



T. Richard Edmund Southwood



Northfleet, UK, 20 June 1931 - Oxford, UK, 26 Oct. 2005

Nomination 18 Sept. 1992

Field Zoology

Title Emeritus Professor and Vice-Chancellor, University of Oxford

Commemoration – Emeritus Linacre Professor of Zoology and former Vice-Chancellor of the University of Oxford, Sir Richard Southwood (hereafter RS) died in Oxford on 26 October 2005. By his own account (see his entry in the 2004 Yearbook of the Pontifical Academy of Sciences), his main scientific contributions were in ecology with a strong bias to entomology, and environmental sciences and policy. A Fellow of the Royal Society, during his distinguished career he received many other honours in recognition not only of his influential research and teaching in zoology but also of his activities as an outstanding university administrator and valued government advisor. He became a member of the Pontifical Academy of Sciences in 1992. RS was born on 20 June 1931 in the town of Northfleet in the County of Kent in south-east England, where his father owned a dairy farm, and he received his secondary education at the nearby Gravesend Grammar School, which he attended from 1942-49. He then went on to Imperial College London where in 1955 he obtained a PhD degree on the basis of research on time trends and patterns of species diversity, making use of the long-term data sets on insects held at the Rothamsted Experimental Station near Harpenden, where he met and married his future wife Alison Langley. During his subsequent career, he served first on the staff of Imperial College, where he became Professor of Zoology and Applied Entomology and Chairman of the Division of Life Sciences, and then, from 1979-93, as Linacre Professor of Zoology at the University of Oxford. His outstanding skills as an administrator from which Imperial College London and the Department of Zoology at Oxford University had already greatly benefited led to his appointment as Vice-Chancellor of the University (from 1989-93). A Vice-Chancellor's many duties include fund-raising on behalf of the University, another activity in which RS enjoyed notable success. Outside the University RS served with distinction as chairman of an international conference held in 1986 on Biological Effects of Low-Level Radiation and also of several U.K. government bodies also dealing with important and politically sensitive issues, including the Royal Commission on Environmental Pollution (1981-86), National Radiological Protection Board (1985-94), Working Party on Bovine Spongiform Encephalopathy (1988-89), Round Table on Sustainable Development (1995-99) and Interagency Committee on Global Environmental Change (1997-2000). According to one close colleague, RS was 'one of the most notable ecologists and zoologists of his generation (but) he leaves an even more lasting legacy through his superb skills as a mentor and builder of academic departments – first at Imperial College London, and later at Oxford University – whose distinguished individuals added up to more than the sum of their parts. A disproportionate number of the world's top ecological researchers today are British, and almost all of them were directly influenced by him'. Notwithstanding his many other duties at Oxford, for eighteen years he found the time to give stimulating undergraduate lectures there. These provided the basis of his last book *The Story of Life*, published by the Oxford University Press in 2002 (paperback 2003). The excerpts from this 'masterly overview impressive in depth, breadth and clarity of the origin and evolution of life' that were selected for presentation at a moving memorial service held last February in the Chapel of Merton College Oxford to celebrate the life of this remarkable man were the opening and closing paragraphs of the book. For their eloquence and the challenges they present to all of us they are worth repeating here. 'Consider the amazing variety of life today: the great herds of animals that roam the African plains, the shoals of fish that teem in coral reefs or the flocks of penguins that huddle on the Antarctic ice. Yet what we see around us is but one still from the film ("movie") of life, a glimpse that we can only understand if we know what came before. This is the book of the film of all life'. 'Will humans having made so much progress by increasing the carrying capacity of their

habitat finally end by overexploiting the world and giving the kaleidoscope another shake? But life is flexible, and we can be sure that the frame of the kaleidoscope will be filled with a new pattern of colours. In contrast, we, in our prodigious numbers, are locked by our agricultural and commercial activities into the current climatic regime. Can political stability survive the stresses that will arise when this changes or will we doom ourselves? We carry a burden of responsibility to learn from our knowledge of the world and its past. Time is short, but we do have the ability to change’.

Raymond Hide

Most important awards, prizes and academies

Awards: Scientific Medal; Zoological Society London (1969); Gold Medal, Linnean Society (1988); Croonian Lecturer, Royal Society (1995). *Academies:* Royal Society (1977); American Academy of Arts and Sciences (1981); Norwegian Academy of Science and Letters (1987); US National Academy of Sciences (1988); Academia Europaea (1989); Pontifical Academy of Sciences (1992); Royal Netherlands Academy of Arts and Sciences (1995); Hungarian Academy of Sciences (1998); Academy of Medical Sciences (1998). *Hon. Fellowships:* (Royal medical colleges) Physicians (1991); Radiologists (1996). *Hon. Degrees* (13): UK (1984, 1994); Australia (1983); Sweden (1986); Canada (1988, 1994). *Civil Honours:* Knight Bachelor, UK (1984); Cavaliere Ufficiale, Order of Merit, Italy (1991); Orden de Merito (II), Portugal (1993); Deputy Lieutenant, Oxfordshire, UK (1993).

Summary of scientific research

The main scientific work of Prof. Southwood falls into two related areas: firstly ecology with a strong bias to entomology and secondly environmental sciences and policy. At the International Congress of Entomology in Vienna in 1960 he presented two papers that outlined new general concepts. One demonstrated that migration (and active dispersal) in insects was associated with the occupancy of temporary habitats; it was an evolved adaptation to the changing geographical position of the breeding site and not primarily a mechanism for reducing overcrowding. The underlying analysis was an early example of the comparative method and published in *Biological Reviews* in 1962. Subsequently these ideas on the role of habitat characteristics on the evolution of life history strategies were further developed in a series of comparative and analytical studies culminating in the 1977 paper, his Presidential address to the British Ecological Society, ‘Habitat, the templet for ecological strategies?’, now a citation classic. The general concept propounded there, that suites of life history categories may be related to habitat characters described on two axes, disturbance and productivity (or its converse adversity), has now been applied to a wide range of animal and plant groups. Within this field with colleagues he developed a synoptic model of population dynamics, demonstrating the relative roles of different factors under different conditions, which gave guidance on the strategies for pest control. The second 1960 paper addressed the question of the differing number of species of insects living on different species of trees; he proposed that this was a reflection of the extent, in space and time, of the exposure of the tree pool of potential colonists, drawing a parallel with the development in insects of resistance to insecticides. This theory was substantiated by comparative studies on the entomofauna of trees in many countries including Hawaii, Britain and Russia. It was a particular case and forerunner of the now well established island biogeography theory. This strand of work was taken forward in a number of conceptual and field studies. In 1972 he drew attention to the evolutionary hurdles (obstacles) to the herbivory in insects: nutritional, attachment, desiccation and discovery. Much of his field work has been on insects and birds of farmlands (disturbed habitats) and woodlands. In the early 1960s he showed how modern agricultural methods, by reducing the numbers of weeds in cereal fields and hence the populations of insects, was causing a fall in the survival of young partridges and hence a decline in their population. Much detailed work undertaken by others has confirmed this hypothesis and has led to changes in agricultural practice. A substantial study undertaken in 1977-79 involved the census and identification of all macroscopic organisms on three stages in a secondary succession; this work provided a test of templet and successional theories. Working in the field in a variety of situations and through his teaching he compiled and developed an overview of ‘Ecological Methods’, published in a book of that title in 1966 which is widely used and remains in print. Through his work in agricultural ecology, Prof. Southwood became involved in what may be broadly described as environmental issues and his publications in this area commenced in 1963 and cover topics such as pesticide use, pollution, energy use, radiation, climate change and sustainable development. As an advisor to the UK Government he played a role in the development of policies on many issues including lead in petrol, acid rain and power station emissions, radiation safety and waste disposal.

Main publications

Southwood, R.E., *Ecological Methods*, London: Methuen, 1966, pp. 392; 2nd edn., 1978; 3rd edn. (with Henderson, P.A.), 2000; Southwood, R.E., *Insects on Plants* (with Strong, D.R. and Lawton, J.H.), Oxford: Blackwell Scientific Publications, 1984, pp. 313; Southwood, R.E., ‘Species richness and resource availability: A phylogenetic analysis of insects associated with trees’ (with Kelly, C.K.), *Proc. Natl. Acad. Sci. USA*, 96,

pp. 8013-6 (1999); Southwood, R.E., 'National communities: structure and dynamics. The Croonian Lecture 1995', *Phil. Trans. R. Soc. Lond. B.*, 351, pp. 1113-29 (1996); Southwood, R.E., 'Insect-plant relations: overview from the symposium', *Entomologia Experimentalis et Applicata*, 80, pp. 320-4 (1996); Southwood, R.E., 'Ecological Processes and Sustainability', *Int. J. Sustain. Dev. World Ecol.*, 2, pp. 229-39 (1995); Southwood, R.E., 'Risks from radiation: perception and reality. The 1993 Crookshank Lecture of the Royal College of Radiologists', *Clinical Oncology*, 5, pp. 302-8 (1993); Southwood, R.E., 'The Environment: problems and prospects', *Monitoring the Environment*, (B. Cartledge, ed.), pp. 5-41, Oxford: Oxford University Press (1992); Southwood, R.E., 'Surface Waters Acidification Programme: Management Group final report', *Sci. Publ. Affairs*, 5, pp. 74-95 (1990); Southwood, R.E., 'Tactics, strategies and templets', *Oikos*, 52, pp. 3-18 (1988); Southwood, T.R.E., *The Story of Life*, Oxford University Press (2003), pp. xiii+264; Kerr, J.T., Southwood, T.R.E. and Cihlar, J., 'Remotely sensed habitat diversity predicts butterfly species richness and community similarity in Canada', *Proc. Natl. Acad. Sci. USA*, 98, pp. 11365-70 (2001); Sugihara, G., Bersier, L.-F., Southwood, T.R.E., Pimm, S.L. and May, R.M., 'Predicted correspondence between species abundances and dendrograms of niche similarities', *Proc. Natl. Acad. Sci USA*, 100, pp. 5246-51 (2003); Southwood, T.R.E., Henderson, P.A. and Woiwod, I.P., 'Stability and change over 67 years - the community of Heteroptera as caught in a light-trap at Rothamsted, UK', *Eur. J. Entomol.*, 100, pp. 557-61 (2003).