German that emanated daily from Jerusalem Radio. But after the American Office of Strategic Services established its Middle Eastern Headquarters in Cairo, Yourgrau also was recruited to serve with that organization, vitally assisting it in its planning of some intelligence operations behind enemy lines, details of which are only now being declassified.

At War's end Yourgrau redirected his phenomenal energy into the resumption of his academic career and the pursuit of his pre-empted research. He became Head of the Department of Logic and Scientific Method at the School of Higher Studies in Jerusalem and subsequently Acting Dean of its Faculty of Arts and Sciences. At the request of the Colonial Office he went to Cyprus in 1948 to determine whether a branch of the University of London should be opened on that island. ("Under no circumstances!" his report concluded after 4 months of investigation.) In the same year Yourgrau emigrated to South Africa, having previously married South African-born Thella Garber. For a decade he taught and continued his writing and research at the Universities of Cape Town, Witwatersrand, and Natal.

In 1959 he moved to the United States, first to accept the position of Research Professor at the Minnesota Centre for the Philosophy of Science, and then to become Chairman of the Department of History of Science at Smith College in Northampton, Mass. In 1963 he accepted a permanent position as Professor of History and Philosophy of Science at the University of Denver.

The scope of Yourgrau's publications was prodigious. Ranging from the political editorials in *Orient* to papers on general relativity, they made him known to an exceptionally large spectrum of scholars, a fact that is attested to by the scheduled appearance in 1981 of a memorial volume of essays in his honour written by a diverse and distinguished panel of more than 30 of his academic colleagues. Although most of his papers are devoted to problems in theoretical physics, a large fraction deals with philosophical issues, while some others treat matters of a biographical, literary, or political nature. Of the many books he co-authored or co-edited, *Variational Principles in Dynamics and Quantum Theory* and *A Treatise on Irreversible and Statistical Thermophysics* are perhaps the best known. In 1969 he founded, with Henry Margenau of Yale University, the international journal *Foundations of Physics,* which he co-edited until his death. He was the recipient of numerous distinctions and honours, which included the Swiss Einstein Medal, awarded to him in 1970.

Gregarious and extrovert, his forthrightness and lack of false modesty endeared him to some, made enemies of others. His co-workers and many friends in different parts of the world enjoyed his unique kind of humour, were buoyed by his passion for life, and stimulated by his enthusiasm for intellectual pursuits. Sentimental and deeply emotional, he was intensely loyal to individuals whose friendship he valued, expecting the same degree of allegiance in return. But perhaps the most enduring impression will be his automatic reflex to side with, and concretely support, human beings — whether fellow students in Germany, penniless intellectual exiles in Palestine, or anyone else who crossed his path — who were treated unjustly or were in need of help. He is survived by his wife, a daughter, and three sons, to whom we extend our profound sympathy in their great personal loss.

Alwyn van der Merwe

David Scott Gilbert

DAVID SCOTT GILBERT was born in Ithaca (N.Y.) on 6 November 1940. He majored in mathematics at Harvard University (1959-63) then, perhaps because of a biological tradition in his family, joined D.H. Fender at the California Institute of Technology, where he gained his doctorate on visual acuity and eye movements. His postdoctoral work was with the late Trevor Shaw at Queen Mary College London, where he later became a lecturer in zoology before joining, in 1973, the Medical Research Council Cell Biophysics Unit at King's College London. He died suddenly of viral pneumonitis on 11 December 1979.

While working with Shaw on sodium transport across the membranes of giant axons, Gilbert became interested in the structural properties of axoplasm and thus concerned with problems of the determination and maintenance of the shape of nerve cells. His first paper on axoplasmic structure in 1972, (*Nature, New Biology* **237**, 195-198) was remarkably stimulating and procedurally elegant. Using polarised light microscopy he showed that the giant axon of *Myxicola* (a marine fan worm) can be described in terms of three levels of helical organisation. The axoplasmic fibrous proteins are arrayed in parallel 'ripple' helices, which are twisted into a larger 'segmental' helix. They form a cylindrical gel that can coil, when the worm shortens during contraction, to form a yet larger 'gel' helix. Gilbert recognised that this axon consisted of essentially one structural component, the neurofilament, and therefore it provided an unparallelled opportunity for experimental study. The demonstration of the helical organisation led to a model in which the filamentous protein forms into twisted strands like a rope and, although the protein content of the axoplasm of *Myxicola* is no more than about 4%, the yarn gives it significant mechanical strength and stability; and it can shear to form branches.

Many earlier observations of axons had been interpreted as demonstrating them to be a viscous soup, rather than this kind of stiff gel, and had led to the supposition that the mechanical properties were due to the membrane and associated connective tissue. Gilbert and his colleagues found the neurofilament gel to be solubilised by a very rapid enzymic autolysis triggered upon the entry of calcium ions into the axoplasm; the technique of very quickly extricating the axoplasm in air had avoided exposure to the calcium ions of physiological saline or sea water. This method enabled Gilbert (1975) unequivocally to determine many of its bulk chemical and physical properties (*J. Physiol. Lond.* **253**, 257-319). Thus the preparation provided an important standard of reference for working on the biochemistry and structure of filaments (10nm filaments, *Nature* **272**, 557-8) and formed a firm basis from which a long-needed attack on axonal structure at the molecular level could begin.

Gilbert was leading the developments on a wide experimental front at the time of his death. Fortunately much of his work with that of colleagues is drafted for publication. Using mammalian as well as cephalopod and annelid nerve cells they have uncovered a wide variety of different neuorofilament proteins. To examine their homologies they have developed a new high resolution system of gel electrophoresis and are beginning to show by fingerprinting techniques that the variety of neurofilament chains in several species, including some mammals, conceals an underlying simplicity. With a view to uncovering the biochemical as well as the structural features of neurofilaments Gilbert and his colleagues have assayed their modification by the action of axonal proteases and of endogenous kinases and phosphatases. At the same time data from X-ray and solution studies are leading to the development of a detailed molecular model of the neurofilament.

Gilbert had a keen critical intelligence and an uncommon ability to choose significant and clear-cut biological problems. He mastered a wide variety of techniques and brought to them exceptional manipulative skill. In our laboratory his broad interests and strong grasp of physical principles made him much in demand for discussion and advice. He was infallibly helpful and generous. We, his colleagues, are impoverished by his death, which will grievously set back the development of this kind of neurobiology in Britain. David had an essential humility and natural friendliness that enabled him to enjoy an easy relationship with a wide variety of people. We mourn him as much because we have lost a friend, as because a young scientist of distinction has vanished from the international scene.

B.B. Boycott