FROM THE GUEST EDITOR

Early in the history of radiocarbon dating, it was recognized atmospheric ^{14}C was not constant (de Vries 1958). Soon afterwards, numerous ^{14}C calibration data sets were in use. The need for a consensus ^{14}C calibration data set led to the first internationally agreed-upon calibration in 1982 (Klein et al. 1982). Since that time, the calibration data sets have continued to be extended and improved. The calibration data sets have traditionally been presented for ratification at the International Radiocarbon Conferences, including IntCal04 and Marine04, which are recommended for general use until further notice.

The earliest calibration data sets relied exclusively on dendrochronologically-dated wood. Tremendous effort and many careers have gone into building tree-ring chronologies and making reliable high-precision ^{14}C determinations on this wood. Ideally, calibration data sets for terrestrial samples should be derived from purely terrestrial records that do not require a reservoir age or dead carbon fraction correction, but as the need for calibration outpaced the availability of dendrochronologically-dated wood, the IntCal98 calibration data set was extended to include other types of records, such as U/Th-dated corals and foraminifera from varved marine sediment records (Stuiver et al. 1998).

With the new calibration data sets presented in this issue, the IntCal working group has made important steps forward. Criteria were established to objectively screen data (Reimer et al. 2002) and the groundwork was laid for a coherent statistical framework for the combination of calibration data sets (Buck and Blackwell, this issue). While the older the date, the more serious the influence of potential errors, the Holocene can now be calibrated "truly absolute" for practical purposes. Possible future corrections to this time period should be minor.

The IntCal working group has chosen not to recommend calibration beyond 26 cal kyr BP as discussed by van der Plicht et al. (this issue). However, some computer programs (e.g. CalPal; Danzeglocke et al. 2004) offer "calibration" across the full ^{14}C dating range. Users of such programs should be aware of the problems involved and that various calibration/comparison records differ considerably (up to many millennia) back to 50 kyr BP.

It may not be long, however, before we can confidently address the full ^{14}C dating range. A number of marine ^{14}C data sets beyond 26 kyr BP have time scales based on Greenland ice-core time scales (Voelker et al. 2000; van Kreveld et al. 2000; Hughen et al. 2004; Bard et al. 2004; this issue; Grootes et al. 2003). Because of disagreements in the currently available time scales of the GISP2 and GRIP ice cores, these records cannot be used to provide an absolute time scale for calibration (Southon, this issue). Yet, when anchored with U/Th-dated corals and speleothems as reported by Shackleton et al. (2004), a consistent picture emerges. Using this approach combined with a random effects model (Buck and Blackwell, this issue) and the new multi-parameter-counted NGRIP ice core (North Greenland Ice Core Project members 2004), we may be able to provide an "almost-calibration" data set to 50 cal kyr BP in the near future.

The IntCal group did not address calibration data sets for the period following nuclear weapons testing. However, the increased use of the "bomb-spike" and its subsequent decline for assigning a timeframe in forensics and earth sciences makes it essential to establish a protocol and make the data easily available. Therefore, this issue includes an extension of the Northern Hemisphere atmospheric records by Levin and Kromer, regional compilations of bomb ^{14}C data by Hua and Barbetti, and proposed usage and a new bomb ^{14}C calibration program by Reimer et al.

With each new calibration data set, the cast of characters has grown, so that the current IntCal04 working group has nearly 20 members who are pictured in one or both of the photographs taken at

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the workshops at Queen's University Belfast and Woods Hole Oceanographic Institute (Figure 1a and b). Additional lead researchers who have provided calibration data sets not previously compiled in IntCal98 are included as co-authors on the IntCal04 and Marine04 papers (this issue). Although we have not been able to include everyone who has been involved in collecting the samples or making the measurements used in IntCal04 and Marine04, we wish to acknowledge their contributions.

Each calibration effort has built upon the past; however, there is a considerable lag time between deciding when there is enough additional, reliable data to justify a new calibration data set until the publication and availability of the final product. With the field evolving rapidly, I would highly recommend that the international radiocarbon community sets a priority to make ^{14}C calibration data set construction an ongoing process.

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REFERENCES

Bard E, Ménot-Combes G, Rostek F. 2004. Present status of radiocarbon calibration and comparison records based on Polynesian corals and Iberian Margin sediments. *Radiocarbon*, this issue.

Buck CE, Blackwell PG. 2004. Formal statistical models for estimating radiocarbon calibration curves. *Radiocarbon*, this issue.

Danzeglocke U, Weninger B, Jöris O. 2002. Köln The Cologne Radiocarbon Calibration & Paleoclimate Research Package CALPAL [WWW program and documentation]. URL:<http://www.calpal.de>.

de Vries H. 1958. Variation in concentration of radiocarbon with time and location on Earth. In: Proceedings Koninklijke Nederlandse Akademie. *Wetenschappen* B61:1–9.

Grootes PM, Voelker A, Nadeau M-J, Sarnthein M, Oriwall A. 2003. Skeleton of a radiocarbon calibration from 40 to 60 kyr BP: news from the Iceland Sea. 18th International Radiocarbon Conference, Wellington, September 2003. Abstracts. p 60.

Hua Q, Barbetti M. 2004. Review of tropospheric bomb ^{14}C data for carbon cycle modeling and age calibration purposes. *Radiocarbon*, this issue.

Hughen KA, Lehman S, Southon J, Overpeck J, Marchal O, Herring C, Turnbull J. 2004. ^{14}C activity and global carbon cycle changes over the past 50,000 years. *Science* 303(5655):202–7.

Klein J, Lerman JC, Damon PE, Ralph EK. 1982. Calibration of radiocarbon dates—tables based on the consensus data of the Workshop on Calibrating the Radiocarbon Time Scale. *Radiocarbon* 24(1):103–50.

Levin I, Kromer B. 2004. The tropospheric $^{14}CO_2$ level in mid-latitudes of the Northern Hemisphere (1959–2003). *Radiocarbon*, this issue.

North Greenland Ice Core Project members. 2004. High-resolution record of Northern Hemisphere climate extending into the last interglacial period. *Nature* 431: 147–51.

Reimer PJ, Brown TA, Reimer RW. 2004. Discussion: reporting and calibration of post-bomb ^{14}C data. *Radiocarbon*, this issue.

Reimer PJ, Hughen KA, Guilderson TP, McCormac FG, Baillie MGL, Bard E, Barratt P, Beck JW, Brown DM, Buck CE, Damon PE, Friedrich M, Kromer B, Bronk Ramsey C, Reimer RW, Remmele S, Southon JR, Stuiver M, van der Plicht J. 2002. Preliminary report of the first workshop of the IntCal04 Radiocarbon Calibration/Comparison Working Group. *Radiocarbon* 44(3):653–61.

Shackleton NJ, Fairbanks RG, Chiu TC, Parrenin F. 2004. Absolute calibration of the Greenland time scale: implications for Antarctic time scales and for $\Delta^{14}C$. *Quaternary Science Reviews* 23:1513–22.

Southon JR. 2004. A radiocarbon perspective on Greenland ice-core chronologies: Can we use ice cores for ^{14}C calibration? *Radiocarbon*, this issue.

Stuiver M, Reimer PJ, Bard E, Beck JW, Burr GS, Hughen KA, Kromer B, McCormac G, van der Plicht J, Spurk M. 1998. IntCal98 radiocarbon age calibration, 24,000–0 cal BP. *Radiocarbon* 40(3):1041–83.

van der Plicht J, Beck JW, Bard E, Baillie MGL, Blackwell PG, Buck CE, Friedrich M, Guilderson TP, Hughen KA, Kromer B, McCormac FG, Bronk Ramsey C, Reimer PJ, Reimer RW, Remmele S, Richards DA, Southon JR, Stuiver M, Weyhenmeyer CE. 2004. NotCal04—Comparison/Calibration ^{14}C records 26–50 cal kyr BP. *Radiocarbon*, this issue.

van Kreveld S, Sarnthein M, Erlenkeuser H, Grootes PM, Jung S, Nadeau MJ, Pflaumann U, Voelker A. 2000. Potential links between surging ice sheets, circulation changes, and the Dansgaard-Oeschger cycles in the Irminger Sea, 60–18 kyr. *Paleoceanography* 15:425–42.

Voelker AHL, Grootes PM, Nadeau MJ, Sarnthein M. 2000. Radiocarbon levels in the Iceland Sea from 25–53 kyr and their link to the Earth's magnetic field intensity. *Radiocarbon* 42(3):437–52.

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Figure 1(a) Attendees at the first IntCal workshop in front of the Lanyon Building at Queen's University Belfast. From left to right: Minze Stuiver, Paula Reimer, Tom Guilderson, Gerry McCormac, Warren Beck, Johannes van der Plicht, Bernd Kromer, Christopher Bronk Ramsey, Sabine Rammele, Caitlin Buck, John Southon, Konrad Hughen, Michael Freidrich, Edouard Bard, Paul Damon. (Photo courtesy of QUB Media Services)

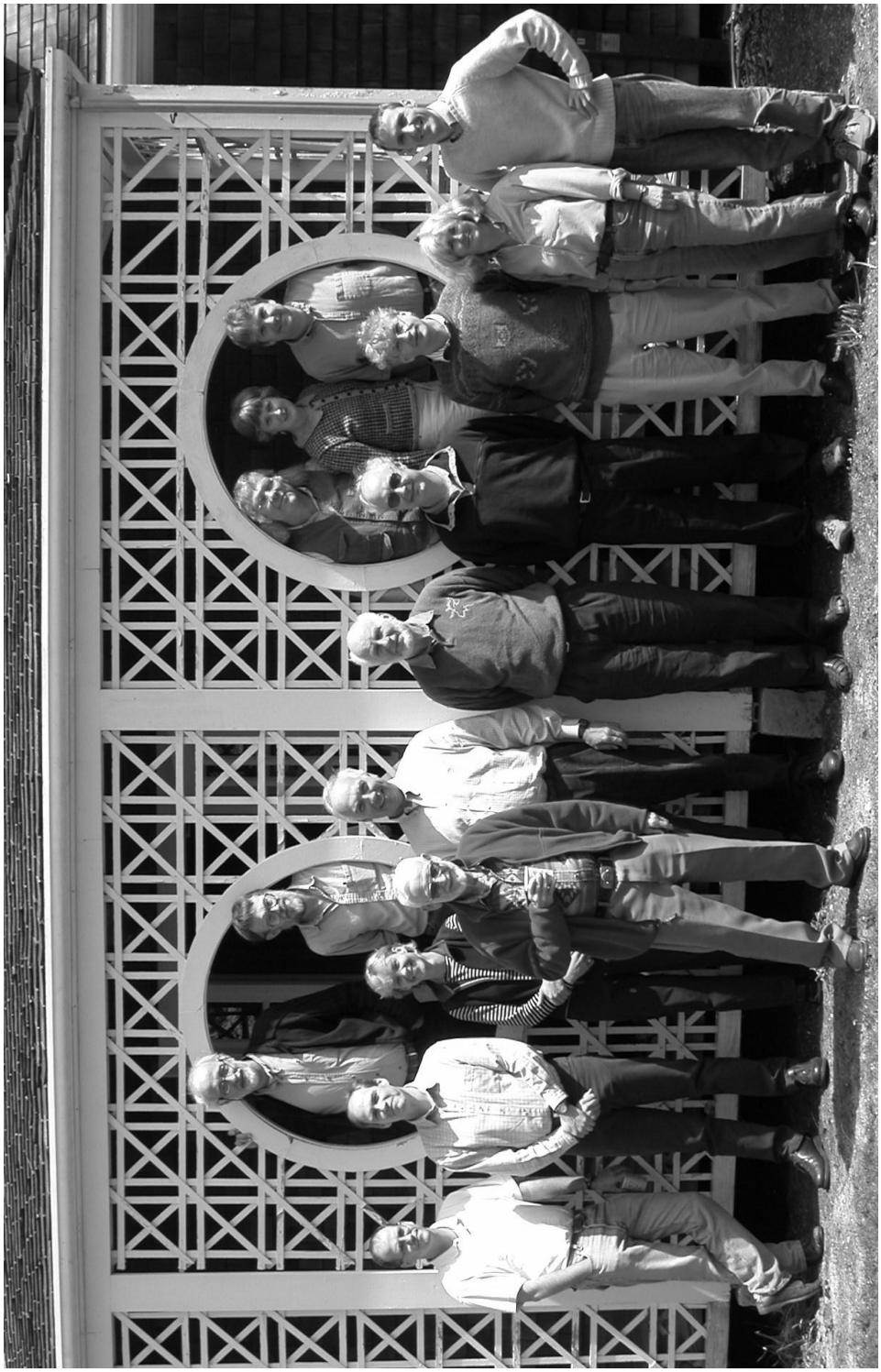

Figure 1(b) Attendees at the second IntCal workshop at the National Academy of Science's Jonsson Center, Woods Hole, Massachusetts. Back row, left to right: Johannes van der Plicht, John Southon, Ron Reimer, Caitlin Buck, Konrad Hughen. Front row, left to right: Tom Guilderson, Edouard Bard, Constanze Weyhenmeyer, Paul Damon, Richard Fairbanks, Minze Stuiver, Warren Beck, Bernd Kromer, Paula Reimer, Michael Friedrich. (Photo courtesy of Michael Friedrich)

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