Structural Chemistry: Techniques

A symposium on the determination of molecular structure, ranging from discussions of classical diffraction techniques to reports on magneto-optical rotation spectra and the Mössbauer effect, was part of the program of the chemistry section of the AAAS at the Philadelphia meeting in December. Eight papers were presented.

A technique which will see wide application in the future is magneto-optical rotation spectroscopy (MOR), described by Victor Shashoua (du Pont Company). This is an extension of the method of optical rotatory dispersion in which the rotation of polarized light by the sample is measured as a function of frequency in the visible and ultraviolet regions of the spectrum. While the optical rotatory dispersion method (ORD) is limited to substances which are naturally optically active, the new method has no such limitation. All substances in a magnetic field rotate the plane of polarized light. Because of this, there are no inert solvents for this technique and considerable care has to be exercised in the interpretation of the results. Working with a magnetic field of 10,000 gauss and temperature control of ±0.1°, Shashoua was able to report a precision of ±0.003° in measuring the rotation.

The spectra obtained are similar in general character to the ORD spectra but often show considerably more detail than ORD shows in compounds which are naturally optically active. Results were shown for a wide variety of substances ranging from inorganic complexes to polypeptides. Among other effects this technique can detect triplet states as well as changes such as those due to complexing and change of *p*H on hemoglobin. More will be heard in the future about this generally applicable technique.

S. S. Hanna reviewed recent work with the Mössbauer effect. Because of the extreme sharpness of the gamma-ray lines, differences in absorption can be achieved by use of the Doppler effect produced by very low relative velocities of source to absorber. Thus, line widths of 10^{-8} electron volts can be measured by use of the drive mechanism on an ordinary lathe bed. The position of the nuclear energy levels is affected by the d-c magnetic field produced at the nucleus by the orbital electrons. Although only electrons in *s* orbitals contribute to the magnetic field at the nucleus, these electrons can be polarized by unpaired electrons in other orbitals. The Mössbauer effect thus is very sensitive to the electronic environment of the absorbing nucleus. Considerable data were presented for absorption by iron atoms in various chemical environments, but no clear relationship with molecular structure has been developed as yet. It appears that the Mössbauer effect is the best test available for the correctness of calculated electron density functions near the nucleus.

Walter C. Hamilton (Brookhaven National Laboratory) considered some of the more recent structural studies in which neutron diffraction techniques are used. Among the works cited was that of the square planar structure of XeF_4 and the linear structure of XeF_2.

M. KENT WILSON
Department of Chemistry, Tufts University, Medford, Massachusetts

Tongues of Science

The complex of problems which confronts the scientist in his attempt to take advantage of knowledge contributed by his colleagues in tongues other than his own was the subject of the symposium presented by the Information and Communication Section (T) on 26 and 27 December at the AAAS meeting in Philadelphia. The symposium, entitled Other Tongues of Science: Assimilating the Literature of Other Nations, was cosponsored by the National Science Foundation.

The symposium's 26 participants represented government and private agencies, organizations, societies, industries, and institutions actively supporting and carrying on programs to insure the inflow of scientific information into the United States and to make it available to the scientist in usable forms. While estimates vary somewhat, only about 35 percent of the scientific literature, even when it is made available, can be understood in the original by individuals competent to read English alone. Scientists who read Russian in addition to English have access to about 50 percent, or half of the world's scientific literature.

The currently extensive acquisition, translation, and publication activities in all areas and fields of science, costly both in terms of scientific manpower and in funds consumed, must be evaluated. How effective are the present translation programs? How necessary

are they? Are U.S. scientists being trained to handle foreign literature competently without translations? Should entire journals be translated or should translated titles or abstracts first be circulated to scientists as bases for the selection of certain full papers to be translated? Can answers to these questions be the same for all scientific disciplines? Or does the literature of one branch of science differ significantly from that of another?

One session of the symposium was devoted to accounts of how foreign scientific information is handled in other countries. Representatives of information agencies in Great Britain, Canada, Japan, and Scandinavia presented details of current programs in their respective areas. Cooperation, coordination, and integration of the work of various information groups and interests within the country contributed significantly. Traditional early introduction of foreign languages into school curricula provides those who enter science with a good working knowledge of those languages.

As to the nature of translations, whole journal (cover-to-cover) translations apparently are desirable in certain disciplines such as physics. Most of the significant Russian research reports in physics, for example, are concentrated in relatively few journals. By translating these completely one can cover the field remarkably well. In other fields of Russian science, such as astronautics, research information is diffuse; reports are scattered throughout many publications. To cover Russian astronautics, then, a selection of articles to be translated becomes a necessity.

It was acknowledged that the broadening of language training programs for U.S. scientists is needed. Merely satisfying language requirements for advanced degrees provides the young scientist with only limited ability to read the scientific literature in these tongues. Furthermore, he is apt to select languages he feels are easier to master, rather than those he is most likely to require to cover the literature of his field. Even at best, the linguistically-gifted and well-trained scientist seldom comprehends the subtleties of more than two foreign languages. He too must depend on translations for much of the literature in other tongues.

As the literature increases in volume in countries as yet scientifically immature, the language problems will increase proportionately.

It seems clear that for the continued

health and growth of science in the United States substantial foreign translation programs must be continued for the foreseeable future.

Derek J. deSolla Price was the speaker at a Section T luncheon. His subject, "A calculus of scientific information and manpower," dealt with such propositions as these: the number of scientists in a field increases as the squares of the number of good scientists and amount of good work; the dollar cost of research increases as the square of the total number of scientists employed; the more scientifically mature a country becomes, the less will be its share of the world-total of scientific work. As a final corollary of his theory he suggested that the scientific paper as a means of communication is fast dying and will be replaced in part by person-to-person communication and in part by machine-handled data and perhaps also some such device as a scientific daily newspaper analogous to the *Wall Street Journal* or the *Financial Times.*

PHYLLIS V. PARKINS
Biological Abstracts,
Philadelphia, Pennsylvania

Forthcoming Events

April

1–2. **Process Automation,** 5th symp., Santa Monica, Calif. (D. Kader, P.O. Box 1065, Canoga Park, Calif.)

1–3. Oak Ridge **Radioisotope** Conf.—Applications to Physical Science and Engineering, Gatlinburg, Tenn. (Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn.)

1–4. American **Radium Soc.,** annual, White Sulphur Springs, W. Va. (C. G. Stetson, ARS, Dept. of Radiology, Englewood Hospital, Englewood, N.J.)

1–5. American College of **Physicians,** Denver, Colo. (E. C. Rosenow, Jr., 4200 Pine St., Philadelphia 4, Pa.)

1–27. World **Meteorological** Organization, 4th congr., Geneva, Switzerland. (Secretariat, WMO, 41 Avenue Guiseppe Motta, Geneva)

2–6. **Psychology,** 8th Inter-American congr., Mar La Plata, Argentina. (G. M. Gilbert, Psychology Dept., Long Island Univ., Brooklyn 1, N.Y.)

3–5. American Soc. of **Internal Medicine,** annual, Atlantic City, N.J. (ASIM, 3410 Geary Blvd., San Francisco 18, Calif.)

3–5. **Streamflow Regulation** for Quality Control, symp., Cincinnati, Ohio. (J. E. McLean, Field Operations Section, Robert A. Taft Sanitary Engineering Center, 4676 Columbia Pkwy., Cincinnati 26)

3–6. National Council of Teachers of **Mathematics,** Pittsburgh, Pa. (M. H. Ahrendt, 1201 16th St., NW, Washington 6)