

**AFFINITIES AND INTER-RELATIONS OF THE FISH-LEECHES OF THE SOUTHERN INDIAN OCEAN AND THE ANTARCTIC\***

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ABSTRACT

The distribution pattern and affinities of nearly 7 genera and 11 species of fish-lice known from the southern Indian Ocean and 8 genera and 10 species from the Antarctic are examined. It is noted that there is great paucity of records of fish-lice from the southern Indian Ocean, but nevertheless, those known, show a very much restricted distribution at the species level. But at the generic level, the fish-lice of the southern Indian Ocean show affinities with the tropical and subtropical forms on one side and with the Antarctic forms on the other. The Antarctic forms in turn, show affinities with the Arctic forms besides including some unique genera unrepresented elsewhere in the world.

INTRODUCTION

In another paper at this Symposium, the author has indicated that fish-lice are generally better known from oceans adjacent to countries with well developed fisheries or marine biological or oceanographical programmes. Fish-lice belonging to the family Piscicolidae are chiefly parasitic on fish inhabiting fresh, brackish and sea waters. In these various habitats, the distribution of fish-lice the world over, presents an interesting pattern. Freshwater fish-lice show a very distinctive restriction, even at the generic level to particular continents and seem to have speciated within that continent. Brackish water fish-lice are confined to river-mouths, lagoons and lakes opening into small bays or seas within a particular temperature zone like the tropics or the temperate zones. Marine fish-lice on the other hand, enjoy a wider distribution at the generic level but at the species level, they are restricted to a smaller area within a temperature zone.

So far as the marine leeches of the various zoogeographical regions are concerned, those of the tropics and subtropics are inter-related, bearing some affinities with those of the adjacent temperate regions. The northern and southern temperate forms in turn are related to those of the adjacent polar regions. There is some evidence of bipolar distribution at the generic level within fish-lice.

Fish-lice of the southern Indian Ocean and the Antarctic are rather incompletely known but there is a great scope for many more forms to be discovered, particularly from the Indian Ocean. Nevertheless, even the few forms known so far, present interesting biogeographical features.

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## FISH-LEECHES OF THE SOUTHERN INDIAN OCEAN

About seven genera and 11 species of fish-leeches have been recorded so far from the Indian Ocean, as listed below:-

<i>Austrobdella bilobata</i> Ingram, 1957	<i>Pontobdella australiensis</i> Goddard, 1909
<i>Branchellion angeli</i> Sigalas, 1921	<i>Pontobdella rayneri</i> Baird, 1869
<i>Branchellion australis</i> Leigh-Sharpe, 1916	<i>Pontobdella tasmanica</i> Hickman, 1942
<i>Branchellion parkeri</i> Richardson, 1949	<i>Pontobdellina macrothela</i> (Schmarda, 1861)
<i>Johanssonia platycephali</i> Ingram, 1957	<i>Trachelobdella leptocephali</i> Ingram, 1957
<i>Malmiana stellata</i> Moore, 1958	

Of the above listed fish-leeches of the southern Indian Ocean, five genera and nine species are known from the continental shelf of Australia and Tasmania in the eastern sector and two genera and two species are known from the continental shelf of South Africa in the western sector of the Indian Ocean but none are known from the Central sector. It is interesting to note that none of the genera from the southern Indian Ocean are endemic although nine out of the eleven species, amounting to 81.8% are endemic. This clearly illustrates the restriction of the species to localised areas but the genera are more wide-spread in the tropics and the subtropics.

With regard to their affinities, genera like *Branchellion*, *Pontobdella* and *Pontobdellina* are represented in the adjacent subtropical and tropical regions. Genera like *Austrobdella*, *Pontobdella* and *Trachelobdella* have representatives in the Antarctic Ocean, and the last mentioned genus *Trachelobdella* is closely related to the Antarctic genus *Trachelobdellina*, a monotypic and endemic genus. There is yet a third category of genera like *Austrobdella* and *Trachelobdella* which are represented in the Antarctic as well as in the Arctic regions, thus illustrating the bipolarity in the distribution of fish-leeches. To this category, we may assign the genera *Johanssonia* and *Malmiana* which are not represented in the Antarctic but are known from the northern temperate and Arctic regions, again indicating bipolarity, by their conspicuous absence in the intermediate regions of the subtropics and tropics.

## FISH-LEECHES OF THE ANTARCTIC OCEAN

Fish-leeches of the Antarctic are as richly represented as those of the southern Indian Ocean or the Subantarctic or the Antiboreal leech fauna of Tasmania and New Zealand. There are eight genera and nine species known so far, as listed below:-

<i>Austrobdella translucens</i> Badham, 1916	<i>Pontobdella rugosa</i> Moore, 1938
<i>Cryobdella levigata</i> Harding, 1922	<i>Pontobdellina macrothela</i> (Schmarda, 1861)
<i>Cryobdellina bacilliformis</i> Brinkmann, 1947	<i>Trachelobdellina glabra</i> Moore, 1957
<i>Oxytonostoma varituberculata</i> Malm, 1863	<i>Trullibdella capitis</i> Brinkmann, 1947
<i>Pontobdella biannulata</i> Moore, 1957	

All these are known from the continental shelf of the Antarctica excepting *Cryobdellina bacilliformis* and *Trullibdella capitis* which are known from the south Georgia and Bouvet Islands. So far as the fish-leeches of the Antarctica are concerned, there is not enough evidence as yet, to decide the circumpolar distribution of any species, because we have no records of fish-leeches from the Pacific Sector or from the region of the Marie Byrd Land. Of the eight known genera of fish-leeches from the Antarctic, four are endemic, amounting to 50% endemicity at generic level and all these four genera are monotypic. Of the nine species known, seven are endemic, amounting to a high endemicity of 77.7% at the specific level.

Of these fish-leeches of the Antarctic, the genus *Oxytonostoma* has representatives in the Arctic region also, indicating the bipolarity of distribution. The four endemic genera are monotypic. The genera *Cryobdella* and *Cryobdellina* are closely related and so also *Trachelobdella* is closely allied to *Trachelobdellina* indicating the origin of new genera within the restricted Antarctic region, perhaps owing to geographic isolation with a totally different environment.

#### DISCUSSION

Bipolar distribution pattern of fish-leeches agrees with similar pattern observed in other groups of animals as well, but the high endemicity at the specific level and comparatively low at the generic level, as compared with the fish-leeches of the Arctic may be due to the fact that the continuity of the Arctic continental shelf with the neighbouring shelves, perhaps assists in the migration of fauna more, compared to the relative isolation of the Antarctic continental shelf, restricting immigration. Koltun (1970) in the case of the Antarctic sponges, has shown the same feature of high endemicity at the specific level but relatively low endemicity at generic level.

The sharp geographic isolation of the Antarctica and its sharp contrast in environmental features with those of the neighbouring continents may be expressed better in terms of Ekman's (1953) observation, "The Antarctic is an exception among the continents in depth of the shelf, this being on average, about 400 metres close to the ice barrier which in this case is often regarded as the shore..... In those regions where the limits of Antarctic would be expected to run, there is no shelf but instead a more or less extensive abyssal region..... Between 200 to 300 and 1500 metres, lies an intermediate layer with higher temperature than at the surface and lower down, and in this warmer water perhaps lives much of its fauna, almost indicating an eurybathic distribution." This may also be the reason why unlike most other fish-leeches of the other oceans, those of the Antarctic are known from the greatest depths of 437 metres, as recorded by Moore (1957) for *Trachelobdellina glabra*.

Fish-leeches frequent shallower waters for depositing egg capsules on foreign objects but shallower waters are unavailable around the Antarctic continental shelf and even when available, they are ice-covered so that the biological adaptations of the Antarctic fish-leeches should be very interesting.

In view of the fact that our information on the fish-leeches of both the southern Indian Ocean and the Antarctic is incomplete, these conclusions may be of tentative nature, subject to modification or confirmation with the availability of more collections and information.

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## DISCUSSION

K. J. MATHEW: While studying the fish leech distribution have you taken into account the distributional pattern of those fishes to which these leeches are attached.

P. J. SANJEEVA RAJ: True, the distribution pattern of fish leeches must be going hand in hand with the distribution pattern of the fishes on which they live.

K. RENGARAJAN: I would like to know whether the fish leeches are host specific?

P. J. SANJEEVA RAJ: They are not too host specific, excepting for one or two species of fish leeches.

HUGH H. DEWITT: The great depths at which leeches have been found in Antarctic waters may be due to the broad depth range of the near shore fishes found there. This correlates with the depression of the continent and shelf by the Antarctic ice cap, which creates great depth near the continent. The warm deep water mass generally does not extend onto the shelf region of the Antarctic continent. It is prevented by the Antarctic bottom water, and reaches to, or nearly to, the surface near shelf edge. There probably, is some other correlation with depth distribution of leeches, perhaps associated with host distribution.

P. J. SANJEEVA RAJ: This may perhaps be true with Antarctic fish leeches.