of the extracted molecules. In palæobotany, substantial progress was made in formulating means for identifying fossil spores and pollen grains, and the development of a 'key' for identifying living and fossil conifer woods is now virtually complete. Further studies are reported on fluidized carbonization, and the first stage of a coal grindability investigation was completed. In the petroleum division studies continued of the catalytic desulphurization of sulphur compounds at high temperatures to remove sulphur as hydrogen sulphide and on the oxidation of sulphur compounds to remove it as sulphate. The study of two-phase flow of oil and water in pipe-lines was continued, in which a general mathematical analysis was developed for two immiscible fluids flowing between wide parallel plates and flowing concentrically in a circular pipe. Considerable progress was made in the study of the effects of hydrogen isotopes on the rates of chemical reactions, while the study of the retention volumes of hydrocarbon gases on chromatographic columns of a series of activated charcoals has been extended to an examination of the relative widths of the chromatographic bands. The autothermic surface combustion reactor for pyrolysing hydrocarbons was further developed. A list of publications of the Council is appended.

BIOLOGY OF *AMŒBA*

THE late Robert Chambers was a much-loved personality on both sides of the Atlantic. A publication by the New York Academy of Sciences has been greatly influenced by him, many papers being presented by his former students and 'second generation' of students*. The papers deal exclusively with the 'fission cycle' of the life-history of Amœba. I first made acquaintance with Chambers when studying *Daphnia pulex*, each having worked out its spermatogenesis. Later, I sent to him supplies of *A. proteus* at various localities.

An article by Mazia in "Science in Progress"[1] prepared readers for some of the many good things in this volume. After a short biography of Chambers and an introduction by Hirshfield, the subject-matter is grouped into four parts. In part 1 ("Structural and Taxonomic Considerations"), Torch describes the cytology of Pelomyxa. The most interesting conclusion is that crystals are a metabolic waste product, probably an accessory mechanism for the excretion of nitrogen. Particulates of Amœbæ are studied by Kassel using a drop-retraction technique; proteins on reaching an experimentally introduced oil–water interface unfold and produce a surface denaturation curve resembling that of a medium containing a protein of low molecular weight. Useful practical hints and photographs of apparatus, as well as electron microscope studies, are given in "Microscopic Studies" by Borysko and Roslansky. Beautiful electron microscopic work by Pappas reveals the astounding presence of fine fibrous extensions on the outer surface of the plasmalemma of three species of amœba, and other unsuspected structures. Kudo gives a welcome résumé of the work of the early observers and their nomenclature and makes a strong plea for the retention of the name *Amœba* for the genus.

In part 2 ("Physical Studies and Cell Division") Landau deals with sol–gel transformations in Amœbæ, and considers that the findings of myosin-like proteins in amœboid forms lend credence to the idea of a contractile substratum. "Synchronization of Cell-Division" by James gives much fascinating detail of the observations made during the establishment of the main thesis. Three authors describe pinocytosis, which was discovered by Lewis, and observed by Mast and Doyle in amœbæ, but only recognized as important in the past few years. Holter, in the next paper, gives some beautiful pictures of the phenomenon, and stresses its importance in the physiology of amœboid cells, though he thinks that the original definition may require modification towards less emphasis on the fluid uptake and more on the dissolved substance.

A very long paper of sixty-three pages by Guthwin and Kopac is a vade-mecum for the microscopic enzyme chemistry of carboxylic esterases in Amœbæ. "Cytochemical Differentiation in Normal and Starving Amœbæ", by Heller, is the second article of part 3. An interesting analysis of the cytoplasmic inclusions deals with refractive bodies. As I have repeatedly pointed out, these refractive bodies are nutritive, and for that reason Dr. Carmela Hayes renamed them 'nutritive spheres'. They play a great part in the formation of the spores in the Proteus group of Amœbæ. Their diameter is indicative of the age of the Amœba—an individual with large nutritive spheres is old and ready to sporulate. Cohen, in "Physiological and Morphological Observations", gives the first hint as to the great weakness of the work under review when he says, "*A. proteus* in our experience consists of at least two strains . . . investigators should give the history of the stock they use". I maintain that two distinct species masquerade under the specific name *proteus*. I have had an opportunity of studying a rich culture from the laboratory of Brachet: it was *A. lescherae* and not *A. proteus*. It also contained very young stages of development, proving that even under rigid subculturing a few individuals escape and sporulate. Want of space prohibits more than mention of "Tracer Studies in Amœbæ" by Plaut, "Effect of Selected Chemical Agents on Amœbæ" by Zimmerman.

In part 4 Hirshfield discusses "Nuclear Control of Cytoplasmic Activities" and Prescott pictures the wonderful Cartesian diver for weighing Amœbæ in his article on microtechnique in amœbæ studies. "Micrurgical Studies on Irradiated Pelomyra", by Daniels, is followed by an account of the celebrated work of Danielli on strains of Amœbæ that have been continuously cultivated for years in King's College, London. In conclusion, one would urge the examination of older Amœbæ for the presence of deoxyribonucleic acid. Brachet's beautiful work on the "Cytoplasmic Dependence in Amœba" evidently omits this. The volume ends on a lighter vein when Kopac visualizes Amœba research in 2158. Used in conjunction with Jepps's "The Protozoa, *Sarcodina*"[2], this volume is a useful reference book for all students of *Amœba*.

MONICA TAYLOR

* Annals of the New York Academy of Sciences. Vol. 78, Art. 2: The Biology of the Amœba. By Henry I. Hirshfield and 22 other authors. Pp. 401–704. (New York: New York Academy of Sciences, 1959.) 4.50 dollars.

[1] "Science in Progress", edit. by Taylor, Hugh, 10th Series (New Haven, Yale).

[2] Jepps, M. W., "The Protozoa *Sarcodina*" (Oliver and Boyd, Edinburgh, 1956).