES ARQUEOLOGICAS
EN EL ESTADO DE JALISCO Y POSIBLEMENTE EN LOS ESTADOS DE COLIMA Y NAYARIT
DURANTE EL PERIODO DEL DIA 15 DE FEBRERO AL 15 DE ABRIL DE 1972

(CONTINUACION DE LOS ESTUDIOS INICIADOS EN ENERO DE 1971
BAJO LA AUTORIZACION DEL I.N.A.H. EN SU OFICIO NO. 401-7,
B/311/42(B)/2-13 DEL 5 DE ENERO DE 1971)

Naturaleza de los trabajos:

El trabajo aquí propuesto es la continuación de las investigaciones iniciadas en la Cuenca de Magdalena en el mes de enero de 1971. En términos generales, se trata de la prueba de instrumentos científicos, entre ellos el magnetómetro de cesio, para la localización de restos arqueológicos en el Occidente de México, y muy especialmente el tipo de tumba denominada "de tiro y bóveda" que suele ocurrir en algunas partes de esta región. En los trabajos realizados en 1971, cuyos resultados han sido reportados en detalle en el informe cuyo recibo fue acusado en el oficio número 407-7-1 B/311.42(B)/2-13 del I.N.A.H., se encontró que el fuerte magnetismo de algunos de los materiales geológicos de los sitios estudiados impidió el adecuado funcionamiento del magnetómetro para tales efectos. Se propone llevar a cabo pruebas adicionales del mismo tipo, y posiblemente de otros instrumentos, en sitios de características geológicas distintas durante un período de aproximadamente un mes entre el día 15 de febrero y el 15 de abril de 1972.

Estos estudios abarcarán las siguientes operaciones:

1. El reconocimiento superficial de sitios en que la presencia de tumbas de tiro y bóveda, y posiblemente de otros tipos de monumentos, es conocida por la existencia de ejemplares que han sido abierto por saqueadores. Esto incluirá el micro-mapeo de cada zona a base de lecturas de magnetismo de alta precisión y posiblemente de otros tipos; el estudio de los materiales geológicos que se encuentren en flor de tierra, y del material que aparentemente fue removido de las tumbas saqueadas; y, cuando sea apropiado, la colección superficial de tiestos para formar un muestrario tipo para el sitio.

2. La apertura de pozos o trinchas exploratorios para determinar la causa de anomalías magnéticas, y posiblemente de otros tipos, que no puedan explicarse adecuadamente con base en las observaciones superficiales; y

3. Los trabajos de salvamiento o las medidas protectivas que sean necesarias para evitar la pérdida de la información y de los materiales de cualquier resto arqueológico de importancia que se descubra en el transcurso de las pruebas contempladas.

Lugar del estudio:

No será posible identificar todas las áreas en que se desea llevar a cabo las nuevas pruebas hasta que se haya realizado algun reconocimiento adicional sobre el terreno en los meses de noviembre y diciembre de 1971; y, de ser posible, se prefiere dejar abierta la posibilidad de hacer pruebas del tipo propuesto en cualquiera parte de los estados de Jalisco, Nayarit y Colima en que parezca conveniente a base de una nueva revisión de la literatura y reconocimientos aéreos y terrestres adicionales.

Tentativamente, se propone continuar los trabajos primero en otros sitios de la Cuenca de Magdalena que no fueron estudiados en 1971 y en los cuales el material magnético de orígen volcánico sea menos abundante. En el caso de que fuere imposible autorizar la realización de pruebas en un área más amplio como aquí se propone, es posible que el número y la variedad de sitios conocidos en la mencionada Cuenca justificaría el proyecto; pero también es muy probable que el valor de los resultados se multiplicaría varias veces, sin un

aumento importante en el costo, si se puede trabajar en otras partes también para tomar en consideración una mayor variedad de condiciones.

Personal:

Investigadores principales: Dra. Betty Bell, Adjunct Professor
The University Museum
Southern Illinois University
Carbondale, Illinois

Dr. Froelich Rainey, Director
The University Museum
University of Pennsylvania
Philadelphia, Pennsylvania

Otros colaboradores: Srta. Elizabeth K. Ralph
The University Museum
University of Pennsylvania
Philadelphia, Pennsylvania

Ing. Bruce Bevan
The University Museum
University of Pennsylvania
Philadelphia, Pennsylvania

La Dra. Bell y el Dr. Rainey son arqueólogos profesionales, cuyos antecedentes ya obran en poder del Departamento de Monumentos Prehispánicos del I.N.A.H. Se considera que sería beneficiosa la integración de algún arqueólogo mexicano en el proyecto, si así dispone el I.N.A.H.

La Srta. Ralph y el Ing. Bevan son técnicos de instrumentación, los dos con una gran experiencia anterior en el tipo de estudio que se propone realizar. Esta experiencia incluye la participación en los trabajos realizados en la Cuenca de Magdalena en enero de 1971.

También acompañarán al grupo durante al menos alguna parte del estudio, un piloto y un co-piloto del avión particular que se ocupará en la realización de los reconocimientos aéreos.

Además, un número todavía indeterminado de trabajadores locales será contratado para ayudar en los trabajos de campo durante un período de aproximadamente un mes.

Condición migratoria de los extranjeros: Ya que se trata de un período muy breve, y que los extranjeros no ejercerán trabajos remunerados dentro del país, se propone que su estancia esté amparada con formularios FM-5, Tarjeta de Turista, los cuales se obtendrán en la frontera en el momento de su internación.

Disposición de los resultados del estudio:

Los resultados de esta investigación serán reportados en detalle al I.N.A.H., por escrito, dentro de los doce meses después de la terminación de los trabajos en el campo. En el caso de que se obtenga algún material arqueológico en el transcurso de estas exploraciones, el mismo será trasladado primero al Centro de Estudios Avanzados del Occidente de México localizado en Ajijic, Jalisco para su catalogación y estudio; haciéndose su disposición definitiva de acuerdo con las instrucciones del I.N.A.H. sobre el particular. No se propone que ningun material arqueológico salga del país.

Presupuesto:

No ha sido elaborado el presupuesto definitivo para el proyecto, pero se considera que los desembolsos en México ascenderán a alguna suma entre los $65,000 y $125,000, moneda nacional.

Instituciones auspiciadoras:

Applied Science Center for Archaeology
The University Museum
University of Pennsylvania

Los servicios del Dr. Rainey, la Srta. Ralph y el Ing. Bevan; el transporte internacional de los mismos; los instrumentos científicos que se van a probar; los fondos para el presupuesto operacional del proyecto, incluyendo los gastos de manutención del personal durante su presencia en México; y, por medio de la colaboración de uno de sus benefactores, el avión que se usará para los vuelos de reconocimiento y la tripulación del mismo.

The University Museum
Southern Illinois University

Los servicios de la Dra. Betty Bell.

El Centro de Estudios Avanzados del Occidente de México

Las facilidades locales necesarias para la adecuada realización de los trabajos, entre ellas: el uso de un vehículo de doble tracción y equipos menores para el uso en el campo; espacio de oficina y laboratorio en Ajijic, Jalisco, para la realización de las partes apropiadas del análisis de los resultados; los servicios normales como órgano de enlace entre las instituciones extranjeras y el

personal en el campo, por un lado, y los organismos nacionales competentes, por otro; los servicios secretariales que sean necesarios; y, posiblemente, el tiempo de una computadora IBM 360/60 que podría ser necesario para la elaboración y análisis de los datos obtenidos en los trabajos en el campo.

NOTA: La participación del Centro todavía no ha sido considerado formalmente por el Consejo Ejecutivo de la Sociedad de Estudios Avanzados del Occidente de México. Sin embargo, cinco de las seis personas que ahora son miembros del Consejo aprobaron el proyecto en principio en una reunión informal celebrada el día 13 de septiembre de 1971, y el presente borrador o alguna versión posterior del mismo será considerado formalmente por el Consejo en su Reunión del 4 de noviembre de 1971.

Colón 36
Ajijic, Jalisco, Mexico

January 31, 1972

Miss Elizabeth K. Ralph
Museum Applied Science Center for Archaeology
University Museum
33rd and Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Beth:

We're still alive and well in Ajijic, though no one would ever have known it lately from the amount of correspondence that I've turned out. I worked with J. Charles Kelley during October and early November at Alta Vista, Zacatecas - an intriguing site - then made one of the compulsory trips to the border, and came back to face the usual holiday-season guests. Other people get plagues of locusts, but Americans living in Mexico always turn out to have swarms of friends who suddenly decide to take vacations here.

In a few days we'll go back out to the Etzatlán area to make final arrangements. I've notified the Presidente Municipal that we're coming, and asked him please to dig out Andrés and/or Ramón because we may want a guide-dog. I intend to start with more looking around in the Etzatlán area in the hope of locating sites which aren't covered with those same blasted rocks, but I'm not too sanguine about finding any. I know there are sites around San Marcos, a few miles beyond the Sta. Gertrudis site, but San Marcos is involved in a bloody little agrarian battle between the small land-owners and a couple of remnant haciendas. It's been going on for about two years, and when I was there in the early fall, things were still so exceedingly touchy that it would be impossible to get local permission to work. Nor would it be a good idea; if you got permission from one faction, you'd be in trouble with the other. I want to spread out, however, and look at an area that Andrés and Ramón talked about southeast of where we were working (the direction is right this time), and then loop around to the Ameca area almost due south of Etzatlán - just beyond that small mountain range in back of the town. This is known to be a shaft-tomb area, but no one except the pot-hunters has ever taken a good look at it, and perhaps it's far enough away for conditions to be different. Also, last year a Guadalajara newspaper published a report of the finding of some archaeological material, maybe shaft tombs (the report was vague), about fifty miles southwest of here, and I want to look into it. This would be about on the southern edge of the known shaft-tomb distribution, which seems to break off for some distance through central Jalisco. It would be about half-way between the Volcán Tequila and the Volcán Colima and some distance from either, so it might be more favorable if there really are shaft tombs there.

I intend also to go to the Hacienda San Sebastián and ask about the possibility of working with a bulldozer, because I think it's about the best hope of doing anything of this kind. My qualms about the bulldozer are based in very large part upon years of experience with placating land-owners and patiently extracting permission to dig a few strata pits on land which comprises their main basis of subsistence. I've discussed the bulldozer idea in general terms with a number of people here, and all - including Bernal - agree that the reaction to stripping off a meter of topsoil over a sizable area would be strongly negative. (Bernal, by the way, suggested trenching rather than over-all stripping.) The hacienda, however, appears to be engaged in a commercial agricultural operation, and probably doesn't feel the same way as a small farmer who has only a few acres from which to get most of his living. That handsome young charro who rode out to visit

us may not be the owner - at least not yet - but I'm sure we can locate the appropriate person to talk to. Another possibility, though not a strong one, is to talk to the ejido authorities in Etzatlán - the people in charge of the communal land-holding system. One or another village might have some ejido land not in crops at the moment which might be explored in this way, but it would be impossible to use ejido pastures because it would take too long for the ground-cover to grow back. Vamos a ver. If Fro is still interested in trying out a bulldozer, I'll try to dig up at least one place where this might be done.

My permit has passed through the many levels of INAH (some of them added since the new archaeological law), and I've signed it and now it has gone to the Ministry of Education for the Minister's signature. This is pretty much pro forma, but it sometimes takes several weeks for it to take its turn passing under the ministerial pen. My application said little more than that in March and maybe April I'd like to do something or other somewhere in West Mexico, and it went through that way - about as open-ended a permit as you can get. It was discussed in advance with Matos, who recommended that it be left that way, on the grounds that spelling out too many details might result in hampering us if we wanted to move around. Getting a permit is a sticky and complicated business these days, and especially for West Mexico (where there is a serious effort to cut down on pot-hunting), and I was pleased that mine went through so briskly.

By the way, I'd appreciate it if you and Fro and Bruce would each send me at least one passport-sized photograph for attaching to any necessary identification papers - inasmuch as the three of you were mentioned by name in the application. It would also be a good idea if anyone else who's coming along - Sam, for example - could produce a photograph too. It was once mentioned that a couple whose name I've forgotten might come along for a while, and perhaps they too should be equipped with photographs, just in case. I don't yet know whatit might be wise to provide in the way of identification for everyone who's connected in any way with the work, in view of the present strict enforcement of the law, but I'd like to be prepared.

photos

Our faithful old carry-all has been in Laredo since mid-October, but we'll have it back here before the first of March. Its exile in Texas is part of the opening stages of applying for our imigrante papers, which don't permit you to bring in even one car duty-free. We've signed the carry-all over to a good friend in Laredo, who's "donating" it to the West Mexican Center, and we'll just have to grit our teeth and pay the astronomical duty on the Chrysler. I'm rather sorry that we'll be working again in the dry season, because I was looking forward to the appearance of the Scrambler. Our Chrysler wouldn't take us very far into the boondocks on our forthcoming exploration, so we're going to rent a jeep and split the cost with an American friend here who's seriously interested in archaeology and wants to go along.

Bill is going to Mexico City tonight, and will get the aerial photographs which Bruce wants. Trying to get them by mail is a miserably complicated and time-consuming affair, which may not even yield up the right photographs, and since Bill has to go to Mexico City on several pieces of business, he thought it would be best to get them in person while he was there. We'll fire them off immediately.

While we're in Etzatlán I'll talk to the Hotel Cadillac and make tentative arrangements for housing us there, and make more definite arrangements when I know how many are coming and when - assuming, as I am at the moment, that we'll at least start out

in the Etzatlán area again. And when I know the arrival date and the size of the delegation, I'll make arrangements to get everyone under a roof here. We can put two people in our guest house and lodge the rest at the Chula Vista, which shouldn't be too full then.

Also, before I forget it, we'll need to have again a list for Customs of the equipment and its value. I think we got the system worked out after a slight hassle last year, and that there's not apt to be any hang-up. But Mexico being Mexico, bless its heart, it's well to be provided with sheaves of paper covering all possible contingencies.

The two copies of the report dropped into the midst of the Christmas-season chaos, and I neglected to acknowledge them, but they did arrive safely - and many thanks.

I've been intending to write to you for some time, but in addition to the many interruptions, I've been holding off a bit until I could do more than exchange pleasantries. As I recall, Fro was going to be away during January and part of February, so I'm unloading all this on you and you can pass it along to him and to Bruce. As soon as we return from our tour of the out-back, we'll call and discuss the whole operation - and I'll also send any further details by mail. The postal system has had some balky spells again lately, and letters occasionally get lost in it for a couple of weeks, so I don't want to entrust all the communication to letters.

I'm looking forward to working with all of you again, and even to returning to the dear old Hotel Cadillac with its corncob-burning water heater. (Do you still like tacos?) Of course, if we move the exploration out any considerable distance and find ourselves roosting even temporarily in some little pueblito, we may find ourselves looking back longingly on the comfort and relative grandeur of the Cadillac. Anyhow, by the end of next week I'll have probed the Magdalena Lake Basin and its environs more extensively, and have looked at other areas (some no doubt close enough to use Etzatlán as a base), to find some sites which won't give the machinery the blind staggers. "Que mentirosa la maquina!" Andres said - but it wasn't the poor maquina's fault. (By the way, do you also intend to bring the seismograph - or anything else other than the magnetometers?)

So: we'll be talking to you in a couple of weeks to iron out details, and I'll also write again, and we can nail down the edges of this operation - to the extent that they can be nailed down before we actually get out into the field and see what transpires. Please say hello to Fro and Bruce for me - and to all of you, welcome back!

Best,

Betty

Betty Bell

Colón 36 (we're having the mail delivered to the house now)
Ajijic, Jalisco, Mexico

Sam 1060 DuPont Bldg.
Wilmington 19801
302/774-2660

bulldozer - photo Paco

February 10, 1972

Dr. Betty Bell
Colon 36
Ajijic, Jalisco, Mexico

Dear Betty:

Many thanks for your good letter of January 31st. Fro is still away on a lecture tour, but will be back about February 17th. I have enclosed photos of Bruce and Fro (the latter can be cut to a smaller size) and also lists of the equipment both with and without values. I haven't been able to catch Sam Carpenter, so will have to send his later.

I am in the midst of setting up a chemical train to convert CO_2 to benzene and then to count its C-14 content with a liquid scintillation spectrometer. Therefore, I shall not be able to come to Mexico, much as I should like to.

I feel strongly, however, that El Arenal is the most likely site for finding tombs, but that it is useless with the instruments unless the magnetic top soil (about a meter thick) is bulldozed away. Trenching serves only to confuse matters for the magnetometer because of effects from the side walls.

We shall try to forestall the extra couple that wants to come, mostly because of adding too many bodies in your carry-all.

Yes, I still like tacos and have even found some pretty good precooked ones in my market which I have stuffed with meat, cabbage, etc.

Best of luck this season.

Regards,

Elizabeth K. Ralph

EKR/ek
Enclosures

Bob
Ralph

Tucson House Apt. 1518
1501 Miracle Mile
Tucson, Arizona 85705
February 9, 1972

Mr. David Crownover
Executive Secretary
University of Penna. Museum
33rd and Spruce Sts.
Phila. Pa.

Hi- I hope this reaches you before your trip to West Africa. My wife and I are enjoying the stay in Tucson. I'm working three days a week in the Museum laboratory with Jim Ayres and one day a week (Saturdays) on a local Urban Renewal dig that has to be finished by April 1st.

We were in Mexico for two weeks in early January. We visited seven sites (five new ones for me) and also got in half a week at Puerto Vallarta and five days in Mexico City.

I still look forward to being back at Penn in May. See you then.

Regards,
Darrel Butterbaugh

Tucson House Apt. 1518
1501 Miracle Mile
Tucson, Arizona 85705
February 9,1972

Miss Elizabeth K. Ralph
University of Penna. Museum
33rd and Spruce Sts.
Phila. Pa.

Dear Beth:

Just a short note to give you a report on my activities and to check up on the plans for the Mexico exploration.

I have been working with Jim Ayres here in the Museum three days a week and helping on a local dig one day a week. The dig is in an Urban Renewal project that has to be finished by about April 1st. In the lab I'm trying to clean up and identify the metal artifacts that have been coming out of the Urban Renewal project. So far nothing very spectacular has been uncovered but this is an historical dig which doesn't hold the interest for me that some earlier "stuff" has. I have met some of the people in the Tree Ring laboratory and it is a great place. I hope to see more of their operations before I leave. The Radio Carbon lab is also under this group. Two mornings a week I am auditing Dr. Culbert's class on South American Archaeology. All in all it is an interesting winter. The climate and area are good. Jan and I are having fun exploring the area.

As to the exploration in Mexico, how are the plans progressing? Is the trip still on? Are you planning to come along? I hope so. What is to be the start and expected finish? If we find a tomb, will we dig it right away or will it take furthur negotiations and another crew? Jan and I still wish to meet you there if the trip is on. Please let us know the plans, etc.

Best regards to all at the lab.

Sincerely,

Darrel Butterbaugh

February 22, 1972

Dr. Darrel Butterbaugh
Tucson House, Apt. 1518
1501 Miracle Mile
Tucson, Arizona 85705

Dear Darrel:

Many thanks for your letter. I have waited to reply until Fro returned. Now he has and we have also received two letters from Betty Bell (the archaeologist fn Mexico).

It looks as if the project will be delayed until April. The only problem about your joining the group is the old one in regard to space in the truck and in the hotel. However, at the moment, I do not know how many are going.

I was glad to hear that you are enjoying Arizona. Please give my best to Bannister and to Ferguson in the Tree-Ring Lab when you see them.

With best regards to you both.

Elizabeth K. Ralph

EKR/ek

November 5, 1972

Miss Elizabeth K. Ralph
Museum Applied Science Center for Archaeology
The University Museum
33rd and Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Beth:

I realize that I'm nagging, but unfortunately, my problem about the contour maps still hasn't been solved. What I need are very clear Xerox copies from which I can make more, be- there are now about ten people in the archaeological hierarchy here who have a right to expect copies of the report. Bruce said he was going to ink the maps before making copies, but if he did, the first four still didn't reproduce clearly (perhaps because the scale is so reduced?). I have some large, grubby, very dim copies of the taped-together notebook sheets, and I might be able to find someone here to decipher and ink them for me.

The other problem is that two maps are still missing. Altogether, we made ten grids, and they're referred to by number in my report. You sent copies of eight maps numbered 1 through 7, but there are two maps numbered 6. This series should be 1 through 8, and I made the correction on the basis of my copies when I was writing the report. This is a small matter, but Nos. 9 and 10 are a larger one.

No. 9 is the last grid made at El Aguacero. I have copies of the notebook sheets with the readings recorded, but without the contour lines drawn in. Perhaps Bill or I could do this well enough to serve the purpose, but I'd really rather it were done by someone who has more experience with this kind of work. However, my No. 9 lacks all the information which appears on the other maps: caption, location, orientation, and technical information (base value, measurement spacing [1 m.], sensor height, contour). It's just a few pages of numbers, with my note as to the location of the site and grid - nothing more. No. 9 wasn't excavated, because it contained just one very large anomaly which Bruce felt certain was geological, but the grid is referred to in my report and I need to include the map. No. 10 is the one grid which we made at Los Areneros; my dim Xerox copy does have the contour lines, but it, too, lacks all the other information.

If I can find someone to ink Nos. 1 through 4 and make them into reproducible copies, is there any possibility that you can get Bruce to complete Nos. 9 and 10 and send me copies which I can have reproduced here? I simply don't have the information needed, but I trust that Bruce has it recorded somewhere. I'm quite certain he had it when he left here, because he said he'd complete these two maps later.

I'm genuinely sorry to keep harping on this, but the archaeological authorities are beginning to get a little restive about the matter, and I can't stall any longer. The time specified by my permit for submitting the report is now long past, and several times during the past month or two, I've been asked when it would be forthcoming. I've explained that I'm simply awaiting the maps, but any further delay will result in a black mark on my good record for promptness - and I don't want this. Please? All assistance will be appreciated most gratefully.

Best,
Betty

Betty Bell

Colón 36
Ajijic, Jalisco, Mexico

Museum Applied Science Center for Archaeology

Froelich Rainey, Director — Elizabeth K. Ralph, Associate Director

THE UNIVERSITY MUSEUM • UNIVERSITY OF PENNSYLVANIA
33rd & SPRUCE STREETS • PHILADELPHIA, PENNSYLVANIA 19104
386-7400 (Area Code 215) — Cable Address "Antique"

November 21, 1972

Dr. Betty Bell
Colon 36
Ajijic, Jalisco
MEXICO

Dear Betty,

Thank you for your letter of November 5th. Bruce has now sent to you 10 copies of all of the grids - fairly good copies.

Quite frankly, since the results were negative and the grids show nothing of interest, we cannot justify spending the time and money to ink them or have them photographed. If we had time on our hands, that would be one thing, but we do not. Our new grant has not yet arrived and we have had to reduce our staff, and there are just too many things to do.

I hope that you will be able to use the copies that Bruce sent to you.

With best regards,

Beth Ralph

EKR/lk

March 12th, 1974

Dr. Betty Bell
Colon 36
Ajijic, Jalisco
Mexico

Dear Betty,

In August 1973, we sent our colleague, Dr. Gary Carriveau, to Acambaro, Gto. to investigate the Julsrud collection. The reason for this is that we have been getting thermoluminscent (TL) dates for this peculiar pottery extending back to 2600 B.C., and we do not believe in the dates. Since then, by various auxillary tests, we have found that this pottery is not datable by TL.

Therefore, Gary collected 2-3 large figurines that may contain enough carbon for C^{14} dating and 6-9 obsidian artifacts which may be suitable for obsidian dating. He collected these with the permission of Dr. Bernal, but Bernal has put them in the hands of Lic. Ariel Valencia (Instituto Nacional de Anthropologia, Cordoba 45, Mexico 7, D.F.) for shipment to the U.S.A.

Our problem is that Valencia has done nothing, and we are eager to start our texts. Is there anything that you can do to get them shipped or taken to the U.S.A.?

I am sorry to bother you with our problem, but a nudge from within Mexico might do the trick.

I hope that you and Bill are both well.

With best regards,

Beth

Elizabeth K. Ralph

Ralph
ASCA

March 17, 1974

Dr. Froelich Rainey, Director
The University Museum
33rd and Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Fro:

I haven't vanished entirely; I've just been sitting back and watching INAH to see what it was going to do, and I think it has now got a few things out of its system and is beginning to function more or less normally again. I'm not quite what INAH means by "American archaeologist" and I haven't been under the gun, but I preferred to sit in a corner and wait for the storm to pass.

In a few days I'll be leaving for Alta Vista, Zacatecas, to work there until the end of May with J. Charles Kelley. It's a nice site - an extensive set of ruins, difficult to excavate, but interesting. I worked there with Kelley a couple of years ago, but now he has a very comfortable NSF grant (into which he wrote me as collaborator) and we can do a better - and bigger - job.

I would still like to have another shot at the shaft-tomb problem, along the lines of finding a panteón which hadn't been looted too badly and taking it to pieces completely. If the máquinas won't work, then I'll go back and pick Andres and Ramon's brains and see what I can find out about a likely spot. Absolutely nothing has happened in the shaft-tomb area during the past two years, except that the looters are still hard at it. No archaeologist, Mexican or American, has worked there or even plans to work there in the foreseeeable future.

When I get back from Alta Vista, and I have to return in June to teach in a summer program here, I'll try to work out something more concrete than just a bunch of generalities about wanting to go on with the work - and send it along to see what you think of it.

If you happen to get to Mexico meanwhile, come by and see us.

Best,

Betty

Betty Bell

Dr. Betty Bell
Colón 36
Ajijic, Jalisco, Mexico

March 27th, 1974

Dr. Betty Bell
Colon 36
Ajijic, Jalisco
Mexico

Dear Betty,

Many thanks for your two letters. In regard to Julsrud, I have enclosed a copy of the only pertinent letter from Bernal. In the correspondence with everyone, they seem to be referred to as "objects" rather than things more specific.

It is the collection which includes the Acambaro dinosaurs as well as many other grotesque "objects".

If you have samples to spare from El Cerro Encantado, we should be glad to try some TL, C^{14}, and obsidian dating. We are interested especially in having some controls to experiment with obsidian dating.

With best regards,

Elizabeth K. Ralph

Return

March 18, 1974

Dear Beth:

We know Ariel Valencia, and I'll see if we can be of any help in getting your things out. Valencia is in charge of a new unit in INAH which deals with registration of everything archaeological - from sites to sherds - and I can see in a vague sort of way how things wound up in his hands. Do you happen to have Bernal's permission in writing? It would help.

I've never seen the Julsrud collection, but I've heard many things about it - few of them uniformly favorable. This isn't by any chance the collection which included the so-called Acámbaro dinosaurs, of fragrant memory? I hope not; they provided the biggest horse-laugh in the past fifty years of American archaeology.

Are you routinely making TL tests now, or only in pursuit of certain problems? From my work at El Cerro Encantado I have three of what Meighan calls "triplets" - levels with obsidian, charcoal, and pottery in association. The obsidian dates were way off, but probably because the site is outside the area in which the hydration rate that they're using is applicable - and UCLA still hasn't squeezed out the C14 dates for those samples. If you're making TL tests, could you tell me about how much they cost and how long they take?

In a few days I'll leave for Zacatecas, to spend a couple of months with J. Charles Kelley digging up the ruins of Alta Vista. I'll be back in June, however, and if you or anyone else from the Museum should be down this way - come by for a visit.

Best,

Betty

Betty Bell

Colón 36
Ajijic, Jalisco, Mexico

September 11th, 1974

Dr. Betty Bell
Colon 36
Ajijic, Jalisco
Mexico

Dear Betty,

My filing system is bad, and I seem to have lost the letter that I wrote to you about helping to expedite the Acambaro figurines, clay, and obsidian out of Mexico.

I am wondering if you have had any luck.

I hope that all goes well with you. I seem to be spending most of my time writing grant proposals and reports.

With best regards,

Elizabeth K. Ralph

November 8, 1974

Elizabeth K. Ralph
Museum Applied Science Center for Archaeology
The University Museum
Philadelphia, Pennsylvania 19174

Dear Beth:

Bill will be going to Mexico City again in about ten days, and he'll try again to see what can be found out about your archaeological bits and pieces. Probably they're still at Córdoba 45, nestled cozily on someone's desk. If by any chance they have arrived, let me know right away.

I'm sorry that I didn't answer you sooner, but we've been thrashing around frantically, trying to get my archaeology book out of the press here - an operation which more and more resembles the extraction of impacted wisdom teeth. I'll send up a free copy as a souvenir of the Museum's exertions in West Mexico. This is a book of original papers (15 in English, four in Spanish) covering the recent field work in West Mexico. In my less sane moments I'm contemplating writing a more general book on West Mexico - which all of a sudden is very popular - and I have a couple of rather strong possibilities for publishing it elsewhere; one a university press, the other a commercial publisher. Anyhow, never again as far as publishing anything of my own here is concerned. One could write an entire book just on the machinations required to publish in Mexico.

The weather is warm and pleasant, the flowers are blooming, and I'll be ecstatic if I never have to see snow again in all my life. Around the first of the year I intend to go with a friend into the country just in back of Etzatlán, to look at the huge stone bolas that were written up in National Geographic a few years ago; undoubtedly natural formations, but interesting. If we stay long enough in Etzatlán, I'll eat a few extra tacos for you.

Come back if ever you can.

Best,

Betty

Betty Bell

Tel. 53105

I enjoyed the article in the American Scientist.

BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC., UPTON, L.I., N.Y. 11973

DEPARTMENT OF PHYSICS

TELEPHONE: (516) 345- 3824

Rolph-
ASCA

12 November 1974

Dr. F. Rainey
Director, University Museum
33rd and Spruce Streets
Philadelphia, PA 19174

Dear Fro,

I have received letters and copies of letters from Charles Hapgood concerning the Acambaro TL measurements. As you may remember, I sent you a manuscript of a paper for publication on this subject. After being here at Brookhaven and reading Hapgood's letters I have some comments and suggestions to make.

Hopefully the samples that I selected from the collection in August, 1973 can be forwarded to MASCA. Beth has one of her friends working on it. The obsidian pieces could be dated by hydration rim techniques. Last year I helped a student on a special project on obsidian dating of Chupiquaro artifacts, supplied by Shirley Gorenstein, from the Cerro Chivo site near Acambaro. We measured 16 specimens and got a series of dates from about 600 B.C. to 900 A.D. which were from well established stratigraphy. From this we obtained a good value for the hydration rate which can be used on the Julsrud obsidian objects. I am not terribly optimistic about the radiocarbon dates from the large figurines because of the inherent problems involved in this technique but it would be good to try it.

Through results from x-ray diffraction studies on the ceramic and soil sample sent by Hapgood, I found a very good correspondence between patterns. This indicated a high probability that material from this area was used in the figurines.

Contrary to my manuscript, further work can be done to check the TL dating. MASCA did not have the necessary apparatus but I have assembled an instrument here that can be used for two additional methods. These are the pre-dose and single crystal zircon techniques. To proceed I would need additional samples from the Museum collection. I believe that these two methods will exhaust all efforts to date the monsters. If you approve I will withhold (with Mark's approval) the paper for publication until we have all results.

We are nicely settled here on Long Island and enjoy it very much. When ever you get a chance, you have an open invitation to visit us and see the laboratory here. I hope that this letter finds you and Marina well.

Best wishes,

Gary

Gary W. Garriveau

cc: Charles Hapgood
Dr. H. O. Haas

BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC., UPTON, L.I., N.Y. 11973

DEPARTMENT OF PHYSICS

TELEPHONE: (516) 345- 3824

Mr. Charles H. Hapgood
R.F.D. 3
Winchester, New Hampshire 03470

Dear Mr. Hapgood,

Thank you for your letter of 1 October and subsequent copies of letters.

Your comments are well taken and I feel that I must make a few clarifications. In my manuscript I re orted only evidence that I observed personally. There was no effort to denigrate the work of others and references to both sides of the arg ment were listed. The results do not 'put an end to all doubts and foreclose further research'. They simply give an indication that this material was fired about thirty years ago.

A letter has been sent to Dr. Rainey (copy enclosed) which requests material for two additional tests. The apparatus for these tests was not available to me before or at the time the paper was written. If this material is available I will postpone publishing the results of thermoluminescent measurements until all tests are completed. Only then will I report the results of the tests and my conclusions with utmost objectivity.

I hope that you find the information contained in this letter and the enclosure helpful and that my plans meet with your approval.

Yours sincerely,

Gary W. Carriveau

Gary W. Carriveau

cc: Dr. F. Rainey, Director, University Museum
Dr. H. O. Haas, Director, MASCA

LIST OF EQUIPMENT

Property of the University Museum, University of Pennsylvania,
Philadelphia, Pa. 19104

1. Precision Portable Cesium Magnetometer, manufactured by Varian Associates, Palo Alto, California. Components include	
2 Readouts Nos. 49-116-90 and 49-116-93	$ 4,000
2 Sensors Nos. 49-544-90 and 49-544-93	10,000
3 30-volt battery packs	450
2 Battery chargers	60
Miscellaneous cables, carrying straps, tapes and spare parts	50
2. Model V-4971 Portable Search Magnetometer, manufactured by Varian Associates, Palo Alto, California. Components include	5,750
1 Audio Readout	
1 Sensor, No. 49-544-195	
1 30-volt battery pack	
1 Battery charger	
Miscellaneous cables, straps and spare parts	
3. 1 Tektronix Portable Oscilloscope Type 321, manufactured by Tektronix, Inc., Oregon	900
4. 2 Triplett Model 310 Voltohmeters	70
~~5. 4 cameras~~	~~4,000~~
5 ~~6~~. 1 Auto Transformer, 220-110 volts, etc.	20
6. ~~7~~. Miscellaneous hand tools for electronics repair	50
7. ~~8~~. Notebooks, tape measures, simple drafting tools, etc.	50
8 ~~9~~. Equipment enclosed in 5 or 6 Halliburton suitcases	250
9. ~~10~~. Spare parts for Magnetometers: Oscillator, Voltage Regulator	100
TOTAL	~~$25,750~~ 21,750

This equipment will all be used by members of the University Museum for the purpose of archaeological research in collaboration with the proper authorities ~~in Mexico~~. It will be brought to Mexico by Bruce Bevan, Froelich Rainey or Samuel Carpenter.

1971 Beth Ralph

1)

LIST OF EQUIPMENT

Property of University Museum, University of Pennslyvania, Phila., Pa.

1.	Precision Portable Cesium Magnetometer, manufactured by Varian Associates, Palo Alto, California Components include	
	2 Readouts Nos. 49-116-90 and 49-116-93	$ 4,000
	2 Sensors Nos. 49-544-90 and 49-544-23	10,000
	3 30-volt battery packs	450
	2 Battery chargers	60
	Miscellaneous cables, carrying straps, tapes and spare parts	50
2.	Model V-4971 Portable Search Magnetometer, manufactured by Varian Associates, Palo Alto, California. Components include	5,750
	1 Audio Readout	
	1 Sensor, No. 49-544-195	
	1 30-volt battery pack	
	1 Battery charger	
	Miscellaneous cables, straps, and spare parts	
3.	1 Tektronix Portable Oscilloscope Type 321, manufactured by Tektronix, Inc., Oregon	900
4.	2 Triplett Model 310 Voltohmeters	70
5.	~~1 or 2~~ 4 cameras	~~200~~ 4000
6.	~~1 Gossen Co. Geohm, Type 323 and cables~~	~~100~~
7.	1 Auto Transformer, 220-110 volts, etc.	20
8.	Miscellaneous hand tools for electronics repair	50
9.	Notebooks, tape measures, simple drafting tools, etc.	50
10.	Equipment enclosed in 5 or 6 Halliburton suitcases	250
11.	Spare parts for Magnetometers: Oscillator, Voltage Regulator	100
12.	~~Possibly~~ 1 Fluxgate Magnetometer, ~~Regulator, if repaired in time~~	~~2,000~~
	TOTAL	~~$24,050~~ # 25,750

This equipment will all be used by members of the University Museum for the purpose of archaeological research in collaboration with the proper authorities in Mexico. It will be brought to Mexico by ~~Elizabeth K. Ralph~~, Bruce Bevan, Froelich Rainey, or Samuel Carpenter.

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been done at Ixtlán. Annular-base molcajetes and three-quarter grooved axes appear in this period; the objects which Gifford designates as plaques (Gifford 1950: Plate 28) and assigns to the Middle Period are clearly fragments of Mazapan-type figurines. Plain wares and bichromes are present in the Late Period, which seems to lack incised wares andpolychromes. The characteristic painted pottery of this period is a white-on-red, very similar to the Autlán (Jalisco) white-on-red which is late at that site (Kelly 1945b: 42); it also strongly resembles the Ixcuintla Phase white-on-red from Amapa. Gifford equates Early Ixtlán and Early Chametla (Tierra del Padre) on the basis of stylistic similarities between Early Chametla polychrome and Early Ixtlán biface polychrome. Middle Ixtlán is equated with Late Chametla II (Lolandis-Acaponeta) and Early Culiacán II (Acaponeta), the Aztatlán horizon at those sites, and with the Aztatlán complex at Guasave. Late Ixtlán "may correspond to Late, Middle and (or) Early Culiacán I" (Gifford 1950: 237), but it is equated specifically only with the Autlán complex, on the basis of the resemblances noted above.

The large site south of the town of Ixtlán del Río has been the object of intermittent excavation and much speculation (cf. Gifford 1950: 193-197; Corona Núñez 1952), but the only report on recent work there (Contreras 1966) deals entirely with reconstruction of some of the architectural features. The mounds which have been excavated so far show the use of cut stone slabs mortared with adobe, and two large petroglyph slabs were imbedded in the wall of one structure. Gifford found no Early Ixtlán pottery at this site, and assigned it to Middle and Late Ixtlán, roughly equivalent in time to the construction and use of the Amapa ball court. Gifford's Site 4 at Jala, a few kilometers to the northwest, gave special promise of contributing to the dating of the Ixtlán area, but a recent (1966) attempt to locate it was unsuccessful. Site 4 consisted of a deep cut in which a thick layer of pumice separated two strata of differing cultural horizons. Below the pumice Gifford (1950: 188) found only sherds attributable to the Early Period while the stratum above the pumice layer yielded sherds of the Middle and Late Periods. Should the site be re-located, dating of the volcanic debris might give a definite end-date for Early Ixtlán.

In 1965, the area around the little town of Tequilita, southeast of Compostela and approximately 50 kilometers south of Tepic, became known as the site of numerous shaft-tomb cemeteries. Furst's investigations there revealed the existence of 24 such cemeteries, with the staggering total of 390 looted tombs. The tomb explored by Furst (1966) at Las Cebollas, near Tequilita, had been looted only of its large figurines. Remaining in it were 83 pottery vessels, 125 complete or fragmentary conch shells,

Nayarit

eight complete small figurines and fragments of six others, two intact slate "mirror" backs and the fragments of many more, slate pendants and beads, shell bracelets and beads, and several pottery flutes.

For several years, the Mexican antiquities market has offered a new style of large pottery figurine characterized as "Chinesca." The name, which was bestowed by collectors of antiquities, carries no diffusionist implications. Rather, it reflects a feeling that the style is vaguely Oriental in appearance (Figure 19; see also Furst 1965: Plates 4-12). In Furst's words, "One of the major identifying characteristics of the style is a remarkable majesty of pose and serenity of expression in a rather naturalistically treated face with high cheekbones and slanted almond eyes. These combined with other, admittedly rather impressionistic details, convey a vaguely Oriental feeling...Chinesca, as now understood, is a collective heading for a number of previously unknown or unrecognized ceramics of diverse but vaguely related styles whose principal common denominator seems to be, on the one hand, their origin in shaft-and-chamber tombs, and on the other, their remarkable aesthetic appeal and quality of execution, which causes them to stand out unmistakably amid West Mexican tomb art..." (Furst 1966: 15; 34). The Chinesca figurines were said to come primarily from southern Nayarit, and to occur occasionally as far north as Rosamorada in the central part of the state. Three of the complete figurines from Las Cebollas were of the small, solid trichrome-decorated type found in the Ixtlán area (Furst 1966: Plate 30a,b; Gifford 1950: Plate 5c, 8c); four were complete in themselves but had been broken off at the base, suggesting attachment to a village model (Furst 1966: Plate 32d,e,f,g); and one was in the style of the small Chinesca figurines - a style far less delicate and naturalistic than that of the large figurines, but nevertheless distinctive (Furst 1966: Plates 50; 51a,b,c). The fragments included the head of a large Chinesca figurine and portions of another, and the concave base of a "Martian" Chinesca, so named because of its peculiar head form (Furst 1966: Plates 31a,b, 33). Small Chinesca figurines also appear in the Gavilán Phase at Amapa (Figure 5k; see also Grosscup 1961: Figures 3n,4s,t); while no complete Chinesca figurine was recovered from the excavations there, people in nearby villages had many which they had found in areas around the site (Figure 20). A radiocarbon date of ca. 100 A.D. (UCLA-1012; Berger and Libby 1966) was obtained for Las Cebollas, while Grosscup places the start of the Gavilán Phase at A.D. 250. However, Grosscup (personal communication) now feels that the Amapa deposits may not have shown the start of the Gavilán Phase, and that it

may be slightly earlier than he first believed. The "Martian" Chinesca figurines are relatively rare, and most complete specimens known to date are in private collections (Figure 21; see also Furst 1966: Plates 53,54,55); one, however, is included in the Ixtlán collection studied by Gifford (1950: Plate 3a), who places it in Early Ixtlán.

Relationships between the pottery vessels from Las Cebollas and those from Early Ixtlán del Río are so strong as to suggest very close contact or even a common source of manufacture. Similarities include numerous composite silhouettes, abundant negative painting, the unusual blue-slipped ware, nubbin ware, and almost identical colors, layouts, and design elements in the bichrome and polychrome pottery (Gifford 1950: Plates 11-19; Furst 1966: Plates 21-29). Further, both the Ixtlán and Las Cebollas collections include pieces which are strongly suggestive of Chupícuaro pottery (Gifford 1950: Plate 15; Furst 1966: Plate 25d,f). Gifford (1950: 212) believes that the Ixtlán piece represents trade ware, and Furst is inclined to agree with regard to the Las Cebollas specimens. He remarks that, "The general appearance and careless decoration of the Ixtlán and Las Cebollas examples places them in the middle to upper range of Chupícuaro ceramic evolution, perhaps around 100-200 A.D." (Furst 1966: 226). Grosscup (personal communication) adds that he feels there are some "general resemblances" between the Chupícuaro material and some of Amapa's Gavilán Phase material.

The pyrites which had encrusted the mirror-backs had disintegrated, but traces discernible on one indicated that it had been covered with neatly-fitted polygonal pieces of pyrite, having from four to nine sides, much in the manner of a well-preserved piece from the Lake Chapala area of Michoacán (Furst 1966: Plate 46). Furst summarizes the data on construction techniques used in the manufacture of pyrite mirrors, which form the basis for chronological ordering, and concludes that the specimens from Las Cebollas equate in time with those from the Esperanza Phase (Early Classic) at Kaminaljuyú, Guatemala. Despite their wide spatial distribution (from Panama to the Southwestern United States) the "close technical correspondences between all of these mirrors and the identity of chronological characteristics" suggest a single pyrite-mosaic industry, although the number or location of the manufacturing centers cannot as yet be determined (Furst 1966: 171-198).

Of the 125 conch shells in the Las Cebollas tomb, 120 belonged to a single species, Turbinella angulatus Solander; this is the common West Indian chank, native to the Caribbean and found from Florida to the northern coast of South America. Four were

Strombus gigas Linné or Queen conch, also a Caribbean shell, and only one, a Strombus peruvianus, was of Pacific Coast origin. One hundred and eleven of the shells were end-blown trumpets. A comparison of the Las Cebollas specimens with the numerous representations of conch shells at Teotihuacán shows that the same shell (Turbinella angulatus Solander), apparently having the same function, predominated at both places. The decorations on the Las Cebollas shell trumpets are very similar to those shown on the Teotihuacán conch shells, and on a shell trumpet from Kaminaljuyú, although the Kaminaljuyú specimen is a Fasciolaria princeps (another Caribbean shell). While the prevalence in West Mexico of a shell native to the Caribbean may simply reflect widespread trade, Furst notes that it may equally well indicate that some well-defined meaning, possibly related to ritual, was attached to a particular species. If this is true, he suggests, there may have been an ideological link between the West Mexican shaft-tomb cultures, Early Classic Teotihuacán, and, if the design motifs are taken into consideration, possibly Early Classic Kaminaljuyú (see Furst 1966: 153-170). The radiocarbon date of ca. 100 A.D., obtained from a Turbinella shell trumpet, places the tomb at about the beginning of the Early Classic.

The tomb at Las Cebollas was located on a slope above a milpa, and local informants maintained that shaft tombs are always found at elevations somewhat above the habitation sites. It was long surmised that the depth of the shaft might be related to the importance of the tomb's occupants but it now appears that depth may instead be a function of the location of the tepetate, a hard, impermeable layer of varying thickness which underlies the less consolidated soil at varying depths. (Tepetate may be composed of various materials, but in this part of West Mexico it is a water-deposited volcanic tuff.) In this area, the tomb chambers are carved out of the tepetate and apparently always have at least two meters of it above their ceilings. The tomb investigated by Furst consisted of two chambers roughly four meters square, with inward-sloping sides and slightly vaulted roofs, located at the bottom of a 5.25 meter shaft; the floors of the chambers were almost a meter lower than the base of the shaft. The top 2.2 meters of the shaft were circular, about two meters in diameter, and lined with a stone retaining wall; seemingly this formed an entry to the square shaft, one meter on each side, which descended to the short, connecting tunnels that led to the chambers. This construction is typical of shaft tombs in the Tequilita area, as are the so-called claraboyas, narrow, tube-like openings which connect the chambers of several tombs; occasionally, also, a vertical claraboya extends from the ceiling of a tomb to the surface of the ground above. It was reported that at nearby Cuatro Albillas, four retainer burials, accompanied by offerings, were found arranged in a square around

the circular opening of a shaft tomb; a similar retainer burial, but vertical instead of horizontal, is reported for an area near Guadalajara, and another near Comala, Colima (Furst 1966: 62-63).

Using informants' statements regarding the average number of burials per chamber, Furst (1966: 229) estimates that approximately 3500 individuals were buried in the 390 tombs located so far in this one municipio, and he believes that perhaps no more than 30% of the tombs have yet been discovered. On the basis of tentative population estimates he concludes that the occupants of a shaft tomb represent a single generation of one family, and offers two interpretations of the stylistic variation in the shaft-tomb offerings of Nayarit and elsewhere in West Mexico: (1) they may reflect some form of exogamy, in which "persons buried in these tombs brought into the common archaeological context objects conforming to their own local traditions"; or (2) "the area in which shaft tombs occur might have been sufficiently unified culturally, if not politically, so that some pottery-making centers or individual ceramic sculptors might have been able to supply the needs of different communities scattered over a relatively large geographical region, because their work found a greater response among the population" (Furst 1966: 236-237; 267-268). Long, working with the shaft tombs of the Magdalena Lake Basin in Jalisco, a short distance to the south, comes to a different conclusion (see following section).

There are a few other data, largely fragmentary, about the Southern Nayarit Highlands in the reports by Corona Núñez (n.d.) and Ross (1939), but the material described lacks both stratigraphic placement and indisputable provenience. A large part of the material studied by Ross was purchased by Lumholtz, and the collection is drawn from an area extending from Tepic and extreme northern Jalisco to central Michoacán. From Tepic comes the famous plumbate turkey effigy collected by Lumholtz (1902, Vol. II: 295), who also noted the existence there of gold and turquoise ornaments; another plumbate vessel is said to come from Terrero, south of Ixtlán del Río. A handsome cloisonné vessel purchased in Tepic is included in the Lumholtz collection, but the evident concentration of this ware around Totoate and Estanzuela (both in Jalisco) suggests that it is an import. Ross and Corona Núñez describe annular bases and a variety of tripods, but, as noted, their material cannot be firmly placed either temporally or spatially. "Tripod vessels are early in Colima, but die out" (Kelly 1944: 208) and were generally assumed to be fairly late elsewhere in the West Mexican sequence, although they occur early in the Valley of Mexico and as far west as Chupícuaro. Much of the material ascribed to the southern Nayarit highlands lacks either annular bases or tripods. Gifford's sherd collection, however, included fragments of annular-base and tripod

molcajetes; he assigns the former to Middle Ixtlán and the latter to Late Ixtlán, but, curiously, assigns to Early Ixtlán a bichrome tripod bowl in the University of California collection which he studied (Gifford 1950: 231-232; Plate 13d).

JALISCO

Northern

The shaft-tomb complex present in the southern Nayarit highlands extends into north-central Jalisco, where, in fact, some of the first shaft-tomb discoveries were made. Tombs are particularly abundant in the Magdalena-Tequila-Etzatlán area and around the shores of the Magdalena Lake Basin (the lake was drained artificially about 60 years ago). They are reported virtually on the outskirts of Guadalajara and are known as far south as Acatlán de Juárez, about 35 kilometers south of Guadalajara, where the poorer inhabitants of the town utilize niches cut into the walls of the shafts for present-day burials (Furst 1966: 49). The first published report of a shaft tomb was that on the looted three-chambered tomb found in 1954 at El Arenal, near Etzatlán (Corona Núñez 1955; Covarrubias 1957: Figure 38).

In 1963, the Los Angeles County Museum of Natural History was given the complete contents of a tomb discovered at San Sebastián, about eight kilometers northeast of Etzatlán and only two kilometers from the El Arenal tomb. The collection, which was purchased at the site and kept intact, included 17 large, hollow figurines, 40 polychrome vessels, several pottery boxes with covers, and various shell and obsidian ornaments and artifacts, including "mirrors" and shell trumpets. The University of California, Los Angeles had surveyed the Magdalena Lake Basin in 1962, and more intensive work was done there during 1963-1964; the hope of finding an unlooted tomb was not fulfilled, but the investigations yielded much information about the shaft-tomb complex in this area. Data were obtained about nine tombs in four cemeteries within a small area: El Arenal (3), Mary Pérez (3), Santa María (2), and Las Cuevas (1), in addition to the tomb at San Sebastián (see Long 1965: 44-60; Figures 4-13). Some of the information was obtained from Long's first-hand investigation of the tombs and study of material left behind by the looters, and some from informants in whose hands much of the tomb material remained.

The Magdalena Lake Basin tombs had from one to three chambers, located at the bottom of rectangular shafts which ranged from 3.5 to 11 meters in depth. There was no indication of the circular entry described for Las Cebollas, nor of retainer burials on the surface. In general, the chambers were three or four meters square, with inward-sloping walls and slightly vaulted roofs, although some of the smaller chambers were roughly oval; this form is also described for southern Nayarit, apparently for a tomb at Corral Falso (Corona Núñez 1954: 47). One single-chambered tomb (Mary Pérez, Tomb One) was barely large enough for one interment, while the San Sebastián tomb contained nine burials; the chambers of other tombs were said to have contained two, three, or four burials. Tomb One at El Arenal was aberrant in having one chamber, with a separate entrance shaft, at a level two meters above the other two chambers; this chamber was, however, also connected with the main entrance shaft (Long 1965: Figure 6); Corona Núñez (1954: 48) notes this as "un subtipo" in Nayarit, but does not locate it. The three tombs at Mary Pérez fall outside the usual pattern of constructing the chambers within the stratum of tepetate; here the tombs, all single-chambered and of relatively shallow depth, had merely been cut into the soil. It is possible, though not likely, that either there is no stratum of tepetate in this location, or that it lies at a depth unattainable by the existing technology. It seems more probable that, for whatever reason, no effort was made to reach it, since the chamber of the nearby San Sebastián tomb is cut into tepetate at a depth of five meters, and the three chambers of Tomb Two at El Arenal, about three kilometers to the northeast, were in tepetate at a depth of eleven meters. (None of the El Arenal tombs reported here is that discovered in 1954.)

In an effort to give provenience and chronological placement to the many figurines long known from this general area, and to reconstruct at least a partial culture history, Long studied the material from the San Sebastián tomb, the material (pottery vessels, figurine fragments, obsidian artifacts, shell, and bone) obtained personally from various looted tombs, and that in the hands of his informants. In addition to a stylistic analysis (Long 1965: 64-75; Appendix), he brought to bear upon it a variety of of dating techniques. The San Sebastián tomb material, which seems to have an indisputable provenience (a figurine arm found by Long in the tomb proved to fit a figurine in the Museum collection), forms the core of the analysis, but the other material considerably enlarged the scope of the results.

The San Sebastián tomb contained figurines of two distinctively different types, which Long has named San Sebastián Red and El Arenal Brown and assigns to different time periods. Intermediate between them he places the fine monochrome figurines -

Ameca Grey, in Long's terminology - so popular with collectors, which are said to come from the Ameca area south of the Magdalena Lake Basin. The San Sebastián Red figurines are of the type characterized by Kirchoff (1946: 51-54) as "Los Desnudos," and heretofore known only to occur in Early Ixtlán (Figure 22; see also Gifford 1950: Plates 4, 6). They are thick-bodied and thick-legged, with very thin arms (often both hands are placed on the upper abdomen); the heads are rather rounded but elongated, and the eyes and mouth may be mere horizontal slits. The figurines are red-slipped; they may be decorated with black paint (occasionally black and white), and negative painting is common. They may be nude, decorated with body paint, or be depicted wearing a brief skirt, shirt, or a waist-band; simple band headdresses, simple necklaces, and ear ornaments are usually present. Some figurines wear what is usually described as armor and a helmet. The Ameca Grey figurines have elongated faces, often finely molded, with large, thin noses, and frequently wear high cross-band turbans; some are also adorned with pellets on the shoulders. The forms are ample and smoothly rounded; many figurines depict seated women, holding a jar or a baby, and some represent what are thought to be warriors armed with clubs. The figurines are unslipped but burnished, and range from buff to grey to brown. Ornaments other than earrings are seldom depicted, and painted decoration is rare except for resist-painted scrolls on the breasts of the female figurines (Figures 23, 24; see also Arte Precolombino del Occidente de México: Plates 45-52, 54). The El Arenal Brown figurines (so named for the color of the paste) are known so far only for the cemeteries of the Magdalena Lake Basin. They have chunky bodies, thick, rounded legs, and short, stubby arms, sometimes decorated with shoulder pellets. The head is elongated and decorated with a head-band which sometimes resembles hair combed outward or downward from a center part; the face is a trifle less elongated than in the other two types, and the eyes and mouth are appliquéd. The figurines are red-slipped; earrings and nose-rings are indicated by appliqué, but other ornamentation (and often clothing) is rendered in white, black, or red paint (Figure 25). Some large figurines so far found only around Antonio Escobedo, a short distance east of Etzatlán, seem to be a distinctive and highly localized style. They show some characteristics of Long's named types, but cannot be fitted neatly into any of them (Figure 26; see also Parres Arias 1962).

On the basis of his stylistic analysis, Long postulates different time periods for each of his three figurine types; pottery vessels of similar wares, also found in

the tombs, are correlated with the figurines. In an effort to substantiate the admittedly tentative, style-based chronology, Long submitted other types of tomb material to the analysis. All bones from the San Sebastián tomb were examined under ultraviolet short-wave and long-wave light, and six bones (each a left tibia) were measured for nitrogen content. The fluorescent color-range and the nitrogen measurements were consistent in suggesting interments over a considerable period, but the results of the subsequent bone-collagen analysis were equivocal (Berger and Libby 1966, 1967). One bone sample (UCLA-966) from a presumed late interment gave a radiocarbon date of ca. 220 A.D., but the second sample (UCLA-1032), which should have dated an early interment, gave a date of ca. 335 A.D. (Long 1965: 90-92). Obsidian from the San Sebastián tomb and from one chamber of Tomb One at El Arenal was analyzed by the obsidian-hydration technique. The samples from El Arenal fell within a range which indicated a single period of use, while those from San Sebastián fell into two groups which suggested separate periods of tomb-use (Long 1965: 84-86). Three shell samples from the San Sebastián tomb were submitted for radiocarbon dating (Berger, Fergusson, and Libby 1965; Furst 1965); they gave dates of ca. 140 B.C. (UCLA-593A), ca. 280 B.C. (UCLA-593B), and ca. 240 A.D. (UCLA-593C). The first date was obtained from a Caribbean shell (Strombus gigus Linné), the second from an un-named Pacific shell, and the third from another Pacific shell (Murex nigritus Philippi). Subsequently, research on local upwelling and on the carbonate content of contemporary Pacific-coast marine shells obtained prior to the atomic-bomb tests has resulted in a revision of these dates (Berger, Taylor, and Libby 1966; Long and Taylor 1966), and the date sequence now is: B.C. 140, B.C. 120, and A.D. 400. The first date has not been revised, due to lack of comparable data from the Caribbean area; it is possible that considerable time may have elapsed before the shell found its way along the trade routes to West Mexico, and that it was placed in the tomb at a somewhat later date. Nevertheless, the Pacific-shell dates seem to reflect two different periods of tomb use, starting in the late Pre-Classic, while the bone-collagen dates suggest yet another period between them.

Obsidian-hydration analysis of material from a habitation site excavated at Las Cuevas showed a chronological overlap between the early habitation period and the period of tomb use, and a radiocarbon date of ca. 1110 A.D. for charcoal from Las Cuevas (UCLA-1017; Berger and Libby 1966) indicates occupation in the Early Post-Classic. Analysis of the pottery excavated from a habitation site at Huistla, on the outskirts of Etzatlán, showed that "Huistla's ceramics bear no relation to the known ceramic types found in the tombs" (Glassow 1967: 80); rather, they resemble the Aztatlán pottery of Nayarit and

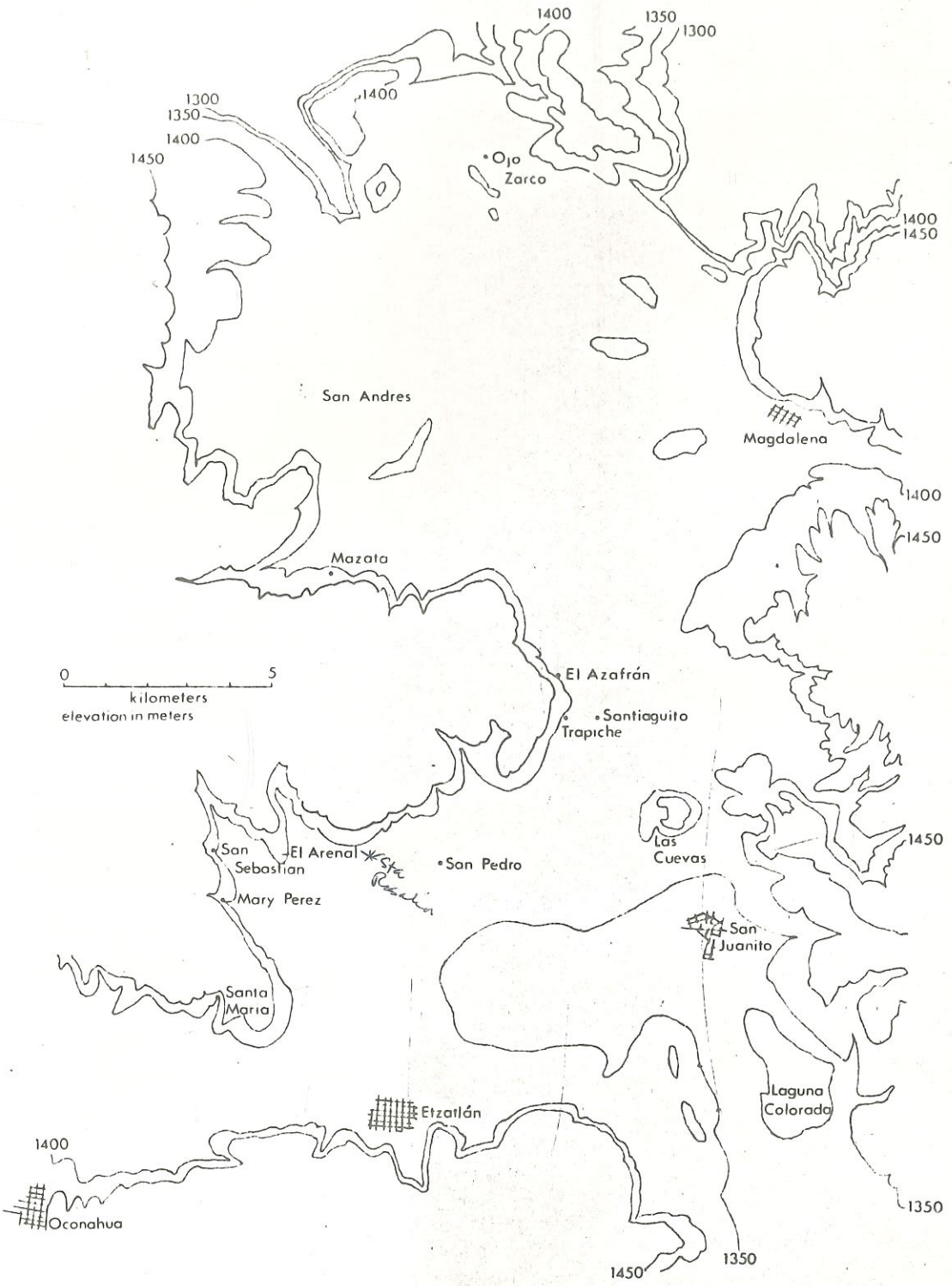


Fig. 4. Map of Magdalena Lake Basin

This tomb is unusual in having a separate shaft leading to one chamber. None of the Arenal tombs diagrammed here is the one from which samples were taken.

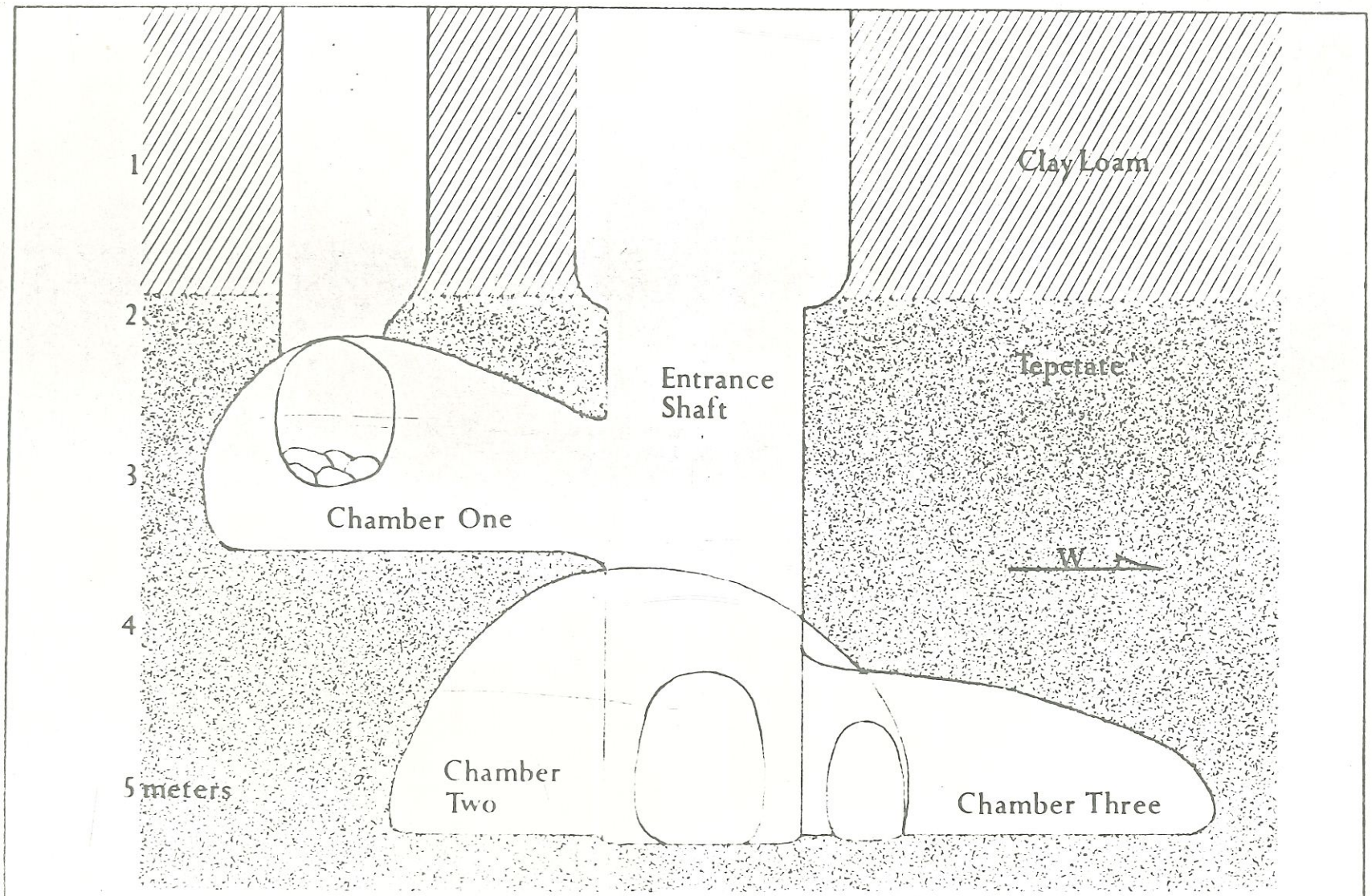


Fig. 6. El Arenal, Tomb One—Side View

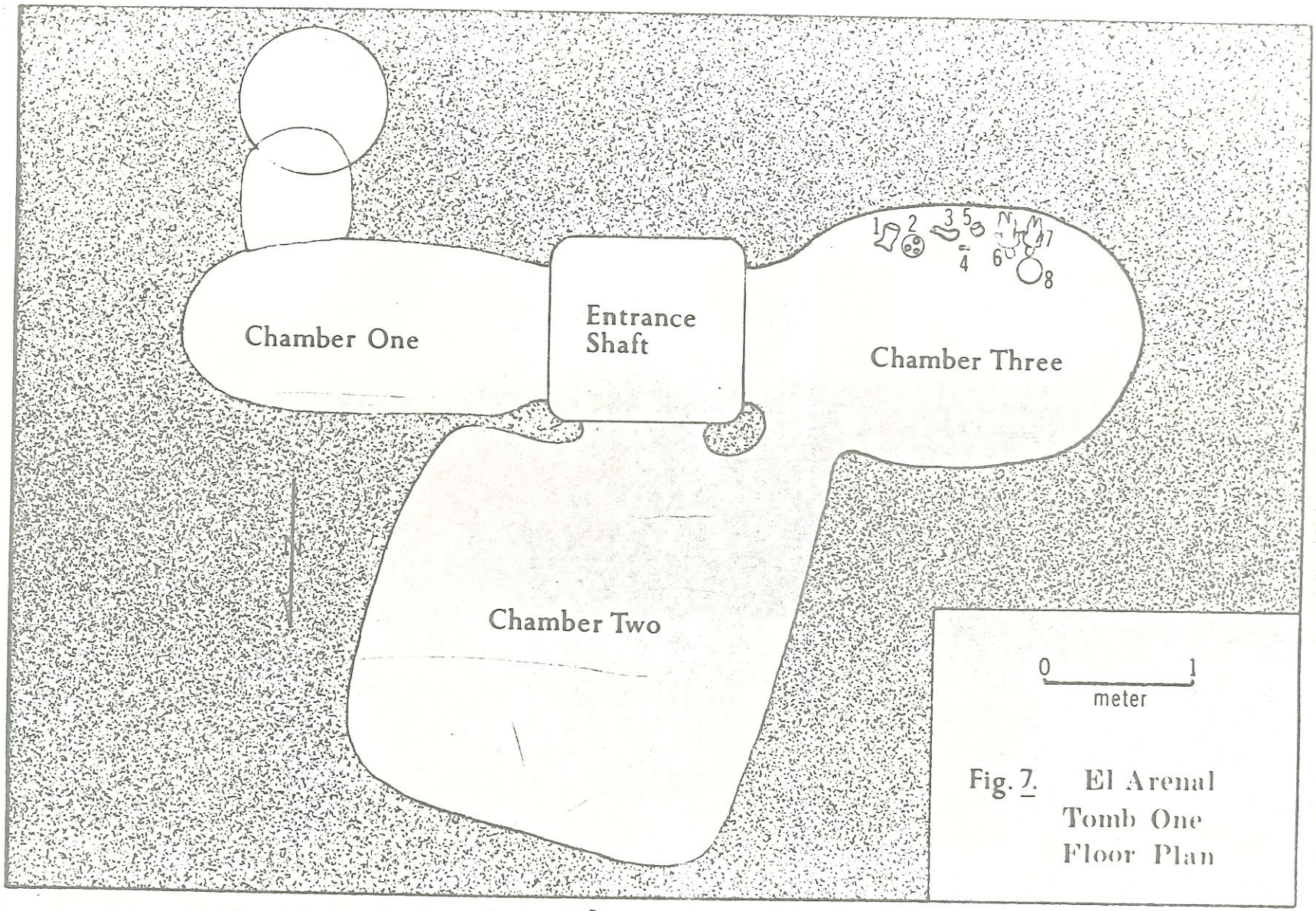


Fig. 7. El Arenal Tomb One Floor Plan

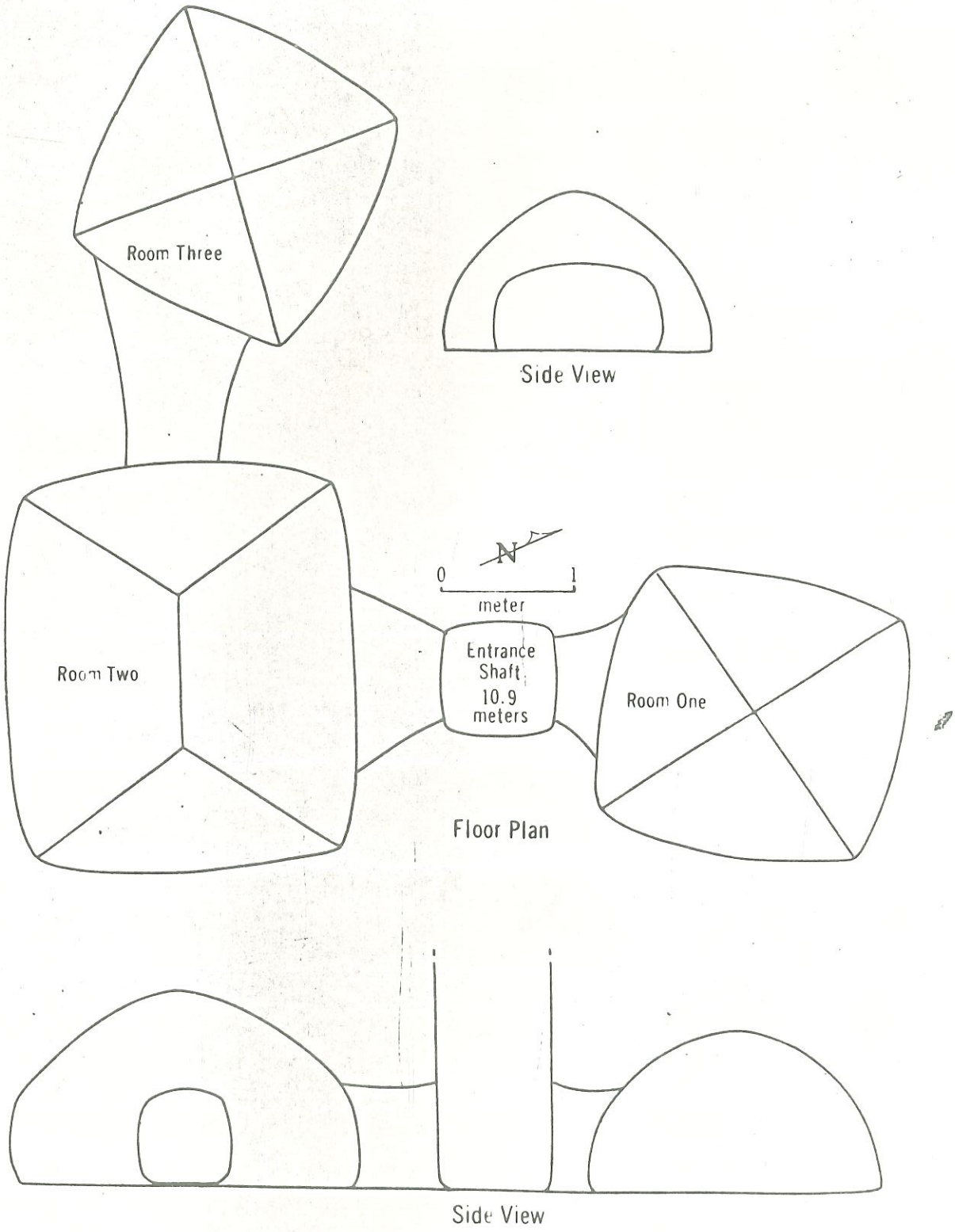


Fig. 8. El Arenal, Tomb Two

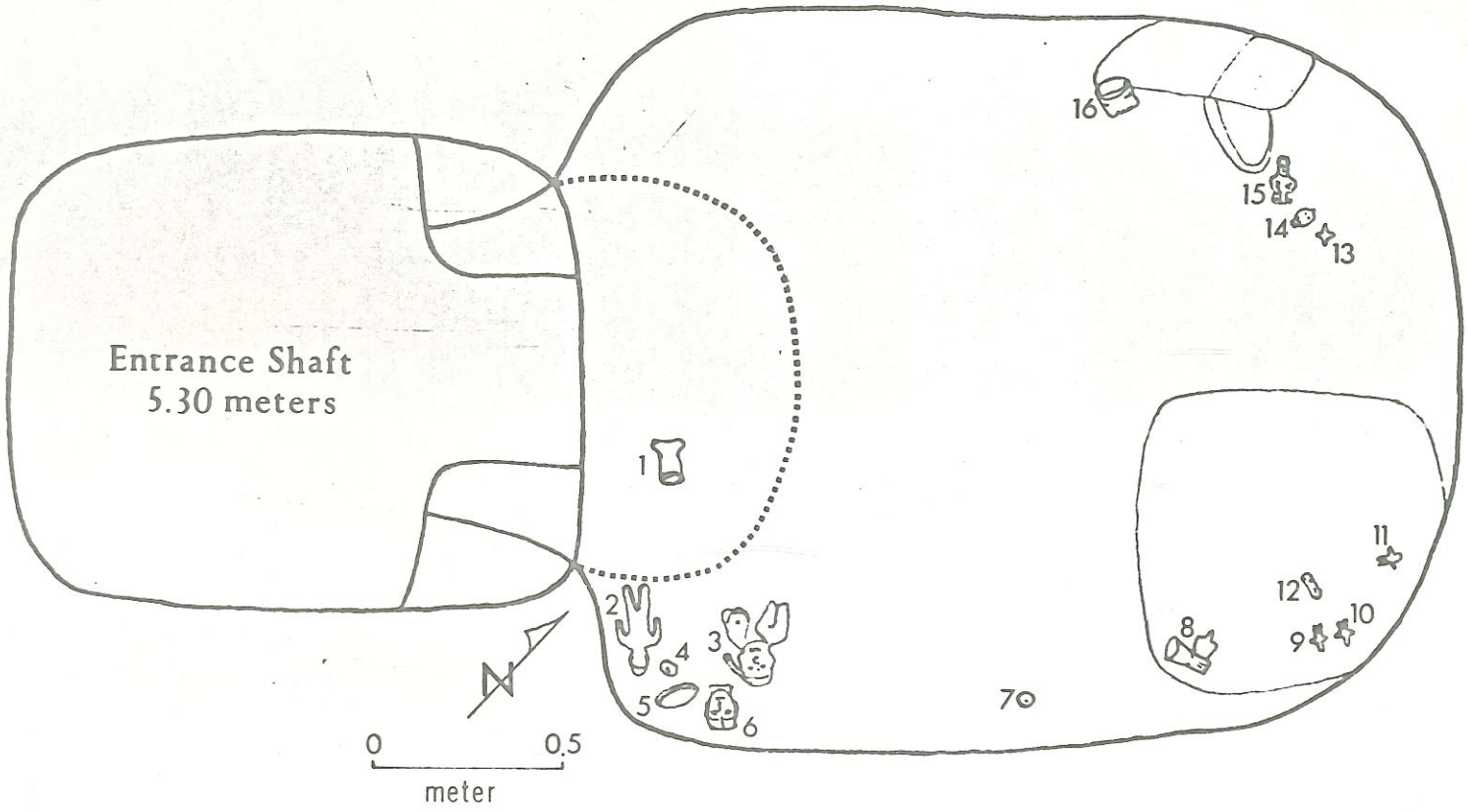


Fig. 9. El Arenal, Tomb Three–Floor Plan

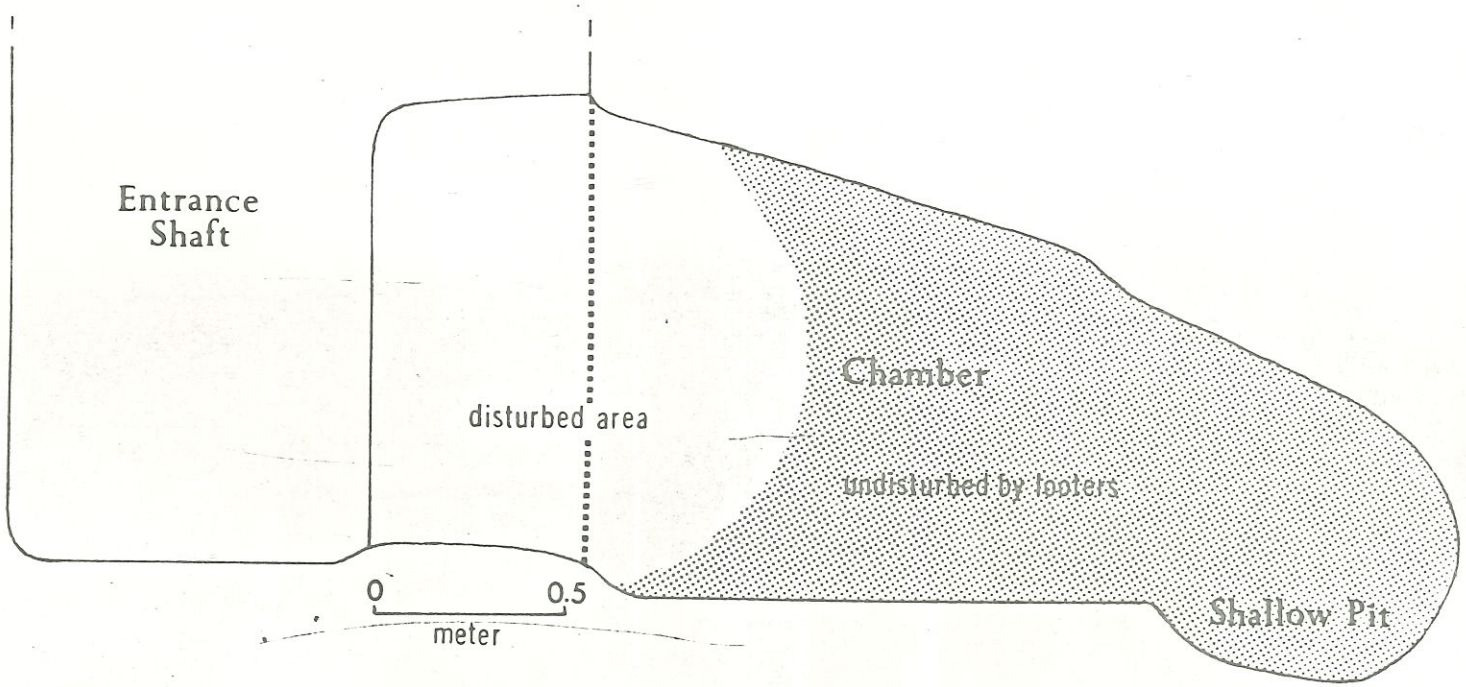


Fig. 10. El Arenal, Tomb Three—Side View

contained one extended supine burial (Fig. 11). Two large "warrior" figures (Fig. 188) were placed at the side of the chamber opposite the entrance, while the small figures (Fig. 189) were placed at the side of the entrance itself.

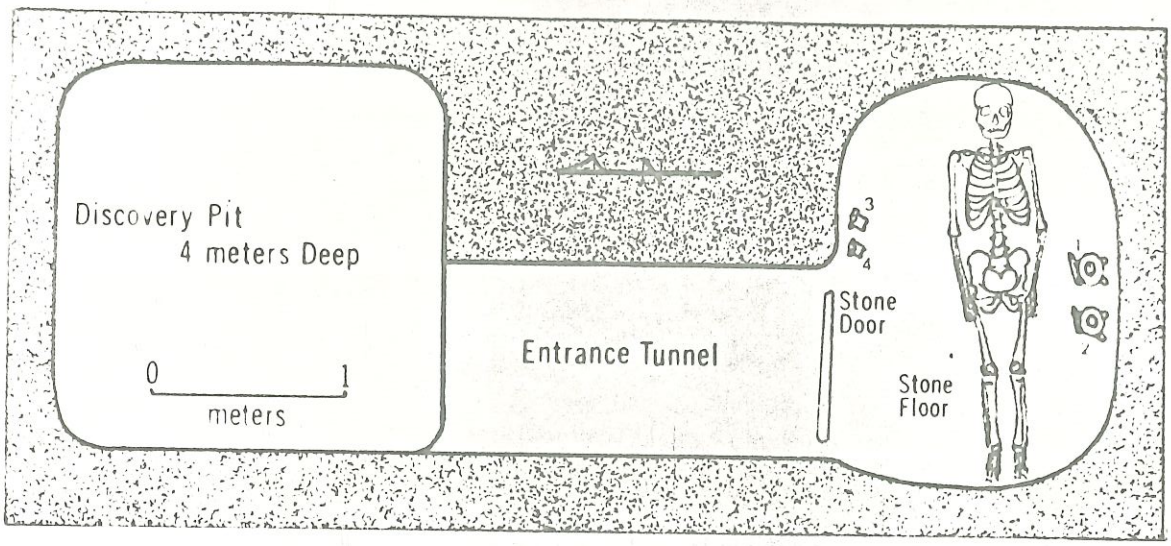


Fig. 11. Mary Perez, Tomb One

Artifacts: The large figures are mace-holding "warriors" of the San Sebastian Red type. They wear "woven" horned helmets, and armor over the upper torso. They each have loop appliqué rings inserted into slits in the ears, and one has a two-strand "bar" necklace. The figures are slipped red, and have negative (resist technique) wavy lines painted on the legs. Each is vented through a large hole in the top of the head.

Two of the associated figures are small, solid, seated females which are quite similar to the three small pendant figures (Fig. 179) and the seated figure (Fig. 177) from Tomb Three at El Arenal. They are reminiscent of Kelly's Ameca figures (also found at Mary Perez,

that both one- and two-chambered tombs have been found here, dug into the clay-loam earth. There is no near-surface tepetate layer. All information regarding this site was derived from informants, and from on-location investigations at the site area, accompanied by informants.

Tomb One.

This reportedly was a shallow (five-meter deep) one-chambered tomb (Fig. 12). There were four burials with associated artifacts. Clay figures were found placed at the sides of the entrance.

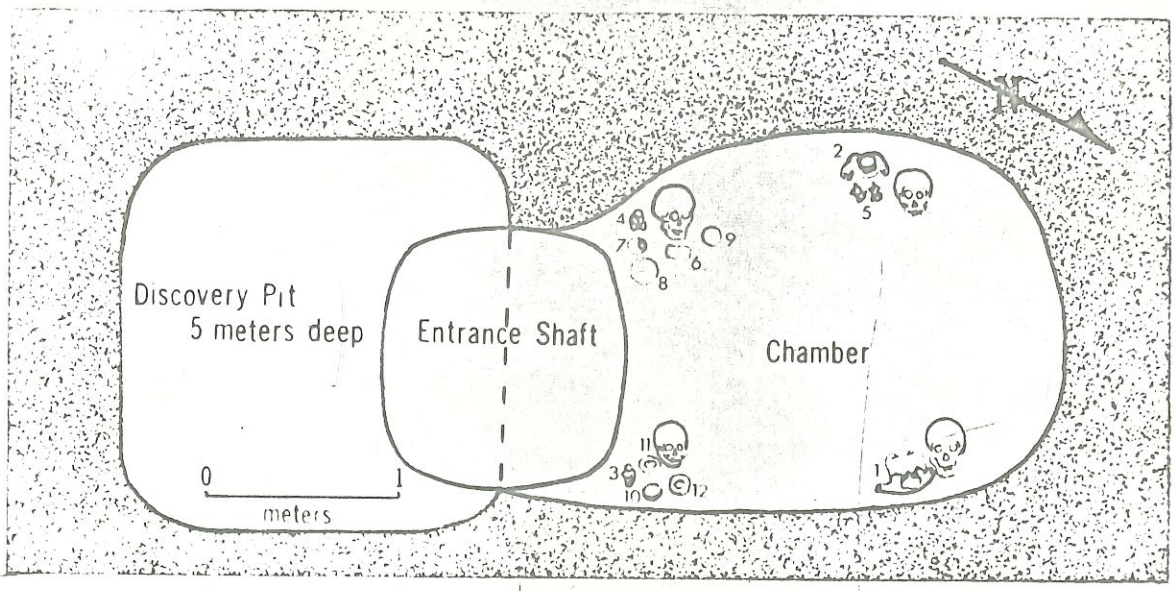
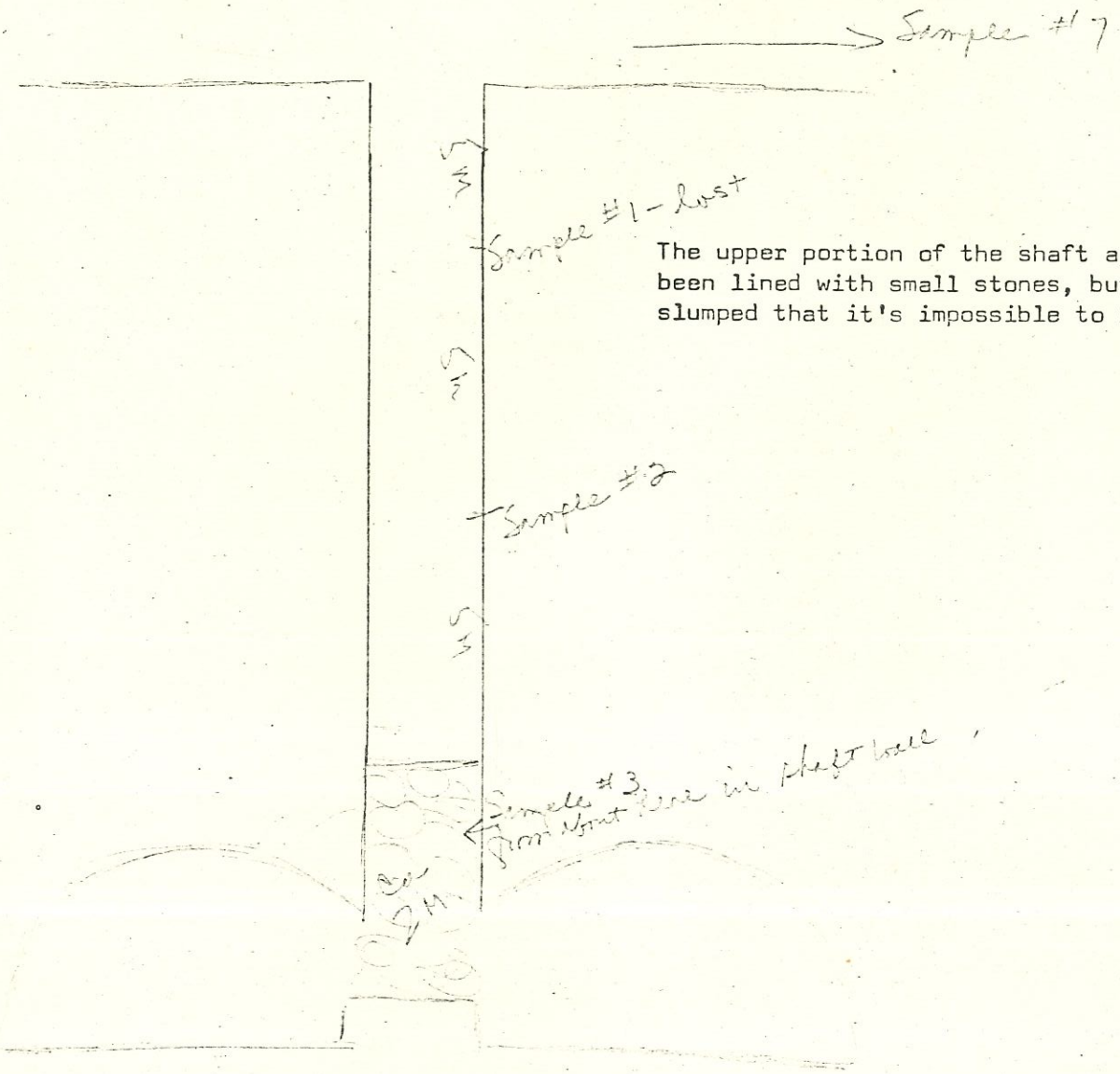


Fig. 12. Santa Maria, Tomb One (Chamber height = 1.5 m)

Artifacts: Found were two large hollow figures (one Ameca Gray, one El Arenal Brown), two small solid (Ameca Gray) figures, two gray dogs and nine vessels. One of the small solid figures (Fig. 196) portrays a male sucking some liquid from an olla through a tube. The two dogs were hollow, had punched pellet eyes, and were made of a fine textured gray paste.

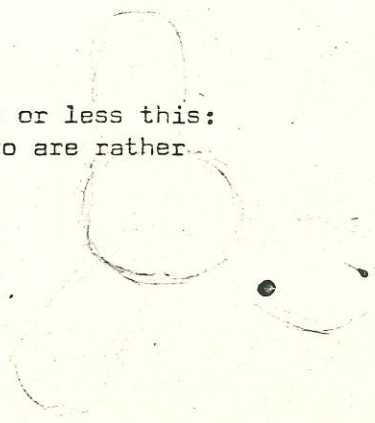
The vessels presented quite a variety (Fig. 197), including:

Obviously not drawn to scale.



The upper portion of the shaft appeared to have been lined with small stones, but so much has slumped that it's impossible to be certain.

The ground plan is supposed to be more or less this: the chambers aren't equidistant, but two are rather closer together.



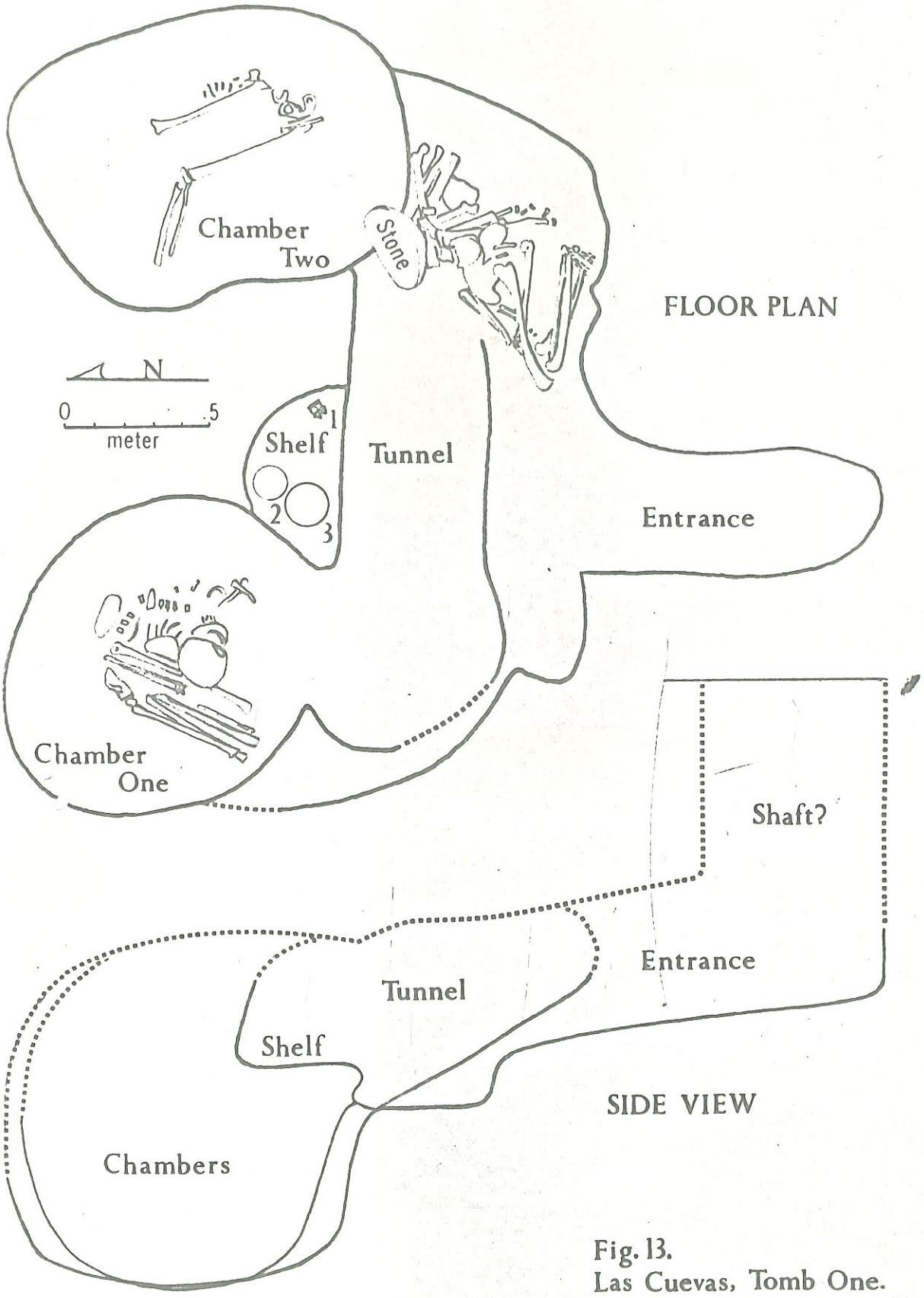


Fig. 13.
Las Cuevas, Tomb One.