

Interdisciplinary Symposium on Lipid Research

Major Problems Defined

The contributions to the symposium "Interdisciplinary Aspects of Lipid Research" will help to define some of the major problems in lipid research. Procedures currently in use and difficulties encountered in their application will be noted and the stage of development of some areas of investigation will become apparent. The interdisciplinary nature of many problems will be emphasized.

Lipids have widely different roles in organisms. Steroids are hormones, the lipid vitamins (A,D,E) are essential cofactors and triglycerides are major storage products. Phospholipids and glycolipids are major structural components of membranes of subcellular organelles. The first part of the symposium deals with biochemical and biomedical problems and is cosponsored by the American Medical Association. This portion of the program emphasizes the roles of phospholipids and glycolipids in membranes. Membrane composition, structure, metabolism and alteration in disease will be considered.

AMA, Geochemists are Cosponsors

The second part of the program features geochemical aspects of lipid research and is cosponsored by the Organic Group of the Geochemical Society. Organic geochemists are concerned to a great extent with the fate of lipids of plants, animals and microorganisms after death. The sequence of changes is important in understanding the properties of soils and sediments and is generally thought to lead ultimately to the formation of petroleum. The biological and nonbiological alterations of lipids after deposition in soil, how lipids are accommodated in and transported by waters, lipids of ancient sediments (rocks), and the formation of petroleum will be considered.

The symposium contributions will emphasize that many of the most important problems in lipid research can be studied in a profitable manner only with the knowledge and techniques from many areas, the procedures in each area requiring a great deal of experience for attainment of proficiency. Research thus becomes interdisciplinary in nature and requires the joint efforts of specialists. Attempts by one investigator or group to master the several areas involved in a major problem are usually relatively inadequate. The study of lipid functions in mitochondria provides an excellent illustration of the several skills required in a major problem. The isolation of mitochondria is accomplished by careful disruption of cells to release the organelles with minimal damage. Mitochondria are then isolated by special centrifugation or other procedures.

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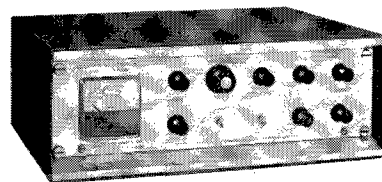
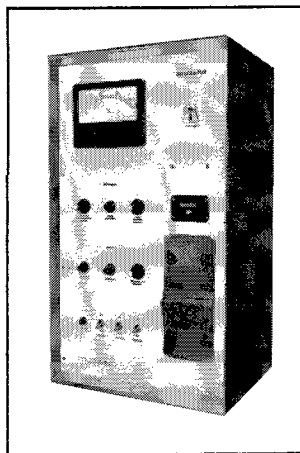
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• *Interdisciplinary Symposium*

(Continued from page 53A)

The preparations are characterized by electron microscopic examination, enzymatic assay, and determination of other characteristic components. Lipid composition is determined by careful analysis and functions dependent upon particular lipids are demonstrated by careful removal of all lipid and adding back pure lipids to an appropriate test system. Studies of organelles from human organs to disclose changes in pathological states requires in addition the knowledge and skills of the clinician and the pathologist, thus further increasing the total number of specialists required.

Vandenheuvcl to Discuss Molecular Models

F. A. Vandenheuvcl will describe the use of molecular models of lipid structures in the formulation of biological membrane structures. Donald Warner will present molecular model formulations of protein structures. Since the major components of cellular membranes are lipids and proteins, both types of model formulations are essential to the understanding of membrane structures. George Rouser will discuss the problems of quantitative analysis of lipids with emphasis on human brain lipids. The value of the comparative biochemistry approach will be illustrated by Claude Baxter who will present a phylogenetic study of lipids of the nervous system. Morris Kates will review the lipid composition of bacteria. Isotope and enzymatic assay procedures in the study of lipid metabolism of the nervous system will be considered by James Berry, while Rodolfo Paoletti will consider lipid pharmacology. The role of diet in lipid metabolism and atherosclerosis will be considered by K. K. Carroll. Studies of subcellular organelles will be highlighted by David Green who will consider the role of lipids in mitochondrial function and by A. N. Siakotos who will describe procedures for isolation of subcellular organelles from human brain. Emphasis upon the more clinical aspects will be found in the presentations of Gerald Feldman (pathology and lipid metabolism of the eye), Nicholas Nicolaidcs (skin lipids), Alfred Knudson (genetics and lipids research), Arthur Prenskey (neuropathology and lipid research), George Venart (general pathology and lipid research), and Bruno Volk (histochemical and electron microscopic studies in the lipidoses).

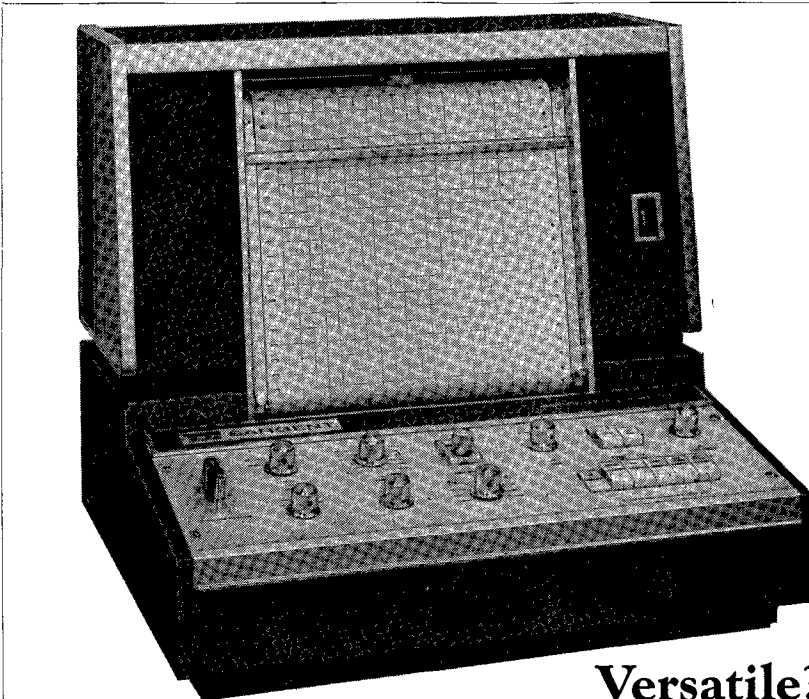
Kvenvolden to Present Review

The portion of the program devoted to geochemical problems will include a review of fatty acids in sediments by K. A. Kvenvolden. New data on the lipids of recent sediments will be presented, P. L. Parker covering fatty acids and R. B. Schwendinger carotenoids and sterols. D. L. Lawlor and W. E. Robinson will present new data on alkanes, fatty acids, and alcohols in oil shale. The hydrocarbon composi-

tion of petroleum and some possible lipid precursors of the components are considered by H. M. Smith while I. A. Breger will discuss mechanisms of decarboxylation and their significance to organic geochemistry. Carbon isotope evidence for the role of lipids in petroleum formation is to be discussed by S. R. Silverman, W. D. Rosenfeld will present the significance of optical rotation measurements of petroleum, and E. Peake and W. G. Hodgson will report new data on alkanes in natural aqueous systems. C. Ponnampcruma will consider the problems of abiogenic synthesis of hydrocarbons and R. E. Kallio will consider metabolism of hydrocarbons by bacteria.

Methodology Major Item

A good deal of cross-fertilization in terms of methodology is to be expected. Geochemists pioneered in the use of mass spectrometry that was then introduced into lipid biochemistry. The recently developed isotope ratio measurement procedures used by geochemists are of general interest. The numerous chromatographic techniques developed largely by biochemists are widely applicable. Knowledge of lipid composition and the enzymes of lipid metabolism obtained by lipid biochemists is fundamental to both medical and geochemical studies and the exchange of information in these areas should be highly beneficial.



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