

CONTENTS

FROM THE EDITOR

<i>Austin Long</i>	iii
--------------------------	-----

ARTICLES

Distribution of Sites and Radiocarbon Dates in the Sierra Nevada: Implications for Paleoeological Prospecting <i>R. Scott Anderson, Susan J. Smith and Peter A. Koehler</i>	<u>121</u>
Radiocarbon Reservoir Ages in the Gulf of California: Roles of Upwelling and Flow from the Colorado River <i>Glenn A. Goodfriend and Karl W. Flessa</i>	<u>139</u>
Evidence for Late Polynesian Colonization of New Zealand: University of Waikato Radiocarbon Measurements <i>T. F. G. Higham and A. G. Hogg</i>	<u>149</u>
Least-Squares Fitting a Smooth Curve to Radiocarbon Calibration Data <i>F. B. Knox</i>	<u>193</u>
Twenty Years of Atmospheric ¹⁴ CO ₂ Observations at Schauinsland Station, Germany <i>Ingeborg Levin and Bernd Kromer</i>	<u>205</u>

BOOK REVIEW

C. E. Buck, W. G. Cavanagh and C. D. Litton, <i>Bayesian Approach to Interpreting Archaeological Data</i> Reviewed by Marian Scott	219
---	-----

LETTER TO THE EDITOR	221
----------------------------	-----

RADIOCARBON UPDATES	223
---------------------------	-----

DISTRIBUTION OF SITES AND RADIOCARBON DATES IN THE SIERRA NEVADA: IMPLICATIONS FOR PALEOECOLOGICAL PROSPECTING

R. SCOTT ANDERSON,^{1,2} SUSAN J. SMITH² and PETER A. KOEHLER³

ABSTRACT. The number of paleoecological records for the Sierra Nevada of California has increased substantially since the compilation of Adam (1985). We examine here the geographical and temporal distribution of records within the range in order to identify areas for which “gaps” exist in our paleoecological knowledge. Seventy-two sites with paleoecological information are identified; these sites are dated with 234 radiocarbon dates. Sites occur primarily between *ca.* 36°N and 38°30'N latitudes, and from *ca.* 1000 m to over 3000 m elevation on both sides of the Sierran crest, although more sites have been analyzed on the west side of the crest than the east side. In general, packrat (*Neotoma*) midden series are located at the lowest elevations, meadow and marsh cores originate from mid-elevations, and lake sediments have been analyzed from the highest elevations. Significant gaps in our knowledge occur for much of the east side of the crest, for both sides of the range above modern treeline, and for time periods older than the latest Pleistocene.

¹Center for Environmental Sciences and Education, Box 5694, Northern Arizona University, Flagstaff, Arizona 86011 USA

²Quaternary Studies Program, Bilby Research Center, Box 6013, Northern Arizona University, Flagstaff, Arizona 86011 USA

³Present Address: P.O. Box 861, Flagstaff, Arizona 86002 USA

RADIOCARBON RESERVOIR AGES IN THE GULF OF CALIFORNIA: ROLES OF UPWELLING AND FLOW FROM THE COLORADO RIVER

GLENN A. GOODFRIEND

Geophysical Laboratory, Carnegie Institution of Washington, 5251 Broad Branch Rd., N.W.
Washington, D.C. 20015 USA

and

KARL W. FLESSA

Department of Geosciences, The University of Arizona, Tucson, Arizona 85721 USA

ABSTRACT. We measured apparent radiocarbon ages of live-collected, pre-bomb mollusk shells from the northern and central Gulf of California to determine the source of the reservoir ages and the reservoir age correction offsets for calibrating ^{14}C dates of fossil samples. Reservoir ages average 860 yr in the northern Gulf and 725 yr in the central Gulf. The corresponding ΔR values (the deviation from typical worldwide values) are 540 yr and 395 yr, respectively, with variabilities (SD) of 90 and 110 yr. This variability significantly limits the precision of calibrated ^{14}C ages. The apparent ^{14}C age of Colorado River water (as measured in a freshwater mussel, collected in the 1890s, before diversion of river flow) is not sufficiently high (1420 yr) to account for the high reservoir ages in the Gulf. The lack of a relation between the stable isotope composition of Gulf mollusks and their reservoir ages is further evidence that the Colorado River does not make a significant contribution to Gulf reservoir ages. Upwelling of old, deep Pacific-derived water appears to be the cause of the large reservoir ages.

**EVIDENCE FOR LATE POLYNESIAN COLONIZATION OF NEW ZEALAND:
UNIVERSITY OF WAIKATO RADIOCARBON MEASUREMENTS**

T. F. G. HIGHAM and A. G HOGG

Radiocarbon Dating Laboratory, School of Science and Technology, University of Waikato
Private Bag 3105, Hamilton, New Zealand

ABSTRACT. We present radiocarbon determinations for 271 New Zealand archaeological samples measured at the University of Waikato Radiocarbon Dating Laboratory between 1975 and 1995. A discard protocol is applied to the series and the list culled to winnow the acceptable dates from those that may incorporate error. None of the 221 acceptable ^{14}C determinations older than 600 BP (in the case of terrestrial samples) or 930 BP (in the case of marine and estuarine shell) extends beyond cal AD 1250. This conclusion supports the short chronology model of New Zealand prehistory presented by Anderson (1991).

LEAST-SQUARES FITTING A SMOOTH CURVE TO RADIOCARBON CALIBRATION DATA

F. B. KNOX

900 Ohariu Valley Road, R.D., Johnsonville, New Zealand

and

B. G. McFADGEN

Conservation Sciences Centre, Department of Conservation, P.O. Box 10420, Wellington
New Zealand

ABSTRACT. We Fourier transformed and filtered calibration curve data to compensate for the averaging effect of radiocarbon-dating sets of adjacent tree rings. A Wiener Filter was also applied to minimize the effects of the counting errors of the dates on the resulting calibration curve and to produce a least-squares curve through the data. The method is illustrated using a short ^{14}C -dated tree-ring sequence from New Zealand to produce a calibration curve at yearly intervals for New Zealand matai (*Prumnopitys taxifolia*). The resulting curve has a nominal standard error of 10 ± 3 yr, which is *ca.* half the average standard error of the original raw data.

TWENTY YEARS OF ATMOSPHERIC ^{14}C CO_2 OBSERVATIONS AT SCHAUINSLAND STATION, GERMANY

INGEBORG LEVIN and BERND KROMER

Institut für Umweltphysik, University of Heidelberg, Im Neuenheimer Feld 366
D-69120 Heidelberg, Germany

ABSTRACT. We present and discuss quasi-continuous long-term ^{14}C CO_2 observations from the continental background station Schauinsland (48°N, 8°E, 1205 m asl, Black Forest, southern Germany). The observed steady decline of atmospheric ^{14}C CO_2 from 1977 to 1996 can be described by a single exponential function with an e-folding time of (16.3 ± 0.2) yr. Summer means (May to August) in atmospheric ^{14}C CO_2 at Schauinsland compare within $\Delta^{14}\text{C} = \pm 4\%$ with measurements made on individual rings from a tree grown in the near vicinity of the Schauinsland site. Both data sets are slightly depleted by up to 5% if compared to maritime background measurements of atmospheric ^{14}C CO_2 made at Izaña, Tenerife. This is due to the influence of fossil fuel CO_2 emissions over the European continent as well as generally in mid latitudes of the Northern Hemisphere. $\delta^{13}\text{C}$ analyses from the Schauinsland samples show mean seasonal variations with an amplitude of $\pm 0.4\%$, caused by atmosphere-biosphere exchange, and a mean decrease from 1977 to 1996 of $\delta^{13}\text{C} = -0.017\%$ yr^{-1} . This trend is mainly due to an increasing quantity of fossil fuel CO_2 in the atmosphere, depleted in $^{13}\text{C}/^{12}\text{C}$ ratio, and compares well to trends measured at other stations in mid-to-high northern latitudes.