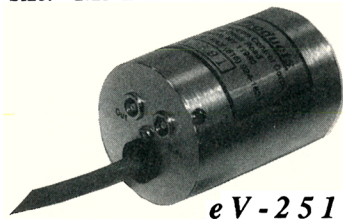


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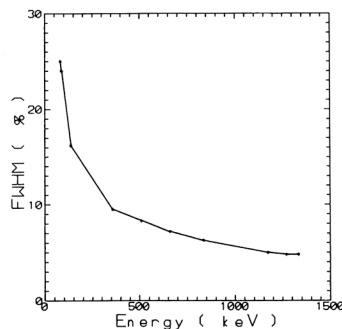
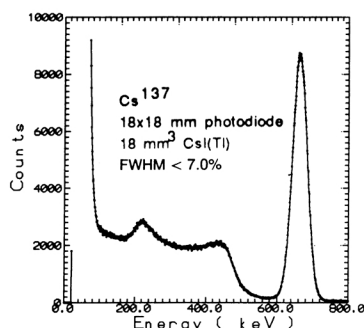
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"solid" problems, two highly original theoretical physicists, Sam Edwards and Pierre Gilles de Gennes, became seduced by "the goop." Both had made major contributions to solid-state physics and started considering other problems outside of what was then the mainstream. Thus they began a further development in polymers that gave it quite a different flavor and, combined with newly available experimental data, allowed for a much deeper understanding of the subject.

De Gennes has had an enormous impact on polymer physics and has contributed to the understanding of virtually every aspect of it. His first book on polymers, *Scaling Concepts in Polymer Physics* (Cornell U. P., Ithaca, N. Y., 1979), is a very elegant introduction to the subject, covering basic material such as equilibrium and dynamical properties of polymers. It is written to be accessible to experimentalists, combining physical intuition and mathematical simplicity. It had a large impact on the polymer community as it helped bridge the gap between the old and the new approach to polymers.

His latest book, *Introduction to Polymer Dynamics*, is quite short—57 pages—and is based on lectures he gave at the Politecnico di Milano in 1986. It consists of four chapters: The first is a basic introduction to the equilibrium properties and dynamics of polymer chains, and the last three explore intriguing problems of current interest, set forth in de Gennes's elegant and original style. The three latter chapters each cover very different problems: protein structure, spreading of liquids and turbulent drag reduction by polymers. All three topics are areas of much ongoing research to which de Gennes has made important contributions. The chapter on protein structure gives a statistical estimate for the minimum number of amino acids in loops between receptor sites of a globular protein. This work, originally performed some 15 years ago and mentioned at a biology conference, appears for the first time in this book.

The book is succinct and clear, but it does not try to provide a comprehensive treatment of polymer dynamics. I highly recommend it to researchers at the graduate level and above who wish to acquaint themselves with current research topics in polymer physics. It is written so as to be intelligible to experimentalists, and, because of its brevity, de Gennes often summarizes the main physical conclusions. *Introduction to Polymer Dynamics* provides valuable insights

into a number of fascinating problems in this fertile field.

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Tuva or Bust! Richard Feynman's Last Journey

Ralph Leighton

Norton, New York, 1991.

256 pp. \$19.95 hc

ISBN 0-393-02953-0

Reviewed by Freeman Dyson

This is an account of the eleven-year campaign, waged by Richard Feynman and his friend Ralph Leighton, to visit the country known to stamp collectors as Tannu-Tuva and to the Soviet government as the Tuva Autonomous Soviet Socialist Republic. The campaign began in 1977 with a casual conversation between Feynman and Leighton in which they resolved to go to Tuva and ended with Feynman's death in 1988.

The initial impulse came from Feynman's memory of the beautiful stamps issued by Tannu-Tuva in 1936 to commemorate the 15th anniversary of its existence as an independent country. Feynman decided that Tuva was the most obscure and inaccessible place on Earth and therefore the most suitable spot for an adventurous spirit to visit. As an additional motivation for his efforts, he had a strong dislike for the repressive policies of the Soviet government and hoped, by visiting Tuva, to throw some light into a dark corner of Soviet territory. In 1988, after the Gorbachev revolution, with *glasnost* in the ascendant in Moscow, a letter finally arrived in Pasadena inviting Feynman and his wife to visit Tuva as guests of the Soviet Academy of Sciences. The letter came two weeks after Feynman's death.

The story told in this book is not a story of failure. Although Feynman failed to reach Tuva, his indefatigable efforts resulted in effects much larger than he had intended. One of these effects was a magnificent traveling exhibition of artifacts from Central Asia called "Nomads of Eurasia," which arrived in Los Angeles in 1987. In conjunction with the exhibition, an international symposium of ethnographers and archaeologists was held at the University of Southern California with Feynman serving as honorary chairman. Feynman said to the assembled scholars, "You can understand how it's a great delight for me to welcome you all here, to see a kind of reality resulting from the nonsense with which we began. We just wanted to visit what was to us the most

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BOOKS

esoteric, strange place in the world." Other consequences of Feynman's efforts were sustained and growing contacts between America and Tuva. A Tuvan ethnographer came with the Soviet exhibition to Los Angeles. Ralph Leighton and his wife finally succeeded in visiting Tuva a year later. Further visits and scholarly exchanges are continuing. William Shear, an American taxonomist, has named a newly discovered Tuvan millipede *Diplomaragna feynmani*.

Physicist readers of this book should be warned that it contains no physics. Friends of Feynman should be warned that it contains more Leighton than Feynman. Most of the book describes Leighton's adventures as he took the active role in carrying out the schemes that he and Feynman hatched together. As the story unfolds, Feynman's own activities are more and more frequently interrupted by visits to the hospital to fight his inexorably advancing cancer. But Feynman never lost his fighting spirit or his sense of humor. Right up to the end, he was teaching classes at Caltech and making plans for his trip to Tuva. The deeper theme of this book only emerges at the end of the story. It is a portrait of a great man slowly dying. It is a lesson to us all, showing how a great soul can defy death by living every hour with courage and style.

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Peerless Science: Peer Review and US Science Policy

Daryl E. Chubin and
Edward J. Hackett

State U. of New York P.,
Albany, N.Y., 1990. 267 pp.
\$16.95 hc ISBN 0-7914-0309-2

Scientists are often called upon to judge the work of their scientific fellows and to be judged in turn. They advise on resource allocations, referee journal papers, award honors, monitor for scientific misconduct and more generally assess scientific validity and promise. In these roles they constitute the peers whose judgmental practices form the subject of this book. As peers, they stand in contrast to others who are not directly engaged in the substantive work of science but who have an interest in what science and scientists are up to: management and funding authorities; policy analysts; science writers, historians and philosophers; politicians and other

spokespersons for the public interest; the public itself; and, of special relevance here, sociologists of science. We are being closely watched—in this case by authors with a sociological bent and considerable familiarity with the Federal science scene.

Early on in *Peerless Science* the authors announce that their perspective on the culture of science is grounded in the social studies of science literature. Their basic outlook is laid out in five axioms, which emphasize science as the work of a social community composed of individuals who, among other things, are not free of human failings. Many scientists will find this quite flattering! What will be harder to absorb—although it is apparently an outlook that has many adherents in the social-studies-of-science community—is the principle that “scientific truths are, at bottom, widely accepted social agreements about what is ‘real,’ arrived at through a distinctively ‘scientific process’ of negotiation.” On closer investigation one will presumably learn that this remarkable axiom is surrounded by satisfactory qualifications of all sorts. (How else does one understand, for example, that light waves—which departed from distant galaxies long before Maxwell and Einstein—knew how to propagate, red shift, bend in gravitational lenses and so on?)

In any case, the book is not greatly colored by this stance toward reality. For the most part it deals with solid procedural and organizational issues having to do with grant proposals, journal refereeing, scientific malpractice and the like—with the science-government relationship as a dominant theme. A fair amount of space is also devoted to science evaluation as a distinct and growing discipline in its own right, with its own history, problems and needs. This new discipline is a metascience that might reciprocally benefit from the critical attention of the sciences being evaluated. Probably unfamiliar to most scientists, and needful of their wary attention, is the subfield of “bibliometrics,” the analysis of citations as a tool for research evaluation. It is interestingly described and analyzed here.

Peer review comes in for some pretty heavy lumps in *Peerless Science*. Our pieties are unmasked and shortcomings revealed, in tones that suggest a respect for the scientific enterprise but also a great deal of exasperation with its internal governance. The authors call upon the peers themselves for evidence: They quote those whose opinions have been solicited in various surveys, as well as

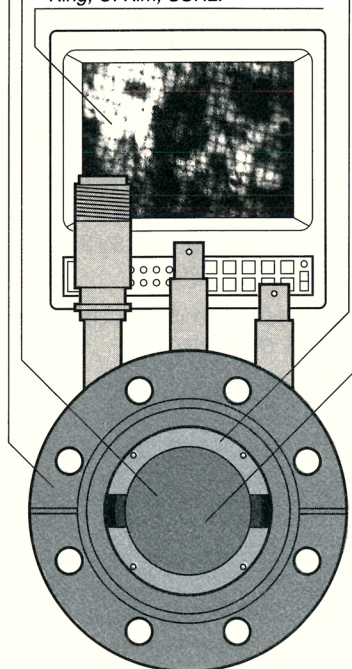
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