retical aspiration in these essays, like the theories appealed to, varies considerably.

Does this muted polemic for what one of the authors calls the "macrocosmic positioning" of science within its social and cultural context point to the future toward which the history of science is moving? If so, there can be little hope that this specialty will provide a meeting ground for scientists interested in the history of their subject and professional historians of science. The new history of science happily ignores precisely those topics that scientists generally consider the most intriguing aspects of their work. Perhaps the evolution of the history of science as a distinct discipline has entered a second phase. If so, one can at this point note little more than the losses entailed and the hopes entertained. It is possible, however, that this most recent attempt to further desanctify science will have the unintended effect of forcing us to realize that science, while inescapably historical, is no less humanistic than poetry, painting, or music. Scientists, like other creative individuals, enrich our lives with specific products of great beauty. When seen in this light, science surely must be considered a constituent of a larger culture. But we should beware of histories that minimize the distinctiveness of the genre, the individuality of the creators, or the particular features of their achievements. Otherwise, we may end up with a history of science without science.

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Plate Tectonics

Geological and Geophysical Investigations of Continental Margins. Papers from meetings, 1977. JOEL S. WATKINS, LUCIEN MONTADERT, and PATRICIA WOOD DICKERSON, Eds. American Association of Petroleum Geologists, Tulsa, Okla., 1979. viii, 472 pp., illus., + plates + index. $24; to AAPG-SEPM members, $19.50. AAPG Memoir 29.

The literature of tectonics is enjoying, or perhaps suffering, a continuing, seemingly exponential growth, which results from a number of factors. First, there is a now general understanding that plate tectonics forms the basic foundation on which we should be modeling global lithosphere kinematics and structural evolution. Consequently, an increased understanding of tectonic processes and relationships has led to a great increase in the number of scientists involved in tectonic research. Second, advances in materials science, coming from ceramics, metallurgy, and the aircraft and the new strong-materials industries, are being, albeit tentatively, applied to structural geology and tectonics. Third, multichannel seismic reflection with computer-based deconvolving techniques developed mainly by the oil industry and the deep-crustal reflection technique developed by Kaufman and Oliver at Cornell have yielded seismic-stratigraphic and crustal-structural data of a beauty and clarity that have enabled us to draw believable structure sections across continental margins and orogenic belts for the first time. Thematic books and data compendia are therefore on the increase and play a welcome and important role in providing concise, up-to-date summaries that make the data and current ideas of tectonics available to a wide audience who would otherwise need to wade through a morass of literature.

The present volume admirably fulfills this role and follows the fine tradition set by the volume edited by Burk and Drake and by the Maurice Ewing series. Four main topics are covered: rifted margins, convergent margins, small basins and their margins, and the natural resources of continental margins. A mistake, in the reviewer's opinion, was made in including a paper on the southwestern margin of Iceland, hardly the best example of any kind of continental margin.

The role of the new seismic stratigraphy is seen in the sequence of fine papers on the Gulf of Mexico and the eastern United States rifted margin. A notable omission in all these papers except for Bott's is any systematic discussion of the structure and petrology of the rifted-margin–continent-ocean transition, in particular the role of thinned, stretched, continental lithosphere beneath the upper continental rise, a phenomenon well displayed by the Jurassic history of the Alps and the northern margin of the Bay of Biscay.

Of fundamental importance is Pitman's paper relating the effect of sea-level change and the thermal subsidence of rifted margins to stratigraphic development. Pitman's work on stratigraphic modeling is probably the single most important piece of research ever done in stratigraphy. He computes sea-level changes from changing ridge volumes, superimposes this effect on a hinging, thermally subsiding rifted margin, and generates a theoretical stratigraphy with onlap and offlap, transgressive and regressive, sequences and disconformities that can be matched with the observed seismic stratigraphy on the eastern U.S. margin.

An imaginative and clever paper on the evolution of the Mediterranean oceanic basins by Biju-Duval, Letouzey, and Montadert ties the basins kinematically to the geometry and history of adjacent tectonically mobile zones. The paper is a fine illustration of how integrated tectonics should be done and is an important example of a new genre of integrative tectonics typified by the French school.

The book also contains papers that fill a useful role in providing up-to-date summaries of otherwise hard-to-find data on areas and topics of importance. Among these are papers by Ludwig *et al.* on the Falkland Plateau, Talwani *et al.* on the South Australian quiet zone, Karig *et al.* on the Sunda arc, and Duque-Caro on the structure and evolution of northwestern Colombia.

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Chemistry in China

Chemistry and Chemical Engineering in the People's Republic of China. A Trip Report of the U.S. Delegation in Pure and Applied Chemistry. JOHN D. BALDESCHWIELER, Ed. American Chemical Society, Washington, D.C., 1979. xx, 266 pp., illus. Cloth, $15; paper, $9.50.

In mid-1978 a delegation of 12 American scientists chaired by Glenn T. Seaborg visited the People's Republic of China for a firsthand view of that nation's research, development, and teaching programs in chemistry and chemical engineering. The visit was the counterpart of one the previous year by Chinese scientists to the United States and covered some 30 sites, including research institutes, universities, and industrial operations. This book is a report of that trip.

The book summarizes the delegation's observations about basic research in organic, inorganic, physical, nuclear, and analytical chemistry and in chemical engineering and research in key areas of technology—petroleum and petrochemicals, catalysis, polymers and synthetic fibers, laser chemistry, isotope separation, instrumentation, and computers.

Part of the book is devoted to a review of the development of chemical science in China over the past 50 years and to a useful examination of the disruptions brought about by the Great Leap Forward and the Cultural Revolution.

China's drive for modernization is hampered by a lag in research and by a missing cohort of scientists and engineers that reflects a decade of disruption in higher education. There is also a lack of experienced middle managers. Given the impaired development of science and technology, the current strategy of the Chinese is to become technologically competitive as soon as possible. In this the Chinese are handicapped by a shortage of computers, instrumentation, and trained technical personnel.

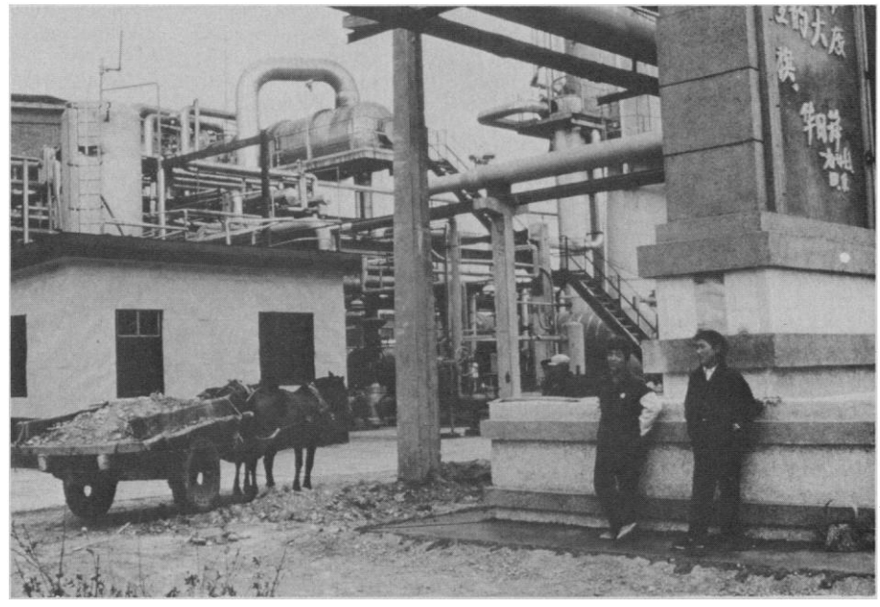
China is moving to raise its national income by expanding agricultural output, by upgrading industry with the help of foreign technology, and by developing international trade. Special emphasis is placed on the development of basic industries.

A substantial part of the organic chemistry program at universities and research institutes is applications-oriented. In pharmaceuticals and agrichemicals, biologically active compounds extracted from plants are being studied; structural elucidations of these active compounds are slowed by the lack of x-ray crystallographic and other equipment. Lanthanide chemistry is under extensive investigation because of the abundance of rare earth minerals in China. Research on rare earth compounds has been directed toward x-ray phosphors, although the materials under study are not as attractive as the materials used commercially in this country. Heterogeneous catalysis is the subject of a major effort, with work aimed at studying process variables, improving existing catalysts, and developing catalysts for new processes. Extensive research in applications of polymer chemistry is also under way. Although little theoretical research was noted by the delegation, such research seems to have potential for near-term contributions to science and technology.

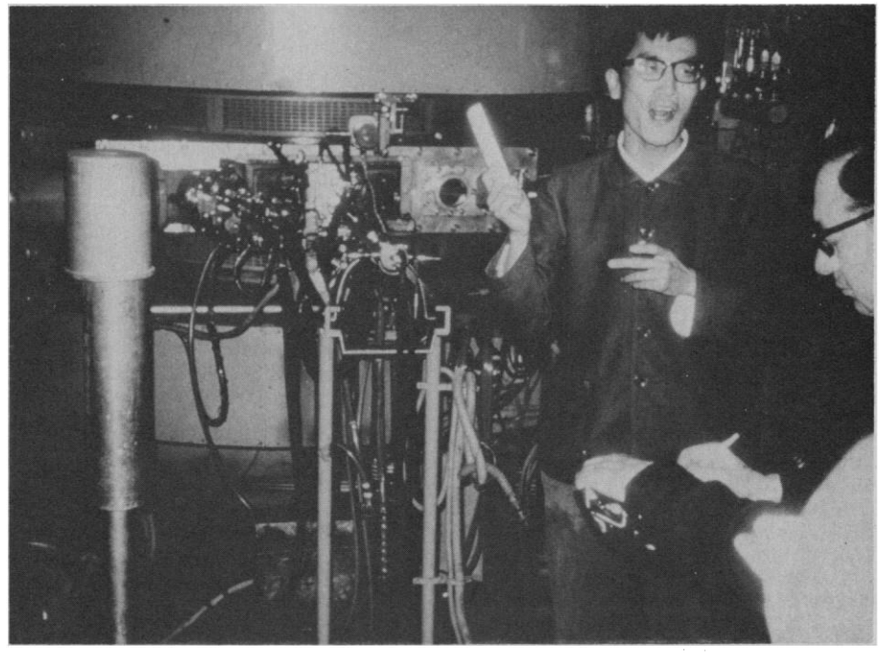
The delegation found that pilot plants lacked instruments for on-line analysis and control. No computers were observed in use for process control. In addition, the Chinese do not appear to use the full power of computers to do complex chemical engineering calculations.

Despite the limits of research, the technology in some Chinese plants is not as far behind the West as might be expected. The Chinese have demonstrated a strong interest in purchasing existing Western technology and have been able to operate it even with a limited number of technical personnel.

The book also describes the highly centralized and complex system for administering and directing research in China, although the structure and operation of the Science and Technology Commission (STC), which was reestablished in 1978, was not made clear to the delegation. The highly centralized system in the People's Republic may well serve the needs of the current programs aimed at rapid industrialization, but it may lack the flexibility and delegation of initiatives that are necessary for success in long-range, fundamental research programs.



Entrance to ammonia plant at Tach'ing. The plant is one of "eight large ammonia synthesis facilities utilizing American technology. In addition, a number of small ammonia synthesis plants are stated to be scattered throughout China." [From *Chemistry and Chemical Engineering in the People's Republic of China*]



Cyclotron, Institute of Nuclear Research, Shanghai. The 1.2 meter cyclotron "was completely designed and built by the Shanghai group. The design started in 1960 and actual operation commenced in 1964. The accelerator was designed for 25 MeV α-particles, and it actually produced 30 MeV particles. It also accelerates deuterons and protons." The cyclotron is being used to produce radioisotopes for nuclear medicine. "There is also a cooperative program between scientists at the Institute of Nuclear Physics and physicists at Futan University who are doing proton induced X-ray fluorescence. Of special interest was a program to analyze valuable old swords dating as far back as the Yu State (about 2500 years ago) by this method." [From *Chemistry and Chemical Engineering in the People's Republic of China*]

In examining the research effort in China it must be recognized that the rest of the world is not standing still. In the United States, for example, the chemistry-related research expenditure is approximately $4 billion annually. To compete effectively will take dedication, patience, and a significant allocation of personnel and financial resources by the People's Republic of China.

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