centrations for assaying bacteria (G.-A. Junter, Faculté des Sciences de Rouen, Mont-St.-Aignan, France).

**Chromatographic and Optical Measurements**

The extensive applications for chromatography in analysis and recovery of biomacromolecules were discussed by M. T. W. Hearn (School of Medical Research, Victoria, Australia). Hearn stressed the problem of detecting and eliminating toxic by-products of biotechnological processes with ion exchange, reverse phase, and affinity chromatography methods. Several presentations highlighted new applications for fast protein liquid chromatography. J. G. Gustafsson (Pharmacia Fine Chemicals, Uppsala, Sweden) has applied this technique to analyze proteins from disrupted *Escherichia coli,* and I. Ivanova (Pharachim, Sofia, Bulgaria) has analyzed crude glucose oxidase from *Penicillum chrysogenum.*

Multi-wavelength UV detection is a powerful tool for resolution of overlapping chromatographic peaks (A. C. J. H. Drouen, Delft University of Technology). B. G. M. Vandeginste (University of Nijmegan, The Netherlands) reported similar results: using a diode array detection system, they can estimate pure spectra if there are fewer than four compounds in the profile. Diode array detection systems are improving many HPLC analyses, especially when combined with sophisticated column switching techniques (G. Decristoforo, Biochemie AG, Kundl, Austria) or microbore HPLC (R. Schuster and J. Emmert, Hewlett-Packard, Walbronn, F.R.G.).

Chromatographic techniques can be especially powerful if they are combined. For example, J. Manen (Laboratoire Central SLEE, Le Pecqu, France) identified polymerization by-products of peroxidase oxidation of phenols using HPLC, negative ion MS, and pyrolysis GC-MS. X. Monseur (Institut de Recherches Chimiques, Tervuren, Belgium) reported on a system that incorporates GC-MS to monitor ethanol fermentation products and cation exchange HPLC for simulataneous analysis of sugars and acids.

The noninvasive nature of optical measurements makes them particularly attractive. Several research groups have combined optical techniques for microbial analysis. N. Nanninga and C. L. Woldringh (University of Amsterdam, The Netherlands) integrated electron microscopy, spectrophotometry, and particle analysis to characterize microbial populations. S. Brahma (University of Rhode Island, Kingston, RI) described a system for bacterial identification using fluorescence and Raman spectrometry.

Optical techniques can also be used to analyze complex biological mixtures. Y. Mulard (Technicon, Saint-Denis, France) demonstrated how reflectance analysis can be applied to biological samples such as wine, beer, and antibiotic or single-cell protein fermentations. Automated photometric analysis can also be used to measure biomass (K. Mechsner, EAWAG, Dübensdorf, Switzerland) or monitor the optical density of cell cultures (H. J. G. Tenhoopen, University of Delft).

**Biochips**

Coupling microelectronics with biological reactions to develop rapid, highly new specific sensors is an area of great interest. I. J. Higgins (Cranfield Institute of Technology, Bedford, U.K.) stressed that new sensors will be developed first for medical applications, then for process monitoring. Several presentations covered analytical semiconductor biosensors. M. T. Flanagan (University College, London, U.K.) described multiparameter semiconductor enzyme systems and devices that couple biosensors to semiconductors via fiber optics. Some Japanese are using techniques derived from the semiconductor industry to develop Clark-type microelectrodes (I. Karube, Tokyo Institute of Technology, Yokohama, Japan). Karube also described application of piezoelectric membranes for biomass measurement.

**Elmar Heinzle is from the Technisch-Chemisches Laboratorium, ETH-Zentrum, CH-8092, Zurich, Switzerland.**

UPDATE AND CORRECTIONS

# BIOTECHNOLOGY IN THE U.S.S.R.

Several interesting developments in Soviet biotechnology have been published recently. The All Union Scientific Research Institute of Bioengineering in Moscow has developed an experimental computerized information system called "Ellips-Mikrobiologiiya." A recent report[1] claimed the system now performs basic communications functions and is supported by adequate software. The system should improve communications between researchers in the microbiological industries considerably.

Results from clinical trials on immobilized proteolytic enzymes for enhanced wound healing have now been published[2]. The immobilized enzyme preparation, trade-named Profezym, was used to debride the purulent wounds of several hundred patients. The researchers claim the preparations shortened the time required for clearing the wound from 6.0–26.7 days (conventional treatment) to 2.4–7.2 days (Profezym treatment).

**Errata**

The diagram titled The Power Structure of Soviet Biotechnology (BIO/TECHNOLOGY **2**:610–615, 686–692; 1984) incorrectly identified the National Council of Biotechnology as an affiliate of the U.S.S.R. Academy of Sciences. The National Council of Biotechnology is an independent organ that supervises the National Program in Biotechnology. Glavmikrobioprom is the main administration of the Microbiology Industry rather than the Ministry of Microbiology Industry. The name of the Moscow State University was misspelled in Table 1 (p. 611); it should be M. V. Lomonosov Moscow State University. Finally, one reference, number 28 on page 615, was garbled; the correct reference appears below[3].

**References**

1. Yezhov, E. V. et al. 1983. (Ellips-Mikrobiologiya information system: Results of an experiment.) Ekonomika i Matematicheskiye Metody **19**:927–928.
2. Kogan, A. S. et al. 1983. (Immobilized proteolytic enzymes in wound treatment.) Vestnik Khirurgii imeni I. I. Grekova **8**:50–54.
3. Dekhtyarenko, T. O. et al. 1982. (Restriction analysis and electron microscopic examination of new and hybrid plasmids of Streptomyces.) Paper presented at Metabolic Plasmids Conference, Talinn, Estonian S.S.R., 19–23 October 1983.

**Raymond Zilinskas, Ph.D., is an Industrial Development Officer with the United National Industrial Development Organization (UNIDO), P.O. Box 400, Vienna International Centre, A-1400 Vienna, Austria. The opinions and evaluations are the author's own and do not represent those of any organization with which he has been or is associated, in particular, the United Nations.**