

Arch. Techniques

COLORADO STATE UNIVERSITY

FORT COLLINS, COLORADO 80521

DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

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September 23, 1969

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

Dear Dr. Rainey:

Michael Coe suggested that I call you about a matter which I've been discussing with him and with Varian Associates regarding a new kind of application of the Cesium magnetometer. He thinks this is the kind of problem in which the Applied Science Center for Archaeology would definitely be interested - and needless to say, I hope so too. Your office reported that you were away this week, so I'm sending you copies of my correspondence with Varian and I will call again next week.

My letter to Varian outlines the problem. Failure to find an unlooted shaft tomb has bedeviled West Mexican archaeologists for many years, especially since each year we see a new flood of material from looted tombs appear on the antiquities market. I had no particular reason for believing that the Cesium magnetometer might work in this connection, except the supposition that an instrument which recorded intrusions into its steady-state reading might also record gaps in it. Since Mike has had some experience with the instrument, I asked him about this; he thought it might very well be so, and advised me to write to Varian. My guess proved to be correct, and Varian seems very encouraging about the chances for success.

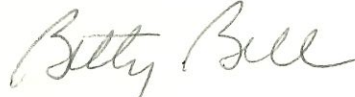
As my letter to Varian notes, I'll be doing some field work in northeastern Jalisco this winter, but I'd also have ample time to explore the shaft-tomb problem. I know it's a little late to start looking for money for leasing an instrument, but I hope it's not too late. Mike urged that arrangements be made for Varian to send its own technician, if the company doesn't do this routinely when leasing its equipment. He thought it would be useful for me to accept their offer to train me to whatever degree is possible given my lack of experience with the instrument, but he felt that the services of Varian's trained technician were crucial to his success at San Lorenzo. I think this would also be true of the shaft-tomb problem, since this appears to be the first negative-anomaly application in archaeology and it would no doubt take a skilled operator to interpret the results.

If arrangements must be made with my university rather than with me as an individual, there will be no problem. I have full support in every way except

financial, for this university, like many others, is on short rations this year where internal funding for research is concerned. If you want references or a curriculum vitae, I'll be happy to supply them.

I think this idea has some excellent possibilities for an entirely new kind of archaeological exploration, and I hope a way can be found to test them.

Sincerely,

A handwritten signature in cursive script that reads "Betty Bell". The letters are fluid and connected, with a prominent loop at the end of the word "Bell".

Betty Bell

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

September 8, 1969

Varian Associates
611-T Hansen Way
Palo Alto, California

Gentlemen:

I don't know which of your several divisions this letter should be addressed to, so I'll write it more or less at-large and hope that eventually it reaches the member of your organization who is interested in applying the cesium magnetometer to archaeological problems. Recently I asked Dr. Michael Coe if he thought the instrument could be used for a problem which is quite different from the one you worked on for him at San Lorenzo. He thought it might very well be so used, and suggested that I write to you about the matter. Specifically, what I have in mind is using it to locate a shaft tomb, and I'll try to explain the problem as briefly and clearly as possible.

A very large part of all the Pre-Columbian art now in private collections - and museums as well - has been looted from the shaft-and-chamber tombs of West Mexico. The culture history of this area is only now being pieced together bit by bit, and it's frustrating that the shaft tombs, which obviously were an important culture trait, remain the happy hunting ground of pot-hunters. The sad fact is that no archaeologist has ever found an unlooted shaft tomb, and until we do, there's a sizable gap in our knowledge of Pre-Columbian Mexico. I'm especially aware of the problem because for the past eight or ten years my own research field has been West Mexican archaeology.

We do know a few things about the tombs. For example, they quite certainly represent early, water-borne contact with South America, for they are confined to one relatively small area in the west of Mexico and their nearest neighbors are in Colombia and Ecuador. We know the assemblage of burial offerings which comes from them: the large, hollow, pottery figurines so coveted by collectors; small, solid figurines; conch-shell trumpets (curiously, most of these are made of Caribbean conch); pyrite mirrors; bone, stone, and shell ornaments; and elaborate polychrome pottery. By the time this material appears in the antiquities market, however, collections from individual tomb chambers have been broken up, and very little can be said about either provenience or context. We have radiocarbon dates which give an approximate range of 200 B.C. - 300 A.D. for the shaft-tomb complex; the pot-hunters often abandon material which they consider to have little market value, and frequently this includes shell which can be used for C-14 dates. We've come across enough looted tombs to have a fairly good idea of their construction, range in size, and so on - but until we find an unlooted tomb with all its contents intact, we lack a vital piece of information about West Mexican culture history.

The distribution of shaft tombs roughly follows the transverse volcanic axis across a part of West Mexico. At present they are known from southern Nayarit on down through central Jalisco and into Colima. There appears to be a gap in distribution for some distance along the western edge of the Jalisco plateau, but we don't know whether this is real or simply reflects more than usually imperfect knowledge.

The attached sketch indicates the construction of a shaft tomb. The main part of the shaft is about a meter in diameter, but a short distance below the surface it often starts widening out until it's roughly two meters in diameter at ground level. The depth of the shaft is known to range from about eight feet to as much as 25 or 30 feet. The tomb chambers are always hollowed out of a stratum of material known in Mexico as tepetate (a water-deposited volcanic tuff), which is found along the arc of the volcanic axis at varying depths below the surface. The builders of the tombs simply dug down until they reached the tepetate, and then generally went far enough into it to ensure that there was roughly two meters of stone above the ceiling of the burial chamber - a rough-and-ready engineering practice no doubt born of experience with the effect of ground pressure on underground chambers. Most commonly there is one chamber at the bottom of the shaft; occasionally there are two, and one looted tomb has three. The chambers vary in size from small, low cavities large enough for one or two burials, to chambers approximately twelve feet long and more than five feet high which probably held eight or ten burials and their accompanying offerings.

After all the burials had been placed in the tomb, the shaft was filled with dirt and rock. Presumably, the tops of these filled shafts are detectable on the surface in some way or other, because the pot-hunters admittedly aren't casting around at random, but archaeologists have no idea what to look for - and understandably, the pot-hunters won't part with this bit of information. If one were using some kind of testing device, however, there's help in the fact that the tombs do occur in "cemeteries" - small areas in which they seem to cluster thickly - so the presence of a looted tomb is rather a good indication of unlooted ones nearby.

Is there any possibility that the cesium magnetometer could be used for locating shaft tombs? Dr. Coe says, "As you probably know, there are two kinds of anomalies which can be detected by it. The first are positive, that is they detect objects or areas which have some slight degree of magnetism. It was this kind of anomaly that we took advantage of at San Lorenzo. The second kind is negative, that is the object or feature itself has no magnetism but the surrounding matrix does. It seems possible to me that at least the shafts of your chamber tombs might be picked up in this way." I know too little of the details of the instrument to have any clear idea of the chances for success, but I'd appreciate hearing from you if you think it has possibilities.

I'll be working in northeastern Jalisco next winter (mid-December to late March), at a site where I worked briefly last winter. There appear to be no shaft tombs in that area; instead, the typical shaft-tomb assemblage of mat-

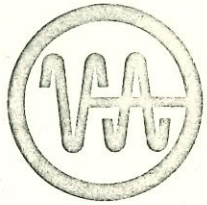
erial comes from deep burials covered with a thick layer of ash and a domed cap of clay. I won't be spending more than three or four weeks actually in the field at the site, however, and I think I'd have ample time to explore further into the shaft-tomb problem (I know the location of several tomb concentrations already), or to collect any specific data which you might need for evaluating this idea. And I believe there would be no difficulty in obtaining a permit for some reconnaissance of this sort.

Thank you for bearing with me patiently. If you think that the cesium magnetometer might be used to help solve this particular and frustrating archaeological problem, I'd like very much to hear from you.

Sincerely,

Betty Bell

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



September 17, 1969

Dr. Betty Bell
Department of Sociology and Anthropology
COLORADO STATE UNIVERSITY
Fort Collins, Colorado 80521

Dear Dr. Bell,

Thank you very much for your extremely interesting and informative letter of September 8.

From the information you supplied it would seem that the Cesium magnetometer would be well suited for use in the detection of shaft tombs. Most volcanic tuffs are highly magnetic--susceptibilities as high as 600×10^{-6} are not unusual--and the burial cavity (or cavities) should give a fairly sizable magnetic signal; i.e., to use Dr. Coe's terminology, the tombs, being voids in a surrounding magnetic matrix, will give rise to a negative anomaly. Also the Cesium sensor is sufficiently sensitive to detect disturbances in magnetic soils so that the shafts themselves, although filled in, should also give rise to an anomaly.

Examples of the use of the Cesium magnetometer in applications similar to the above are provided from Vietnam, where the Cesium magnetometer has been used with some success to detect tunnels (voids in a magnetic soil) and non-magnetic mines (disturbances of a magnetic soil).

Probably the best way to use the Cesium magnetometer would be to take the instrument to the location of a known tomb concentration and to then make several passes over the site of a looted shaft tomb. This would give you an indication of what a tomb "looks like" magnetically, so that you would be able to recognize the signal from an as yet uncovered tomb. It will then be necessary to stake out a grid pattern (a two meter grid suggests itself as being the most practical) over the area to be surveyed.

I really feel that our "space-age instrument" (as one of the more popular magazines described the Cesium magnetometer) will put you a jump ahead of even the most avid and experienced pot-hunters in the detection of these tombs.



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Dr. Betty Bell
Page 2
September 17, 1969

I am enclosing with this letter some data sheets on our instruments and also some technical articles which may be of interest to you.

I have deliberately refrained from quoting any prices or recommending any particular instrument in this letter as there are a number of instrumental possibilities varying from a simple hand-carried sensor with an audio readout to a dual-sensor, gradiometer set-up. The exact instrument configuration you choose will be determined by the degree of technical sophistication you feel necessary and by your budgetary limitations. Suffice it to say that we do have all the instruments described on the attached data sheets available for lease and that we do not presently anticipate any difficulties in supplying you with an instrument next winter.

Perhaps, after reading the enclosed information, you might care to contact us again to discuss the exact instrument details, as well as lease rates and availability. Incidentally, you don't mention in your letter whether you have had any experience in operating this type of instrument. If you haven't, we would be very glad to have you visit us out here for operational training and for any other advice we might be able to give you based on our experience from similar surveys.

Thank you again for your letter and for your interest in our company. We look forward to hearing from you.

Yours sincerely,

Peter Gotla, Manager
Geophysics Product Group
Analytical Instrument Division

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Enclosures

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COLORADO STATE UNIVERSITY

FORT COLLINS, COLORADO 80521

DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

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October 6, 1969

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

Dear Dr. Rainey:

Thank you very much for your advice and assistance with my idea about using the cesium magnetometer to search for unlooted shaft tombs. I hope it will be possible to do some preliminary testing when your technician is in Mexico this winter.

We'll be leaving for Mexico around December 10, and will be there until late March. My husband and I have a home near Guadalajara, and we'll be staying there a large part of the time. The work which I have planned will require about 20 days in the field, probably in two periods of ten days each, and I'll take the excavated material back to our home and finish working on it there. The site, at which I worked briefly last winter, is in the far northeastern corner of the state of Jalisco; I know the area fairly well, and I'm certain it harbors no shaft tombs.

There are, however, at least three shaft-tomb areas within about a three-hour drive of Guadalajara. Another area, which seems to be especially rich judging from the amount of loot attributed to it, is about a day's drive, due primarily to the difficulty of the terrain. We have a large four-wheel-drive vehicle - a GMC carry-all - so transportation is no problem, but no doubt it would be a wiser use of the time to concentrate on the areas which are closer. There is a looted shaft tomb in the cemetery of a little town only about 20 miles from where we live, but I doubt that this would be the ideal situation in which to try out the magnetometer.

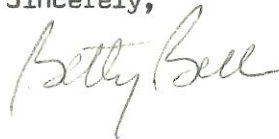
One of my students is going along to help with the field work, and we plan to take him around to some of the local archaeological areas - which will give me an opportunity to pin-point looted tombs. Only one of these trips will take us away from home for more than a day, so messages should reach us with little delay. It would help if we could

have a general idea of when the technician might arrive, but roughly a week's notice of a definite arrival would give us time to make certain that we can meet him in Guadalajara and have things arranged so that he can start to work promptly.

Thank you again. I was pleased to learn that you're interested in making a rather extensive magnetometer survey in Mexico, not only because my problem might form part of it, but also because I think it could be very useful to Mexican archaeology as a whole. If the results of preliminary shaft-tomb testing seemed promising, then I would definitely plan more extensive work for the following winter.

You mentioned that you had discussed the magnetometer survey with Ignacio Bernal, and I wondered if your arrangements with him allow you to go into whatever area you choose for the purpose of surveying. If they don't, perhaps I should ask for an additional permit or a letter to cover the shaft-tomb testing. Probably there would be no difficulty if we didn't have one for a job of this kind, but it might be well to have an official-looking piece of paper just in case some village authority became curious.

Sincerely,

A handwritten signature in cursive script that reads "Betty Bell". The signature is written in dark ink and is positioned below the word "Sincerely,".

Betty Bell

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

COLORADO STATE UNIVERSITY

FORT COLLINS, COLORADO 80521

DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

December 1, 1969

Dr. Froelich Rainey
University Museum
Philadelphia, Pennsylvania

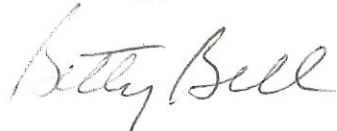
Dear Dr. Rainey:

We will be leaving for Mexico on December 10, and I wondered if you had any further information on whether it would be possible for you to send a technician to Guadalajara to do some preliminary testing for shaft tombs with the Cesium magnetometer. As I recall, you said that your technician would return from Europe in early November, and that you would then have a better idea of the winter's schedule. I'll call you some time in the next week and find out what the situation is.

Our address in Mexico is Apartado 84, Ajijic, Jalisco. There's only one phone in the village and it's usually out of order, but we can be reached via Chapala 69. This is the Chula Vista Motel, about half-way between Ajijic and Chapala, where the managers take telephone messages for us and deliver them promptly. (Both of the managers - Enrique Rojas and Antonio Shafer - speak English, and if they seem uncertain about my professional name, they'll recognize me readily as the wife of Dr. William Winnie.) We're about 35 miles from Guadalajara - only about 20 from its airport - and it's easy for us to meet planes.

As things now stand, we'll have to be back in the United States around the middle of March. Needless to say, I hope that some preliminary work can be done this winter, and I'll undertake to have things arranged so as to make the best use of your technician's limited time.

Sincerely,



Betty Bell

October 30, 1970

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

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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 at 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 prove 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 in print) 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 accommodations. 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 night. 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 regard 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

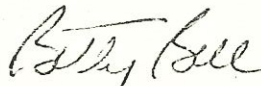
INAH itself will change in about a month, when the new president of Mexico takes office. I know most of the present archaeological officials, but I don't yet know who'll be replacing them, and it will be impossible to arrange for any official representation until after the new people take over. All in 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

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.

February 2, 1971

Dear Betty:

I just now have your letter of the 25th and also the form for the American Philosophical Society which will go off today. Sorry you haven't had more exciting results so far but I am not really very much surprised. One look at all that volcanic terrain and I became very uneasy about the possibility of a magnetometer. In any case, it is a good try and maybe some other site will pan out. I haven't heard from Beth recently and we are all wondering about her plans for returning. There is no hurry and we certainly should cover that whole area with a real try.

By this time, I hope Bruce has recovered from the Aztec Revenge and is feeling more chipper. Will you please tell him and Beth that we have a whole mass of air photo data from England and that we will expect to set up a meeting with all concerned persons sometime in March, probably here in the States. I shall be back from Europe in March.

I really enjoyed our very brief excavations into the archaeology of Western Mexico and also meeting you and Bill so if something interesting develops there, do keep us in mind for some sort of joint expedition. Both Sam Cappenter and Hugh Sharp were delighted with our whole trip.

All the best to you both and I hope to see you again before long.

Regards,

Froelich Rainey
Director

Mrs. Betty Bell
Apartadd 84
~~Ajijic~~, Jalisco, Mexico

Ajijic

January 25, 1971

Dear Fro:

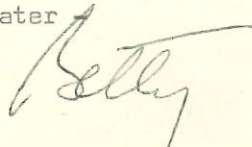
Beth has already written to you, so probably there's not much that I can add. The results of the seismographic tests were rather blurry. I dug a pit to check one faint anomaly, but could find no reason for it - except, as suggested by one of our pot-hunter workmen, the machine might have recorded a little burrow-hole dug out to one side of a nearby (and unsuccessful) pot-hunters' pit. A great many of those mostly-filled pits were dry holes; the pot-hunters dig down to the tepetate, inspect it, and if they don't find the right "signs," close it up again. As to what surface indications lead to these explorations, accounts are still mixed. One of our workmen, probably Sta. Rosalía's chief pot-hunter, seems to be giving straightforward accounts of everything, and, oddly, to be interested in our finding an unlooted tomb. They're all fascinated by the machines, and disappointed that we haven't been led directly to an unlooted tomb. When the seismic anomaly didn't pan out, one of them commented disapprovingly, "Que mentirosa la máquina!" A big magnetic anomaly, confirmed by the seismograph, was apparently due to a huge rock - buried in soil so nearly like concrete that there was no chance that "los indios" had ever monkeyed around in it. Just before I left, Bruce had found a nice linear anomaly which suggests the stones around the top of a shaft, and they're going to check it further with the magnetometer and the seismograph. (When I left on Saturday, Bruce was immobilized with the Aztec Two-Step, but nothing of the sort would dare happen to Beth.)

I came home for a couple of days to catch up on a few things, and when I go back on Tuesday I'll dig the linear anomaly - even if the test results are equivocal. I'm just curious about it. I'm also going to move operations to Cerro Molcajete, just east of Sta. Rosalía. One of the problems where we've been working is that the local tepetate is so like the soil in composition that it's difficult to get clear indications. And this seems to be the case in virtually all of the sites around that little inlet. At Cerro Molcajete, however, there's no tepetate - or at least it isn't called that. The soil rests directly on what the locals call "hormigón" - a pinkish, porous volcanic tuff, which rather resembles the tepetate described in most of the literature. Bruce has looked at the hill and at the chunks of hormigón lying around, and thinks the situation might be better there. There aren't many tombs there, but Molcajete is said to yield some of the fanciest stuff in the area, much sought after by the compradores.

I'd also like to go over to Ahualulco, six or eight miles east, to run the portable search magnetometer around a couple of mounds near the highway there. An archaeologist whom I know has a grant to dig them next summer (his interest is mainly the Post-Classic), so I shouldn't dig holes in his bailiwick, but I'll send him the information if the tests suggest anything. For that matter, I think he'd have no objection if I went up with him next summer and dug a few holes of my own, since he isn't overly interested in the shaft-tomb period.

We're all settled more or less comfortably amid the seedy pleasures of the Hotel Cadillac, which really isn't too bad. The cuisine in Etzatlán is far short of gourmet (for how many days in a row can you eat tacos and rice?), but at least there's hot water and the power hasn't failed. Bill comes up from time to time, and we all keep plugging along. I know the tests may not turn out to be successful, but meanwhile it's a real nice clam-bake and I'm having a fine time. (Though perhaps Bruce, skulking in the Cadillac with his bottle of Entero-Vioformo, might not say the same.) I'll go back up tomorrow, and vamos a ver.

More later



I've taken the liberty of giving your name as a reference in applying to the American Philosophical Society for a small grant to cover my part of the current project. It isn't a huge sum, but I thought I'd make a try for a grant, even though it'll be rather post hoc as far as the work is concerned. I don't know if they'll think it proper to list you as a reference inasmuch as the Center is financing most of the work, but we shall see.

February 8, 1971

Beth R.
Please return for
Dr. R. to see
Thanks
J.C.

Dear Fro:

By now you've no doubt had a full report from Beth, and we're about to leave for Laredo to renew car papers, but I wanted to write you a note before we leave. I'll write my report for INAH when we return, and I'll send you copies of it.

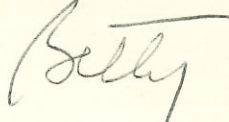
I'm sorry this first attempt wasn't a glittering success, but I haven't given up all hope. Bill and I will go back to Etzatlén in a few weeks and check out some other sites where the soil and rocks are said to be different, and I'll send up some samples. These other sites were either farther away, or access to them required permission which took too long to obtain at the last minute, but perhaps their suitability can be checked by lab analysis of the material from them. It's useless to wish that we'd known at the start what we learned during the course of the work, so I'll just continue to poke at the problem.

I'm deeply grateful for all you've done, and while I'm sorry we didn't locate an unlooted tomb, I've learned a great deal during the past month - and enjoyed myself thoroughly in the process. Now that I've returned to hot showers, a decent bed, and something other than tacos for dinner, I've started to miss the Hotel Cadillac, the rocky road to Sta. Rosalia, and the hours spent plodding over the hills in the blazing sun. Beth and Bruce and Harry Mayne did a splendid job, and I hope they weren't too uncomfortable while they were doing it.

I wrote some paragraphs about the test pits for Beth's report, and I'll add anything else you may need. I'll get the information about the instruments from that report, and probably I'll write Bruce for more detailed information about the soils and rocks. I've been invited to give a paper in the West Mexico symposium at the 1971 SAA meeting, and if you have no objection, I'd like to report briefly on this work. If nothing else, I may now be West Mexican archaeology's leading expert on tepetate.

Thank you again. We hope you can stay longer the next time you come down; our guest house is almost finished, and you're welcome to use it any time you want to.

Best,



Betty Bell

May 5, 1971

Dear Betty:

I don't know whether you have heard anything from Ignacio Bernal or Otto Schondube but when Ignacio was here to receive his Lucy Wharton Drexel medal, we had a long talk about future investigation in Western Mexico trying to find one of those virgin shaft tombs. I explained that we had two duPont directors now as members of our Board, Sam Carpenter and Hugh Sharp, both of whom are interested in Latin America, aerial photography, and air planes so I thought the quest of the tombs in Western Mexico was a natural to enthuse these gentlemen. Therefore, if the instruments don't work, I think we should try everything else possible in the search for the tombs. Neither Ignacio nor Schondube found objection to a bulldozer on a small area on one of the sites and Schondube even said he would like to join us if he could be of help.

So, let's try to work out some plan for October or November of this year. I told Ignacio I would officially be the representative of The University Museum and that I would write to you to try and work out some sort of collaboration in this search and that if he wants to assign somebody representing the Mexicans, that would probably be satisfactory with you, as it was with me. In any case, this ought to be fun and I hope you can work it out so that it also looks good to some of the stuffer members of our profession.

All best wishes,

Froelich Rainey
Director

Dr. Betty Bell
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