

Protohydra and Kinorhyncha in Africa

ALONG the southern shores of South Africa there are streams which, flowing into sunken valleys, form lagoons only open to the sea at intervals of months or years. Their mouths are closed by wide bars over which the dunes move in their march along the coast. At high tides in stormy weather, waves wash over the bar and in time the waters of the lagoon rise above sea-level. When floods from the land make the river rise rapidly, the bar is breached and the waters of the lagoon pour out into the sea until it becomes a shallow estuary and so remains for a few weeks.

Such a lagoon is formed at the mouth of the Greater Kleinmond River in the Bathurst District. It has a rich fauna. The salinity, ascertained by the Knudson method, is normally between 23·3 and 34·0 per mille, but it has reached 41·2 per mille during a long drought when the mouth was closed for several years.

Recently, when studying the psammophilous community, several specimens of *Echinoderella*¹ sp. nov., one of the Kinorhyncha closely related to the Mediterranean *E. capitata* Z., were obtained and with them two specimens of a *Protohydra* not unlike *P. leuckarti* Greef. Although Kinorhyncha are widely distributed, the only recorded African species² is *Echinoderes ehlersi* Zelinka,³ from Zanzibar, an island with an interesting fauna differing in many ways from that of the mainland. *Protohydra* is considered to be monotypic by Ewer⁴ and to be confined to the northern Palaearctic.

Nothing is known of the mode of locomotion of *P. leuckarti*. My two specimens of *Protohydra* were noticed because they crawled like Kinorhyncha; they were collected in the belief that they belonged to that class. They resembled *Echinoderella* in size (about 0·6 mm.), shape and colour. They had a pseudo-segmentation and anteriorly they possessed a light-coloured, pulsating, roughened vesicle which, although lacking long 'hairs', might have been the head of some undescribed Kinorhyncha.

Kinorhyncha move by extruding and retracting an introvert covered with hair-like processes known as scalids. They move forwards in a series of short 'steps' with a pause between each. Animals living in sand or mud often move in like manner. Some Polychaeta such as *Glycera* spp. draw themselves along by means of their pharynx, while *Solen* spp. among the Mollusca move rapidly by using the elongated foot. The anatomical mechanism is different in these examples; and *Protohydra* has yet another way of producing a similar movement.

When crawling, *Protohydra* sp. is contracted until it is about one-third its length when at rest and fully extended. The hind region is narrow, the middle corrugated externally so having a segmented appearance, and the coelenteron is at times somewhat expanded by fluid; the anterior region is short and has thinner walls. At more or less regular intervals contraction of the wall of the coelenteron forces the fluid content forwards and the anterior region is distended to form a thin-walled vesicle from which the nematocysts project and produce a roughening easily visible. (These nematocysts, kindly measured for me by Dr. R. F. Ewer, are of two types as in *P. leuckarti*, the stenoteles being similar to those of *Hydra*. They are 9–10 μ \times 7 μ , and the isorhizas are 9 μ in length. Both, therefore, differ from those of

P. leuckarti Greef.) The expansion and contraction of this roughened vesicle, pushing it forwards and pulling it backwards, moves the animal forwards in a manner very similar to but more slowly than that of *Echinoderella*. I know of no other coelenterate which moves in this way so very different from that of other Hydrozoa.

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¹ Zelinka, C., *Zool. Anz.*, **32**, 130 (1908).

² Remane, A., "Bronns Klassen und Ordnungen des Tierreichs", **4**, Abt. 2, Buch 1, Teil 2 (Leipzig, 1936).

³ Zelinka, C., Deutschen Sudpolar Expedition, 1901–3, **14** (*Zool.*), **6**, 419, pl. 39 (1913).

⁴ Ewer, R. F., *Proc. Zool. Soc.*, **118**, 226 (1948).

Lichen Terminology

WALLROTH¹ introduced the term 'gonidia' to describe the green cells found in lichens. They were considered to be 'brood cells' or organs of reproduction of the lichen-fungus. This interpretation of their function was accepted until the appearance of the classic work of Schwendener². Although it was to be many years before the theory of the dual nature of lichens, proposed by Schwendener, was universally accepted, the gradual realization of the identity of the gonidia with free-living algae, brought about a complete change in meaning of this term. No longer could it retain its original application to cells which were thought to take part in the reproduction of the fungal component, but came to be accepted as a term applied to an organism, capable of independent existence, and in no way connected with reproduction of the lichen-fungus. Its continued use has been fostered by convenience at the expense of terminological exactitude.

Rapid development, during recent years, in knowledge of lichen physiology and morphology has brought an ever-increasing awareness of the insufficiency and ambiguity of the term 'gonidia'; indeed, the lack of suitable descriptive terms applicable to diverse instances of associations, as well as those of particular interest to the lichenologist, is likewise becoming evident.

Any term for describing the respective components of the lichen thallus (including the bacteria which are known to occur in certain cases) cannot find universal acceptance unless it bears no implication of the nature of the association. We are far from agreement on this point; but such knowledge as we do possess is sufficient to undermine any belief that there exists but a single form of association between alga and fungus, be it true symbiosis or parasitism of either organism upon the other. It is for these reasons that the terms 'algal host', 'algal symbiont' and 'fungal symbiont', although finding increasing use by lichenologists, should, together with 'gonidia', be discarded.

Three new terms are here proposed as substitutes for the various misleading terms referred to above. They are: (1) 'phycobiont', applicable to an alga in association with a fungus in the formation of a lichen; (2) 'mycobiont', applicable to a fungus in association