

January 25, 1962

Dr. Zaky Iskander  
Director of the Chemical Laboratory  
Department of Antiquities  
Tahrir Square  
Cairo,  
Egypt, U. A. R.

Dear Zaky:

The enclosed reply has come from Dr. Berlyn in response to my letter to Yale. It is encouraging to learn that Dr. Kukachka is thought of so highly.

I am wondering now if you would like me to hold the duplicate set of samples until Dr. Kukachka's analysis is completed, or do you know of some other place to which I should send them. I seem to remember that you told me that you had given some to Dr. Stern, but my memory may have failed me.

I hope that the rumors of your possible return are correct. Dr. Fakhry had a delightful dinner party last evening which I enjoyed very much.

With best regards,

Elizabeth K. Ralph

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*Dr. Fakry Iskander*

Department of Antiquities

Midan El-Tahrir, CAIRO

Tel. 813395  
79034 Dom.

February 13, 1962.

Miss Elizabeth K. Ralph,  
Department of Physics,  
The University of Pennsylvania,  
Philadelphia 4, Pennsylvania,  
U. S. A.

Dear Beth,

It was indeed a great privilege to me to meet you and visit your laboratory. I thank you very much for your great hospitality and help. I shall always remember the happy days I passed in Philadelphia.

Since my return to Cairo, I have been so busy in the International Committee for Conservation of the Abu-Simbel Temples, that I could not find time to write to you. I have received two letters from you by post, as well as the list of samples of the wood from the Cheops Boat at Giza from Dr. Schulman. I have also received a letter from Dr. Kukachka. I was very astonished to receive his letter so quickly. I shall write to him to-day to thank him for his great kindness.

The identifications reported by Dr. Kukachka agree with what we know about the kinds of wood the Ancient Egyptians had used. Only I shall ask him if the species of the Zizyphus samples may be *Spina Christi* rather than *jujuba* which might not have been used by the Ancient Egyptians.

I have given 5 samples to Dr. Gettens who delivered them to Dr. Stern for identification, but I did not yet receive his answer. I have phoned Dr. Werner from the London Air port when I was passing by London in my way to Cairo. I have told him that you would send him the samples of wood, which you kindly did, and I hope, therefore, he will send me the identifications soon. I prefer you better keep the rest of the samples with you until I get the answer of Dr. Werner. If the identifications agree, then you can use them for determining their date by the Radiocarbon  $C_{14}$  method.

As to the tree-ring dating of the Ancient Egyptian woods, I cannot actually give a definite opinion. Dr. Bannister has visited Egypt in July 1961 and we discussed this question together after showing him the samples we have. After he returned, he sent me a letter saying that "the future of tree-ring work in your country is still uncertain, but thanks to you, I feel that the outlook is promising". Dr. Bannister can give a more correct opinion than myself, and I think we have to ask him what he thinks about this project of sending him or any other specialist to work on this subject. My idea, however, is to wait for some more time until:

- (i) we find out objects from the different periods of the same kind of wood giving a series of probably overlapping rings,
- (ii) we study the possibilities of getting samples from them without destroying the objects,

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(iii) until the problems of saving the Nubia Monuments are settled so that I can be more free to help the specialist~~s~~ in obtaining the samples and give him the facilities required for this very important work.

At any rate, you can communicate these views to Dr. Bannister and see what he thinks about the whole project.

It seems that I shall not be able to return soon to the U. S. A. to accompany the Exhibition, since it is very probable that I shall be charged with the whole project of Consolidating the facades and the interiors of the Abu-Simbel Temples. This may take me until Nov. 1962. After the completion of this project, I may be delegated to accompany the Exhibition.

Indeed, I was very happy in the U. S. A. specially because of the great interest of the visitors in the Exhibition and in the history of Ancient Egypt. I think also that I succeeded in convincing most of the visitors of the Exhibition to contribute for the safeguard of the Nubia Monuments, and I <sup>am sure</sup> am actually very keen to continue my efforts in this respect so that we <sup>can save</sup> these important monuments which are the inheritance of the whole world.

Will you please give my best regards to David Crownover, Caroline, Geraldine, Mr. Wiley,, Mr. Parkinson and all the members of your laboratory and the Museum.

Hoping to see you sooner or later in the U. S. A. or in Cairo, and with best wishes and kindest regards, I remain always,

Sincerely yours

*Zakay Iskander*

*Will you please ask  
David to send me by post  
5 copies of the new edition  
of the Catalogue of Tut's  
Exhibition, Thank you*

*Zakay*

February 23, 1962

Dr. Zaky Iskander  
Director of the Chemical Laboratory  
Department of Antiquities  
Tahrir Square  
Cairo, Egypt, U. A. R.

Dear Zaky:

Thank you very much for your helpful letter.

In regard to the tree-ring dating, I have conveyed your suggestions to Bryant Bannister, and have told him that we shall postpone consideration of the start of the project, at least, until 1963. If I can help in any way for your item (i), that is, in sending samples for species identification, or do any other preliminary work, please let me know.

We continue to regret that you had to leave and hope that you will be able to return to the U.S.A. later this year.

Sincerely yours,

EKR/lm

Elizabeth K. Ralph

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*Dr. Zaky Iskander*

Department of Antiquities

Midan El-Tahrir, CAIRO

Tel. 813395  
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July 14, 1962

Dr. Elizabeth K. Ralph.  
Applied Science Center for Archaeology,  
Department of Physics,  
University of Pennsylvania,  
Philadelphia 4, Pennsylvania,  
U. S. A.

Dear Beth,

Excuse me for being so late in writing to you. I have been so much busy and completely absorbed in the work that I could not write to anyone.

I did not receive until now the results of identification of the wood samples which were delivered by Dr. Gettens to Dr. Stern, nor of those sent by you to Dr. Werner. I shall write to both of them this week. Meanwhile, I hope you had time to deal with the Radiocarbon dating of the wooden pieces from the Cheops Boat. You can use all the pieces you have for making two or more determinations. We are very eager to know the results of your determinations for publishing them in the second volume of "The Cheops Boats".

Dr. Rainey has been here in Cairo this week for three days. We discussed with him the situation regarding the contribution of U.S.A. for the projects of lifting up the Abu-Simbel Temples.

I hope your future plans will include a visit to Egypt. You will like our country and you will never forget this visit. It seems I shall not be able to return to the U. S. A. in the near future since I am charged with the conservation of the Abu-Simbel Temples, before lifting them up. I am going to leave for Nubia this month for this project which may take about six months.

With best wishes and kindest regards,

Sincerely yours

*Z. Iskander*

September 4, 1962

Dr. Zaky Iskander  
Department of Antiquities  
Midan El-Tahrir  
Cairo, Egypt

Dear Zaky:

Many thanks for your letter of July 14th. I was glad to read that you had received the reports of the wood identification.

We have not yet started the C-14 dating of your wooden pieces from the Cheops Boat because we think that the dates will be more reliable after we have completed our lengthy series of known age tree-ring dated samples. At the present time, our lack of the optimum "effective" half-life for this period of time necessitates an uncertainty in the C-14 dates of approximately 5%. Therefore, we prefer to delay the dating of your samples until our calibration is better.

I was sorry to read that you are unable to return to the U.S.A., and I do hope that I shall have the opportunity to visit Egypt before many years elapse.

With best regards, I am,

Sincerely yours,

Beth Ralph

EKR:dml

October 11, 1962

Dr. Zaky Iskander  
Department of Antiquities  
Midan El-Tahrir, Cairo  
UAR

Dear Zaky:

Bannister and Beth Ralph are still interested in doing something about tree-ring research of ancient Egyptian woods particularly since Bannister's work on the wood at Gordion in Turkey has proved successful with a dependable floating chronology. I feel sure this work in Egypt could get nowhere without you and your active assistance so anything we do on that project will depend upon your interest and some of your free time to work on it with Bannister. Is there any possibility for the academic year 63-4? If so I would proceed to look up some funds for the job.

Please tell Ahmed Fakhry that I am most anxious to hear from him, since he has, as far as I am concerned, just disappeared into the blue and I have the feeling he is probably hiding behind a bush in the desert some place. Also of course I am very anxious to know what is happening there. We are doing our damndest about ABu Simbel but honestly I am not very optimistic.

With very best wishes,

Froelich Rainey  
Director

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April 6, 1965

Dr. Zaky Iskander  
Director of Chemical Laboratories  
✓ The Egyptian Museum  
Cairo, U.A.R.

Dear Dr. Iskander:

Over the past two weeks Dr. Rainey informed me about the developments in Egypt and we have been thinking about the possibility of obtaining valid wood samples from various locations in Egypt. I have also been in correspondence with Dr. Bannister, who will be the other member of the coring team.

In connection with this work, let me first say that we could arrive in Cairo on June 22 or 23. We presume it will take 2 or 3 weeks to do our work, this depending on the number of sites that we will have to work at.

In connection with this work I would like to ask a series of questions in order that we may prepare ourselves better for our task.

1. Is there electricity in the tombs at Dashur, and if so, what is the voltage?
2. If there is no electricity inside the chambers proper, could a cable several hundred feet long be lead into the area of work?
3. Would there be a half-inch electric drill available for propelling the corers?
4. If there is no electricity available, could a portable generator be rented?
5. Will there be labor costs: for ladder holding, scaffolding, portaging of equipment, etc.?
6. Are there other sites besides the two pyramids at Dashur that might yield valid samples? Perhaps the Cheops sun boat could be cored in an inconspicuous location.

As far as I can say at the present, we will have with us also a battery driven half-inch drill, which we could use in case of current failure or unavailability of electricity. Of course, there would be the problem of recharging the batteries after a few hours work. This means in turn commuting to a source of electricity and because of this would be the less preferred method of coring.

I hope all these questions will not be too much bother to you. Dr. Rainey sends his best regards.

Hoping to hear from you soon, I am

Sincerely yours,

Henry N. Michael  
Research Associate

HNM/rs

*Arch. Techniques*  
*C. A. Iskanter*

January 16, 1963

Dr. Zaky Iskander  
Department of Antiquities  
Midan El-Tahrir  
Cairo, Egypt ✓

Dear Zaky:

Dr. Rainey and I were glad to receive your letter of November 15, 1962. I was, especially, pleased to read that you expect to have time to assist us in the tree-ring research of ancient Egyptian woods during the academic year 1963-64.

We have just submitted a grant proposal to the National Science Foundation in which we have requested funds for the beginning of these studies. I have mentioned specifically the pilot project suggested by I. E. S. Edwards--namely, to determine the interval between the date of construction of the burial chamber in the pyramid of Meidum and the upper chamber in the Bent Pyramid of Dashshur. I hope that this meets with your approval. Please don't hesitate to suggest others and any ideas that you have in regard to how this research could be started.

In December, I visited the Laboratory of Tree-Ring Research in Tucson, and while there, discussed these plans for the future with Bryant Bannister. Bannister is quite sure that he will be able to go to Egypt for at least, one month in the winter of 1963-64. If more time is needed, there is the possibility that we could send a second person to continue the work under your direction after Bannister's departure.

Dr. Zaky Iskander

January 16, 1963  
Page 2

We are hoping also to begin studies of the history of metallurgy in our Applied Science Center for Archaeology, and I hope that we may seek your advice and help in regard to the availability of ancient objects in Egypt for metallographical examination.

The dating of your samples from the Cheops boat is now scheduled for early summer (1963). I am sorry for this long delay in determining these C-14 dates.

Sincerely yours,

Elizabeth K. Ralph

cc. Dr. Rainey (University Museum)

EKR:dml

*Dr. Zakay Iskander*

Department of Antiquities

Midan El-Tahrir, CAIRO

Tel. 813395  
79034 Dom.

March 5, 1963

Dr. Elizabeth K. Ralph,  
Applied Science Center for Archaeology,  
The University Museum,  
33rd and Spruce Streets,  
Philadelphia 4,  
Pennsylvania, U. S. A.

Dear Beth,

I have received with great pleasure your letter of Jan. 16, 1963. Although the interval between the date of construction of the burial chamber in the pyramid of Meidum and that of the upper chamber in the Bent pyramid of Dahshur, is very short, probably 15 - 20 years, I think it is worth trial to examine the beams of wood found in these two chambers. When Dr. Barnister comes, we may start this work, and if we find out that this period is too small to be determined through the examination of these beams, we may compare them with those found in the Cheops Boat which date back to the end of the reign of Cheops or the beginning of the reign of his successor Dedefre.

I hope Bryant will be able to come and do this work here. If you write to him, please give him my best wishes and convey to him my great hopes that he will be able to remain with us for a long time. Perhaps you Beth can also manage to come with him; it will be a complete working group.

I shall be greatly interested in your studies on the history of metallurgy. I am ready to take part in these studies since I did researches in this field and I have still some points which need further work.

My best wishes to Mrs. and Dr. Rainey, David, You and all my other friends the members of the University Museum.

Sincerely yours

*Z. Iskander*

*incl. - sample info.*

May 27, 1964

Dr. Zaky Iskander  
Department of Antiquities  
Tahrir Square  
Cairo, Egypt U. A. R.

Dear Zaky:

We are preparing our Radiocarbon Date List VII which will include the C-14 date for your Cheops boat, and I find that I do not have the complete reference for your book entitled "The Cheops Boat, Part I " Could I trouble you for the date and place of publication? My memory is very bad because I cannot recall whether or not you were the author If another, please send me that information too

We continue to hope to be able to start a pilot dendrochronological project with you in the winter of 1964-65 Henry Michael, at one time, had planned to come to Egypt this summer, but now he will not be able to come.

With best regards,

Elizabeth K. Ralph

EKR:gj

June 26, 1964

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Dr. Zaky Iskander  
Department of Antiquities  
Tahrir Square  
Cairo, Egypt, U. A. R.

Dear Zaky:

Dr. Velikovsky writes or telephones to me regularly to ask if we would date more samples from Tutankhamon's tomb.

I have told him that we hope to be working with you next winter and that we should prefer to wait to ask you then. However, he is a very impatient man, and is wondering if additional samples could be sent here before the winter. If there are samples of grain, papyrus, linen, hides or such available, they would be the best to have.

If these are difficult to obtain and if you are busy, please ignore this request.

With best regards,

E. K. Ralph

EKR:gj

Abu-Simbel, 7th May, 1965

Dear Dr. Michael

Welcome with Dr. Bannister to Egypt, we hope you will enjoy your trip and visit to our land, the land of the Pharaohs.

I am afraid I may not be in Cairo at the time of your arrival on June 22 or 23, since most probably I shall be at Abu-Simbel. However, my friends in the laboratory at Cairo: Mr. Abd El-Latif Erfan and Dr. Saleh Ahmad Saleh will be there and are ready to afford any facilities needed.

There is no electricity in the pyramid, at Dakshur as well as it is too far from Saggara to get electric current from it. I think you will have to use the battery driven half-inch drill and recharge the batteries daily during night at Cairo.

I think that it is necessary that Dr. Rainey asks officially Mr. Mohammed Hedde, the Director General of Dept. of Antiquities to give you permission for getting samples of wood from the beams of ceiling in the Dakshur pyramid and from the other samples you may think of. If you do not get the permission beforehand, it may take you much time to get it after your arrival.

With best wishes and kindest regards, to you and Dr. Bannister,

Sincerely yours

I Iskander

Zaky Iskander  
c/o Dept. of Antiquities  
Tahrir Square, Cairo

Dear Fro

Your last visit to Egypt was very short. I am sorry I could not get hold of you. I was managing to see you at dinner in the Tahrir Club on Sat. 27 January, but the Television programme I was giving on that day did not finish before 10:45 p.m., so I missed you.

Perhaps you know that I have retired since about four months. I am teaching, however, in the American University in Cairo on "Science and Technology in Ancient Egypt". I thought of giving this course (a copy of which is enclosed) in some universities in U.S.A. Will it be possible to arrange for this during the second semester of 1973-1974 in the University of Pennsylvania or other Universities?

Hoping to see <sup>you</sup> in the near future and with best wishes and kindest regards to you and to all your family,

Sincerely yours

Z. Iskander

ZAKY ISKANDER

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March 14, 1973.

NAME: Dr. Zaky Iskander ; *Date of birth: 16 Nov. 1912, Egypt*

DEGREES: B.Sc. Hons, Special Chemistry, 1935, Faculty of Science,  
Cairo University.  
Diploma of Institute of Egyptology, 1942, Faculty of Arts,  
Cairo University.  
M.Sc. Organic Chemistry, 1945, Faculty of Science,  
Cairo University.  
Ph.D. Organic Chemistry, 1953, Cairo University.

POSITION: 1. Director of the Research Archaeological Laboratory,  
Department of Antiquities, Cairo, till 1966.  
2. Director General of Technical Affairs,  
Department of Antiquities, Cairo, till 1971.  
3. Director General of Department of Antiquities, till May 1972.  
4. Director General of the Antiquities Organization,  
till 15th of November 1972.  
5. Professor of Science and Technology in Ancient Egypt,  
A.U.C., since September 1970.  
6. Professor of Technology of Painting for higher studies,  
Faculties of Fine Arts in Cairo and Alexandria, since 1969.

BOOKS

WRITTEN:

1. The Cheops Boats, Part I, Cairo, 1960
2. Brief History of Ancient Egypt, Cairo, 5 editions,  
1948, 1949, 1954, 1960, 1965.
3. The Discovery of Neferwptah,  
Department of Antiquities, Cairo, 1971.

BOOKS

TRANSLATED

- INTO ARABIC:
1. A. Lucas, Ancient Egyptian Materials and Industries,  
3rd edition.
  2. W.F. Albright, Archaeology of Palestine.
  3. Leonard Cottrell ( Editor ),  
Concise Encyclopaedia of Archaeology.

- PAPERS :
1. Cleaning, Preservation and Restoration of the Silver Coffin and Cartonnage of Shashanq, Annales du Service des Antiquites de l' Egypte ( A.S.A. ) T. XL ( 1941 ), p. 581-589.
  2. Ancient Egyptian Cheese, A.S.A., T XLI ( 1942 ), p. 295-313.
  3. Materials and Mothed used for Mummifying the Body of Amentefnekht, A.S.A. T. XLII (1943), p. 223-250.
  4. Liquid found in the Sarcophagus of Ptahshepses, A.S.A., T XLV (1945), p. 259-262.
  5. A collection of Foundation Deposits of Tuthmosis IIX, A.S.A., T XLVII (1947), p. 157.
  6. Analysis of the Different Samples of Gold, Silver and Bronze discovered in El-Ted, Cat. Gen. des Antiquites Egyptiennes du Musee du Caire, Tresor de Ted, 1950, p. 52-55.
  7. Triad Prototropic Systems, NATURE, 167, ( 1951 ) p. 1069-1070.
  8. Desert Varnish and Mortar of the Rhomboidal Pyramid at Dahshur, A.S.A., T LII (1954), p. 271-274.
  9. Triad Prototropic Systems, Part II, The Effect of Substituents on the Mobility of the Azemethinecarboxylic acids, Journal of the Chemical Society London, 1954, p. 203-209.
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  11. Donnees Nouvelles sur la Momification dans l'Egypte Ancienne, A.S.A., T LIII (1955), p. 167-198.
  12. Treatment of a Dangerous Case at Thebes, A.S.A., T LIV, (1956), p. 39-42.
  13. Chemical Analyses, in : Horus Sekhem-Khet, The Unfinished Step Pyramid at Saqqara, by M.Z. Goneim, Cairo, 1957, p. 35.

14. The Pottery found in the Tomb of Neferwptah and its significance, *Vepa* 41 ( 1964 ), *Ceramics and Man*, p. 177-186.
15. Temporary Stuffing Materials used in the Process of Mummification, Part I, *A.S.A.*, T LVIII ( 1964 ), p. 197-208.
16. Bees in the Temple of Edfu and their Control, *A.S.A.* T LVIII ( 1964 ), p. 187-196.
17. Chemical Identification of the samples found at the Monastery of Phoebammon, *Le Monastere de Phoebammon dans la Thebaide*, T III, p. 59-71.
18. Causes and Effects of Humidity in Monuments in Desert Regions, Conference on the problems of Moisture in Historic Monuments, *ICOMOS*, Roma, 1967, p. 85-92.
19. Temporary Stuffing Materials used in the Process of Mummification, Part II, *A.S.A.*, T LXI.
20. Bees in the Temple Dandara and their Control, *A.S.A.* T. LXI.

## Science and Technology in Ancient Egypt

Instructor : Dr. Zaky Iskander

- 1- A Journey in the history of Egypt, illustrated by coloured slides of the important monuments from the different periods.
- 2- Geological Periods and evolution of Man
- 3- Development of Civilization in Ancient Egypt: the palaeolithic period, the Neolithic period, the predynastic period, the Dynastic period.
- 4- Primitive Time-reckoning: the calendar, the Sothic cycle, the Julian calendar, the Coptic calendar, the Gregorian Calendar. Dating, hours, shadow clocks, water-clocks.
- 5- Fire Making: starting fire by percussion, wood friction, fire drill, fuels, heating, lighting.
- 6- Metals and Alloys: Copper, ores, copper smelting, refining, calculation of the amounts of copper extracted, copper working; Bronze and tin, bronze working; Brass, cementation process; Gold, electrum and silver, extraction, refining, working, colouring; Lead, ores, extraction and uses; Iron, ores, history, meteoric iron, furnaces.
- 7- Building and Building Materials: Factors deciding nature of building; brick-making; building stones; mortar and plaster; wood, wood working.
- 8- Pottery: Definition, origin, formation of clay and its composition action of heat on clay, manufacture of pottery, slip, colouring, decoration.
- 9- Faience: Definition, composition of body material, shaping, glaze and its composition, glazing, decoration, glazed pottery.
- 10- Glass: Definition, history, manufacture, shaping, colour, devitrification.
- 11- Mummification: Purpose, history, scientific basis, techniques in different periods, general method used in New Kingdom.
- 12- Painting Materials: Techniques, pigments used and their chemical composition.

- 13- Writing Materials: writing grounds, papyrus, paper, pens, palettes, inks.
- 14- Cosmetics: Eye-paints, lip-paints, face-paints. *Perfumes, and so on.*
- 15- Progress of Science in the Alexandrine Age: Cultural Relations between Greece and Egypt, Alexandria University, Physics (Strato) mechanics (Archimedes), mathematics (Euclid and Appollonius), Astronomy (Eratosthenes), Medicine (Herophilus).