modesty. His lectures were simple and clear, and his criticism was always constructive and helpful. His motivation as a researcher derived from the pleasure of observation, an urge for knowledge and a keen understanding of relationships. He was intrigued, like many earlier researchers, by the secretive world of the termite colony. How do all the different castes including the workers, the soldiers and the reproductive individuals develop from the same origin in such numbers? How is this ratio maintained and regulated? His understanding of the termite colony as one organism, which he had gained in Africa, and the methods of experimental physiology he had learned, led to further discoveries. He found that all the castes of the termite colony interact continuously, as though they were parts of a single organism. The presence of reproductives in lower termite colonies inhibits the development of that caste, whereas their absence induces the formation of further reproductives. In a similar way the ratio of developing soldiers is regulated by the proportion of soldiers present in the colony.

Lüscher became aware of the importance of 'social hormones' as agents of regulation and communication within the termite colony, and with the biochemist Peter Karlson he introduced the now well-known term pheromone. He could demonstrate by means of ingeniously simple experiments that pheromones are released from the anus of the reproductive individual and are ingested orally by other termites and then distributed throughout the colony by oral exchange, the so-called process of trophallaxis. Pheromones regulate the make up of the social structure, whereas hormones determine the process and direction of development of the single individual, and the latter are controlled by the former. It was established experimentally that the inhibition of reproductive caste development could be simulated by application of 'juvenile hormone', which in general inhibits the metamorphosis of larval insects into adults. The same hormone applied in higher doses to the termite society was shown to stimulate soldier production. With these findings, Lüscher made a breakthrough towards a new physiological understanding of termite caste regulation. The antagonistic effect of reproductives and soldiers that inhibit the development of their own caste and open the way towards development of the other could be interpreted physiologically: the reproductive castes transmit, by means of their pheromones, information causing the developing larvae to produce their own juvenile hormone, whereas the soldiers, probably also by means of specific pheromones, transmit information to inhibit juvenile hormone.

Recent results from Lüscher's team in Nairobi and Bern suggest similar exocrine-endocrine principles of caste regulation for

the highly organized mound-building 'higher termites.'

To understand all these interrelationships Lüscher augmented his work with basic research into the mechanism of hormonal interaction. He investigated the mechanisms of action of juvenile hormone and the ecdysteroid moulting hormones. He studied the interactions and regulatory mechanisms of those hormones in the cockroach, a nonsocial insect related to termites.

Lüscher's name as a termite researcher and insect physiologist has international acclaim. He retained, however, his love for the countryside, for plant and animal life and for his fellow men. I best remember the hours I spent with him in the African bush, as we stood looking with astonishment at an opened termite mound. Here lay the motivation and drive for his life's work: the questions arising from his awe and respect at the incomprehensible and beautiful. This ethos together with scientific accuracy and genius gave him and his work its far reaching importance.

Reinhard Leuthold

G.S. Adair

GILBERT SMITHSON Adair, who died on 20 June 1979, was a highly respected and well loved character on the Cambridge scene for sixty years. Many generations of students and research workers have cause to be grateful for his willing help with practical advice and theoretical explanations. This ranged from supplying Max Perutz with his first haemoglobin crystals and instructing people in the art of preparing collodion membranes of varying permeabilities, to simple explanations of Gibbsian thermodynamics. In this way he exerted considerable influence although he was, to the best of my knowledge, only formally responsible for the supervision of two research students; Muriel Robinson (who became Muriel Adair) and the author of this notice.

Adair was born on 21 September 1896, the son of a Quaker family. He went up to King's, Cambridge, in 1915 and remained in that city, with only very brief interruptions until his death. He was a Fellow of his college from 1923 to 1933 and an honorary Fellow after retirement from his University post (Reader in Biophysics) in 1963.

The wide interest of biophysicists in haemoglobin, which extended over the last 60 years, involved several distinguished Cambridge men. Adair had the stimulation of A.V. Hill, Barcroft and Roughton, who not only contributed to our knowledge about the respiratory function of haemoglobin, but also used this important

and plentiful protein to develop novel thermodynamic and kinetic methods. The iron contents had given an equivalent weight for haemoglobin of about 16,700 Daltons. Brown and Hill had shown that comparison of calorimetric and van't Hoff ΔH for oxygen binding gave about 17,000g of haemoglobin per mol of binding site. Osmotic pressure measurements preceding those of Adair gave variable results and tended to support the prevailing theory that haemoglobin occurred in solution with a molecular weight of about 17,000 and that there was some tendency towards aggregating of these units. Adair's attention to experimental detail is illustrated in a masterly paper "A critical study of the direct method of measuring the osmotic pressure of haemoglobin" (*Proc. Roy. Soc. A108*, 627, 1924) in which he reports a molecular weight of 67,000 and explains the erroneous results of others. It is important to point out that this preceded by about a year, Svedberg's determination of the molecular weight of haemoglobin in the ultracentrifuge.

Further studies of the osmotic pressure of haemoglobin solutions led Adair to detailed experimental and theoretical investigations of membrane potentials. In the 1930s he extended these studies to serum proteins and to the determination of charges on protein molecules from the measured membrane potential at different pH and ionic strength.

The above contributions led to his election to the Royal Society in 1939. During the war Adair was much occupied with the teaching of physiology, especially in practical classes. After the war, one of his main concerns was to improve his simple technique for measuring osmotic pressures, so that small pressures of solutions of large protein molecules could be measured. He also found it difficult to believe the results of his second research student, which indicated reversible dissociation of haemoglobin molecules in dilute solutions and at high ionic strength, until he confirmed it himself with his refined methods.

Adair was a shy but very friendly man who was absolutely devoted to his rather specialised, but very valuable work in the laboratory. The essence of his experimental technique was simplicity and attention to detail. Old fashioned alarm clocks and domestic heaters formed the backbone of his wonderful method for making semi-permeable membranes.

Apart from his scientific work Adair read widely and, in his youth, was a keen rock climber. There are a number of stories about his climbing activities at college and into the Physiology Laboratory. From 1931 until her death in 1977, he shared a life of work and simple pleasures with Muriel Adair. Their house near Grantchester Meadows allowed him to pursue his interests in the observation of a variety of plant and animal life.

H. Gutfreund