



GEOFFREY DOUGLAS HALE CARPENTER

On 30 January 1953, Professor G. D. HALE CARPENTER died at the Radcliffe Infirmary, Oxford, England, at the age of 70, after several months of illness. He was one of the five Honorary Members of The Lepidopterists' Society. For many years he had been the leading authority on insect mimicry. He was a follower and close friend of EDWARD BAGNALL POULTON and succeeded him as Hope Professor of Zoology (Entomology) at Oxford University when Sir EDWARD retired in 1933. At that time CARPENTER was

elected Fellow of Jesus College, Oxford. He held the Hope chair until he reached the age limit in 1948, when he was appointed Emeritus Professor.

His early career was in the field of medicine, in which he specialized in insect-borne diseases. During many years of investigation of Tse-tse fly sleeping sickness in Africa he found time to work steadily on his favorite problems of mimicry and systematics of African butterflies. During the last twenty years of his life he concentrated professionally on Lepidoptera. At the time of his death the Zoological Society of London had in proof his great monograph of the geography and systematics of the Danaine butterflies of the genus *Euploea* of the islands of the southwestern and central Pacific region. The manuscript had been completed in May 1951. His friends, Dr. B. M. HOBBY and N. D. RILEY, saw it to press after his passing.

CARPENTER was born in Eton College on 26 October 1882. His father, P. HERBERT CARPENTER, D.Sc., F.R.S., was then an assistant master at Eton. His grandfather was the distinguished British physiologist, WILLIAM BENJAMIN CARPENTER, D.Sc., F.R.S. CARPENTER was first educated at the Dragon School and Bradfield College. He attended Oxford University as a member of St. Catherine's and received his B.A. in 1904. He had a very early interest in natural history, and it is reported that while an undergraduate he read his first paper on the Mother-of-pearl Moth (*Sylepta ruralis* Scop.) and its parasites, before the Ashmolean Natural History Society of Oxfordshire.

After graduating from Oxford, HALE CARPENTER entered a medical career, studying at St. George's Hospital, London, from which he received the degrees of B.M. and B.Ch. in 1908. He took the D.M. in 1913, presenting results of his study of the Tse-tse fly as his dissertation. With his special interest in entomology, it was natural that he was attracted to the study of insect-borne diseases. In 1910, when studying Tropical Medicine at the London School, he was asked to undertake a study of the biology of the Tse-tse fly (*Glossina palpalis*) which is the carrier of African Sleeping Sickness (Trypanosomiasis) in Uganda. He entered the Colonial Medical Service and left England in June 1910 to take up work on the north shore of Lake Victoria Nyanja, at the source of the Nile. He soon moved to the islands in the northwest corner of the Lake, to study the Tse-tse on depopulated islands, principally at Damba, Bugalla in the Sesse Islands, and Kome. For nearly three years he remained there, investigating not only the Tse-tse but also the other forms of animals and plants.

He had known POULTON at Oxford and had remained in correspondence with him in Africa. This undoubtedly stimulated CARPENTER's early interest in the adaptive significance of animal coloration, particularly mimicry in butterflies and some other insects. During his residence in the islands he made some of his now classic studies of those most wonderful mimicking complexes: *Pseudacraea eurytus* Linné, which strikingly resembles various species of the inedible danaid genus *Bematistes* (= *Planema*); and *Papilio dardanus* Brown, which mimics danaids of several genera. His experiences

on the islands form the substance of his first book, *A Naturalist on Lake Victoria*, published in 1920.

With the outbreak of the First World War, CARPENTER was called to medical duty, in August 1914, with the British troops on the Uganda—German East Africa frontier. In December of 1914, after four months of preparation, CARPENTER was appointed Medical Officer of a fort at Kakindu, on the southern border of Uganda. Here he spent about a year, with plenty of time for the pursuit of Lepidoptera. In the book on his wartime field studies, *A Naturalist in East Africa* (1925), he wrote (p. 23):

"The wet weather, when the afternoons were sunny and hot, produced vast numbers of butterflies, and as my military duties were done by about eleven in the morning I made the most of exceptionally favourable circumstances, and as soon as the morning quinine and sick parades (not to mention the 'Jigger' parade) and the daily round of sanitary inspection were over, I went off to the forest and collected there through the middle of the day, getting back in time for a meal about four, and the evening sick parade. This was for me an extraordinarily exciting time, for I had never collected in a large forest before, and every day yielded something of fresh interest. For in the island forests of Lake Victoria, although individuals had been fairly abundant, species were not numerous, while at Kakindu the hosts of butterflies passed beyond anything I had ever seen; some days are quite unforgettable."

For three months early in 1916 CARPENTER was stationed in the southwest corner of Uganda, but from May 1916 to January 1918 he was located at various camps in central Tanganyika Territory, about 200 miles south or southeast of Lake Victoria. In this region Lepidoptera and other insects were collected steadily, but it was here, at Itigi, that the famous experiments were carried out to test the edibility to young insectivorous monkeys of conspicuously *versus* cryptically colored insects. The results were striking, probably the best body of data in print on the correlation between "warning coloration" and distastefulness. He wrote in the 1925 book (p. 148) of an amusing event during the course of these tests:

"On one occasion I had in my hand a beetle of a group regarded by the monkey as extremely distasteful. I offered my closed fist to the monkey, who came running up to see what was there; when I opened my hand and he saw the nature of the beetle he broke into a broad grin and walked away, evidently treating the matter as a joke!"

During January to November of 1918, CARPENTER was principally at Dar es Salaam, near Zanzibar, and at Mozambique, when the end of his military service finally came, just before the Armistice. He wrote: "To my intense joy I was told that the importunities of the Uganda government had at last had an effect, and I was released by the military authorities to return to my work on the Tse-tse fly on which I had been employed when the

war broke out." For his service during the war CARPENTER was appointed Member of the Order of the British Empire (M.B.E.).

CARPENTER returned to the Colonial Medical Service as a sleeping sickness control officer in Uganda after the war. He retired from the Service in 1930, but on special request he carried out a study of *Glossina* in Ngamiland in 1930-31. During these dozen years he was a prolific writer; in addition to the two books on natural history, he published a steady stream of papers on butterfly geography, mimicry in several insect groups, and his Tse-tse fly research.

In 1919 he married AMY FRANCES THOMAS-PETER, from Cornwall, England. Mrs. CARPENTER survives him. They had no children.

On his retirement from the Medical Service, HALE CARPENTER returned to Oxford and POULTON. There he began almost daily visits, to work with the unique collections in the Hope Department. He built a house close to Oxford, at Cumnor Hill, where he lived for the rest of his life and pursued his hobby of gardening for recreation.

At Oxford, with the congenial comradeship of POULTON, CARPENTER plunged harder than ever into his preferred problems of adaptive coloration. Among others, he paid special attention to the role of birds as predators of butterflies and therefore shapers of mimicry. Some years earlier, POULTON and the mimicry theory had been violently attacked in a series of papers by the American entomologist and ornithologist, W. L. MCATEE. MCATEE and others maintained that birds do not feed on butterflies often enough to be significant factors in mimicry. CARPENTER, and in part POULTON, gradually recorded a convincing body of data proving that in many parts of the world birds and other visual hunters do prey heavily on edible species of butterflies **other than mimics** of such distasteful forms as the *Danaidæ* and the *Aristolochia*-feeding Swallowtails. Soon after his return to England, he published the superb little volume, *Mimicry* (1933), for which E. B. FORD prepared a section on the genetics of mimicry.

Professor POULTON carried on a very voluminous correspondence with naturalists in all parts of the world. This, added to the administrative responsibilities of the Hope chair and of important offices in several leading scientific societies, hindered his progress in writing a long-planned *magnum opus* on adaptive coloration in animals. POULTON retired from the Hope chair in 1933 with the intention, never brought to fruition, of concentrating on the book. It was logical that HALE CARPENTER should have been elected his successor in the Hope Professorship.

When his knowledge of concealment, Africa, and tropical medicine was needed during the Second World War, CARPENTER helped to prepare soldiers in training near Oxford, and he also wrote guide books for use by the military forces in Africa.

CARPENTER was an effective organization officer and served several societies as a leader. He was President of the Royal Entomological Society in 1945-46. He took an important part in the affairs of the Pacific Science Congresses and became known personally in North America while attending these meetings. In England he was also active in meetings of the Royal Society, the Linnean Society, and the Zoological Society of London, and he was an elected Fellow of the latter two.



I am indebted to Mrs. AUDREY SMITH and to the present Hope Professor, Dr. GEORGE C. VARLEY, for the two photographs. The first was taken a number of years ago; the snapshot was taken 31 July 1948, the day CARPENTER retired from the Professorship. Mrs. SMITH also very kindly prepared a major portion of the following bibliography. I have drawn freely on the biographical information given in Dr. B. M. HOBBY's fine obituary of Professor CARPENTER (*Brit. Med. Journ.* 1: 406; 1953).

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LIST OF PUBLISHED WORKS BY PROFESSOR G. D. HALE CARPENTER

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