

Cephalopod Cognition

Edited by

ANNE-SOPHIE DARMAILLACQ

University of Caen Basse-Normandie, France

LUDOVIC DICKEL

University of Caen Basse-Normandie, France

JENNIFER MATHER

University of Lethbridge, Alberta, Canada



CAMBRIDGE
UNIVERSITY PRESS

Tribute to Martin J. Wells

Martin Wells, who died aged 80 in 2009, was not only a distinguished biologist with a passion for invertebrates, but also a colourful and stimulating personality who enthused generations of students with the sheer excitement and beauty of studying animals, especially cephalopods – squids and octopuses. He began his research into cephalopod learning when he and his wife, Joyce, abandoned their PhD programs at Cambridge to move to the Stazione Zoologica in Naples, Italy, as the Director in 1953. Acting on a suggestion from J. Z. Young, who had discovered a way of training octopuses to make visual discriminations, they began studying tactile learning in octopus. They soon showed that these animals could discriminate between objects on the basis of touch, using the suckers on their arms, and that octopus suckers contain chemoreceptors so they can learn to ‘taste’ what they touch. This ‘tasting by touching’ is extremely sensitive, enabling octopuses to distinguish between snails and stones as their arms explore their surroundings at night or in murky waters.

Collaborations with J. Z. Young continued into the 1970s, building up a map of octopus brain function based on surgically ‘removing bits’, seeing what functions changed and then documenting exactly what was removed microscopically. This eventually resulted in octopus brains becoming the best-known non-vertebrate biological data processor ever studied. Ultimately, cephalopods’ brains were so different that they were referred to as ‘the only alien intelligence that humans have encountered’. A bit later Martin tried to work backward towards the origins of this intelligence by studying ancient *Nautilus* brains, but they turned out to be not very smart, so he began referring to them as ‘racing snails’.

Martin also discovered that in the cephalopod brain there is an analogue of the vertebrate pituitary gland: the optic gland, closely associated with sexual maturation. Martin and Joyce’s 1959 paper in the *Journal of Experimental Biology* on this topic became a classic in the literature of invertebrate endocrinology. Martin’s interest in the 1970s turned to various aspects of cephalopod cardiovascular and respiratory physiology. Collaborating with colleagues from around the world, he published a series of challenging papers attempting to relate physiology to the life of the whole animal in its environment. His more recent studies on nautilus yielded fascinating data about the physiology of an animal that regularly moves from the surface to depths of more than 700 m, and also taught us much about the reasons for the eventual failure, from an evolutionary perspective, of the shelled cephalopods (the ammonites and belemnites) that once dominated the ancient seas.

On the basis of his work in Naples, Martin was elected to a prize fellowship at Trinity College, Cambridge, in 1956, and in 1959 he was appointed a university demonstrator in the Cambridge zoology department. He soon became one of five founder fellows of Churchill College, and a tutor and director of studies in biology. In 1966 Martin was awarded a Cambridge ScD and the silver medal of the Zoological Society of London in 1968. He was made a university reader in 1976. With Joyce, he travelled extensively in search of cephalopods, and colleagues with whom to study them. Among many destinations that he visited (often as a visiting professor) were Duke University in North Carolina, Hawaii, Ghana, Dalhousie in Canada, Papua New Guinea, Australia, Texas and Uganda.

Martin approached marine biology as a 'way of life'. He used his position in Cambridge to create a global cadre of marine biologists of the cephalopod persuasion. Post-doctoral fellows and graduate students from around the world were welcomed to his laboratory, his college, his house, his marine stations and his boats. They were expected to make wine and, occasionally, garden in the Bury, his home. Perhaps only half of the world's cephalopod biologists enjoyed Martin and Joyce's hospitality over the years, but this community will never forget their influence. Several generations now hark back to it. Martin's approach was not just a scientific but also an intellectual exercise that expanded the minds of those lucky enough to be involved. He was a writer of popular science books, essays and rigorous papers, a novelist, painter and a yachtsman, talents he came by honestly as the grandson of H. G. Wells. Living with the entire Wells family shaped minds.

Martin's philosophy was always, 'Why tackle easy questions when the hard ones are so much more interesting?' I think the hardest question he ever asked was, 'Why do cephalopods need to be so smart when they die so young?' The phrase 'live fast, die young' has become a popular descriptor of the cephalopod lifestyle, but perhaps the phrase should be expanded to 'live fast and smart, to leave your offspring fewer enemies'. Martin died on the first day of Darwin's bicentenary, so a Darwinian answer seems appropriate.

Ronald O'Dor