

VOLUME 24 / NUMBER 1 / 1982

Radiocarbon

Published by THE AMERICAN JOURNAL OF SCIENCE

Editor

MINZE STUIVER

Associate Editors

To serve until January 1, 1984

STEPHEN C PORTER *Seattle, Washington*

To serve until January 1, 1985

W G MOOK *Groningen, The Netherlands*

HANS OESCHGER *Bern, Switzerland*

Editor at Large

IRVING ROUSE *New Haven, Connecticut*

Managing Editor

RENEE S KRA

Kline Geology Laboratory
Yale University
New Haven, Connecticut 06511

ISSN: 0033-8222

EDITORIAL STATEMENT TO CONTRIBUTORS

Since its inception, the basic purpose of Radiocarbon has been the publication of compilations of ^{14}C dates produced by various laboratories. These lists are extremely useful for the dissemination of basic ^{14}C information.

In recent years, Radiocarbon has also been publishing technical and interpretative articles on all aspects of ^{14}C . The editors and readers agree that this expansion is broadening the scope of the Journal. Next year we will publish the Proceedings of the Eleventh International Radiocarbon Conference which will be held in Seattle, Washington, June 20-26, 1982. We also published the Proceedings of the Tenth International Radiocarbon Conference in 1980.

Another section is added to our regular issues, "Notes and Comments". Authors are invited to extend discussions or raise pertinent questions to the results of scientific investigations that have appeared on our pages. The section will include short, technical notes to relay information concerning innovative sample preparation procedures. Laboratories may also seek assistance in technical aspects of radiocarbon dating. Book reviews will also be included for special editions.

All correspondence, manuscripts and orders should be sent to the Managing Editor, Radiocarbon, Kline Geology Laboratory, Yale University, 210 Whitney Ave, PO Box 6666, New Haven, Connecticut 06511.

The Editors

NOTICE TO CONTRIBUTORS TO THE PROCEEDINGS OF THE 11th INTERNATIONAL RADIOCARBON CONFERENCE

The editors of RADIOCARBON announce the publication of the Proceedings of the 11th International Radiocarbon Conference to be held in Seattle, Washington, June 20-26, 1982. The Proceedings will appear in one of the three regular numbers of Volume 25, 1983, and will be offered as part of the subscription for that year.

Rising inflationary costs and cutbacks in government funding for scientific research have seriously affected our plans for publication. We are forced to impose stringent rules on our contributors, and hope they will understand our limitations.

Presentation of a paper at the Conference will not guarantee publication in the Proceedings issue. If a paper is accepted but will not fit into the Proceedings, it will be considered for publication in one of RADIOCARBON's regular issues. *Only those manuscripts submitted in proper form (in three typewritten copies) at the Conference will be considered for publication.* Articles may not exceed 10 pages including references, illustrations, and tables. No more than four illustrations per paper are recommended, reducible to no more than two pages. Figures should be reduced as much as possible. Preference will be given to shorter articles. No discussions will be published.

The normal review system will be employed. Style guidelines follow the previous Proceeding issues (Volume 22, Nos. 2 & 3, 1980) or the Instructions to Contributors in each issue of RADIOCARBON.

Because we will be using the photo-offset method of printing for this issue, the author will receive detailed instructions, after review of the paper, as well as standardized sheets for the preparation of final copies. If the author prefers, RADIOCARBON will prepare the final text for a reasonable fee, payable in advance.

Each institution sponsoring research reported in an article will be asked to pay a charge of \$80.00 per printed page. Institutions paying such charges will be entitled to 100 free reprints without covers.

We look forward to this project and our renewed associations.

THE EDITORS OF RADIOCARBON

NOTICE TO READERS

Half life of ^{14}C . In accordance with the decision of the Fifth Radiocarbon Dating Conference, Cambridge, 1962, all dates published in this volume (as in previous volumes) are based on the Libby value, 5570 ± 30 yr, for the half life. This decision was reaffirmed at the 9th International Conference on Radiocarbon Dating, Los Angeles/La Jolla, 1976. Because of various uncertainties, when ^{14}C measurements are expressed as dates in years BP the accuracy of the dates is limited, and refinements that take some but not all uncertainties into account may be misleading. The mean of three recent determinations of the half life, 5730 ± 40 yr, (*Nature*, v 195, no. 4845, p 984, 1962), is regarded as the best value presently available. Published dates in years BP, can be converted to this basis by multiplying them by 1.03.

AD/BC Dates. In accordance with the decision of the Ninth International Radiocarbon Conference, Los Angeles and San Diego, 1976, the designation of AD/BC, obtained by subtracting AD 1950 from conventional BP determinations is discontinued in Radiocarbon.

Authors or submitters may include calendar estimates as a comment, and report these estimates as AD/BC, citing the specific calibration curve used to obtain the estimate.

Meaning of $\delta^{14}\text{C}$. In Volume 3, 1961, we endorsed the notation Δ (Lamont VIII, 1961) for geochemical measurements of ^{14}C activity, corrected for isotopic fractionation in samples and in the NBS oxalic-acid standard. The value of $\delta^{14}\text{C}$ that entered the calculation of Δ was defined by reference to Lamont VI, 1959, and was corrected for age. This fact has been lost sight of, by editors as well as by authors, and recent papers have used $\delta^{14}\text{C}$ as the observed deviation from the standard. At the New Zealand Radiocarbon Dating Conference it was recommended to use $\delta^{14}\text{C}$ only for age-corrected samples. Without an age correction, the value should then be reported as percent of modern relative to 0.95 NBS oxalic acid. (Proceedings 8th Conference on Radiocarbon Dating, Wellington, New Zealand, 1972). The Ninth International Radiocarbon Conference, Los Angeles and San Diego, 1976, recommended that the reference standard, 0.95 times NBS oxalic acid activity, be normalized to $\delta^{13}\text{C} = -19\text{‰}$.

In several fields, however, age corrections are not possible. $\delta^{14}\text{C}$ and Δ , uncorrected for age, have been used extensively in oceanography, and are an integral part of models and theories. For the present, therefore, we continue the editorial policy of using Δ notations for samples not corrected for age.

Citations. A number of radiocarbon dates appear in publications without laboratory citation or reference to published date lists. We ask that laboratories remind submitters and users of radiocarbon dates to include proper citation (laboratory number and date-list citation) in all publications in which radiocarbon dates appear.

Radiocarbon Measurements: Comprehensive Index, 1950-1965. This index, covering all published ^{14}C measurements through Volume 7 of RADIOCARBON, and incorporating revisions made by all laboratories has been published. It is available to all subscribers to RADIOCARBON at \$20.00 US per copy.

Publication schedule. Beginning with Volume 15, RADIOCARBON has been published in three issues: Winter, Spring, and Summer. Contributors who meet our deadlines will be given priority but publication is not guaranteed in the following issue.

List of laboratories. The comprehensive list of laboratories at the end of each volume appears in the third number of each volume. Changes in names or addresses should be reported to the Managing Editor by May 1.

Index. All dates appear in index form at the end of the third number of each volume.

RADIOCARBON

Editor: MINZE STUIVER

Managing Editor: RENEE S KRA

Published by

THE AMERICAN JOURNAL OF SCIENCE

Editors: JOHN RODGERS, JOHN H OSTROM, ROBERT A BERNER

Managing Editor: MARIE C CASEY

Published three times a year, in Winter, Spring, and Summer, at Yale University, New Haven, Connecticut 06511.

Subscription rate \$60.00 (for institutions), \$40.00 (for individuals), available only in whole volumes. The Proceedings of the Tenth International Radiocarbon Conference, vol 22, nos. 2 and 3, are available for \$60.00. The price of the full volume 22, nos. 1-4, is \$60.00 for individuals and \$80.00 for institutions.

All correspondence and manuscripts should be addressed to the Managing Editor, RADIOCARBON, Kline Geology Laboratory, Yale University, 210 Whitney Ave, PO Box 6666, New Haven, Connecticut 06511.

INSTRUCTIONS TO CONTRIBUTORS

Manuscripts of radiocarbon papers should follow the recommendations in *Suggestions to Authors*, 5th ed.* All copy (including the bibliography) must be typewritten in double space. Our deadline schedule is:

For	Date
Vol 24, No. 3, 1982	May 1, 1982
Vol 25, No. 1, 1983	Sept 1, 1982
Vol 25, No. 2, 1983	Jan 1, 1983

General or technical articles should follow the recommendations above and the editorial style of the *American Journal of Science* or the Proceedings of the Tenth International Radiocarbon Conference. Date lists should follow the format shown in the most recent issue of RADIOCARBON. More detailed instructions are available upon request. Separate mailings have been discontinued.

Illustrations should include explanation of symbols used. Copy that cannot be reproduced cannot be accepted; it should be capable of reduction to not more than 10 by 17.5, all lettering being at least 1/6 inch high after reduction. When necessary, one large map or table can be accepted, if it will not exceed 17.5 inches in width after reduction. Line drawings should be in black India ink on white drawing board, tracing cloth, or coordinate paper printed in blue and should be accompanied by clear ozalids or reduced photographs for use by the reviewers. Photographs should be positive prints. Photostatic and typewritten material cannot be accepted as copy for illustrations. *Plates* (photographs) and *figures* (line drawings) should each be numbered consecutively through each article, using arabic numerals. If two photographs form one plate, they are figures A and B of that plate. **All measurements should be given in SI (metric units).**

Reprints. The minimum reprint order for each article will be 100 copies without cover. No reprints will be furnished free of charge unless page charges are paid. The cost of additional copies will, of course, be greater if the article is accompanied by plates involving unusual expense. Copies will be furnished with a printed cover giving the title, author, volume, page, and year, when specially ordered.

Page charges. Each institution sponsoring research reported in a technical paper or a date list, will be asked to pay a charge of \$80.00 per printed page, due when galley proof is returned. Institutions or authors paying such charges will be entitled to 100 free reprints without covers. No charge will be made if the author indicates that his institution is unable to pay them, and payment of page charges on an article will *not* in any case be a condition for its acceptance.

Back issues and price lists may be obtained from the office of RADIOCARBON.

Missing issues will be replaced without charge only if claim is made within three months (six months for India and Australia) after the publication date. Claim for missing issues will not be honored if absence results from failure by the subscriber to notify the Journal of an address change.

• Suggestions to authors of the reports of the United States Geological Survey, 5th ed, Washington, DC, 1958 (Government Printing Office, \$1.75).

**US NATIONAL COMMITTEE FOR INQUA ANNOUNCES
TRAVEL SUPPORT PROGRAM
FOR XI INQUA CONGRESS IN USSR**

The US National Committee of the International Union for Quaternary Research (INQUA) is seeking funding for a travel support program to ensure that the United States will be represented by an adequate number of qualified scientists at the XI International Congress of INQUA, to meet in Moscow, USSR, August 1-9, 1982. Funds for this purpose, now being solicited from a number of government agencies and private institutions, will be coordinated by the US National Committee for INQUA. Applications from younger scientists are encouraged.

Applicants for travel grant support should request application forms from Mr W L Petrie, USNC/INQUA, National Academy of Sciences, 2101 Constitution Ave, NW, Washington, DC 20418. Four completed application forms, together with four copies of the abstract of the paper submitted to INQUA should be received by the Academy Office by the end of January, 1982. Grant awards may be made as late as July 15, 1982, depending on funds received. If possible, some advance indication of tentative selections will be communicated earlier.

The purpose of the International Union for Quaternary Research (INQUA) is to bring together, on a world-wide basis, scientists in all disciplines concerned with the history of man's environment, and with the processes by which environment and man's relation to it have evolved. Included among these disciplines are: archaeology, botany, climatology, ecology, geochemistry, geography, geomorphology, geophysics, hydrology, paleontology, limnology, oceanography, palynology, physical anthropology, soil science, tectonophysics, and zoology.

The National Academy of Sciences is the adhering body to INQUA on behalf of the American scientists. The US National Committee, under the chairmanship of Dr R S Hoffmann, University of Kansas, plans US participation in INQUA activities. One of the functions of the Committee is to arrange for travel support of US scientists attending the international congresses of INQUA held at four-year intervals. Further information about the XIth Congress may be obtained by writing to Dr Ismail P Kartashov, Secretary-General, XI INQUA Congress, Geological Institute, USSR Academy of Sciences, Pyzhevsky 7, Moscow 109017, USSR.

CONTENTS

	A high-precision calibration of the AD radiocarbon time scale <i>Minze Stuiver</i>	1
	Charcoal production from wood and cellulose: implications to radiocarbon dates and accelerator target production S W Leavitt, D J Donahue, and Austin Long	27
DATE LISTS		
ANU	<i>H A Polach, E G Rhodes, John Head, and John Gower</i> ANU Date List IX	36
BS	<i>G Rajagopalan, Vishnu-Mittre, B Sekar, and T K Mandal</i> Birbal Sahni Institute Radiocarbon Measurements III	45
UCR	<i>R E Taylor</i> UCR Radiocarbon Dates III	54
WAT	<i>J C Berry and R J Drimmie</i> University of Waterloo Radiocarbon Dates I	68
WIS	<i>Margaret M Bender, David A Baerreis, Reid A Bryson, and Raymond L Steventon</i> University of Wisconsin Radiocarbon Dates XIX	83
BOOK REVIEW		
	<i>Pieter M Grootes</i> Proceedings of the Regional Conference on the Application of Isotope Analyses in Archaeology, Hydrology and Geology; edited by Dušan Srdoč, Bogomil Obelić, and Adela Šliepčević	101