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Editorial Notes

A DISCOVERY has been made in America which may be of the greatest use to archaeologists. It consists of a method of dating dead pieces of formerly living substances (such as wood and bone) by means of their radiocarbon content. The details are highly technical and beyond the comprehension of those who are not specialists. Preliminary tests on dated specimens of wood from Egypt have produced results which, as the table shows, agree very closely with the values expected; the maximum range of error is about 450 years, but the average of four samples agrees with the expected result to within about a hundred years. Further refinement of the process is expected to enable specimens as old as 20,000 or 25,000 years to be dated. That covers the whole of the Mesolithic period and takes us back to the end of the palaeolithic period and into the final phase of the Ice Age. Wood specimens are available (from peat deposits) for the whole of this period; and if the radiocarbon method, as it may be called, can be used on such, a very considerable refinement of the present British chronology will become possible. For the present methods of dating peat deposits rest ultimately on the absolute chronology built up on the basis of clay varies in Sweden, and on correlations between British and continental deposits. Other promising subjects are wooden piles from lake-dwellings, wooden handles of axes, prehistoric boats and coffins and all other organic material, such as the straw included and preserved in clay bricks and baskets, and seeds and fruit stones. We print below an extract from an article by Professors W. F. Libby, E. C. Anderson and J. R. Arnold, of the Institute for Nuclear Studies, University of Chicago, published in *SCIENCE*, March 4, 1949; Vol. 109, No. 2827, pp. 227-8; and we wish to thank the publishers for permission to do so, and Professor Libby and his colleagues for the same and for an offprint of the article. We also wish to thank Lord Cherwell for calling our attention to the discovery, which was first made known in this country by *SCIENCE TO-DAY*, Vol. 5, No. 125, 24 March 1949. We hope that it may be possible to publish in *ANTIQUITY* a full and authoritative account of the method, when further experiments now in progress have been concluded.

Having established the world-wide uniformity of the radiocarbon assay at the present time, it seems a logical assumption that this would have been true in ancient times. Assuming this, and using the half-life of radiocarbon, $5,720 \pm 47$ years, one can calculate the specific activity to be expected after any given time interval elapsed since the removal of any carbonaceous material from equilibrium with the life cycle. For living materials this probably coincides with the time of death; for carbonates it would correspond to the time of crystallization (assuming no further interchange with the solution or atmospheric carbon dioxide to occur). On this basis we have undertaken examination of wood samples of well established age from the ancient Egyptian tombs. Two such samples were used, one from the tomb of Sneferu at Meydum (furnished by Froelich Rainey, of the University of Pennsylvania Museum, Philadelphia) which was $4,575 \pm 75$ years old; the other from the tomb of Zoser at Sakkara (furnished by Ambrose Lansing, of the Metropolitan Museum of New York) which was $4,650 \pm 75$

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years old. The former sample is cypress wood ; the latter is acacia. John Wilson, of the Oriental Institute of the University of Chicago, has given the dates quoted, at the behest of a committee of the American Anthropological Association, consisting of Frederick Johnson, chairman, Froelich Rainey, and Donald Collier. The expected assay for 4,600-year material is easily calculated to be 7.15 ± 0.15 cpm/gm of carbon on the basis of the present assay and the half-life. Table 2 presents the data obtained on these materials.

'The data on both samples were averaged since the error in ages almost overlaps the difference, and the weighting was taken according to the error quoted in each run. The errors quoted here and in Table 1 also are standard deviations determined strictly from the statistical counting error, and, since the data agree within these errors, we believe that no other appreciable error is involved in the measurement. It is gratifying that the mean of the determination agrees with the expected value within 1 standard deviation unit. An error of 0.4 cpm/gm in the specific activity corresponds to an error of 450 years in a 4,600-year-old sample.

'On this basis we feel encouraged to proceed with further tests on younger samples of known age. This work is now in progress. It is hoped that certain unknowns can be measured in the near future. A large thermal diffusion column similar to the one used by Dr Grosse and his associates has been installed in the laboratory and a considerable increase in accuracy should result, permitting the measurement of samples as old as 20,000 to 25,000 years'.

AGE DETERMINATION ON THE EGYPTIAN SAMPLES

<i>Sample</i>	<i>Specific activity found</i> (<i>cpm/gm of carbon</i>)
Zoser	7.88 ± 0.74
„	7.36 ± 0.53
Sneferu	6.95 ± 0.40
„	7.42 ± 0.38
„	6.26 ± 0.41
Weighted average (both samples)	7.04 ± 0.20
Expected value	7.15 ± 0.15

With the present number of ANTIQUITY we are glad to record the accession of quite a large number of new readers, to whom we give a hearty welcome. We hope they will be satisfied with its contents. We try to act as a medium between specialists and the general reader ; but we also like to be the first to publish new discoveries. Sometimes such articles are necessarily somewhat technical, but we know (from letters received) that readers appreciate them. That is especially true where an advance in technique is described, such as that recorded in the preceding paragraphs. One can appreciate its significance without understanding the methods. Dating sites and objects is the prime objective of archaeology, and absolute dating the ultimate objective. For until an orderly sequence of events has been established there can be no history, and without an absolute chronology the relations between cultures and civilizations must remain obscure and uncertain. A period that is not dated absolutely in years is like a map of an area that has no latitude or longitude ; one cannot place it on the Earth's surface. If one could imagine such uncoordinated maps as existing separately of England and France, there would be nothing to show the existence of the English Channel, which has played so great a part in the history of both countries.