in *Linus Pauling in His Own Words*, Barbara Marinacci, almost a member of the Pauling family, essentially brushes the matter aside. Whatever the truth may be, it seems unfair for the Goertzels to interpret a particular action of Pauling's later years as being symptomatic of a severely flawed character.

The Goertzels' study has value, particularly in the social and political area, but it is ploddingly written and poorly proofread. On page 84 we find Charles D. Coryell transmogrified to "Hugo Thorell" and on page 89 to "Charles Theorell." "Grigory Mendeleev", "J. La-Bel", "J. E. Bernal" and "M. E. Datkins" certainly gain the reader's attention but not his confidence.

Hager's *Force of Nature* is a much longer, scientifically more authoritative and very well-written account of Pauling's life. It is a more empathetic book than is the Goertzels'. "I began this portrait as a Pauling enthusiast, and remain one, although my enthusiasm is now qualified," Hager writes. He fell under Pauling's spell in 1984 when, as a correspondent for the *Journal of the American Medical Association*, he attended a lecture given by Pauling on megadoses of vitamin C. Pauling's mesmerizing skill as a lecturer survived into his mid-eighties and, like legions before him, Hager was by turns enthralled, impressed and charmed.

Although he is not Pauling's official or authorized biographer (that daunting honor belongs to Robert J. Paradowski), Hager had frequent access to his subject and the cooperation of some members of the Pauling family. As a veteran of the medical beat, he handles the molecular biology and dietetics with understandable (in two senses) authority. He is equally persuasive in the chapters devoted to physical science and to political activism. In spite of the overlapping time frames of the various strands of Pauling's complicated life, the narrative flow is well maintained, the ample documentation being in the form of a 50-page appendix. While Hager's book is admiring of Pauling, it is by no means a hagiography, and it sets a standard that the various works-in-progress will be hard pressed to equal.

Pauling was a virtuoso of both the written and spoken word and his own best advocate. As Pauling's great contemporary Robert S. Mulliken ruefully admitted, "He was a master showman [who] persuaded chemists all over the world to think of molecular structures in terms of the valence bond method." His masterpiece was *The Nature of the Chemical Bond* (Cornell U. P., 1939), almost certainly the most influential chemistry text of the 20th century. It was typical of Pauling's stubbornness that in 1960, when the theoretical tide had already turned from the valence bond method towards molecular orbital theory, he issued a new third edition carrying ferrocene (with its 560 resonance forms) emblazoned on its cover.

In 1986 I wrote to Pauling, as no doubt had many others, suggesting that it was perhaps time he write his autobiography. He replied, "I am planning to do so when the time comes." That time never came, and as he says in his introduction to Barbara Marinacci's anthology, "this book will take me as close to writing my memoirs or autobiography as I shall ever get." Few of Pauling's technical writings find their way into *Linus Pauling in His Own Words*. Instead we are offered a generous selection from his speeches, interviews and nontechnical and political writings, some of them previously unpublished.

Pauling was a popularizer and propagandist of genius. At times he could be blunt: "Rifle bullets kill men, atomic bombs kill cities." Sometimes he was avuncular:

> When an old and distinguished person speaks to you, listen to him carefully and with respect—but do not believe him. Never put your trust in anything but your own intellect. Your elder, no matter whether he has gray hair or has lost his hair, no matter whether he is a Nobel laureate, may be wrong. The world progresses, year by year, century by century, as the members of the younger generation find out what was wrong among the things that their elders said. So you must always be skeptical—always think for yourself. There are, of course, exceptional circumstances: when you are taking an examination, it is smart to answer the questions not by saying what you think is right, but rather what you think the professor thinks is right.

At times he could even be rhapsodic:

> I like everything about the world. I like the mesons and the hadrons, and the electrons and the protons and the neutrons; and the atoms, the molecules, the self-replicating molecules; the microorganisms, the plants and animals; the minerals; the zunyite and cuprite, and pyrite and marcasite and andalusite, and all of the other minerals; the oceans and the mountains, and the forests; the stars and the nebulae and the black holes out there; the Big Bang 18 billion years ago. I like all of it!

But whatever the context and whatever the audience, he was clear, he was committed, he was compassionate and, far more often than most, he was right—or if not, at least on the side of the angels.

Gender Differences in Science Careers: The Project Access Study

Gerhard Sonnert
and Gerald Holton
Rutgers U. P., New Brunswick, N.J., 1995. 187 pp. $50.00 hc
ISBN 0-8135-2174-2

Who Succeeds in Science? The Gender Dimension

Gerhard Sonnert
and Gerald Holton
Rutgers U. P., New Brunswick, N.J., 1995. 215 pp. $16.95 pb
ISBN 0-8135-2220-X

These well-written and insightful books present the results of a most interesting study of a large, well-defined sample of scientists and present excellent discussions of previous work on gender differences in scientific success. *Gender Differences in Science Careers*, which describes the Project Access study in statistical detail, is not only a major contribution to the sociological literature in this area but is also clear, complete and cogent, a pleasure to read. *Who Succeeds in Science?* is written for a more general audience, including young people contemplating science careers, as well as teachers, science administrators and policy makers, and includes thought-provoking chapters of biographical material about scientists in the study sample as well as advice for would-be scientists and an array of policy recommendations.

Although there are differences in emphasis and amount of detail, both books discuss the results of the study and the conclusions that may be drawn from it and previous work. Understandably there is a great deal of overlap.

Project Access consisted of three components, two of which are exhaustively described in *Gender Differences in Science Careers*. The first was a statistical study of the 699 responses to a questionnaire sent to a sample of men and women who had held either National Science Foundation or National Research Council postdoctoral fellowships. The sample of respondents is shown to be representative of the complete group, and the reasons for choosing this elite group are discussed. Since it is possible to quantify success in academia in terms of rank and tenure, regression analyses to determine the predictors of success were carried out for those respondents who were academic scientists.

Even in this very accomplished sample, the women respondents were less successful on average than the men. Productivity (as measured by the annual publication rate) was found to be a very significant predictor of success, but in an analysis including this and many other characteristics, gender remained a significant predictor: Women as a group were still disadvantaged with respect to rank and tenure.

The second component of the study was qualitative, based on interviews with 172 scientists drawn from the respondent sample and 35 Bunting postdoctoral fellows and finalists in science and engineering. This permitted an examination of the events that shaped their careers and of their perceptions of the characteristics important to a scientific career. As might be expected, no single type of event or characteristic dominated. However, there are interesting gender differences in a number of areas, especially those pertaining to social aspects of science such as collaborations, participation in informal discussions and informal networks, and interactions at meetings. No significant differences were found in the area of epistemology, and the few that arose in methodology could be summarized by the observation that the women were more conservative than the men in their adherence to the traditional rules of scientific research.

The results from both components of the study are discussed in the context of the deficit model and the difference model, which posit that gender differences in success arise respectively from differences in the treatment of men and women scientists and differences in how the two groups function as scientists. As expected, neither model by itself is sufficient to explain the findings. One important observation presented in this discussion is that, even though the average productivity rate of the women was lower than that of the men, there is evidence that the women published longer, more comprehensive and more frequently cited papers than did the men.

Who Succeeds in Science? includes discussions of the background literature, models, results and conclusions woven into a clear and lively text. It also presents the third component of the study: 20 detailed career biographies based on extensive interviews with the subjects. Ten are scientists who remained in academic research and the rest are scientists who left; each group is evenly divided by sex. These chapters are very important, since they give life to the findings and illustrate the interaction of deficits and differences in real careers.

Most young scientists, both men and women, will find the chapter of advice in *Who Succeeds in Science?* very useful. The chapter on policy is also excellent and confronts the question of whether women should be encouraged to go into science at a time when the job market is so tight and no reliable prediction can be made of the need for scientists in the future.

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Statistical Thermodynamics of Surfaces, Interfaces, and Membranes

Samuel A. Safran
Addison-Wesley, Reading, Mass., 1994. 270 pp. $55.95 hc
ISBN 0-201-62633-0

Only recently has soft condensed matter physics—an area dealing with such diverse materials as polymers, amphiphiles, liquid crystals and membranes—been recognized by the physics community as an area of study in its own right. The materials embraced share a tendency to self-assemble into aggregates such as lamellae and cylindrical or spherical micelles. These aggregates may themselves assemble, producing either ordered phases whose symmetries range from the pedestrian to the bizarre or disordered fluids whose structures range from the trivial to the complex.

The growth of interest in this nontraditional area is fed not simply by the inherent interest of such systems but also by their enormous technological importance and the increased stimulation arising from the area's overlap with biological subdisciplines. Indeed, the model of biological membranes as a bilayer of amphiphilic phospholipids, undergirded by an elastic network of specialized proteins (themselves polymers of amino acids) and incorporating other biologically active proteins, serves as a paradigm of the overlap of interests. This intersection of physics, chemistry, biology and materials science is most likely to be one of the areas of greatest excitement and growth in the next decade.

A small indication of the activity in this field was the publication in late 1994 of three books on the subject, including Samuel Safran's *Statistical Thermodynamics of Surfaces, Interfaces, and Membranes*. All three deal with similar material but each presents it very differently and to a somewhat different audience. The other two books are the multiauthor collection *Micelles, Membranes, Microemulsions and Monolayers*, edited by William Gelbart, Avinoam Ben-Shaul and Didier Roux (Springer-Verlag) and the monograph *Self-Assembling Amphiphilic Systems* by Gerhard Gompper and me (Academic) (See PHYSICS TODAY, March 1995, page 91). Whereas the latter two are more narrowly intended for researchers and their students, Safran's book is broadly targeted at first-year graduate students in any number of disciplines and assumes only a rudimentary knowledge of statistical mechanics.

One of the most laudable aspects of Safran's presentation is the methodical way he proceeds from simple to complex systems. He first considers a single isolated and static interface. The effects of thermal fluctuations on the interface are then considered in a discussion that culminates in a particularly simple variational treatment of the roughening transition first given by Yukio Saito. Interactions between rigid interfaces are considered next. I was surprised and pleased to find here a nice presentation of the theory of van der Waals interactions due to Igor Dzyaloshinskii, Evgenii Lifshitz and Lev Pitaevskii; such a presentation is unusual in a book aimed at beginning graduate students. Fluctuations are then added to the interfaces, which leads to the discussion of bending energies and curvature moduli. This section provides a nice example of the benefits of a well-thought-out incremental approach. Having previously calculated the pressure between charged plates immersed in solvent, Safran can now use it to obtain the saddle-splay modulus of a collection of charged membranes. Finally, systems of extensive amounts of interface are treated, starting with colloids, whose surfaces are given and rigid, and concluding with self-assembling systems consisting of fluctuating interfaces, as exemplified by microemulsions.

While the systems studied get progressively more complex, the methods employed do not. Safran consistently applies variational methods wherever possible. If this approach causes him to sacrifice a treatment of the Kosterlitz–Thouless recursion relations when discussing roughening, it nonetheless enables him to tie this discussion to a later one devoted to fluctuations in bicontinuous phases. The presentation also benefits greatly from stimulating and challenging problems.

The book has one major weakness: There is almost no discussion of experiment or its connection to theory. Were I to teach a course using Safran's book, I would certainly have to supplement it with much discussion of physical phenomena. Following my own prejudices, I would also broaden the coverage of the last chapter on self-assembling systems, which now builds only on the elastic description of interfaces in earlier chapters, to include a Landau description, which would also use methods presented earlier. But it is a tribute to this delightful book that, after reading it, I would like to teach a course based upon it. And I would advertise it widely, not only in my own department, but in biology, chemistry and materials science as well.

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Optical Coherence and Quantum Optics

Leonard Mandel and Emil Wolf
Cambridge U. P., New York, 1995. 1139 pp. $50.00 hc
ISBN 0-521-41711-2

Optical coherence theory underlies image formation for naturally illuminated and self-luminous scenes, wave propagation and scattering in random media, and all forms of optical interferometry. The purview of quantum optics spans laser theory, photon and photoelectron statistics and fundamental issues in quantum measurement.

Optical coherence and quantum optics have long been closely related. However, the breadth and depth of knowledge that exist in these two fields make attempting their thorough coverage in a single volume a daunting task. In *Optical Coherence and Quantum Optics*, Leonard Mandel and Emil Wolf have made a worthy effort toward that end; it helps that the authors' names are nearly synonymous with the book's title.

In essence, *Optical Coherence and Quantum Optics* is three books: one on the propagation of classical field coherence functions in free space, one on laser theory and related topics and one on photodetection and nonclassical light. Although Mandel and Wolf build connections among these topics, dividing the book into three units can be accomplished without much loss of continuity or content.

The discussion of coherence theory for classical fields commences with elementary, semiquantitative assessments