California: Calexico Union High School; Needles Union High School; Pomona Catholic High School; Santa Ynez Valley High School.

Colorado: Central High School, Grand Junction; Delta High School; Sheridan Union High School, Englewood; Holy Trinity High School, Trinidad.

Connecticut: Darien High School; Griswold High School, Jewett City; Housatonic Valley Regional High School, Falls Village; Watertown High School.

District of Columbia: Alice Deal Junior High School; Hebrew Academy of Washington; Woodrow Wilson High School.

Indiana: Chesterton High School; Lebanon Junior-Senior High School; Western High School, Russiaville; Tipton High School.

Iowa: Britt High School; Clarinda High School; Estherville High School; Sumner High School.

Louisiana: DeRidder High School; Haynesville High School; Minden High School; Natchitoches High School.

Maryland: Howard County High School; Northern Garrett County High School; Northwestern Senior High School, Hyattsville; Northwood Junior-Senior High School, Silver Spring; Walter Johnson Senior High School, Rockville; Wheaton Senior High School; Wicomico Senior High School, Salisbury; Wiley H. Bates High School, Annapolis.

Michigan: Holland Christian High School; Marlette Community High School; Newaygo High School; Okemos High School; Rodney Wilson High School, St. Johns; Union High School, Greenville; Warren High School; Washington Gardner High School, Albion.

Minnesota: Cloquet High School; Detroit Lakes High School; Fergus Falls High School; Grand Rapids High School; Lourdes Central Catholic High School, Rochester; Mapleton High School; Northfield High School; Worthington Senior High School.

Montana: Anaconda Public High School; Beaverhead County High School, Dillon; Fergus County High School, Lewiston; Libby High School.

New York: Canandaigua Academy; Glens Falls High School; Herkimer Central High School; Hornell Senior High School; Interlaken Central School; Northside High School, Corning; Oneonta High School; Plattsburgh High School.

North Carolina: Bunker Hill High School, Claremont; Charity High School, Rosehill; Davis County High School; Highland High School, Gastonia; Jones Central High School, Trenton; North Davidson High School, Lexington; Price High School, Salisbury; Shepard High School, Zebulon.

North Dakota: Hettinger High School; Valley City High School; Wahpeton High School; Williston High School.

Oklahoma: Clinton High School; McAlester High School; Norman High School; Shawnee High School.

Texas: Killeen High School; Rio Grande City High School; Seguin High School; Weslaco High School.

Virginia: Bluestone High School, Chase City; Halifax County High School; Martinsville High School; Robert E. Lee High School, Staunton; St. Stephen's School, Alexandria.

West Virginia: Dunbar High School; Sherman High School, Seth; Sophia High School; Sutton High School.

A Basic List of Science Books for High Schools

The AAAS has published a descriptive catalog of the books in the traveling libraries which is available to teachers and high-school librarians on request. This book list, although limited in scope, proved to be in demand last year as a guide for purchasing books for school and community libraries.

The AAAS, with the cooperation of the National Science Foundation, plans to publish late in 1957 a basic list of science and mathematics books for high-school libraries and other libraries used by young people. The number of titles in the proposed book list will not be limited, and the list will include the kinds of books in the traveling library, as well as standard reference books, natural history keys and field guides, and a selected group of basic textbooks. The list will be based on the many suggestions for the traveling library made by individuals and representatives of organizations and will be compiled by a small committee of specialists in the teaching of science and mathematics, library supervisors, and others. Such a list will meet a need frequently mentioned by school officers, teachers, and librarians.

The AAAS solicits the comments and suggestions of students, teachers, librarians, scientists, and others concerning the traveling library program, and will be glad to receive comments concerning books now in the traveling library or books not in the traveling library that are suggested for the basic book list. In suggesting books kindly list the author, title, and publisher to facilitate the identification and examination of your suggestions and recommendations.

H. Devaux, Plant Physiologist, Pioneer of Surface Physics

Henri Edgard Devaux, professor emeritus of plant physiology at the University of Bordeaux, died on 14 March 1956, at the age of 93 years. Although he was physically infirm for many years, this remarkable man was active scientifically until his death. His last publication, "The mystery of the second fertilization of angiosperms. . . ." appeared in the *Comptes rendues* of the Academy of Sciences, session of 4 January 1956; his first paper, "On the variation of growth and development of plants at different hours of the day" appeared in 1882; thus his productive scientific life extended over a period of 74 years.

Henri Devaux was born on 6 July 1862, in the village of Etaules (Charente-Maritime) to a Protestant family of farmers and seafarers. In 1884, he was awarded a scholarship to the University of Bordeaux, where he studied pharmacy and natural science. In 1887, he came to the Sorbonne where he remained for 4 years, receiving his doctorate in 1889, his thesis having to do with the mechanism of gaseous exchange of plants. In 1891, after a short stay at the University of Dijon, he returned to the University of Bordeaux, where in 1906 the first chair of plant physiology in provincial France was created for him, a post which he occupied until his retirement in 1932 at the age of 70. After his retirement, he retained a small laboratory in the Faculty of Sciences at Bordeaux in which he worked actively until

1950, when a fractured femur forced him to transfer his research activities to a small front room in his home, where he continued his experiments aided by his faithful technician, Henriette Lafon, who worked with him for 18 years. (I am indebted to Mlle. Lafon and Mme. E. Devaux-Morin, for many biographical details, and to J. H. Schulman, for helpful advice.)

Although Devaux worked actively in cellular physiology and in plant histology, his major contributions to science were in the field of molecular physics, and it was under this heading that most of his contributions to the *Comptes rendues* appeared. It was in November 1903 that Devaux published his first memoir on the properties of surface films of various substances and gave rigorous proof that they were actually monomolecular in nature. Although credit for the discovery of monomolecular films belongs to Lord Rayleigh, Devaux was the first to demonstrate that a wide variety of substances other than oils could be caused to spread into thin films of molecular dimensions and thus helped lay the foundation upon which were built our present concepts of the structure of matter.

Devaux's experimental work was always extremely clear in theory and amazingly simple in apparatus and technique. His initial measurements of length and cross section of fatty acid molecules were made using nothing more complex than a photographer's developing tray, powdered talc, and some strips of paper with which to compress the surface films. An excellent summary of Devaux's methods may be found in the classical paper of Langmuir, "The constitution and fundamental properties of liquids" [*J. Am. Chem. Soc.* **39**, 1848 (1917)]; Langmuir relied heavily on Devaux's work in providing evidence for his revolutionary doctrine that the structural formulas of the organic chemist were to be taken literally as guides to the reactivity and structure of molecules, and that the chemical properties of organic compounds could be attributed to the presence of certain chemically active portions of the molecule, the "group molecules," or polar groups, rather than to the reactivity of the molecule as a whole.

Devaux was a pioneer in the field of protein surface chemistry, demonstrating in 1903 that even highly water-soluble proteins like albumin would spread at the air/water interface into monolayers, and using surface methods to measure the dimensions of protein molecules. He was also able to make essentially correct conclusions concerning the stereochemistry of oleic acid by comparing its cross section and length at the air/water interface with those of stearic acid. He applied his methods to the study of inorganic substances such as the sulfates of mercury, lead, and copper and was thus led in 1912 to reintroduce the mercury trough, originally used by K. T. Fischer in 1896. He found that on a mercury surface many organic and inorganic substances formed thin films of molecular dimensions (for example, sulfuric acid) which could thus be easily and elegantly studied. He also demonstrated the two-dimensional surface crystallization of salts and other substances at the mercury/water interface and devoted many years to the study of the physical and optical properties and the permeability of such films.

Devaux's work became known abroad rather quickly; translation of one of his memoirs into English was undertaken by the Smithsonian Institution in 1912, and he became well known to his American and English confreres as a result of the extensive and generous citation of his work by Langmuir in several publications. His name has been attached to two phenomena that he discovered in the 1930's (both called the *Devaux effect*), the first being the irreversible transformation of protein films into solid fibers, resulting from compression and collapse of the films (Mazia-Hayashi), and the second being the crinkling of protein-stabilized oil/water interfaces, caused by diminishing experimentally the volume of the dispersed oil droplets (Kopac); both Devaux effects have been useful in studies of cell function and structure. In 1946, the Faraday Society took the initiative in planning a meeting (jointly with the Société de Chimie Physique) which was held in Bordeaux to honor Devaux; he took an active part in all the sessions.

It is sad to have to record that recognition in France was very slow in coming to Devaux and that he never achieved there the prominence which he merited and which, indeed, he achieved beyond the frontiers of his own country. In this, he shared the fate of other outstanding French scientists who, as a result of being attached to the provincial universities of that highly centralized country, are virtually unknown in other regions of France, whereas the occupants of the chairs of the Paris faculties achieve almost automatically a prominence sometimes quite out of proportion to their contributions. Devaux became a correspondent of the Academy of Sciences only in the year following his retirement and was elected to nonresident membership in 1946, on the eve of his 84th birthday.

Those who have seen Devaux in his laboratory will always hold memories of this enthusiastic savant bent over his mercury tray much as a great virtuoso over his keyboard. With contempt for the scientific proprieties of the present era, he would touch the side of his nose with his fingernail to obtain a bit of sebum with which to demonstrate the surface behavior of oils; as a ready source of protein, a drop of saliva would suffice for a demonstration that would entrance the visitor. One could easily visualize his joy when as a young man in 1888 he created his famous camphor boat: a small piece of camphor placed over the notched end of a paper "boat," complete with mast and pennant, would "give for hours on end a rapid and regular movement," a motion that could be opposed or stopped by films of other surface-active agents. Later he joyfully announced that he could "smell monolayers" by compressing films of perfumes beyond their collapse pressure. He created many other ingenious models of molecules at surfaces; let us cite only his "films" of lentils, oats, and other grains, which when floating at the mercury surface permitted visualization of the effect of compression on the packing and orientation of interfacially adsorbed molecules [see his illustrated memoir in the *Journal de Physique et le Radium* **9**, 441 (1938)].

Devaux was a deeply religious man and was unable to conceal that intensity of belief and devotion to his church which in France often characterizes the Protestant and which in the English-speaking countries seems to characterize the Catholic but which in all countries typifies the adherent to unpopular or minority faiths. He explicitly rejected Claude Bernard's famous dictum that there should exist no connection between oratory and laboratory, although he was well aware that in this he was virtually alone among his scientific colleagues. For Devaux, science and religion were one, and his experimental work had for him almost the quality of divine worship. His work was marked by this fervor but also by a gentle sense of humor and by a certain artistic flavor which is, perhaps inevitably, disappearing from the scientific literature of today.

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