Electron Microscopy in Latin America[1]

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A recent publication of the UNESCO (Boletín del Centro de Cooperación Científica de la UNESCO para América Latina, No. 2, 4–20, Junio-Julio 1952) presented a review and bibliography of electron microscopy in Latin America. The present extract epitomizes the features of principal general interest in this report; the original (in Spanish) should be consulted for a full discussion and for references.

THE FIELD of the electron microscope (the structure of matter in the level of dimensions from 10 to 10,000 A) includes macromolecules and structures revealed by the optical microscope. The electron microscope thus has many applications in physics, chemistry, and biology, including specialties such as metallurgy and medicine. It is therefore important to develop in Latin America suitably equipped centers for electron microscopy. The present position is examined in this report.

Most of the 25 microscopes installed to date were made by the Radio Corporation of America. The Philips Company of Holland has supplied at least three microscopes, the Siemens Company, one. All RCA models except the EMT are represented, but our inquiry developed no direct information about nearly half of these, the 9 Models "C." Indirect information indicates that the majority of these are not in use. Of the 11 RCA microscopes EMU, the majority are in use and some have produced results. The Philips and the Siemens research microscopes were but recently installed.

A survey with questionnaires to the principal centers of electron microscopy in South America developed the following information:

Electron Microscopy Section, the Naval Hospital, Buenos Aires, Argentina.—During the last five years, under the direction of Dr. Mario G. Malfatti, various biological and medical subjects have been studied, with 12 publications including work on the pigment of melanosarcomas, on alastrin, *Pasteurella aviaria,* rabies virus, the Género Candida, *Mycobacterium tuberculosis* var. *hominis,* pulmonary silicosis, *Mycobacterium leprae,* and on *Vibrio cholerae.*

Malbrán Bacteriological Institute, Virus Section, Buenos Aires.—Under the direction of Dr. Armando S. Parodi, work has been done on the cytology of the mammary gland and the complex nature of mitochondria, with one paper in press.

Instituto de Suelos y Agrotecnia del Ministerior de Agricultura y Ganadería de la República Argentina, Buenos Aires.—Dr. M. A. Servici de Rondini directs studies that include clays, soil colloids, soil microorganisms, and plant viruses (two papers).

Sección de Microscopía Electrónica de la Escuela Politécnica de la Universidad de São Paulo.—The well-equipped section of electron microscopy at the University of São Paulo (Brazil) Polytechnic School, directed by Dr. P. Ribeiro de Arruda, is primarily dedicated to work in the chemical and biological fields. Diatom identification, classification of Brazilian clays, morphology of proteins of cobra venom, the evolution of yeasts in various media, the electron bombardment of specimens, and especially of protein from peanuts, have been studied. A bibliography of 15 works, including review and technical papers, exists.

Sección de Microscopía electrónica del Instituto Oswaldo Cruz de Rio de Janeiro, Brazil.—This section, directed by Dr. Hans Muth, addresses the broad interests of the Institute in biology and medicine. Studies started in 1951 include the morphology of bacteria and of *Spirogyra* and protozoa, and various species of insects. Some crystalline substances have been analyzed. One paper has been published on the olfactory organs of *Papilio polystictus* Btlr. and *proneus* Hbn. (Lepidoptera).

Section of Electron Microscopy, Instituto Butantán, São Paulo, Brazil.—This unique Siemens electron microscope UM 100b was installed October 1952 in a well-equipped laboratory for the study of biological problems, primarily in virus research, under the direction of Dr. A. Vallejo-Freire. The absorption of viruses, the surface of snake scales, the spermatozoa of snakes, the morphology of aluminum oxide, the structure of insect muscle, inorganic gels, and the relation between tissue and foot-and-mouth disease and yellow fever viruses are being studied. Four papers have been prepared.

Departamento Federal de Seguridad Pública, Rio de Janeiro, Brazil.—This EMC microscope, under Dr. A. C. Villanova, is used for studies of clays and kaolins.

Instituto de Biofísica, Facultad Nacional de Medicina, Universidade do Brazil, Rio de Janeiro, Brazil.—This Philips microscope, installed in 1952 and under the direction of Dr. Hertha Meyer, is being used for studies of nerve fibers, of cell-parasite relations *in vitro,* and of the multiplication of viruses in bacteria.

Departamento de Ultraestructura celular del Instituto de Investigación de Ciencias Biológicas, Montevideo, Uruguay.—This department for the study of biological material, directed by Dr. E. De Robertis,

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has an improved RCA-EMU microscope, installed in mid-1950, and all facilities for auxiliary techniques and maintenance. The development of techniques for biological material includes the culture of tissues, especially nerve, on parlodion films, ultramicrotomy, a special technique for leukocytes and platelets, and a technique for macromolecules dispersed as aerosols and electrostatically precipitated. Biological, medical, and veterinary problems studied include nerve structure, elastic fibers, bacterial flagella, foot-and-mouth disease virus, anaplasmosis, myxomatosis, and the ciliary and neuromotor apparatus of *Tetrahymena geleii*. Studies are now being made of the virus-cell relation in myxoma of the rabbit, of the ultrastructure of cilia and neuromotor apparatus of infusoria, and of plasma particles associated with mouse leukemia. Nineteen publications have been prepared.

Conclusion

Considering the number of instruments, about 25, the results obtained so far are disappointingly few. Only a few laboratories are working in full, and producing original results. Contributory factors seem to include the following: a lack of scientific personnel specially trained for ultrastructural studies; a lack of technical personnel for the repair and maintenance of the instruments; poor choice of instruments (about half are of a model of limited usefulness); a general lack of supplementary instruments and facilities for auxiliary techniques; the lack of replacements, for maintenance; customs regulations that seriously impede electron microscopy in Latin America.

In line with the interest of UNESCO in forwarding this new discipline and scientific progress in Latin America, the following steps are recommended: fellowships to specialized centers for ultrastructure in the United States, Europe, or Latin American countries; improved interchange of technical information through periodical meetings of specialists in the field, and perhaps the formation of a society for studies of fine-structural problems in Latin America; modification of customs regulations to expedite the import of replacement parts; improved facilities for maintenance of electron microscopes; and an intensive theoretical and practical course in electron microscopy at a Latin American center.

Pasadena Conference on the Structure of Proteins

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A SMALL GROUP OF INVESTIGATORS, active in the study of protein structure by x-ray diffraction and other physical methods, met at the California Institute of Technology, Pasadena, on September 21–26, 1953, in a conference organized by Linus Pauling. In many respects the conference could be regarded as a direct continuation of a discussion held by the Royal Society in London on May 1, 1952 [*Proc. Roy. Soc. London* **141B**, 1–103 (1953)]. Indeed, many of the participants were the same in both meetings. However, while the meeting in London had occupied only a single day, five days were fortunately available for discussion in Pasadena, so that an opportunity for constant and repeated interchange of ideas between the participants was possible over a relatively prolonged period. The conference was outstanding for the number of distinguished British participants involved, including Sir Lawrence Bragg, W. T. Astbury, J. T. Randall, M. F. Perutz, J. C. Kendrew, D. P. Riley, A. Elliott, F. H. C. Crick, I. MacArthur, M. H. F. Wilkins, and I. F. Trotter. The conference was made possible by the support of the Rockefeller Foundation, the National Foundation for Infantile Paralysis, and the American Institute of Biological Sciences in conjunction with the Office of Naval Research.

At the beginning the discussion was centered on recently determined structures of amino acids and peptides, and their implications for protein structure. R. Pasternak discussed the structure of glycyl-asparagine, which further confirms the planarity of the amide group and the adjoining carbon atoms in the fundamental repeating unit (—C · CO · NH · C—), and other features of peptide structure already established. E. W. Hughes reported his work with H. Yakel on N,N′-diglycylcystine, establishing accurate values for the distances sulfur-sulfur (2.04 A) and sulfur-carbon (1.87 A) and for the S—S—C angle (103°); the whole structure is of importance in the consideration of cross-linkages between polypeptide chains which involve cystine disulfide groups.

The discussion then turned to possible helical configurations of polypeptide chains. Barbara W. Low discussed the configuration of the π helix, in which each CO group is hydrogen-bonded to an NH group four residues beyond it along the polypeptide chain. She described some of the relationships within and between the two different families of polypeptide