

matter are based on familiarity with the situation and repeated computations of the type given here. Having examined many proposals, one is naturally reluctant to spend time on detailed study of another variant.

Only a completely new and unique approach to weather modification could have any hope of success in eliminating or ameliorating smog. Until such a unique approach has been demonstrated to be effective, it is reasonable for the agencies concerned with the solution of the problem to devote their undivided

efforts to the detection and control of the sources of the pollutants responsible for the obnoxious and deleterious effects of smog.

References and Notes

1. *Smog*, originally a contraction of *smoke and fog*, has come to mean, generally, obnoxious concentrations of air pollution, and in Los Angeles specifically, the eye-irritating, plant-damaging, and visibility-reducing mixture which develops in the daytime on days of low inversion and light winds.
2. Much of the background work for this article was carried out while I was senior meteorologist at the Air Pollution Foundation, Los Angeles, Calif.

3. M. Neiburger, C. G. P. Baer, L. B. Leopold, *The California Stratus Investigation of 1944* (U.S. Department of Commerce, Weather Bureau, Washington, D.C., 1945).
4. M. Neiburger, *J. Meteor.* 1, 29 (1944).
5. L. A. Dubridge, *Engineering and Science* 19, 18 (1955).
6. O. G. Sutton, *Micrometeorology* (McGraw-Hill, New York, 1953).
7. P. A. Leighton and W. A. Perkins, *Solar Radiation, Absorption Rates, and Photochemical Primary Processes in Urban Air*. Report No. 14 (Air Pollution Foundation, Los Angeles, Calif., 1956).
8. M. Neiburger, N. A. Renzetti, R. Tice, *Wind Trajectory Studies of the Movement of Polluted Air in the Los Angeles Basin*. Report No. 13 (Air Pollution Foundation, Los Angeles, Calif., 1956).

R. Chambers, Pioneer in the Study of Living Cells

In the death of Robert Chambers in his 76th year, the scientific world has lost one of its most illustrious names. Biologists everywhere will be saddened, but many will call to mind his remarkable contributions to the study of living cells. Chambers was best known for his fundamental and enduring work on the biophysics of protoplasm. Many special problems and characteristics of plant and animal cells were resolved and made understandable by the use of microinstruments which he devised, improved, and logically exploited. To scholars of cellular physiology, his work on the structure of living membranes, capillary physiology, mesonephros function, fertilization problems in marine eggs, and adhesiveness of cancer cells in tissue culture remains classical. His astonishing development of the micro-manipulator, along with the essential glass needles, micropipettes, electrodes, and microgages, stands as a landmark in the progress of science.

A contemporary and close friend of men like T. H. Morgan, E. B. Wilson, E. G. Conklin, and G. H. Parker, Chambers was nevertheless a *modern* man. It is to his credit that more than half of the program for the forthcoming International Congress for Cell Biology, in Scotland, is, almost prophetically, directly related to cellular studies in which he was at one time or another actively engaged. He furnished basic ideas for

others to follow. His superlative services to biology and to science are, unfortunately, not so well known.

Born in Erzurum, Turkey, of Canadian missionary parents, he grew up in a deeply religious household and in the exciting atmosphere of Armenian-Turkish disputes. He is credited with having, as a boy, single-handedly interrupted a village massacre, preventing further bloodshed.

The prime quality of Chambers throughout his long life was his warm, human sympathy for his family, his students, and his host of friends in many lands. At his home, he and Mrs. Chambers entertained prince and pauper. No one was turned away. In a characteristic way he named his first cottage on the shores of Buzzards Bay "Bobtucket." His hospitality knew no bounds. His long associations with New York University, where he was research professor of biology, and with the Marine Biological Laboratory of Woods Hole, of which he was a trustee, enriched both institutions immeasurably.

This is not the place to review fully his education and early life at Robert College, Istanbul, or his later education at Queens University in Canada and at the University of Munich, where he became Richard Hertwig's favorite (and most famous) student. He belonged to one of the oldest German student corps, but he told me he never actually fought

a duel! His numerous honors, positions, and accomplishments will be listed in the archives of many societies to which he belonged. Mention must, however, be made of his having been president of the American Society of Zoologists, the Harvey Society of New York, and the former Union of American Biological Sciences. In the latter group his efforts led directly to the formation and establishment of the present American Institute of Biological Sciences. He was a founder of the Society of General Physiologists. With Josef Spek, he founded and edited the journal *Protoplasma*. He was an active member of the committee of scientists that persuaded the United States Congress to set up the National Science Foundation. As senior scientific adviser to the New York World's Fair, his laboratory provided free motion pictures of living cells that attracted the largest number of public visitors of any educational exhibit. It is noteworthy that he was the chief spirit in the renaissance of the New York Academy of Sciences that led to its present prestige and fame.

Chambers loved adventure, he loved his family, but above all he loved the eternal search for scientific truth. To him, religion and science were indivisibly one. While it is true that he also knew personal tragedy and felt the slings and arrows of outrageous fortune and the discouragements of seeking almost parsimonious research-grant support, it is nevertheless true that his life was a deeply happy one. Indeed, the monuments to his career are the basic facts he discovered, the achievements of his students, the flourishing of the societies, journals, and ideals which he literally built with his own brilliant intellect, and the profound respect and admiration of his world-wide circle of friends and fellow-scientists.

W. R. DURYEE
George Washington University School of Medicine, Washington, D.C.