SYMPOSIUM: LIPID MONOLAYER AND BILAYER MODELS AND CELLULAR MEMBRANES. PART I.

conducted by The American Oil Chemists' Society at its 58th Annual Spring Meeting, New Orleans, Louisiana May 7-10, 1967

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Introduction

DR. ROBERT M. BURTON (Chairman of the organizing committee): The papers which follow were presented at the 15th Annual American Oil Chemists' meeting in New Orleans as a symposium on "Lipid Monolayer and Bilayer Models and Cellular Membranes." Following each paper is a carefully edited version of the oral discussion which took place at the meeting. We would like to express our thanks to the contributors which made this symposium financially possible. In alphabetical order these are: Ames Company; Armour Pharmaceutical Company; Hunt-Wesson Foods; Miles Laboratories, Inc.; The Lilly Research Laboratories; The Pierce Chemical Company; The Procter and Gamble Company. Without this financial aid there are several speakers who could not be here now.

About two years ago, several of us began to discuss the possibility of presenting a structured, detailed symposium to consider the structure of cellular membranes. Basis to this topic, would be the discussion of the properties of lipids and of lipid models of membranes. It was our objective to bring together scientists of various disciplines to discuss their studies on cellular membranes and to consider in detail their models of membranes. We believe that these ten papers will serve at least two functions. One, these papers are instructive and should be useful to the novice who wishes to enter this field and to the interested, but uninformed, bystander. Two, each of these papers will progress from being instructive to the point where they will approach scientific sophistication such that experts in the field will benefit from this symposium.

We shall proceed from two papers, one by Dr. Small, and one by Dr. Fergason, which center on selected aspects of the physical chemistry of lipids to a consideration of monolayers and bilayers. The initial monolayer paper, by Dr. Arnold, is primarily concerned with protein-protein interaction at an air-water interface. This was not an oversight by our planning committee, it was intentional. We want to remind you that lipids *alone* do not constitute the cell membrane. To properly consider models of cellular membranes, we must also be conversant with the properties of proteins and polysaccharides. Next, Dr. Mysels summarized his discussion of the fundamental properties of thin lipid films occasionally referred to as soap bubbles. With this background of the physical properties of lipids, their behavior in thin films, and the elements of monolayer techniques we jump into the tricky field of lipid bilayers. Dr. Robert Howard discusses in detail the problems of instrumentation and of chamber design for the study of lipid bilayers. Then, Dr. Haydon describes the characterization and properties of lipid bilayer membranes separating two aqueous phases. At this point we start our return to cellular membrane. Dr. Wolken's paper examines subcellular organelles and relate their lipid composition to structure. Dr. Cornwell's paper presents a most interesting study of the lipids of the red blood cell using the monolayer technique and relate these observations to plasma membrane structure. Then, Dr. Demel presents a correlative study of phospholipid structure and physical properties as examined by monolayer technique. These studies show the interaction of different lipids at an oriented interface. It is at this point that we conclude with a complete return to a natural cellular membrane system studied in detail by Dr. del Castillo and related it to his parallel observations on a lipid bilayer system. These studies show a marked similarity between the lipid bilayer model and the true cellular membrane.

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