## EDITORS' COLUMN

IMPORTANT PRACTICAL applications of analytical instrumentation in the modern world keep coming to our attention. In the sports area, gas chromatography was used to monitor the urine of Olympic athletes at Munich. More than 2500 randomly selected athletes were screened for evidence of any of some 30 performance-improving substances. The analytical system, consisting of Hewlett-Packard gas chromatographs, strip-chart recorders, and an HP computer, costs $100,000. The chromatographs were equipped with nitrogen-selective flame ionization detectors developed by German scientists at Hewlett-Packard, GmbH, Boeblingen. The use of these drugs is discouraged not only because athletes are given an unfair advantage, but also because these drugs can result in physical and mental damage.

### Computer Learning Applications

Lawrence Livermore Laboratory in Livermore, Calif., reports that artificial computer intelligence in the form of pattern recognition is finding some practical applications. Original research papers on this subject have appeared in the technical section of *Analytical Chemistry*, and a Report by T. L. Isenhour and P. C. Jurs, pioneers in this field, appeared in *Analytical Chemistry* in August 1971. More recently, B. R. Kowalski, Colorado State University, and C. F. Bender of LLL introduced the subject of pattern recognition techniques to readers of *JACS* in the August 9 issue. At Livermore most work in pattern recognition has been done with nmr spectrometry, mass spectrometry, and nmr and mass spectroscopy together. Pattern recognition programs have been used experimentally to help University of California archeologists determine the origins of artifacts in Northern California. The archeologists had tried unsuccessfully to correlate the concentration of elements present in the artifacts with the same elements in known source cites. Given the same problem and data, pattern recognition programs eliminated considerable information as irrelevant and found conclusive correlations in the remainder. The work helped archeologists trace old Indian trade routes. In another application, pattern recognition programs were able to find relationships between defective blocks of high explosives (used to generate shock waves in physics research) to compositional variations. Subsequent composition changes tested against the relationships proved correct. At the Livermore Laboratory, the Bio-Medical Division plans to use pattern recognition to identify and classify chromosomes.

Most of the research on pattern recognition methodology has come from the electrical engineering literature. The methods most useful in chemical and spectral problems are those concerned with the manipulation and analysis of large sets of measurements. The ability of these programs to handle masses of data and to consider various types of measurements simultaneously permits the identification of subtle differences between objects.

### Scientific Instrument Market

The world market for scientific instruments is estimated to be $5.9 billion by 1975, an increase of $1.2 billion over 1970 figures. The U.S. Department of Commerce surveyed the market and estimated that the U.S. export share of the world market will be about $1 billion by 1975. The current U.S. share of the market is said to be $578 million. The Commerce Department is trying to aid U.S. makers of scientific instruments to increase sales by sponsoring exhibitions (see page 46 A, September, for information on an exhibition in Japan) and by holding seminars on financing such as the two held in conjunction with La-Salle National Bank in Chicago in July and September.

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