sible explanations for year-to-year population variations is simply "differential predation" patterns. Aggregations of prey cause aggregations of predators; thus any physical processes that affect opportunities for prey to aggregate will affect local fishery production. He also reminds us that variations in fish development (differences in growth rate or size at maturity) provide information about local environmental patterns, because they constitute responses to those patterns.

Laevastu is a true advocate of ecosystem management practices. However, in this book he seems unclear about what is and is not known about the early life history and survival of pelagic fish. In 1975 Lasker proposed that the survival of larvae to the first-feeding stage, owing to their limited mobility, depended on the existence of natural concentrations of appropriate food, which could be dispersed by any climatic or weather event that mixed the upper ocean. It follows that there are relatively rare periods when all the right conditions are met; fish larvae that hatch into these environments enter a "survival window," from which they can proceed to subsequent developmental stages provided that they evade the many other threats to survival with which they are confronted. Laevastu refers to an absence of support for Lasker's starvation hypothesis as well as for the concept of a survival window.

In fact, strong evidence has been presented for both hypotheses. Gail Theilacker of the National Oceanography and Atmospheric Administration (NOAA), for example, has shown that for numerous samples of ocean-caught larval anchovy as many as 65 percent of individuals in any given sample are in a state of starvation. For many years the Fisheries Oceanography Coordinated Investigations (FOCI) have synthesized NOAA's physical and biological sampling capabilities to study recruitment-related processes in Alaskan pollock that reproduce in the Shelikof Strait. Some of FOCI's recent reports use data on earbone growth to show that fish two years old and older that they studied were born at different times during the spawning period, with different survival, a finding that supports the survival window hypothesis. Similar data sets from several other well-studied fisheries provide further evidence.

The overriding message that emerges from this book is that fisheries science is not well in the world. There are important differences in quality between fishery forecasts based on well-defined cause-and-effect relations and statistical inferences derived from means, correlations, and curve-fitting procedures. These are often confused within conventional stock assessment paradigms, where unverified and unverifiable hypotheses abound. Until there is a clear acknowledgment of the effect on fisheries of environmental processes as well as destructive human behavior, fisheries will continue to "surprise" managers. Despite its minor lapses, Laevastu's work is a major contribution to the effort to improve fisheries management through greater awareness of ecological factors, and it should be required reading for all resource managers. Beyond serving as a primer for mariners, novice managers, and fisherfolk wishing to better understand the relationship between environmental processes and fisheries production, it offers poignant commentaries on marine systems such as the Black Sea and the Baltic, where humanity has shown itself to be a curse on nature.

Gary D. Sharp
Cooperative Institute for Research in the Integrated Ocean Sciences, Monterey, CA 93940

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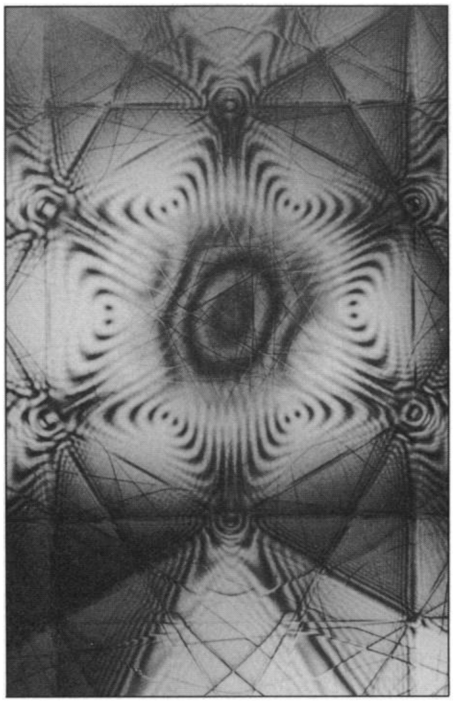
The New Microscopy

Electron Microdiffraction. J. C. H. SPENCE and J. M. ZUO. Plenum, New York, 1992. xxiv, 358 pp., illus. $49.50 or £59.40.

It has been argued that the electron microscope is one of the key inventions of the 20th century, having contributed more than any other device to our understanding and control of materials on an atomic scale. In recent years, in a gradual shift of emphasis from real to reciprocal space, the popular image of an enhanced optical microscope has been complemented by the emergence of the electron optical column as a uniquely flexible tool for diffraction physics. Twenty years ago, electron diffraction was regarded as a sensitive method for investigating crystal structures but one that was more qualitative than quantitative, at least in comparison with x-ray or neutron methods, because the interactions of charged particles with the specimen were too complex for exact interpretation except by elaborate computer calculations. Given that the physics of electron diffraction is no different today, one may ask what new developments warrant a reexamination of the subject.

First, smaller and smaller probe sizes have become available on commercial microscopes. It is now possible to obtain a probe of subnanometer dimensions; hence microdiffraction patterns may now be obtained from ideal crystalline areas of even the most complex specimens. This advance alone has made possible the routine identification of crystallographic space groups by simple inspection of diffraction patterns. Simultaneously, other barriers to quantitative interpretation have been surmounted by the use of spectrometers to remove the inelastically scattered electrons, as well as improvements in the theory of dynamical diffraction and the widespread employment of computer workstations for online image processing and calculations.



"Large-angle convergent beam pattern recorded at 100 kV from silicon in the [111] orientation. The Omega filter of the Zeiss 912 has been used to remove most inelastic scattering, together with a very small selected area aperture, resulting in high contrast." [From *Electron Microdiffraction*; courtesy of Dr. J. Mayer, M.P.I., Stuttgart, Germany]

Even today, only a few laboratories have been able to incorporate all of these advances in the field. Yet there is no doubt that a new baseline has been established for the next century. Thus the authors of *Electron Microdiffraction* not only are uniquely qualified to describe the new developments by their experience of the field, they have demonstrated a keen sense of timing. In essence, they have written a user's manual for the new microscopy, aimed at both experimentalists and theorists, to help the next few generations of researchers exploit the opportunities that are within sight. Among these, we may expect that electron diffraction patterns will be used to infer the bonding charge distribution between atoms for a wide range of crystals. Further, the introduction of field-emission electron sources has generated a new field based on coherent, phase-sensitive diffraction and imaging related to optical holography.

To establish a solid background for future research, Spence and Zuo present a detailed analysis of the intensity distribution within convergent-beam electron diffraction patterns from crystals, with emphasis on a unified approach from dynamical theory. The book is illustrated throughout by examples of experimental patterns. The first half of the volume consists of a systematic development of dynamical diffraction theory, including discussions of the failure of Bragg's law, the concept of dispersion surfaces, diffraction into higher-order Laue zones, and applications such as channeling, accurate measurement of structure factors, critical voltages, polarity determination, and local measurements of strain and composition. A detailed exposition of methods for symmetry determination follows. Subsequent chapters include an authoritative survey of the current status of and prospects for coherent nanodiffraction and a discussion of new instrumentation. Throughout the book, a quantitative approach to diffraction is reinforced through the use of precisely defined units of measurement, physical constants, and phase factors. The computer programs used for dynamical calculations are listed in a lengthy appendix, with examples of the output distributed throughout the text. Other appendixes provide a summary of the relationships in dynamical theory, crystallographic data, and a valuable bibliography of convergent-beam electron diffraction applications indexed by material.

Although perhaps too advanced for beginners, *Electron Microdiffraction* is a valuable resource and will prove indispensable for workers in this rapidly evolving field.

Roger Vincent
H. H. Wills Physics Laboratory,
University of Bristol,
Bristol BS8 1TL, United Kingdom

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