

of the blepharoplast, which is an intact part of the parent surface.

There is no nervous system in sponges, and no sign of nervous control of the flagella, either from the individual cell or from the community. The direction and timing of their beat is wholly uncorrelated, and though the frequency of two neighbouring cells generally approximates to equality, it is not exactly the same. The frequency varies when the temperature and soluble contents of the water vary. Except in certain cases where a wandering ovum (*Grantia*) or pore-cell (*Clathrina*) is laid over a collar-cell, I have never seen a flagellum motionless in a cell which was not moribund. I believe the motion to be ceaseless, unconscious, and uncontrolled, a direct function of the chemical and physical environment.

What has this to do with the history of animals? Our ancestors were flagellates, or lower than flagellates, for as many generations as they have been anything else, for perhaps five or fifty times as many generations as they have been vertebrates, at least two hundred times as many generations as they have been mammals, and our ancestors were flagellates for at least five thousand times as many generations as they have been men. All those flagellate ancestors of ours passed their whole active lives in this continual rhythm of accumulating

energy and building, accumulating energy and building, twenty or more to the second through the whole of their short lives. Is it likely that we have forgotten that rhythm? I believe that all through our growth, from infancy to prime, we added our molecules to every unit of protoplasm, rhythmically, as our flagellate ancestors did. When we have passed our prime, our units keep their rhythmic reconstruction; only now, because we are land-animals and must not grow any bigger for fear that our limbs should snap, the rhythm or the chemical change is readjusted, so as only each beat to add as many molecules as we use up between the beats. But the adjustment is not perfect, so that when we have done growing our protein units do not keep absolutely constant—they lose a little each beat on the balance of gain and expenditure. So that as we grow older our muscles shrink, and our nerves shrink, and our cartilages shrink, and our brain shrinks, and we become what other people call 'senile'; and at length we die—a thing which none of our twelve thousand million flagellate ancestors ever did.

Incidentally, I believe that to that same metabolic rhythm, inherited from the flagellates, we owe our sense of time; so that our appreciation of dancing, poetry, and music shows that we are still flagellates at heart.

H. J. Carter

Obituary.

MR. E. W. FERGUSON.

SCIENTIFIC circles in Australia have suffered a great loss in the death at Wahroonga, New South Wales, on July 18 last, of Dr. Eustace Ferguson. Eustace William Ferguson was born at Invercargill, New Zealand, in 1884, the son of the distinguished divine, Rev. John Ferguson of St. Stephen's, Sydney, and when an undergraduate of the University of Sydney showed a passion for natural history. He was encouraged to collect coleoptera by Mr. George Masters, Curator of the Macleay Museum, in whose room I first made his acquaintance. Graduating in 1908 with honours in medicine, he showed an unusual knowledge of that side of his work which dealt with zoology and microbiology. He joined the Linnean Society of New South Wales in 1909 and contributed his first entomological paper on the Phalidurinae, or ground weevils of Australia, in which group he became the authority; in all he published fourteen papers on the group, papers that were distinguished by their lucidity and judgment.

Joining the Department of Health of New South Wales as pathologist, Ferguson succeeded Prof. Cleland as chief microbiologist; and in logical sequence his later entomological work took a medicinal turn. He was soon keenly engaged in the study of mosquitoes, biting flies (*Tabanidae*), fleas, and ticks. Here, as in the field, he showed a remarkable power of close observation, which, combined with a retentive memory, enabled him to recognise at once any form, however minute, that he had once examined. As the companion of many

a delightful collecting trip, I have never met his equal for keenness of sight and notice of detail in natural objects.

Ferguson possessed a wide knowledge of Australian birds—whether on land or sea. From 1915 until 1918 he served in the Medical Corps of the A.I.F. in France, Egypt, and Palestine, using his opportunities to visit the Natural History Museum to study types of Australian insects; while in the East he was greatly interested in the history and archaeology of those lands. He contributed some half dozen papers on the Diptera—chiefly on the *Tabanidae* and *Syrphidae*—to the Linnean Society of New South Wales, and used his influence with other specialists to communicate some sixteen valuable papers by them to the same society between 1922 and 1927—papers largely founded on material supplied by himself.

Ferguson was a member of the council of the Linnean Society of New South Wales from 1921, and its president in 1926—during the November of which year he was attacked by his fatal illness, actually writing an able presidential address, "A Review of Medical and Veterinary Entomology in Australia," on his sick-bed. He was also a member of council and president in 1922 of the Zoological Society of New South Wales, his address containing a strong plea for a biological survey of Australia. In his Department he organised "Tests for the Susceptibility to Diphtheria," and wrote a valuable Report on Dengue Fever. He leaves a widow and six children, five sons and a daughter.

H. J. CARTER.