

little to do with it one way or the other, in science as in the arts.) Actually, few scientific geniuses are even close to infallible, and some can be wrongheaded indeed — look at Linus Pauling and vitamin C, or Julian Schwinger and cold fusion. Bardeen cracked a problem that dozens of the greatest minds of physics had failed at — isn't that enough?

There are, almost inevitably, glitches in the details in this book, but the authors' admiration and affection for their subject illuminates the biography. At the same time, they bring readers with varied levels of expertise to a real understanding of the complex workings of science as they are actually experienced by those of us who do it. Will the book appeal to the mass market and thus make a dent in the "John who?" problem? I'm not convinced, but perhaps it should. ■

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Keeping your feet in a moving field

Earthshaking Science: What We Know (and Don't Know) about Earthquakes

by Susan Elizabeth Hough
Princeton University Press: 2002. 272 pp.
\$24.95, £17.95

Gregory C. Beroza

Seismologists have been grouped, unfavourably, with economists in that they are both great at telling you why an event happens after it has happened. This sentiment reflects frustration with our limited knowledge of earthquake behaviour. Why don't we understand earthquakes better? And why can't we predict them?

Large earthquakes occur infrequently, and the processes that are the key to understanding them are removed from our sight by miles of opaque material. Moreover, the sudden rupture of a fault in an earthquake is a nonlinear process that occurs within materials that vary strongly in their properties and appear to be complex at all spatial scales. Given these challenges, perhaps it is not surprising that we lack a comprehensive understanding of earthquake behaviour.

A more optimistic view of our limited understanding is that the science of earthquakes is not mature. Almost every new well-recorded earthquake seems to have at least some surprising aspect. We are still on the steep part of the learning curve.

Earthshaking Science takes on the difficult task of reviewing the state of earthquake science at a time when the field is evolving rapidly. Its author, Susan Hough, has done an admirable job of clearly and accurately

illuminating the boundary between our knowledge and our ignorance. In the process, she outlines some of the major outstanding problems in the field and provides a balanced and insightful view of them from several sides. Time and again as I read this book I thought to myself that she had advocated a particular position too strongly, only to find on the following page that she would offer an equally strong counterargument.

Hough, who has experience of both earthquake research and public outreach, has written a book that is accessible to readers in other disciplines and to a non-technical audience, but provides enough thoughtful commentary and perspectives to hold the attention of specialists.

An important part of any general book on earthquakes is how it treats short-term earthquake prediction — a topic that is central to seismology and foremost in the minds of non-seismologists. In this book there is not a great deal of material on earthquake prediction, which might disappoint readers outside the field. This de-emphasis is not surprising, though, given the lack of success to date. Instead, the discussion focuses on whether or not earthquakes are predictable even in theory (see *Nature* web debate; <http://www.nature.com/nature/debates>). As elsewhere, Hough delivers an even-handed and up-to-date treatment of both sides of the issue.

The book excels in its treatment of the prediction of potentially damaging strong ground motion in the near field of an earthquake. The ability to predict strong ground motion is arguably more important than the ability to predict earthquakes. Seismologists use ground-motion prediction in the form of probabilistic seismic hazard analysis (PSHA) to characterize earthquake risk.

PSHA, as used in building codes, for example, is an estimate of the distribution of ground motion with a 10% probability of being exceeded over a 50-year time interval. A lot goes into this estimate, and this book explains it clearly. To my knowledge there is no other accessible treatment of this topic. The test that precariously balanced rocks offer of the validity of PSHA is a nice example of the currency of the material in this book.

Earthshaking Science is not a textbook or a coffee-table book. But it is a readable tour of many key aspects of earthquake science. The author focuses on California but also covers the poorly understood earthquakes in the central and eastern United States. What's missing is a thorough treatment of the many earthquakes in other tectonic environments. One can hardly fault the author for this, because it would require a considerably larger book. Moreover, much of the research knowledge needed to write such a book at the same level does not yet exist. But it soon will.

Recently deployed modern seismic and geodetic monitoring networks in Japan, as



Shock result: earthquakes do enormous damage but are extremely difficult to predict.

well as parallel efforts being contemplated in the United States, have led to the discovery of new phenomena. In the past year, discoveries of large aseismic transients and what appears to be an entirely new type of seismic event deep under Japan are changing our views of fundamental earthquake processes. It is my strong expectation that the author will have a lot of new material to incorporate into the second edition. ■

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More on earthquakes

The Mechanics of Earthquakes and Faulting, 2nd edn

by Christopher H. Scholz
Cambridge University Press, \$130, £90 (hbk);
\$48, £32.95 (pbk)

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Fertile ground for politics

Autarkie und Ostexpansion: Pflanzenzucht und Agrarforschung im Nationalsozialismus

edited by Susanne Heim
Wallstein Verlag: 2002. 312 pp. E20

Wissenschaften und Wissenschaftspolitik: Bestandsaufnahmen zu Formationen, Brüchen und Kontinuitäten im Deutschland des 20. Jahrhunderts

edited by Rüdiger vom Bruch & Brigitte Kaderas
Franz Steiner Verlag: 2002. 476 pp. E96

Marco Finetti

Germany's major scientific organizations are finally examining their past during national socialism. For years the involvement of the sciences, and in particular of the research organizations, in the Third Reich was pursued only by undaunted PhD students or

journalists. But now both the Deutsche Forschungsgemeinschaft (DFG), Germany's main research funding agency, and the Max-Planck-Gesellschaft (MPG) are officially preoccupying themselves with the subject. Under external pressure, as well as from an internal sense of judiciousness, they have commissioned independent historians to reappraise their activities, or those of their predecessor organizations, during the years from 1933 to 1945, and in the early years of the Federal Republic of Germany. And there is much more to be brought to light.

The superb anthology *Autarkie und Ostexpansion* looks at the way in which German plant geneticists in several institutes belonging to the Kaiser-Wilhelm-Gesellschaft, the predecessor of the Max-Planck-Gesellschaft, surrendered themselves to the National Socialist rulers. The 11 contributions in this edited volume describe a science that represented particularly fertile ground for National Socialist ideology and politics.

Agricultural self-sufficiency had been on the political agenda of plant scientists

long before Hitler came to power. Nazi agricultural policy, however, went one decisive step further: it linked autarchy with expansion. As the book appropriately puts it, this appeared to the plant geneticists to be "a welcome framework in which long-planned research programmes could finally be carried out".

The zealotry with which the scientists proceeded and the ultimate outcome are illustrated by the example of Wilhelm Rudorf. Several of the anthology's articles examine his double career before and after 1945. Somewhat mediocre as a scientist but loyal as a National Socialist, Rudorf was appointed director of the Kaiser Wilhelm Institute for Cultivation Research in Müncheberg near Berlin in 1935, at the explicit request of the Nazi rulers but in opposition to the experts.

The ambitious Rudorf showed his supporters his gratitude. In 1937, long before Hitler's invasion of Poland and the Soviet Union, he called on German plant cultivators "to develop or improve useful plants

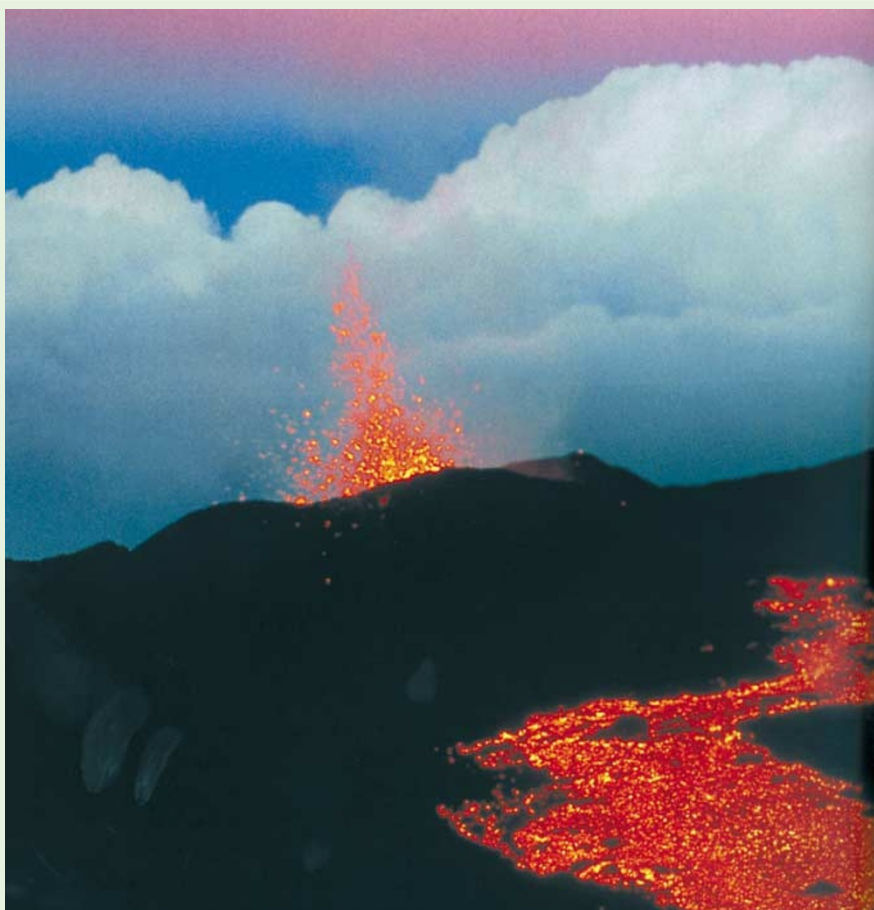
which will make it possible to populate more densely the entire northeastern and eastern territories and other border areas". And that was not all — from 1943, at the personal request of Heinrich Himmler, Rudorf helped to set up a centre for the cultivation of natural rubber in the grounds of the Auschwitz extermination camp — an impressive example of cooperation between the Kaiser-Wilhelm-Gesellschaft and Himmler's élite corps, the SS.

This cooperation with the Third Reich did not stop Rudorf from pursuing his career after 1945. He remained director until 1961, and until his death in 1969 was a member of the newly founded Max Planck Institute for Cultivation Research, initially in Hameln, later in Köln-Vogelsang, where the internationally renowned research institute still has its headquarters today. As director, Rudorf even prevented his colleague Max Ufer from resuming his work at the institute. Ufer had been dismissed from the Kaiser-Wilhelm-Gesellschaft in 1933 because he was married to a Jew. When Ufer asked to be reappointed in 1952, Rudorf agreed on condition that Ufer should not reside on the grounds of the institute because of his Jewish wife. Not surprisingly, Ufer turned down this supremely contemptible offer.

In many ways, *Autarkie und Ostexpansion* is both enlightening and shaming, and with its publication the Max-Planck-Gesellschaft has taken a positive step forward in reappraising its past. The same, unfortunately, cannot be said of Germany's biggest research organization, the DFG. Three years ago, it presented the results of an initial investigation into its own activities during the time of the Weimar Republic and the Third Reich. But the study, prepared by Frankfurt historian Notker Hammerstein, played down the DFG's involvement in the Nazi regime and met with criticism even from within the ranks of the DFG (see *Nature* **402**, 461; 1999).

A second attempt has now been made in the anthology *Wissenschaften und Wissenschaftspolitik*, produced at the initiative of the DFG. But this, too, is disappointing. The collection of almost 50 contributions covers a vast range of topics, including changes in the philosophy of modern physics before the First World War, 'big science' and research under National Socialism, and sociology in the Third Reich and in West Germany, to name just three. Most of the articles only scratch the surface, particularly regarding the role of the DFG in these areas. There is no doubt that the DFG, and above all its president, Ernst-Ludwig Winnacker, is serious in its attempts to reappraise the organization's past. But one could have certainly wished for a more enlightening choice of authors and subjects. ■

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Mountains of fire

Few sights on Earth are more spectacular, or more deadly, than a volcanic eruption. This dramatic image shows an eruptive cone and its lava flow at the Piton de la Fournaise volcano on the island of Réunion in the Indian Ocean.

It is one of 170 photographs taken by the award-winning lensman Philippe Bourseiller that are spectacularly reproduced at a giant size in *Volcanoes* (Harry N. Abrams, \$49.95), which includes text by Jacques Durieux.