P. O. Box 3825
Greenville, Del.
Nov. 14, 1963

UNIVERSITY OF PENNSYLVANIA
Professor of Physics
Philadelphia, Penna.

Dear Sir:

Would you please send me all available information concerning Carbon 14 dating.

I am using this subject for a term paper in Plain Physics.

If there are any charges I will be glad to pay them.

Very truly yours,
John Hartman
John T. Hartman

Kucushka reply?

November 26, 1963

Mr. John T. Hartman
P.O. Box 3825
Greenville, Delaware

Dear Mr. Hartman:

Carbon-14 measurements are used in both geology and archaeology. They have been used to determine the time of the ice ages and other things important to the geologist. In each, they are used to attempt to place in time events which happened before recorded history.

There are two basic problems which affect the accuracy of the method. One is an inherent problem of the dating method; the other one of sample collection. First, a few principles around which the method is based.

In the upper atmosphere cosmic rays bombard nitrogen atoms, and this reaction produces Carbon-14. Now if this cosmic ray intensity were to be constant, then Carbon-14 production would also be constant. Luckily, the cosmic ray intensity is so nearly constant that the rate of Carbon-14 production is assumed constant with no dire effects. After Carbon-14 is produced, it then burns into Carbon-14 dioxide and mixes with common Carbon-12 dioxide. This kixture will be absorbed by plants during photosynthesis, the plants in turn eaten by animals, that is, the mixture will go through the carbon dioxide cycle and hence every living thing will have this mixture of Carbon-14 and Carbon-12 in its makeup. Besides this, Carbon-14 is radioactive and is thus constantly decaying. Here we come to the most important part; if there is a constant amount being produced and a constant amount decaying, then there should be a constant equilibrium amount of Carbon-14 in all living matter; and second, when an animal or plant dies, it is no longer in the carbon dioxide cycle, it no longer taken is new Carbon-14, and the Carbon-14 content slowly disappears by the radioactive decay process. So in principle all that is needed to date a sample is first to know the actual equilibrium amount in living things, and second, to determine the amount of Carbon-14 remaining in the sample.

The error in method arises from the nature if radioactivity. First of all, radioactive decay is a random process and only a statistical average of the number of decays per minute can be measured. This in itself leads to errors of from thirty to two hundred years depending upon the age of the sample. A typical date would be 2000 + 60 years old. Also with Carbon-14 there is an uncertainty as to its half life value. Half life is defined as

the time required for one half of the original radioactive material to disintegrate. This constant is necessary in order to calculate dates from disintegration data. Here agin, the error is within a few percent and when added statistically makes a small difference. And ordinary date of 2000 ± 60 would now read 2000 ± 67.

The second type of error is the more difficult because its magnitude can not be estimated. It stems from the fact that the date given for a sample is the time since that sample died. Thus, if the sample submitted for dating is a piece of beam, that wood may have died long before the tree was cut (the only living part ofa tree being its outer rings) and the structure would be dated too old. Also fungus and moss growth on samples or even organic washes from pastures and fileds over covered sites contaminate samples with more modern carbon and hence give rise to dates too young. While this indictment may seem staggering, the most efficient way to avoid gross errors of this nature is to date a series of samples from the same site so that the obviously contaminated or non-representative samples can be weeded out by their lack of agreement with the others.

A good source of more information on Carbon-14 is found in "Physics and Archaeology" by M.J. Aitken, Intersdience Publishers, 1961; some additional help may be found in the enclosed brochure from Isotopes, Inc., a commercial Carbon-14 laboratory at 123 Weedland Avenue, Westwood, New Jersey. A reprint of one our date lists is enclosed so that you may see the dates as they finally appear.

Good luck on your term paper.

Very truly yours,

Robert Stuckenrath, jr.
Radiocarbon Laboratory

301 Steel Road
Cape May Court House, N.J.

January 2, 1964

Ralph
What about
this?
7502

Dr. Frolisch Rainey
University Museum
34th Spruce St.
Phila. 4, Pa.

Dear Dr. Rainey:

On the suggestion of Dr. Horace Richards of the Academy of Natural Sciences of Philadelphia, I am asking your help in connection with a project for the forthcoming New York Worlds Fair.

Perhaps you have heard of the old art of cedar shingle mining that was practiced in Cape May County years ago. This aspect of early New Jersey industry is to be included in the New Jersey exhibit.

I have recently "mined" a few cedar logs and have hand split shingles from them for the fair display. The question has frequently arisen as to the age of these cedar logs buried in the swamps of South Jersey - speculations from 300 - 3000 years. I have a sample from a large white cedar log taken from a depth of approximately 8 ft. It would be interesting to be able to include in the fair exhibit a Carbon-14 determination of this old wood.

Any help that you could give me in having this test made would be very much appreciated.

Sincerely

Lewis P. Albrecht, Jr.

L. P. Albrecht, Jr.

January 7, 1964

Mr. L. P. Albrecht, Jr.
301 Steel Road
Cape May Court House, N. J.

Dear Mr. Albrecht:

Dr. Rainey has asked me to reply to your letter of January 2nd in regard to the dating of a cedar log from southern New Jersey.

Unfortunately, we have too many samples waiting to be dated which have been submitted by members of the staff of the University Museum so that we may not promise to date new samples sooner than two years hence.

There is a good commercial C-14 laboratory which does not have such a backlog of samples - namely, Isotopes, Inc. 123 Woodland Avenue, Westwood, N. J. Their charge is approximately $175 per sample.

Another possible laboratory is that of the Laimont Geological Observatory, Columbia University, Palisades, N.Y. (Dr. W. S. Broecker). They are more interested in dating samples with geological significance whereas ours are primarily archaeological.

To determine the time when the tree died, it would be necessary to take your sample (about one ounce) from the outer growth rings of the log.

Sincerely yours,

Elizabeth K. Ralph

EKR:ek

E. Wreschner

קרן לחקירות פריהיסטוריות בישראל

CENTRE DE RECHERCHES PRÉHISTORIQUES EN ISRAËL

B. P. ~~1502~~ 9075 ת. ד.

Haifa
Jérusalem, le 27.2.67. ירושלים

Dr. Robert Stuckenrath jr.
Radiocarbon Laboratory
University of Pennsylvania.

Your letter 29.5.65.

Dear Dr. Stuckenrath,

As you possibly remember, I sent samples of material from the neolithic site of Jiwath Hapansa for C14 dating.

Have you any information concerning the results or readings?

With thanks

Yours sincerely

Emil Wreschner

March 2, 1967

Dr. E. Wreschner
Centre de Recherches Prehistoriques en Israel
B. P. 9075
Haifa, Israel

Dear Dr. Wreschner:

Thank you for your note of February 27th regarding your radiocarbon samples. In our normal schedule of dating, we do all those samples on hand from South America, then Central America, then the North American Arctic, the Pacific, and finally, the Medietrranean and Near East, before swinging back to the Americas again. We are now beginning those samples from your part of the world, dating first those samples which have been on hand for the longest time.

Additionally, we have been plagued for the past few weeks with circuit problems, and are now recalibrating our equipment before proceeding with further dating to insure the greatest accuracy possible.

At the present rate of progress, we can hope to get down the list to your samples sometime during this Spring. You shall have the dates just as soon as we count your samples.

If you have any further questions, please don't hesitate to write.

Sincerely,

Robert Stuckenrath, jr.
Radiocarbon Laboratory

Ralph
Nuts!

A. BURKS SUMMERS

HOLLY OAKS, TILDEN LANE
ROCKVILLE, MARYLAND 20852

301 / 946-5430

Can you use
that in a
news way?
JHS

January 12, 1967

Dr. Froelich Rainey
Director
University Museum
University of Pennsylvania
201 South 34th Street
Philadelphia, Pennsylvania 19104

Dear Dr. Rainey:

Dr. Lawrence Angel of the Smithsonian Institute has suggested that we confer with you on the possibility of having some bone specimens checked for their age classification. The skeleton came from a tomb in northern Tchad a year ago.

In company with the Honorable Maurice Stans, former Director of the Budget, we covered this territory, specifically the area northeast of Fada during November and December, 1965. We were primarily collecting animal specimens for the Children's Museum of Rock Hall, South Carolina.

There are large numbers of graves here which consist primarily of rock cairns surrounding a more formal stone tomb. Some of these cairns have thousands of rocks piled upon them, many of very considerable size, and are as large as a small pyramid.

Due to the fact that the Smithsonian Institute is nine months behind with their work, they suggested that we might call upon you for this information through the Carbon 14 tests.

The Stans-Summers Expedition carried Explorer's Club Flag No. 182. In addition to the graves, we made a pictorial record and especially of cave paintings, which are particularly clear in this area. A French university has classified these paintings as approximately six thousand years of age. An interesting feature is that the dancing girls series are almost duplicates both in dress and posture of those to be found on the walls of Angkor Wat six thousand miles away.

Your consideration and that of Dr. Beth Ralph will be appreciated.

I am a former graduate of the University.

Very sincerely,

A. Burks Summers

cc: Hon. Maurice H. Stans
785 Fifth Avenue
Apartment 11 B
New York, New York 10022

January 18, 1967

Dr. A. Burks Summers
Holly Oaks
Tilden Lane
Rockville, Maryland 20852

Dear Dr. Summers:

Dr. Rainey has asked me to reply to your letter of January 12 in regard to dating a skeleton from a tomb in northern Tehad.

Unfortunately, we have also a large backlog of samples to be dated - we are more than a year behind. Therefore, we are not able to accept new samples except from the expeditions of the University Museum or closely related studies.

Another C-14 laboratory in Washington which has a larger counting capacity is the following:

Dr. Meyer Rubin
U. S. Geological Survey
Washington, D. C. 20242

It might be possible to interest Dr. Rubin in dating your samples.

There is also a commercial laboratory that does reliable analyses and which reports results within three to four weeks - namely

Isotopes, Inc.
123 Woodland Avenue
Westwood, New Jersey

Their charge is approximately $150 per sample.

I regret that we are so slow in our counting.

Sincerely yours,

EKR:pc

Beth Ralph

May 9, 1968

Dear Walter:

Just a note to say that I have been in touch with Henry Borstling and he has arranged to do the magnetometer survey for you on the weekend of May 25 and 26 if that is satisfactory. Will you ask your staff member concerned with this to send me a note about where and when and how Borstling should meet him on May 25.

All the best.

Sincerely,

Froelich Rainey
Director

Dr. Walter J. Heacock
General Director
Hagley Foundation
Greenville, Delaware 19807

FR/jt

ELEUTHERIAN MILLS-
HAGLEY FOUNDATION
INCORPORATED

Greenville • Wilmington • Delaware • 19807

May 7, 1968

Dr. Froelich Rainey
Director
The University Museum
Thirty-third and Spruce Streets
Philadelphia, Pennsylvania 19104

Dear Fro:

Thank you for your note of May 2 and for your cooperation in making Mr. Borstling available for a magnetometer survey here. The staff member who will work with him is away until May 20, but any weekend after that will be satisfactory.

I plan to be present on Saturday, June 8, for the 10:30 Bicentennial meeting.

Yours very truly,

Walter J. Heacock
General Director

WJH:f

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Soil Survey Laboratory
4th Floor, 1325 "N" Street
Lincoln, Nebraska 68508

June 17, 1968

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

Dear Miss Ralph:

Mr. Walter Lyford referred me to you. He recently sent me a progress report on his work with a portable cesium magnetometer. I am interested in its use to locate previous soil sampling pits that have been filled. It would seem feasible to bury a piece of metal when the pit is originally filled. Would you have any comments on the kind of metal, size of object, and depth of burial, as these would affect the distance that the piece of metal could be detected?

Sincerely,

Robert B. Grossman/dp

Robert B. Grossman, Head
Soil Survey Laboratory

July 17, 1968

Dr. Robert B. Grossman, Head
Soil Survey Laboratory
4th Floor, 1325 "N" Street
Lincoln, Nebraska 68508

Dear Dr. Grossman:

In regard to locating previous soil sampling pits that have been filled, by means of magnetometers, I think that the best things to "plant" in them would be Aluico magnets. A cylindrical magnet about 1 cm in diameter and 4 cm long can readily be detedted at a depth of 1 meter and possibly at 2 meters.

For more precise information both about the magnets and the purchase of a cesium magnetometer, I suggest that you write to Dr. Sheldon Breiner, Analytical Instruments Division, Varian Associates, 611 Hansen Way, Palo Alto, California 94303.

Please excuse my delay in replying - have just returned from field trips abroad.

Sincerely yours,

Elizabeth K. Ralph

EKR:kw

HUNTSVILLE CHAPTER
ALABAMA ARCHAEOLOGICAL SOCIETY

7608 Teal Drive, SW
Huntsville, Alabama 35802
August 1, 1968

Dr. Froelich Rainey
Director of the University Museum
University of Pennsylvania 19100

Dear Dr. Rainey:

The magnetometers discussed in your articles in the 23 Sep 66 issue of "Science"(Vol. 153) and in Volume 110, Number 2 (22 Apr 66) of the Proceedings of the American Philosophical Society are quite interesting and would appear to be adaptable to use locally. To date, I have been unable to obtain specific information on the magnetometer.

It would be greatly appreciated if you would suggest additional literature on the subject, and possibly, manufacturer and the range of costs for instruments suitable for archaeological surveying. Any comments you may have concerning techniques and procedures for using the magnetometer will certainly be appreciated.

Thank you very much.

Sincerely yours,

B. Bart Henson

B. BART HENSON
Vice-President
Huntsville Chapter
Alabama Archaeological Society

BBH/bth

Masca

May 20, 1969

Dear Dr. Jordan:

I have yours of May 13 regarding thermoluminescence and can advise you as follows:

There are at present only two thermoluminescence labs, here and at Oxford. Both labs have been working on perfecting the system and are just now starting to date unknowns. At a conference in Spoletto in Italy, it was agreed that thermoluminescence could not be used for geological dating but was successful in archaeological dating of pottery. This has led to some question about the method because of the confusion between geologists and archaeologists -- probably because of little material of unknown age one hears little about the method. We have no doubt that once it has been perfected it will improve and eventually probably will be more common than C-14, dating remains from the Neolithic onward largely because it dates cultural remains themselves and probably it is cheaper to do analysis.

I am sending on a copy of Masca which describes the method. As you can see, it does require a trained chemist or physicist to operate the equipment. I feel sure that you should see the lab here and talk with our operators, if you expect to establish the equipment at the University of Connecticut. I hope you do, and urge you to have a look at this lab and to talk with Mark Han who is doing our analysis here.

All best wishes,

Froelich Rainey
Director

Dr. Douglas F. Jordan
Curator
The Anthropological Collections
University of Connecticut
Storrs, Connecticut 06268

cc: Mr. Han

THE UNIVERSITY OF CONNECTICUT
THE ANTHROPOLOGICAL COLLECTIONS
JORGENSEN AUDITORIUM

May 13, 1969

Dr. Froelich Rainey
Director, University Museum
University of Pennsylvania
33rd and Spruce Streets
Philadelphia 4, Pennsylvania

Dear Dr. Rainey:

I have recently become rather interested in the problem of Thermoluminescence and am making some preliminary investigations into the feasibility of setting up the appropriate equipment here at the University of Connecticut. May I impose upon your time and good nature to request references to some of the most recent and informative literature on this topic -- particularly what specific kinds of equipment are suitable and what preparation outside the field of Thermoluminescence is necessary. Another question that I am concerned about is whether this equipment requires the services of a trained technician?

I would be most grateful for some recent references in the field. In my ignorance I am puzzled that, in spite of a great deal of promise, so little Thermoluminescent dating seems to be undertaken and I am curious about the reason for the discrepancy.

Thank you very much for your time.

Yours very truly,

Douglas F. Jordan

Douglas F. Jordan
Curator

DFJ:fw

STORRS, CONNECTICUT, 06268

Haverford College

HAVERFORD, PA. 19041 215-649-9600

DEPARTMENT OF PHYSICS

June 13, 1969

Dr. Elizabeth K. Ralph
Department of Physics
University of Pennsylvania
Philadelphia, Pa. 19104

Dear Elizabeth:

I am on an ad hoc panel on nuclear data which is preparing a study for the NAS-NRC Committee on Nuclear Science. We are looking into all sorts of questions in the handling of nuclear data and in particular we are looking at the usefulness and need for nuclear data compilations by fields outside of nuclear physics proper. In this connection I have been asked to look into the needs for nuclear data that archeology may have and I naturally thought of you. Would you have any comments about what type of nuclear data compilations you find most useful in your own work, and whether you would wish different types of presentations of nuclear data to be also made? Would you have any suggestions about other people in archeology I should contact on this matter? We are anxious to prepare recommendations which will make future compilations useful to many different segments of the scientific community.

With best regards,

Fay S.

Fay Ajzenberg-Selove

FAS/cb

Mrs. Bush, Sec.
Aspen Center for Physics
P.O. Box 1208
Aspen, Colo.
81611

July 9, 1969

Dr. Fay Ajzenberg-Selove
Aspen Center for Physics
P. O. Box 1208
Aspen, Colorado 81611

Dear Dr. Selove:

Please excuse the delay in my answering your letter of June 13th. I have just returned from field work with magnetometers in Italy and Yugoslavia.

I had hoped to be able to talk to you on the telephone because I don't know quite how to answer your questions about the handling of nuclear data. Usually, archaeologists think of data handling and statistical interpretations rather differently from nuclear physicists. If you are considering C-14 and thermoluminescence dates as nuclear data, there would be much to discuss. At present, C-14 dates are being compiled on old-fashioned IBM cards that are sorted with knitting needles. At the moment, there are too few thermoluminescence dates for complilation.

A good person to contact would be Dr. Edward Sayre, Brookhaven who collaborates with the NYU Conservation Center and specializes in nuclear irradiation analyses.

I hope that we can discuss these matters more fully when you return.

Sincerely yours,

Elizabeth K. Ralph

EKR/emf

MASSACHUSETTS INSTITUTE OF TECHNOLOGY *CAMBRIDGE, MASSACHUSETTS 02139*

Room 8-432
23 October 1970

Dr. Elizabeth K. Ralph
Museum Applied Science Center for
Archaeology
University Museum
University of Pennsylvania
33rd and Spruce Sts.
Philadelphia, Pa. 19104

Dear Elizabeth:

I spent some time last summer excavating several furnaces in Ecuador which may be pre-Columbian in date. At the moment I'm not even certain of their use -- they may have been metal working furnaces or possibly for calcining lime. I am also uncertain of the period to which they belong. Unless they are Spanish and, therefore, of Colonial date (c. 1500 A.D. and after), they may have been constructed by the pre-Columbian peoples of the culture known as Manteño (c. 850-1500 A.D.).

I have brought back to MIT numerous samples of the furnace wall, slag, ash, etc. in an attempt to determine the use of these structures. Before embarking upon a broad analytical program, though, I would like to have some idea of the date of the furnaces.

Luckily there were two areas within two separate furnaces where sufficient charcoal remained for me to collect several samples. None of the charcoal was handled. It was collected with the tip of a metal trowel and placed inside aluminum foil wrappers. These samples are presently being shipped to me from Ecuador.

I am writing to inquire whether it would be possible for your laboratory to undertake one or a series of C-14 studies on this material. How large a sample is needed for an individual run, and in what form do you prefer to receive it; for example, should it be cleaned of as much soil, sand etc. as possible before it is sent or do you prefer to do all the handling yourself? What sort of error can one ordinarily expect in a date that might be as late as 1500 A.D.? In other words, would I have some chance of distinguishing between the end of the Manteño sequence and the beginning of the Spanish colonization which, as you can see, coincide at 1500? How long does an analysis generally take and do you ordinarily charge other archaeological research labs for this service? Our own policy is not to charge other institutions for the analyses we undertake on their behalf, but I don't know if you have such similar reciprocal relations.

I look forward very much to hearing from you soon.

With kindest regards, and a special hello to Gayle Weaver,

Heather

Heather Lechtman

HL:ls.

MASCA
10/27/70

Miss Heather Lechtman
Room 8-432
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Dear ~~Miss~~ Heather,

Your site in Ecuador sounds interesting, but unfortunately, we have such a backlog of samples that we cannot accept additional ones at this time unless they are of especial importance to one or more of the curators in our museum.

I have enclosed a copy of our sample requirements (Some ~~labs can use~~ labs have smaller counters & can use half as much, but with some loss in precision). Enclosed also is a list of the items of information that are required by C-14 labs.

If you have a little money to spare, I suggest that you send your samples to:

Dr. Jim Buckley, Isotopes, Inc.
Westwood Laboratories
50 Van Buren Ave.
Westwood, N.J. 07675

or

Dr. Harold W. Krueger
Geochron Laboratories, Inc.
24 Blackstone St.
Cambridge, Mass. 02139

These labs charge about $170 for one sample & $155 each for 2 to 9 samples, & usually produce the results within six weeks.

As for ~~A.D. 1500~~ C-14 dates as late as A.D. 1500, the uncertainty would be approximately ± 50 years. Fortunately, it is just early enough for a C-14 date to be somewhat useful, that is, it is just beyond our ambigious periods between A.D. 1550 & 1750. However, if the periods of Spanish colonization & the Manteño sequence overlap & the C-14 dates happen to be A.D. 1500, I guess that the dates would be of no help.

Sorry not to be of more help to you. With best regards,

Both

Elizabeth K. Ralph

magic mending

536 Warmsprings Drive
Fayetteville, N. C. 28303
December 29, 1970

Miss Elizabeth K. Ralph
Applied Science Center of Archaeology
The University Museum
University of Pennsylvania
Philadelphia, Pennsylvania 19104

Dear Miss Ralph:

I am a sophomore at Saint Andrews Presbyterian College in Laurinburg, North Carolina. During the winter semester, which starts the first week of January, I will be working with radio-carbon dating with Dr. A. L. Applegate. The project will be exploratory because neither Dr. Applegate nor I have done any of this work before. The goal is to produce benzene from pure carbon samples; the counting will be with liquid scintillation. The method is that of Noakes, Kim, and Stipp (1965) that was published in Proceedings of the Sixth International Conference - Radiocarbon and Tritium Dating - Held at Washington State University (Atomic Energy Commission). This includes the three major steps:

1) conversion of the sample to carbon dioxide
2) conversion of the carbon dioxide to acetylene
3) conversion of acetylene to benzene

I was speaking to SP5 Ray Ring at the library on December 27 while looking for information on the technique and necessary equipment. He suggested that I write to you and explain the project and our problem. We will need more information on the equipment and set-up necessary for this procedure. I hope that you can tell me where I might obtain this information. Any help would be appreciated. Thank you.

Sincerely yours,
Lynn Simpson
Lynn Simpson

January 5, 1971

Miss Lynn Simpson
536 Warmsprings Drive
Fayetteville, N.C. 28303

Dear Miss Simpson:

Enclosed find five reprints of various articles, which I hope you will find useful. Each has a bibliography at the end which may lead you to more sources of information. Stephen M. Kim, whose current address you will find on his most recent article, would be in a better position to give you additional information, as his laboratory actually is using this technique (we are still only thinking about it).

Since you do not say what Dr. Applegate is a doctor of, may I make one warning:

Acetylene EXPLODES spontaneously at a pressure of 2 atmospheres.

Good luck with a most ambitious undertaking.

Sincerely,

Mrs. Stuart Lawn
Radiocarbon Laboratory

Improved Synthesis Techniques for CH_4 & C_6H_6 R.C. dating
Polach & Lapp
Elimination of Liquid Scintillators —
Polach
R.C. dating at the Ill. Stat Geol. Survey
Kim et al
Organic Scintillators - Low level counting
evaluation
Kim. Nates XII

THE UNIVERSITY OF MICHIGAN
MUSEUM OF ANTHROPOLOGY
UNIVERSITY MUSEUMS BUILDING
ANN ARBOR, MICHIGAN, U.S.A. 48104

DIVISION OF THE GREAT LAKES

22 September 1972

Miss Elizabeth K. Ralph
Mrs. Stuart Lawn
Department of Physics
University of Pennsylvania
Philadelphia, Pa. 19104

Dear Miss Ralph and Mrs. Lawn:

I have recently completed an excavation program at an archeological village site in west-central Illinois. Judging from the styles of broken pottery recovered at the site, I estimate it was lived-on approximately between A.D. 100 and A.D. 400.

I have 3 samples of carbonized wood and a carbonized mass of nutshells (recovered from refuse and fire pits at the site) which I wish to date by the radiocarbon method to more closely determine the time at which this site was occupied.

Given my research goals, it is most important that I obtain dates of an accuracy better than ±100 years from these ca. 2,000 year-old samples. Can you tell me the sample size (dry weight in grams) required by your lab to achieve such dating accuracy? I would also like to know the cost per sample for your C-14 dates, and whether or not this cost varies with the amount of analysis-time required to obtain a date of the needed accuracy.

If you have an information leaflet describing your counting methods, desired sample sizes, the condition in which samples should be submitted, and the data which should accompany them, I would appreciate a copy of this also.

Finally, how long might I expect to wait after submitting the samples before receiving the results of your age-determinations?

Thank you very much for your assistance.

Sincerely,

Kenneth B. Farnsworth
Research Assistant

EKR replied
EKR called 2/20/75

The Metropolitan Museum of Art

Fifth Avenue at 82nd Street, New York, N.Y. 10028 212-TR 9-5500

November 13, 1974

Dr. Elizabeth Ralph
MASCA
University Museum
University of Pennsylvania
33rd Street and Spruce
Philadelphia, Pa. 19174

Dear Dr. Ralph,

I am writing you for your advice on the possibility of obtaining carbon-14 dates on samples from two objects, from our Ancient Near East Department, for which there is considerable interest.

The first object is a recently acquired terracotta head, which was dated by thermoluminescence. However, the TL-date of late 7th - mid 9th century A.D., is not exactly in agreement with a stylistically suggested Parthian provenance (2nd-4th century A.D.). The terracotta head contains the remains of probably a wooden supporting rod, approximately 1/2" in diameter. The wood was charred either during the firing of the clay or in a fire at a later date. (A fire could be the reason for the young TL-date.) Although we have not established exactly the amount, there appears to be enough charcoal for a carbon-14 dating.

The second object is a bronze axe from our collection, probably 2nd millenium B.C., which still has remains of wood in the shaft, the amount of which is probably sufficient for carbon-14 dating. A complication in this case is that the wood not only contains coppper corrosion products (probably malachite) but also an organic material, used in the consolidation of the bronze.

Is there a possibility that your laboratory would be willing to perform carbon-14 tests on samples from these objects? If this would not be possible could you recommend

a laboratory who would be willing and able to date these materials accurately? We would prefer not to use any of the commercial carbon-14 laboratories, mainly because the dating would require most if not all the material available, while their reported dates are in general not as accurate as is possible in research laboratories such as yours.

I would be very grateful for your consideration of my requests.

Yours sincerely,

Dr. Pieter Meyers
Research Chemist

November 25, 1974

Dr. Pieter Meyers, Research Chemist
The Metropolitan Museum of Art
Fifth Avenue at 82nd Street
New York, N.Y. 10028

Dear Dr. Meyers:

In reply to your request to date two samples of wood, I am writing to say that there are a number of complications.

First of all, there is the new policy of our Museum which prohibits us from testing anything that has been brought out of the country of origin without permission. If these two were exported legally, then this is not a problem.

Secondly, the objects must be of some interest or have some importance for the research of the appropriate Curator in our Museum. Otherwise, we have to charge $150 per sample. If I could trouble you to fill out the items of information on the enclosed sheet, this would answer these questions.

Another drawback is that our counters are exceptionally large (8 liters) so that we require larger samples than most laboratories. We are building a small 1-liter counter, but it may be six months before this is working well.

A good commercial laboratory that has both large and small counters is Isotopes, Inc., Westwood Laboratories, 50 Van Buren Ave., Westwood, N.J. 07675. Jim Buckley is in charge (201-664-7070). Their charge as of a few years ago was $170 for one and $155 for two to nine samples.

I am sorry to be so negative in reply to your request.

With best regards,

Elizabeth K. Ralph

EKR/cat

December 3, 1974

Dr. Ernest C. Conrad
10896 Walnutwood Way
Rancho Cordova, California 95670

Dear Dr. Conrad:

It appears that your anthropology student also is a bit out of her field. The radiocarbon dating technique can only be applied on specimens of very recent vintage on the geological time scale, say, approximately 45,000 years old. Specimens older than this have lost so much of their original C-14 that they can no longer be dated by this technique. When the method was first developed it was assumed that the ratio of C14/C12 was constant over geological time spans. Perhaps this is what your student means by her statement concerning the formation and decay of radioactive carbon. Recent work has shown that this assumption was not valid, which means that radiocarbon dates must be corrected to adjust them to true ages. At present the correction, based upon long-lived sequoia and bristlecone pine tree rings, can be applied back approximately 8000 years.

Radiocarbon dating draws no conclusions about the age of the earth's atmosphere, which in any case is far older than 30,000 years. One may rest assure that there was something for the dinosaurs to breathe, and it was probably much the same mixture of gases that we breathe today.

We hope these statements and the enclosed material answer your questions. A further discussion of the method can be found in Dating Techniques for the Archaeologist edited by Henry Michael and Elizabeth Ralph, MIT Press (1971).

Very truly yours,
Barry Weiss
A C-14 atom who is
about to decay

Enclosure

February 21st, 1975

Mr. Arthur W. Clapp, President
Walpole Woodworkers, Inc.
767 East Street
Walpole, Massachusetts 02081

Dear Mr. Clapp,

Your project sounds like an interesting one. However, since the cedar logs are not of archaeological importance, we must charge $170.00 per sample. (Our basic funding is for archaeological research).

We prefer to have 25 grams (dry weight) for each sample, and we need some of the items of information that are specified on the enclosed sheet.

If the logs are all in one deposit, perhaps 3 to 4 C-14 dates would be sufficient.

Sincerely yours,

Elizabeth K. Ralph

WALPOLE WOODWORKERS, INC.

Rustic Cedar Fencing • Cedar Outdoor and Camp Furniture • Small Buildings

767 EAST STREET
WALPOLE, MASSACHUSETTS 02081

668-2800 Area Code 617

February 19, 1975

Applied Science Center for Archeology
University Museum
University of Pennsylvania
Philadelphia, Pa.

Gentlemen:

Our business has had some special Cedar Logs made available to it. These logs have been very deep in the mud in the Dismal Swamp in North Carolina for a great many years. The wood is sound, although it is extremely wet and heavy.

In investigating the possibility of using this material for small pieces of furniture, I feel that the value of the piece of furniture would be greatly enhanced if the age of each log could be verified. It is my understanding that one of these logs has been carbon-dated and the age indications are in the range of 8,000 years.

I would like to find out if it is practical to carbon-date each log which we might process, or if the cost of such a test would be prohibitive. Mr. Ned Holt of the Massachusetts Institute of Technology suggested that I seek this answer from you.

I would certainly appreciate your opinion on this matter.

Sincerely yours,

WALPOLE WOODWORKERS, INC.

Arthur W. Clapp

Arthur W. Clapp
President

AWC:jv

Pfizer
MINERALS, PIGMENTS & METALS DIVISION
PFIZER INC., 640 NORTH 13TH STREET, P. O. BOX 548, EASTON, PENNSYLVANIA 18042

215 253-6261

March 14, 1975

Dr. Michael Jameson
Dept. of Classical Studies
University of Pennsylvania
Philadelphia, PA

Dear Dr. Jameson:

One of our employees has discovered carbon fragments from an Indian site in Pennsylvania and needs an approximate age by carbon-14 dating. If you can do it, I would appreciate an informal reply giving cost and sample size.

If your group can't handle the request, would one of the other carbon-14 dating labs, University of Arizona or University of California at San Diego be more appropriate?

Many, many thanks in advance for your assistance.

Sincerely,

James K. Barr
Director of Research

JKB/sac

March 21, 1975

Dr. James K. Barr
Minerals, Pigments and Metals Division
Pfizer, Inc.
640 No. 13th Street
P.O. Box 548
Easton, Pa. 18042

Dear Dr. Barr:

Dr. Jameson has sent your letter of March 14th to the C^{14} laboratory.

In answer to your questions, we should be glad to date a sample or more from the Indian site in Pennsylvania. We charge $150 per sample. The sizes required are listed on the enclosed sheet. However, with the small 1-liter counter, the uncertainty in the C^{14} date would be of the order of ±300 years instead of ±40 or ±50 years.

We require also some of the items of information which are specified on the second sheet.

Sincerely yours,

Elizabeth K. Ralph

EKR/mes

XX 19174

June 11, 1975

Ms. Marina de G. Sullivan
4245 East Ave. (Smyth)
Rochester, N.Y. 14610

Dear Ms. de G. Sullivan:

Our laboratory dates only those samples which are of interest to the curators of the University Museum, and your crucifix doesn't especially fall into this category of samples. Also our counters are large, and therefore we require rather large samples, about 20 grams of wood or 60 to 100 grams of bone.

If you really want to date your crucifix, I would suggest that you contact

Isotopes, Inc.
Westwood Laboratories
50 Van Buren Ave.
Westwood, N.J. 07675
201-664-7070

They charge $175 for a single sample, and since they have smaller counters, they would need somewhat less sample material.

Sincerely yours,

Barbara Lawn
Radiocarbon Laboratory

4245 East Ave. (Smyth)
Rochester, N.Y. 14610
May 30, 1975

Barbara Lawn
Dept. of Physics and
University Museum
University of Pennsylvania
Philadelphia, Pa. 19174

Dear Ms. Lawn:

I should appreciate it very much if you could give me some information regarding Carbon Testing--to know the kind of material and age of a certain ofbject.

My family acquired a crucifix supposedly 400 years old and made of whale bone and wood.

I should like to know:

1. if your place could do the carbon testing
2. how much material or sample of the whale bone and wood you would need
3. how much it would cost
4. if it is worthwhile doing this

For your attention and interest, thank you.

Sincerely,

Marina de G. Sullivan

Marina de G. Sullivan

PRESERVATION COPY: 08/21/2014

2, Rue du Vieux Marché
1260, Nyon
Vaud, Switzerland

August 29th, 1975

Mrs Elizabeth Ralph

Radiocarbon Laboratory
Physics Department
University of Pennsylvania

Dear Dr. Ralph,

You were kind enough to instruct me in some of the mysteries of your department's work last year. Since then my research has kept me tied to religious, cultural and astronomical matters far removed from the C-14 field.

Yet a nagging question has just recurred in conversation and I would be most obliged if you could find time to answer it.

Are radiocarbon dates for material discovered in volcanic deposits, where the item was in fact 'killed' by the volcanic material surrounding it, adjusted for that condition? Is it possible to do so with any degree of reliability and if not is it possible to give any estimate of the amount of preternatural 'ageing' which may possibly be involved?

It may be that samples have been tested from Pompeii and that such a quotient if any has in fact been established in some cases. Can you instruct me, please.

yours sincerely,
Peter Littman

P. Littman

September 10, 1975

Dr. R. Whittman
2, Rue du Vieux Marche
1260, Nyon
Vaud, Switzerland

Dear Dr. Whittman:

In response to your question about C^{14} samples from volcanic deposits, we feel that in most cases, one need not worry about preternatural "ageing." Usually, eruptions are short-lived in terms of the age of the sample, and if there is good air circulation such as at sites near the Mediterranean, the "old" carbon thrown up from the volcano would soon be dissipated. If a volcano should erupt for a long time into a semi-closed "pocket" with poor air circulation, then there might be something to worry about.

Sincerely yours,

Elizabeth Ralph

Mrs. Th.-W. Schmidt

2842 Lohne (Oldbg.)
Friedr. Taphornstr. 8
Germany

November, 11, 1975

Ralph MASCA

Professor Dr. Froehlich G. R a i n e y
Direktor des Museums (archaelogy) of the University of
Pennsylvania

P h i l a d e l p h i a, Pennsylvania USA

Dear Dr. Rainey,

I have been reading the " Die Suche nach Sybaris" Search for Syb aris, (Orville h. Bullit) It is fascinating, and I admire the work and the patience about the difficult search for Sybaris. A friend of mine (M D in Germany) and I (my husband was a german scientist and worked for the Government in the US and died in the US a few years ago) a very interested in archaelogy. For the first time I read and heard about the different "Magnetometers", which you used with great success in archaelogy for the search of Sybaris. I would appreciate it very much, if you would kindly give me some information about the new instruments, where or if they are already on the market. It was mentioned in the book, that "Varian Ass. of Palo Alto, Cal. developed and made the instruments for you, but as I understood it was your idea.
I don't know if I should write to Varian Ass. and ask for some information.
I would be very grateful to you, if you could let me know. I am very sorry, to bother you, and I do hope you understand my interest and my request.

Thank you very much

your sincerely Mrs. Schmidt

Please could you send your answer by air mail, as one does not realize how long it takes for overseas mail. Thank you.

November 14, 1975

Mrs. Th.-W. Schmidt
2842 Lohne (Oldbg.)
Friedr. Taphornstr. 8
Germany

Dear Mrs. Schmidt:

Dr. Rainey has asked me to reply to your letter of November 11th.

I have enclosed a reprint of an article in Geoexploration in which our cesium magnetometers are described. Unfortunately, Varian Associates built these two units especially for us, and they have not manufactured any others nor do they plan to do so in California. However, we have just learned that their Canadian branch might build some. The address is:

Varian Associates of Canada, Ltd.
45 River Drive
Georgetown, Ontario
phone: 416-457-4130

Sincerely yours,

Elizabeth K. Ralph

Air Mail

Roemisch-Germanisches
Zentralmuseum

Tgb.-Nr. 75/3782
hkm-BA

D-65 Mainz, 12 Dec., 1975
Ernst-Ludwig-Pl. 2
W.Germany

12/19/75

Radiocarbon Laboratories
University of Pennsylvania
Philadelphia, Pennsylvania
19174
U.S.A.

Dates XIV + XVIII sent

Gentlemen,

I should like to ask you for assistance in the following matter:

In her report on the excavations at Aphrodisias (Turkey) Miss Kadish mentions that your laboratory was given samples from those excavations for dating. From elsewhere I received a hint that your results were to be published in "Radiocarbon" 17,5 (1975) 196 sq. Unfortunately I was not able to make out this number of Radiocarbon in Germany.

C14 dates for the Late Chalcolithic levels ("VIId") of Aphrodisias being of extreme importance for a study of mine now going into press, I should like to ask if your lab undertook datings of Level VII materials, what those dates are and where exactly they are published. Thank you most cordially indeed in advance for your cooperation.

Best wishes,

Yours sincerely

(Dr. O.Höckmann)

Beth –

Jon. left this on David O'Connor's desk. He wanted to be the one to send out an offprint

Gail

Sent

January 9, 1976

Dr. Elizabeth Ralph
The University Museum
University of Pennsylvania
Philadelphia, Penna 19174

Dear Dr. Ralph,

You probably don't remember me, but this won't prevent me from asking you a favor.

During the past five years or so I have been associated with a project involving the study of the so-called colossi of Memnon in the plain of Thebes. Last year Dr. Labib Habachi told me about an article by Dr. J. O'Connor on his excavations at Malkata by the basin of Birket Habu, and which had appeared in the journal Exploration 3.1: 101, 1974. The U.C. library has had this journal on order for a considerable length of time, but it has not become available. Dr. Habachi told us that the article contained a reference to our suggestion that the onetime lake of Birket Habu had been used in connection with the transportation of the colossi. Since the publication was not available to us, I wrote Dr. O'Connor directly asking him for a reprint. I received no answer, and I do not doubt that Dr. O'Connor is out of the country or was otherwise prevented from answering.

Now I should like to ask you if it would be possible for you to obtain a reprint for us - perhaps you have a spare copy, or you could ask your library or archives to send us a reprint or xerox, if this is not too much trouble.

Our team naturally is interested in seeing the report (and subsequent report, if any), since the article is most likely to be pertinent to our continuing work. We would be glad to defray the cost of any such material.

With many thanks and best regards,

Fred Stross

Fred Stross
Bldg 70
Lawrence Berkeley Laboratory
University of California
Berkeley, Ca. 94720

92 210. Saint-Cloud, France.
on 7th February 1976.

Dear Miss Ralph,

I apologize for writing to you - I have heard, from Prof. Fairbridge, and some others, of a very interesting work that you have done, on correcting the C 14 scale.

I should be very interested by your results : I have written a synthesis on the climatic changes, and sea-level changes, during the Holocene - The curve of sea-levels is entirely founded on C 14 dates (160 samples), from the French Laboratory

of Orf sur Yrette (C 14); but I think it would be very interesting and useful, to compare mes results with yours own studies-

May I ask you, - either to send me your scale of datation, or to tell me in what Review I can found it ?

It will be a great pleasure for me, to send my work on Holocene sea-level changes- Dr. Richards, of Philadelphia Museum, was very interested by it.

With my apologizes for all my mistakes, - I am,

Very sincerely yours,

Mrs. M. Ters

Prof. Dr.

Madame Mireille TERS
72, rue Henri-Régnault
92210 SAINT-CLOUD
Tél. 771.77.15

February 14, 1976

Madame Mireille TERS
72, rue Henri-Regnault
92210 SAINT-CLOUD
France

Dear Madame Mireille TERS:

Thank you for your letter of February 7, 1976. We have been working on a calibration for radiocarbon dates and have included a copy of our MASCA Newsletter Volume 9, Number 1, 1973 which contains the results of our work.

Should you have additional questions, please do not hesitate to write to us again.

Sincerely yours,

Elizabeth K. Ralph

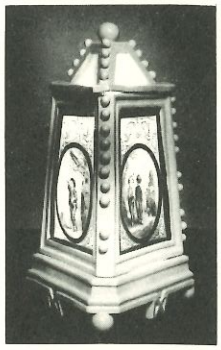
Blair Museum of Lithophanes & Carved Waxes

LAUREL G. BLAIR
CURATOR

March 9, 1976

Ms. Elizabeth K. Ralph
University Museum
33rd and Spruce Streets
Philadelphia, Pa.
19174

Dear Ms. Ralph:--

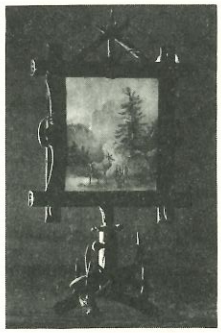


Mr. Henry G. Fischer, Wallace Curator in Egyptology, suggested that I write you.

We have just acquired a wax statue of Osiris, and we are trying to authenticate it. Mr. Fischer states that he believes that it is authentic, but Mr. John D. Cooney, Research Director of the Department of Ancient Art of the Cleveland Museum of Art, questions it.

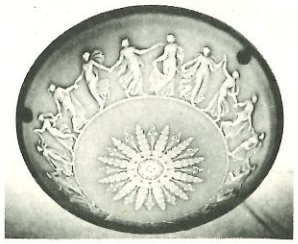
Therefore we are wondering if it should be authenticated by some testing such as the Carbon 14 test, although Mr. Fischer warns that a large piece of the wax might have to be donated, and if so that might ruin the piece as it is only a shell to be placed over the mummified body of a falcon.

What would you advise?



Very truly yours,

Laurel G. Blair



PHONE 243-4115
AREA CODE 419

2032 ROBINWOOD AVE.
TOLEDO, OHIO 43620
U. S. A.

March 11, 1976

Dr. Laurel G. Blair, Curator
Blair Museum of Lithophanes and
Carved Waxes
2032 Robinwood Avenue
Toledo, Ohio 43602

Dear Dr. Blair:

Thank you for your letter of March 9, 1976. To date your wax statue of Osiris, we would need 100 grams of wax and I think that this would destroy your statue. However, if you decide to have your object dated by C-14, please fill out the enclosed information sheet and return it to us.

Sincerely yours,

Elizabeth K. Ralph

May 10, 1977

Mr. Joseph J. Feiereisen
Department of Geography
University of Oregon
Eugene, Oregon 97403

Dear Mr. Feiereisen:

In regard to your samples of woody peats, I am writing to say that they may be large enough, but that we should need to do the pretreatments to be sure.

Our charge per sample is $200 which includes the pretreatments and other preparation. We do not promise to report results within less than six months from the time of receipt of the samples. The summer is particularly bad because we date large numbers of ouroown samples that are sent inffrom field expeditions.

We can try to date yours by August 1, 1977, but do not promise to do so.

Sincerely yours,

Elizabeth K. Ralph

EKR:mbp

P.S Isotopes

May 3, 1977

Dr. Elizabeth K. Ralph
Department of Physics
University of Pennsylvania
Philadelphia, Pennsylvania 19174

Dear Dr. Ralph:

I am writing to inquire whether your laboratory could do C-14 dating of two (2) samples for me, and what your current costs and time backlog are for C-14 dating.

The samples are woody peats with a silt matrix. They are probably 45 - 60 per cent wood fragments, and weigh ca. 100 g and 120 g respectively moist weight. They are hand auger samples from approximate 4 and 5 m depths in estuarine deposits, and represent a vertical stratigraphic interval of ca. 15 cm. If you feel the sample size may be too small after preparation, I can send along the next adjacent vertical samples. These are similar in composition in both cases, and occur within the same apparent stratigraphic unit.

Could you provide me with the following information: (1) your current rate per sample for C-14 dating; (2) the expectable turn-around time between submission of samples and receipt of dates, and; (3) whether there are any additional costs for sample preparation over and above the rate in (1) above.

I would like to submit the samples as soon as possible, pending receipt of correspondence on costs and backlogs, but in no case later than May 31, 1977. I would like to have the dates back by August 1, 1977 at the latest. The dates will be important chronological markers for final interpretation of the stratigraphy for my Doctoral dissertation. Thank you very much.

Yours truly,

Joseph J. Feiereisen

Joseph J. Feiereisen
Department of Geography
University of Oregon
Eugene, Oregon
97403

June 21, 1977

Mr. Forrest T. Pettigrew
1327 Fishermans Road
Norfolk, Va. 23503

Dear Mr. Pettigrew:

In reply to your letter of June 13th in regard to thermoluminescence (TL) dating, I am writing to say that we may not be able to provide this service during the summer. Also, it is frequently difficult to date shell-tempered pottery because of the carbonates that are released upon heating.

If you want to pursue the possible TL dating, I suggest that you write to Dr. M.J. Aitken, Research Laboratory for Archaeology, 6 Keble Road, Oxford OX1 3QJ, England. Their charge used to be £ 50 per sample, but it may now be more.

The pottery should be sealed as well as possible immediately after excavation to conserve its ground water content. Do not wash it. We require 3 grams and 5 grams of the soil which surround it (to measure the external radiation dose). Also, one needs to know the depth below ground.

I am sorry to be somewhat discouraging. Perhaps you will find more charcoal for ^{14}C dating.

Sincerely yours,

Elizabeth K. Ralph

June 13, 1977

Applied Science Center
for Archaeology
University Museum
University of Pennsylvania
33rd and Spruce Streets
Philadelphia, PA 19174

Dear Sir:

I am associated with the Nansemond Chapter of the Virginia Archaeological Society; our chapter is presently engaged in an excavation on Currituck Sound in North Carolina. The site is an Indian Village from which we have received a radiocarbon date of 660 BC.

The reason I am writing to you is to see if you can supply me with some information on thermoluminescence dating. At the Currituck site we are finding large quantities of shell tempered pottery, but few items that lend themselves to accurate radiocarbon dating. If we could get a good date from some of the pottery we would be in a much better position when the final report is published.

What I need to know is where should we send the pottery for the dating; and what shape should the pottery be in - that is, should the pottery be cleaned or as it is found? What is the charge for this dating and how much pottery is required.

Thank you for your help in this matter.

Very truly yours,

Forrest T. Pettigrew

Forrest T. Pettigrew
1327 Fishermans Road
Norfolk, VA 23503

Ms. Irena Hart,
4775 Vezina Avenue,
Apartment 202,
Montreal, Canada,
H3W 1B7

9 September 1977

Dear Ms. Hart:

The metal detectors with which we are familiar are manufactured by the following firms:

Relco Industries, P.O. Box 10839, Houston, Texas 77018.

Edmund Scientific Co., 1776 Edscorp Building, Barrington N.J. 08007.

Forestry Suppliers Inc., 205 West Rankin St., Box 8397, Jackson Mississipi 39204-

The enclosed photocopies supply further information.

The prices quoted are not up-to-date, and may now be somewhat greater. I suggest that you write to each manufacturer to obtain their catalogs and 1977 prices.

Sincerely yours

Elizabeth K. Ralph.

4775 Vezina Avenue
Apartment 202
Montreal, Canada
H3W 1B7

August 23, 1977

Applied Science Centre for Archeology
University Museum
University of Pennsylvania
33rd and Spruce Streets
Philadelphia, Penn. 19174
U.S.A.

Gentlemen:

I am writing to you on behalf of a German friend, an amateur archeologist who is involved in digging up Roman artifacts (approx. 65 - 70 A.D.) in the Krefeld area of Germany. He has seen advertised some metal-detecting equipment of North American manufacture that would be useful in searching for coins and small objects, and he has asked me to find out what the local cost of purchase would be.

My problem is that I cannot locate the manufacturer, or more precisely, cannot determine who manufactures the Coin Hustler and Yukon models. However, I understand from a member of the staff of McGill University here that you may have developed such equipment and/or might give me information on where to look further.

Any literature or other information you might have on manufacture, type, cost, and so on, would be most welcome, since this friend is planning to visit Canada next year and would possibly purchase the detector while here.

Sincere thanks for your assistance.

Yours truly,

Irena Hart

Irena Hart

THE UNIVERSITY
OF ASTON
IN BIRMINGHAM

Gosta Green, Birmingham B4 7ET / Tel: 021.359 3611 Ex
England.
The Department of Geological Sciences
Head of Department: Professor D D Hawkes MSc, PhD, FGS

20th, April 1978.

Dear Miss Ralph,

I am a research student at the above university and my interest is in the palaeomagnetism of Recent sediments. On reading an article by C. J. Ransom (1973) in Nature (Lond.) I was interested to note that you were investigating magnetic field reversals and in particular; that one of your colleges J. B. Pritchard had unearthed some material from kilns dating from the eighth centuary BC. I would be interested to learn of any results that you may have come to regarding this material and the suggested magnetic field reversal.

Thankyou for your interest,

R J Suttill

Yours sincerely

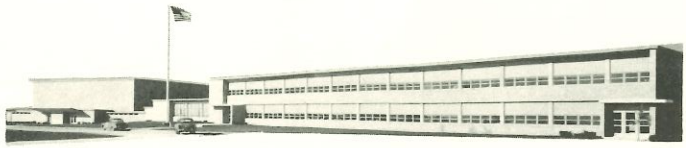
R. J. Suttill B.Sc.

Lincoln-Way Community High School

LEE F. ROSENQUIST
SUPERINTENDENT

JONAS R. LASHMET
ASSISTANT SUPERINTENDENT

F. KEVIN McGIVERN
ASSISTANT SUPERINTENDENT



District No. 210

CENTRAL CAMPUS
NEW LENOX, ILLINOIS 60451
815/485-2511

EAST CAMPUS
FRANKFORT, ILLINOIS 60423
815/469-9645

19 September 1978

Ms. Elizabeth Ralph
University of Pennsylvia
Philadelphia, PA 19104

Dear Ms. Ralph:

A recent article in the CHICAGO TRIBUNE relating to your work in archeology has aroused the interest of a number of our students and faculty.

Of special interest is the hand-held cesium magnatometer and the soil-penetrating radar equipment. I am attempting to locate a source of such equipment and would appreciate it if you could furnish me with the names and addresses of any suppliers you know of.

Yours truly,

D. A. Denoff

D. Aleksander Denoff
Librarian

WASHINGTON UNIVERSITY

ST. LOUIS, MISSOURI 63130

DEPARTMENT OF ANTHROPOLOGY

February 8, 1979

Dr. Elizabeth K. Ralph
Radiocarbon Laboratory
University of Pennsylvania
Department of Physics, DRL/E1
Philadelphia, PA 19104

Dear Dr. Ralph,

I was recently awarded $600.00 by the National Science Foundation for a series of radiocarbon dates for my dissertation research. The object of the research is to test some recent ideas of the dietary patterns of three aboriginal cultures that occupied the western Middle Tennessee Valley from 3000 to 300 B.C.

In order to establish the necessary chronological controls to test the subsistence model, I will need at least 5 or 6 radiocarbon dates. Would it be possible to get a reduced rate for a series of dates, rather than the standard price for one date?

Thank you.

Sincerely,

David H. Dye

David H. Dye

broward community college

central campus
3501 southwest davie road
fort lauderdale, florida 33314

Dr. Biddle
Museum of Applied Science Center for Archaeology
U. Museum
U. of Penn.
33 & Spruce Streets
Philidelphia, Penn. 19014

7 April 1979

Dear Dr. Biddle:

I am need of some information on radio carbon dating. For the last year I have been involved in excavating a Tequesta Indian occupation site in southern Florida. One of the major problems which has confronted my research team is a layer of extremely hard cement-like material we sometimes refer to as "concreation".

We do not known what is the cause of this geological feature, but we do know it is present only at a few of the sites in southern Florida. We also know that since cultural remains are found both above and below this material, it must re-represent a recent type of formation.

In order to learn more about the formation of concreation, we would like to set some time parameters around its formation. We have samples of bone and charcoal from above, inbetween and below concreation, and we hope this material can be dated.

At your convenience, I would like to learn more about your radiocarbon dating service. Such things as avoiding contamination and sampling procedures would be appreciated. Last but not least, we would like to know how much it would be to process between three to six samples. We are working on a very limited budget and we would, therefore, like to do this as inexpensively as possible.

Thank you for your time and consideration in this matter. I will be looking forward to your reply.

Sincerely,

John Fletemeyer

John Fletemeyer
Behavioral Science Department

Dr Ralph - for information

11th April 1979

Dr. Berger,
Institute of Geophysics,
University of California,
Los Angeles, California 90024, U.S.A.

Dear Dr. Berger,

I am very interested in the large number of C14 dates tabulated in your Nature paper and wonder whether the more precise ones (e.g. those of Dr. Ralph), if based on the outer rings of contemporary wood, could be used for a chart similar to your fig. 3 but with double the resolution (i.e. 40 years) and at 20 year intervals A.D. 40/79, 60/99,...etc. This might then show the ups and downs of your fig2. I enclose a recent Maya note that explains the reason for my hope.

Yours sincerely,

c.c. Dr. M.Smith, Dr. Ralph

Current Anthrop 18(4), 1977, 749,

On Maya Correlations and Calendar Reforms

by D. J. SCHOVE
St. David's College, Beckenham, Kent BR3 3BQ, England.
21 III 77

In the interesting article by Edmonson (CA 17:713–17) there is a statement significant for the Maya correlation problem. Edmonson writes (p. 713), "Thus it would appear that at least four different calendars were in use among the Maya at different dates." Moreover, for other parts of Mexico, Cline and Cline (1973, 1975) have shown that, where long-count control had lapsed or did not exist, "slippage" of dates had occurred during the period A.D. 400–1500.

The principle of continuity has until recently been the first criterion used to test proposed placements of the floating Maya chronology in the Christian calendar. The choice thus once seemed to lie between the conventional (Goodman-Martinez-Thompson) correlation and the Spinden correlation, 260 (or 5 × 52) years earlier; in his lists of alternative possibilities, others at the intervening 52-year periods are included by Kelley (1976:31).

Planetary conjunctions should now, I suggest (Schove 1976*a*, *b*, 1977*a*), be regarded as the first criterion. Saturn, Jupiter, and Venus return to the same positions after nearly 60 years, almost exactly three *katuns*. Each *katun* is just under 20 years, and so is the period of Saturn-Jupiter conjunctions. Accepting this principle, the G-M-T correlation might be 27.3 years in error (Schove 1976*a*, *b*), or it could differ from that adjusted date by some multiple of just under 60 years. The best solution is to make a further adjustment of 59.1 years so that the dates are 86.4 years later than the G-M-T dates. This makes them nearly a century later than radiocarbon estimates, but the adjustment is necessary, for reasons I have explained elsewhere (Schove 1976*b*).

The calendar reform of 1539 may not have been the first of its kind, and, indeed, if slippage occurred, other possibilities arise. A change of the correlation constant from 615,824 to 584,283 (the G-M-T correlation) seems to have taken place between Classic and Colonial times. This involves a change of 31,541 days; this difference is divisible neither by 13 nor by 73 nor by any of the well-known Maya cycles. I should be interested to know whether either a calendar reform or a small change in the short-count dating could explain how or why 31,541 days were lost in Maya chronology. A hypothetical short-count calendar reform instituted to preserve the usefulness of the "12 Lamat" eclipse table of the Dresden Codex (after nodal recession had made it obsolete) is being investigated.

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88(1) 38-52

Winterthur Museum

22 May 1979

Dr. Elizabeth Ralph
University of Pennsylvania
Philadelphia, Pa. 19104

Dear Dr. Ralph:

Dr. George Reilly, of our staff, thought that you might be of help in the problem of such close dating by radiocarbon in the matter of the so-called Ming dynasty saddle-rug (xerox enclosed).

We would deeply appreciate any comments you might have.

Very sincerely yours,

Mary Hammond Sullivan

Mrs. Matthew C. Sullivan

A Ming Dynasty Saddle-Rug

(see plate IX)

The saddle-rug which was sold at Sotheby's, London on December 12th 1978 for £9,900, is not only extremely interesting in design and construction but it carries the distinction of being the first oriental rug known to us which has been dated by the radio-carbon method.

The drawing shows gold and red Chinese dragons, with their traditional pearls, flanking an ogival medallion and surrounded by blue clouds. The single border is decorated with a vine in turquoise and outlined in brown. The shape of the rug is traditional; several wool pile saddle-rugs, attributed to northern China or Mongolia and dated to the 18th or 19th century, are known which, like this example, were made in two halves with the pile facing down the horse's flanks and with similar indented corners at the back. These however are smaller[1] and none appears to be known with the same construction as the Sotheby example. In addition there is a number of Tibetan saddle-rugs of the same shape[2] but again woven with a different technique.

The design and style of drawing are consistent with assignment to the Ming period; nevertheless, it would be difficult to date the rug by style alone. Hence the importance of the radio-carbon test which was carried out, on the vendor's instructions, at the Atomic Energy Research Establishment at Harwell.

The age range given by the radio-carbon test is 1530 to 1610 AD. However, this should be placed into perspective: radio-carbon dates are conventionally expressed as a range of one standard deviation representing a 'probability' of 68 per cent for the dates quoted. Thus there is a 32 per cent chance that the date of origin was earlier or later, although almost certainly not outside the range 1490 to 1650. Moreover, the test can be applied with this order of accuracy only to rugs which are more than about 300 years old and can not distinguish reliably between later dates. Another reason against its use in the past has been that it is a destructive test which consumes about 20 grammes (⅔ oz) of the material, a serious limitation when applied to valuable pieces – a 2.5 cm strip was cut away from the centre of the saddle-rug. On a more encouraging note, it seems that advances in the method promise to reduce the material required to a few milligrammes, perhaps within the next three years.

The structure analysis below shows a number of interesting features. The metal brocading gives two different colour effects – bronze and silver – due to the use not of two different metals but of differently coloured cotton 'cores' around which the metal is wrapped.

Equally interesting is the deeply 'depressed' silk pile, obtained by the use of three weft shoots between each row of knots and the knots themselves which are asymmetric (Persian) and open to the left. The centre weft shoot is pulled tight to obtain the 'double-foundation', with the warps on two levels, which is also known on a small number of pieces which have been tentatively attributed to Chinese Turkestan and whose dates have been a matter for speculation. However, this construction is most familiar from its use on 'vase-technique' Persian carpets of the 16th and 17th century in which the centre weft is often thinner than the others and of silk. The discovery that the Sotheby saddle-rug was woven by this method, probably as early as the 16th century, opens the possibility that the 'vase-technique' – like many designs on Persian carpets – may have been introduced from the east.

R.P.

Notes

[1] Examples include a saddle-rug in the James F. Ballard Collection at the Metropolitan Museum of Art, New York (inv. no. 122.100.30; cf. M.S. Dimand and J. Mailey, *Oriental Rugs in the Metropolitan Museum of Art*, New York 1973) and nine rugs in the Joseph V. McMullan collection (cf. J.F. McMullan, *Islamic Carpets*, New York 1965, nos. 138, 139, 143, 144, 146-149, 152). The dimensions of these ten saddle-rugs vary within the ranges: length – 124 to 143 cm, width – 53 to 69cm. This compares with 158 x 79cm for the Sotheby example.

[2] Examples are published by P. Denwood, *The Tibetan Carpet*, Warminster 1974, plates XVI and XVII.

Technical Data*

dimensions: length 79 + 79cm; width in centre 79cm, at sides 71cm. The saddle-rug was made in two halves with the pile pointing outwards

warps: Z3S cotton, dark ivory, on two levels

wefts: Z3S cotton, dyed pinkish brown; 3 shoots: centre shoot pulled tight ('vase-technique')

pile: Z2S silk

knots: asymmetric, open to the left; H42 x V42 = 1848 knots/dm², 3.5mm high

upper end: missing

lower end: 5mm peach-brown cotton kilim Z3S

selvedges: missing

metal areas: bronze coloured (sealed) metal (not analysed) wrapped around either dark brown or dark ivory cotton and used in weft-float brocade over three warps and back around one warp. Three wrapped threads are used together. This imparts a silvery appearance on the ivory cotton and a bronze appearance on the brown cotton

colours: Silk – orange (in one dragon), gold (in other dragon), ivory, dark brown, salmon pink, dark blue (clouds), turquoise (borders), pale blue (abrash). Cotton – brown and ivory, both wrapped with metal.

*Structure analysis by Lesley Pinner

An article on the application of the radio-carbon test to oriental rugs by R.L. Otlet who carried out the tests on this saddle-rug, will appear in a forthcoming issue.

St. John's College
Cambridge
England
Aug. 9th 1979

Dear Sirs,

I am an archaeology student at Cambridge University, and I am working on a dissertation for my finals concerning Radiocarbon dates and 3rd m BC Indus / Arabian / Mesopotamian contacts and chronology.

I have come up against one or two points of confusion as regards calibration - I wonder if you could clarify them for me?

In recent Pennsylvania date lists in "Radiocarbon", calibrated dates using the MASCA calibration have been presented alongside the 6p. $t_{\frac{1}{2}}$ 5568 conventional date.

eg P 2302 (R 19, p. 210) 4320 ± 70 6p

MASCA 3110 - 3090, 3050 - 3010 ± 70 BC

This calibrated date appears to have been reached by taking the 6.p date, multiplying by 1.03 to allow for the $t_{\frac{1}{2}}$ difference, (subtracting 1950) calibrating this single date, and

quoting the ± figure unchanged

Thus $(4320 \pm 1.03) - 1950 = 2499.6 \pm 2500$ bc

calib. 2500 (via MASCA newsletter)

$\Rightarrow$ 3110 – 3090 , 3050 – 3010 ± 70 Bc.

However, according to the MASCA newsletter Vol 9, No 1, p.2, "To take account of the uncertainty in a ^{14}C date, one should first add and subtract the standard deviation ± 10, and then find the maximum possible spread from the tables"

If we follow this procedure for P 2302

2500 ± (70+10) $\Rightarrow$ 2580 , 2420 bc

calib $\Rightarrow$ 3160 – 2970 BC.

That is, 3065 ± 95 Bc. , a date different both in the centre point and the s.d. from that given in Radiocarbon.

Following the above quote from the newsletter, there is an example given of an uncalibrated b.c. date of 2000 ± 50 bc , which following the quoted procedure produces 2190 – 2480 BC (calibrated) (that is, 2335 ± 145 Bc). If however we follow the method apparently used to produce the P 2302 calibration in Radiocarbon, we obtain a date of 2330, 2440 ± 50 – a date substantially

different, especially as regards the ± figure.

My problem in brief then, is this - should I, following the NASCA newsletter, allow for the s.d. limits (±10) before making the calibration calculations, or should I ~~as~~ calibrate merely the quoted (centre) data, and add on the unaltered s.d.?

I look forward to hearing from you.

Yours Sincerely,

Andy Tomkinson

OAKLAND UNIVERSITY Rochester, Michigan 48063

DEPARTMENT OF CHEMISTRY Area 313 377-2320

May 29, 1979

Dr. Elizabeth K. Ralph
MASCA
University Museum
University of Pennsylvania
33rd and Spruce Sts.
Philadelphia, PA 19104

Dear Dr. Ralph:

Two years ago I had the opportunity to visit your laboratories. I now have access to a TL reader, and I believe we are in a position to begin some simple experimentation with thermoluminescence. I know that the actual techniques are being continuously improved, and I wonder if we might have a copy of your current standard protocol for thermoluminescence dating.

Thank you for your assistance in this.

Sincerely yours,

G. Brieger

Gottfried Brieger
Professor of Chemistry and
Coordinator, Archaeology Concentration

GB/clb

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 19104

The Faculty of Arts and Sciences

DEPARTMENT OF PHYSICS

June 8, 1979

Professor Gottfried Brieger
Department of Chemistry
Oakland University
Rochester, MI 48063

Dear Professor Brieger:

That was good news that you now have a TL reader. We have had some reorganization here, and Stuart Fleming is now in charge of our TL dating. He is in the midst of reorganizing everything so that I suggest that you write to him about six months from now.

One important change is the use of a germanium detector for total inherent radioactivity instead of our alpha counters.

I am sorry not to be of more help.

Sincerely yours,

Elizabeth K. Ralph

Elizabeth K. Ralph

EKR/jkc

The Commonwealth of Massachusetts
University of Massachusetts - Boston
Harbor Campus
Boston, Massachusetts 02125

TELEPHONE (617) 287-1900

4 September 1979

Dr. Elizabeth K. Ralph
Radiocarbon Laboratory
University of Pennsylvania
Department of Physics, DRL/E1
Philadelphia, Pennsylvania 19104

Dear Dr Ralph:

I have been directing extensive archaeological investigations in Kenya for the past several years and have need of a substantial number of C-14 dates to support our research. Our program covers newly discovered sites as well as thoroughly excavated ones and I anticipate the need of 50 to 100 C-14 dates over the next 12 to 18 months.

The character of the materials found thus far suggests that perhaps 50% of the dates will be on bone samples, while the rest will be on charcoal, wood, or other vegetable material.

The expected ages will range from as little as 200 to about 12,000 years B.P., and the samples will be sent in small groups of 5 to 10 samples with subsequent samples selected partly on the basis of prior results when possible.

Please advise if both bone apatite and bone gelatin analyses can be done on a single sample of adequate size and preservation.

Can you provide C-13 corrections, especially on bone fractions or carbonates? If so, what is the extra charge for that correction? Are there any extra charges for pretreatment procedures or for small samples?

What approximate turn-around-time would you anticipate on shipments of 5 to 10 samples at a time? Can you provide priority service on critical samples? If so, how fast and at what cost per sample?

If we assume 1 gram of carbon in the pretreated sample, what is your older limit? Also, what sort of precision would you expect on near-modern samples?

Finally, what sort of financial arrangements must be made? Is prepayment necessary? Please quote a price/sample, if possible, at this time.

Please advise me as soon as possible if you can handle part or all of my dating requirements. Thank you for your prompt attention.

Sincerely,

Charles M. Nelson
Chairman, Department of Anthropology
CMN:maf

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 19104

The Faculty of Arts and Sciences

DEPARTMENT OF PHYSICS

September 5, 1979

Mr. Andy Tomlinson
St. John's College
Cambridge, ENGLAND

Dear Mr. Tomlinson:

In response to your questions, I am sending you a copy of MASCA Newsletter, Vol. 9, No:1, so that you may make your own corrections.

The $\pm$ 10 tolerance is quite arbitrary because the uncertainty may be larger for periods of time that do not have many ^{14}C dates. Therefore, I think it is best to ignore the $\pm$10, but mention that the true uncertainty in the calibration curve has not been determined.

Within a year, we expect to have new calibration curves with the uncertainties estimated for each 500-year interval of time.

Sincerely yours,

Elizabeth K. Ralph

EKR/us

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 19104

The Faculty of Arts and Sciences

DEPARTMENT OF PHYSICS

Kenya

September 11, 1979

Dr. Charles M. Nelson, Chairman
Department of Anthropology
Harbor Campus
Boston, MA 02125

Dear Dr. Nelson:

In regard to dating your samples from Kenya, I am writing to say that we have more than a year's backlog, so that we could not promise results in less than 2 years. We charge $200 per sample for charcoal & wood and $300 for bones.

The specialist for bones is Dr. Vance Haynes, Institute for the Study of Earth and Man, Southern Methodist University, Dallas, Texas 75275. For the bone gelatin we require at least 1 kg of sample. I should imagine that both apatite and bone gelatin could be dated from the same sample, but it would be better to consult the expert.

We do have a good mass spec for the measurement of $^{13}C-^{12}C$ ratios, and we do not charge extra for this nor pretreatments nor small samples.

The smallest sample that we can date (charcoal or wood) must weigh 4 grams, and the limit is about 20,000 years. For a full-sized sample, we need the amounts shown on the enclosed sheet.

We have a committee that we have to consult before we accept samples, I doubt if they would want our laboratory tied up for a half year with your 50 to 100 samples. Therefore, I suggest that you try Jim Buckley at Isotopes, Inc. Westwood Laboratories, 50 Van Burren Ave., Westwood, NJ 07675. They do very reliable dating, and charge $200 for normal and $300 for rush orders.

There is also a person who specializes in processing bones. He is Richard R. Pardi, Radiocarbon Laboratory, Queens College, CUNY, Flushing, NY 11367.

Sincerely,

Elizabeth K. Ralph

EKR:bac

PEABODY MUSEUM OF ARCHAEOLOGY AND ETHNOLOGY

HARVARD UNIVERSITY, 11 DIVINITY AVENUE, CAMBRIDGE, MASSACHUSETTS 02138 U.S.A.
Telephone (617) 495-2248

December 3, 1979

Dr. E.K. Ralph
Radiocarbon Laboratory
Rittenhouse Laboratory, E-1
University of Pennsylvania
Philadelphia, Pennsylvania 19104

Dear Dr. Ralph:

I would like to have two or three charcoal samples dated by the radiocarbon technique and am writing to you for information about the possibility of having these done in your laboratory. I have spoken with Bernard Wailes about this matter, and he suggested that I write to you.

During the past two summers I have been directing excavations at an Early Iron Age settlement in Bavaria, West Germany; I plan another two or three seasons of fieldwork to excavate the entire settlement. We have some good chunks of charcoal which were recovered deep down in some of the pits on the settlement. I would like to get carbon-14 dates on some of these.

Would it be possible for your laboratory to work with thesessamples? If so, can you tell me how long a determination would take and how much each would cost?

I would appreciate any information you could give me on this matter.

Yours sincerely,

Peter S. Wells

Peter S. Wells

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 19104

The Faculty of Arts and Sciences

DEPARTMENT OF PHYSICS

Early Iron Age
Bavaria

December 5, 1979

Dr. Peter S. Wells
Peabody Museum of Archaeology and Ethnology
Harvard University
11 Divinity Avenue
Cambridge, Mass 02138

Dear Dr. Wells:

In regard to your samples from Bavaria, we should be glad to date them by ^{14}C, but the problem is that we have a backlog of at of at least 1½ years.

If you want faster service, I suggest that you try Jim Burkley, Isotopes, Inc., Westwood Laboratories, 50 Van Burean Avenue, Westwood, N.J. 07675. The lab does very reliable dating. We both charge $200 per sample unless you have a special rush, their charge is $300.

I have enclosed a list of the items of information that we both like to have for publication in Radiocarbon.

Sincerely yours,

Elizabeth K. Ralph

EKR:bh

Enclosure

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 19104

The Faculty of Arts and Sciences

DEPARTMENT OF PHYSICS

May 5, 1980

Mr. Michael D. Conner
Dept. of Anthropology
University of Chicago
Chicago, IL 60637

Dear Mr. Conner:

In reply to your letter of April 28th, I am writing to say that we cannot accept your samples for ^{14}C dating, mainly because we have a two-year backlog.

I suggest that you contact Dr. Jerry Stripp, Beta Analytic Inc., Radiocarbon Dating, P.O. Box 248113, Coral Gables, Florida 33124. Their charge is $175 per sample.

Sincerely yours,

Elizabeth K. Ralph

EKR/jkw

April 28, 1980
Dept. of Anthropology
University of Chicago
Chicago, Ill. 60637

Dr. Elizabeth K. Ralph
Radiocarbon Lab
Dept. of Physics, DRL/E1
Univ. of Pennsylvania
Philadelphia, Penn. 19104

Dear Dr. Ralph:

I am a doctoral candidate in biological anthropology at the University of Chicago. My dissertation research, which utilizes prehistoric skeletal remains from the lower Illinois River valley, requires a series of from 20 to 50 carbon dates, the exact number depending upon funding and other considerations. All samples will be bones from human skeletons, a few are burned but most are not. I am currently preparing funding proposals and seeking a lab to analyze the samples. If it might be possible to use your lab, I would appreciate information regarding your facilities for dating bone samples, the amount of bone needed and the approximate cost per sample.

The skeletal material is from burial mounds of the Late Woodland Jersey Bluff Phase (ca. AD 650-1000). The mounds occur on the bluffs overlooking the river valley and the parent material for all soil on the bluffs is highly calcareous Peorian loess. Bone preservation in this soil is generally excellent, though local conditions in some areas produce a more acidic B horizon in the soil which lowers the quality of the bone. The majority of samples are from sites excavated in the last 20 years but one important series was excavated in the 1930s.

Thank you for any help you might be able to provide regarding this project.

Sincerely,

Michael D. Conner

Michael D. Conner

Ernest C. Conrad
10896 WALNUTWOOD WAY, RANCHO CORDOVA, CAL. 95670

Es gibt nichts schrecklicheres
als aktive Unwissenheit

Goethe

Department of Physics
Radio Carbon Lab
University of Pennsylvania
Philadelphia, Pa.
19104

Dear Colleague:

Recently one of my anthropology students made the following comment in her paper concerning our class discussion on the age of the earth and the use of Carbon 14 in dealing with establishing dates:

> The rate of formation and decay of radioactive carbon should be the same after approximately 30,000 years. The scientifically verifiable observation that this is not yet the case indicates that the atmosphere of the earth is not yet that old. Indeed, properly corrected carbon 14 should give maximum ages of only 10,000 years.....

As this area is a bit out of my field (comparative religion) I would appreciate any comments you may have on the above remarks. I know that your lab has been working in this area of correcting the Carbon 14 work.....and I hope that you may shed some light for me.

With All Good Wishes
Ernest C Conrad

Ernest C Conrad

P.S. In one word....HELP