

337), in which we supposed for the sake of some detailed calculations that the symmetry of the gap was determined by phonons, and is independent of that symmetry. In suggesting, if they do, that in some sense d-wave symmetry—which I was correctly quoted as saying is favored by the weight of the evidence—is evidence for the spin-fluctuation theory, Pines and Scalapino seem to be misrepresenting the situation. The d-wave is necessary but far from sufficient evidence for their theories, and it says nothing about the issues that divide their theories from my school, which are fundamental (and have implications for a wide spectrum of phenomena in solid state physics).

Philip W. Anderson
Department of Physics,
Princeton University,
Princeton, NJ 08544, USA

Recession of Tropical Glaciers

In his report "Quantifying global warming from the retreat of glaciers" (8 Apr., p. 243), Johannes Oerlemans calculates a global warming rate over the last century from glacier terminus variations, having assumed that these were solely a result of

rising air temperature. He properly notes that factors other than temperature affect glaciers and that the monitoring of glacier mass balance is a better way to infer climatic change. He also depicts the terminus record of Lewis Glacier (figure 1 in the report), which stems from the University of Wisconsin's long-term glaciological program on Mount Kenya (1, 2). I believe some rectification is necessary concerning the climatic interpretation of this record.

The year 1893 marked not only the earliest terminus observation, but was also close to the onset of glacier recession in East Africa. This contrasts with the beginning of ice retreat around the middle of the 19th century in the Ecuadorian Andes, as documented from the evaluation of historical sources (3), and in New Guinea, as inferred from numerical modeling (4). The modeling of Lewis Glacier (1, 5) indicates that the onset of recession resulted from a drastic decrease in precipitation and concomitant cloudiness and radiation effects during the last two decades of the 19th century, which was also reflected in a drastic drop of East African lake levels. Sensitivity analyses of the glaciers of Mount Kenya (6) indicate that a warming trend with enhanced sensible heat supply favored further ice shrinkage in the first half of the

20th century, while in the most recent decades increased atmospheric humidity contributed to the accelerated ice wastage. The much later onset of ice recession in East Africa appears to be related to a reduction in precipitation during the boreal autumn rainy season, which resulted from an acceleration of westerlies in the equatorial zone of the Indian Ocean during the last two decades of the 19th century (7).

Processes other than global warming merit attention for the understanding of glacier variations in the low latitudes. The Lewis Glacier on Mount Kenya is the only ice body in the tropical half of the Earth for which measurements are regularly reported (8). The continuation of this long-term glaciological program is uncertain.

Stefan Hastenrath
Department of Atmospheric and
Oceanic Sciences, University of Wisconsin,
Madison, WI 53706, USA

References and Notes

1. S. Hastenrath, *The Glaciers of Equatorial East Africa* (Reidel, Boston, MA, 1984).
2. ———, *Glaciological Studies on Mount Kenya 1971-83-91* (Univ. of Wisconsin, Madison, WI, 1991).
3. ———, *The Glaciation of the Ecuadorian Andes* (Balkema, Rotterdam, The Netherlands, 1981).
4. I. Allison and P. D. Kruss, *Arct. Alp. Res.* **9**, 49 (1977).

Sophisticated cyclic AMP and cyclic GMP Analogues Available!

- cyclic nucleotide - based inhibitors of cAMP-/cGMP-dependent protein kinases (cAK/cGK)
- hydrolysis-resistant activators of cAK/cGK for long-term activation experiments
- rapidly metabolizable structures for pulse - type activation
- potent activators of cyclic nucleotide dependent ion channels
- analogues with different cGK isozyme selectivity ($I\alpha/\beta$)
- pairs of analogues with opposite site selectivity for preferential activation of either type I or type II of the cAK isozymes
- pairs of synergistic analogues with high activation potential
- analogues with extremely high membrane-permeability
- affinity gels with PDE-stable ligands for cAK, cGK & PDE
- main metabolites of PDE-sensitive structures
- common cAMP/cGMP analogues
- fluorescent structures
- reactive intermediates

BIOLOG - LIFE SCIENCE INSTITUTE -

Forschungslabor und Biochemica - Vertrieb GmbH

Head office:
Flughafendamm 9a,
P.O. Box 107125
D-28071 Bremen, Germany
Phone: 49 (0) 421 59 13 55
Fax: 49 (0) 421 59 47 71

US/Canada distributor:
Ruth Langhorst Int'l. Marketing
7514 Girard Ave. Suite 1-411
La Jolla, CA 92037
Phone: (619) 457-1573
Fax: (619) 456-0810

In Japan contact:
Wako Pure Chemical Ind., Ltd.
Phone:
Tokyo: 03-270-8571
Osaka: 06-203-3741

Circle No. 1 on Readers' Service Card

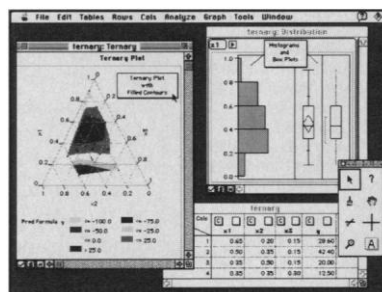
Introducing JMP® Version 3!

Statistical Visualization and Design of Experiments Software for the Apple® Macintosh®

See What You've Been Missing

JMP® Version 3 offers many new statistical features that increase power and flexibility, while maintaining its ease of use.

- In addition to the broad range of statistical tools already offered by JMP, new Version 3 features include survival analysis; stepwise regression, cross-tabulations, nonparametric correlations, and inverse prediction.
- Also offered are dramatic new graphical platforms



such as contour plots; ternary plots; outlier box plots; graphical paired T-tests; and UWM, EWMA, and Cusum control charts.

- Design of Experiments is now an integrated part of JMP. JMP

offers six types of designs: 2-level, response surface, mixed-level, mixture, general factorial, and D-optimal.

Call SAS Institute's JMP Sales Department at 919-677-8000, x5071 for

a free demo disk of JMP Version 3.

JMP®

Circle No. 9 on Readers' Service Card

5. P. D. Kruss, *Z. Gletscherkd. Glazialgeol.* **19** (no. 2), 43 (1984).
6. S. Hastenrath and P. D. Kruss, *Ann. Glaciol.* **16**, 127 (1992).
7. S. Hastenrath, in *Proceedings of the International Symposium on Seasonal and Long-Term Fluctuations of Nival and Glacial Processes in Mountains, UNESCO-IUGG-IASH-ICSU, Tashkent, Uzbekistan, September 1993*, in press; S. Hastenrath, A. Nicklis, L. Greischar, *J. Geophys. Res. Oceans* **C11**, 20219 (1993).
8. World Glacial Monitoring Service, *Glac. Mass Balance Bull. No. 2 (1990-91)* (1993).
9. Supported by NSF grant EAR-9217211.

Response: Hastenrath is right in pointing out that factors other than air temperature affect the mass balance of glaciers. First of all, solar radiation forms the most important source of energy for the melting process on most glaciers. This implies that changes in cloudiness are potentially important. Latent heat transfer, related to humidity, is another factor. Also, changes in precipitation can greatly change a glacier's mass budget.

My view—that, on the global scale, air temperature is the most important factor—is based on calculations with a mass balance model (1). For a typical midlatitude valley glacier, a 40% decrease in cloudiness or a 20% decrease in precipitation would have the same effect as a 1°C temperature rise. Such changes in cloudiness or precipitation may occur locally or even regionally on a decadal time scale, but most climatologists would agree that global trends of this order on a century time scale are unlikely. This justifies the statement that the observed retreat of valley glaciers is first of all a result of rising air temperature.

The mass balance of tropical glaciers has different characteristics. There is no well-defined melting season and changes in precipitation are probably larger than anywhere else, implying that the climatic interpretation should be done with great caution. I agree with Hastenrath that the record of Lewis glacier is unique and should be continued by all means.

Johannes Oerlemans
Institute for Marine and Atmospheric Research,
Utrecht University,
3508 TA Utrecht, The Netherlands

References

1. J. Oerlemans, *Z. Gletscherkd. Glazialgeol.* **27-28**, 63 (1991).

UNESCO's Role

I support the ideas expressed in the Policy Forum "Back to the future with UNESCO" by Rita R. Colwell and David Pramer (19 Aug., p. 1047). Among the many activities of UNESCO, where it is unique as a worldwide organization, is its role in the bridge between science and culture, as reflected by

the encouragement of fundamental science on a worldwide scale.

I have sought the assistance of UNESCO on a project to construct large detectors covering 5000 square kilometers to study the highest energy cosmic rays (energies $\geq 10^{20}$ electron volts, ≥ 16 joules) with the strong support of its director general, Federico Mayor. UNESCO is currently helping us with the formation of an international group that will meet at Fermilab (in Batavia, Illinois) in early 1995 to make a technical design for such a detector.

It is clear that, in the future, large and expensive science projects will require international collaborations. Their success will depend on international participation in the design stage of the project. In the formation of such collaborations, there is an opportunity to seek the intellectual contributions from developing countries or from countries emerging from the cold war era. UNESCO is the ideal organization to aid in finding such qualified scientists and engineers. After the technical design, UNESCO can be of great assistance in bringing scientific representatives of countries together to form the worldwide collaboration that will construct the apparatus which has been designed by the international group.

Such a role for UNESCO is nothing new. In the early 1950s, UNESCO was instrumental in the foundation of CERN (the European Organization for Nuclear Research) with the leadership of I. I. Rabi and Pierre Auger. As Colwell and Pramer suggest, the United States should rejoin UNESCO. Several years ago I signed a petition to that effect. I can state in a most concrete way that UNESCO has been, and will continue to be, an effective catalyst for our efforts to study the highest-energy cosmic rays.

James W. Cronin
Department of Physics, Enrico Fermi Institute,
University of Chicago,
Chicago, IL 60637, USA

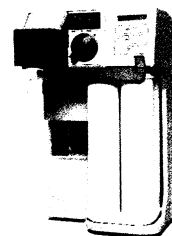
Strategies for Research

"Reorientation of research objectives" is currently much discussed, as in an editorial of that title by Philip H. Abelson (6 May, p. 755). The editorial cites opinions from a representative of the Council on Competitiveness and from a recent official of IBM, but the questions involved are more extensive than these opinions suggest.

On the one hand, there are now insistent calls from the U.S. Congress for attention to strategic research, often following specified initiatives chosen by government officials. This has meant that scientific projects that fit these initiatives are often well funded, but it is not clear that the selected initiatives take

Avoid Culture Shock.

Problems with cell growth? Maybe it's in the water. The Milli-Q® PF Plus System with new hollow-fiber UF cartridge significantly improves the viability of fragile tissue culture lines. It delivers the highest pyrogen reduction (5 log) with 18 megohm resistivity, low TOC (<20 ppb), and a 5000 molecular weight cutoff. Milli-Q water: the shockingly simple way to eliminate water-related variables in your work. For more information in the U.S. and Canada, call 1-800-MILLIPORE, ext. 8060. In Europe, 33-1-30.12.71.83.



MILLIPORE

© 1994 Millipore Corporation