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Achtheres percarum Nordmann and
Salmincola gordonii Gurney in
Yorkshire

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THE PARASITIC COPEPODS *ACHTHERES PERCARUM*
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Of the two parasitic copepods referred to here, both of which belong to the family *Lernaeopodidae*, *Achtheres percarum* was collected in Britain for the first time in 1954 in the River Colne, and in the Grand Union and Kennet and Avon Canals, all of which are in the Thames drainage area (Harding & Gervers, 1956). Since then it has been reported from Rostherne Mere, Cheshire [Rizvi — unpublished thesis, cited by Chubb (1965)] but not apparently elsewhere in this country. Because of the confusion in which it was involved (see below) it was, however, described and illustrated by Gurney (1933) in his monograph of the British freshwater Copepoda. The material he used came from continental Europe. The other species, *Salmincola gordonii*, was already known in Yorkshire and was indeed described from specimens collected in the River Rye (Gurney, 1933). It has since been reported from Scotland (Friend, 1939) where it had already been found prior to Gurney's work but had been erroneously reported (Scott & Scott, 1913) as *Achtheres percarum*, and has more recently been reported from the Isle of Man (Bruce, Colman & Jones, 1963). Outside the British Isles it is unknown. (It is possible that *S. heintzi* (Neresheimer) from Bavaria, which I regard as unrecognisable from existing descriptions, is closely related to this species.)

Material of *A. percarum* (Fig. 1) has now been obtained from three localities in Yorkshire, where it has evidently been established for some time as some of the specimens were collected as long ago as 1958. The two earliest collections came to me via Mr. A. Rennie of the Yorkshire Ouse and Hull River Authority and consisted of three specimens taken from a Perch (*Percu fluviatilis* L.) in Doe Park Reservoir, near Denholme (Nat. Grid. Ref. SE 077340) in June 1958, and several individuals taken from four Perch in the Lower Lake, Bretton Park (Nat. Grid. Ref. SE 285125) in August 1961. The overflow of Doe Park Reservoir goes to Harden Beck which joins the River Aire at Bingley. Bretton Park Lake lies between Clayton West and West Bretton and its overflow goes to the River Dearne, which joins the Don at Denaby, near Mexborough. The third locality is Lower Dunsforth (Nat. Grid. Ref. SE 450645) where three specimens were taken from two Perch in the River Ouse by Mr. C. Milner in July 1966 and came to me via Mr. E. W. Aubrook. All the material from these three localities consisted entirely of females.

No information is available concerning the site of attachment of the specimens in the first two localities, though the buccal cavity is the most usual, and all those from the Ouse were so located and gave rise to considerable inflammation. In all, 33 parasites were obtained from four fishes at Bretton Park, and the sample of fishes examined included one Perch which was apparently uninfected.

Like many highly modified crustacean parasites, *A. percarum* exhibits considerable variability of those parts of the body which are not concerned with functions such as attachment and feeding. This was illustrated by the material in the present collections which showed both inter- and intra-population differences. Many of the specimens from Bretton Park were particularly squat and fat. Such an individual is shown in Fig. 1a, which gives a general impression of the size and form of the animal and supplements Gurney's figures which are of more slender individuals.

Particularly noteworthy as it seems not to have been referred to before, was the variation in length of the maxillary arms (Mx). Distally these jointly give rise to a single median bulla (B) (see particularly Fig. 1, e and f) which is inserted into the host (Fig. 1, c and d). In some individuals the maxillary arms were very short and scarcely extended beyond the limits of the cephalothorax (Fig. 1, c); in others they were very long (Fig. 1, b and e), being considerably more than twice as long as the shortest in animals of approximately the same size, and extended far beyond the limits of the cephalothorax. Between these extremes were arms of various intermediate lengths. All the available specimens had been removed from the host so the exact site at which each was attached was not determined, but one suspects that this variation is of functional significance and that it will prove to be related to the position in which the parasite establishes itself.

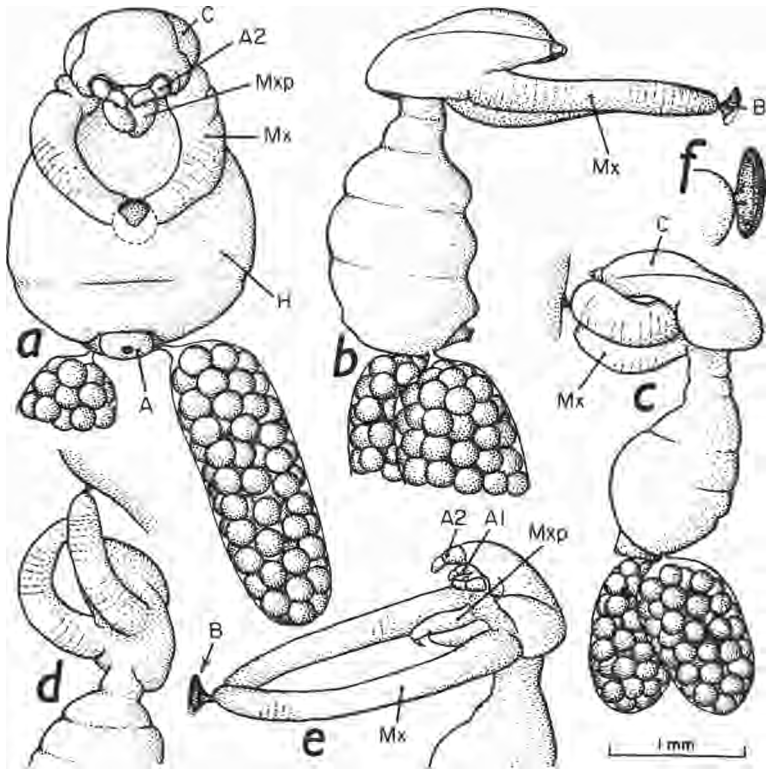


Fig. 1. *Achtheres percarum*.

a: Adult female ventral. b: Adult female lateral. Note the very long maxillary arms of this individual. c: An adult female, lateral, showing the way in which the bulla is inserted in the host. Note the very short maxillary arms of this individual. d: Another female with the bulla still in position in the host showing, in comparison with Fig. c, how the orientation of the maxillary arms differs in different individuals. e: Another female, seen ventro-laterally to reveal some of the appendages. Note the very long maxillary arms of this individual. f: The bulla.

Note: All specimens illustrated are from Bretton Park Lake.

Legend: Ai: Antennule. A2: Antenna. Mx: Maxilla. Mxp: Maxilliped.

B: Bulla. C: Cephalothorax. H: Hindbody. A: Abdomen.

There is also apparently a considerable variation in size. Gurney (1933) gives the length of females as about 4 mm., Wagler (1937) as 4.5 mm., and Gusev (1962) as 3-5 mm. Most of the Bretton Park specimens, however, were only about 2.5 mm. in length, but two of the three specimens from the Ouse had a length of about 3 mm.

Some of the eggs of a specimen from the Ouse contained larvae which were beginning to emerge. These are copepodid larvae, for all naupliar stages are passed through in the egg.

Salmincola gordonii (Fig. 2) is known as a parasite of the Brown Trout, *Salmo trutta* L. and Grayling, *Thymallus vulgaris* (Nilsson) in the River Rye (erroneously called Ray in the original description) and from the Brown Trout in Scotland. It is also recorded from *Salmo trutta* in Port Erin Bay, Isle of Man, having been found there in

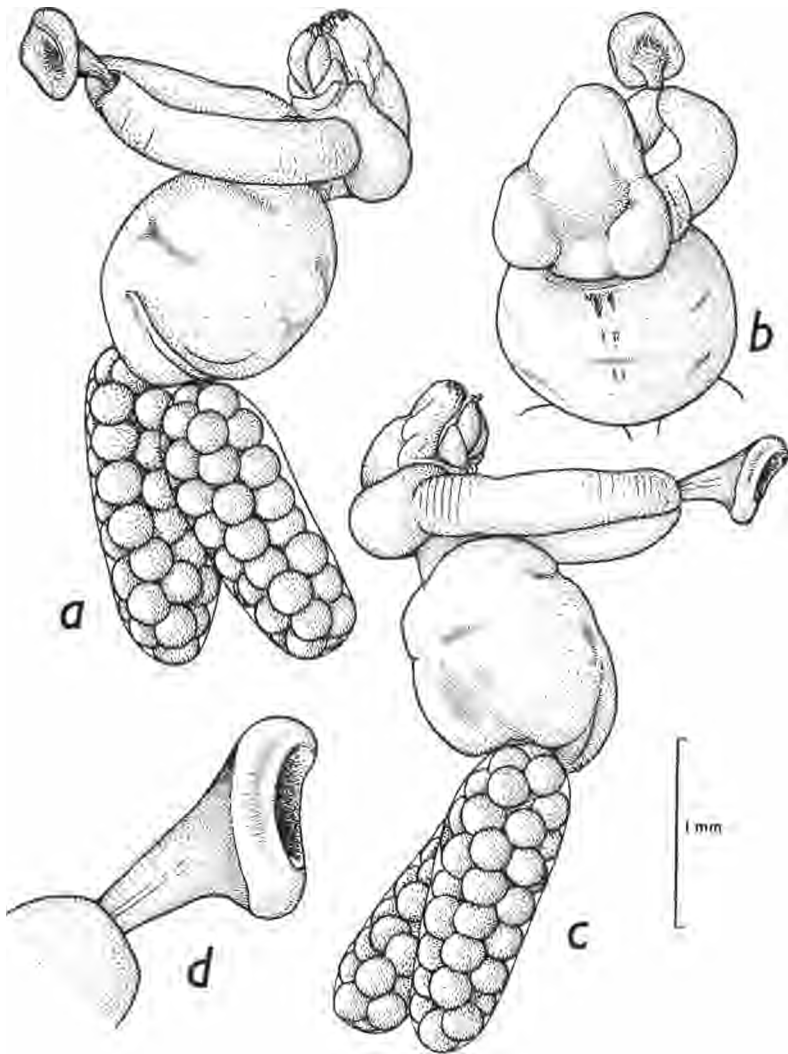


Fig. 2. *Salmincola gordonii*.

- a: Adult female, lateral, from the left. b: The same, dorsal.
 c: The same, lateral, from the right. d: The bulla.

1956 and 1958 (Bruce *et al.*, 1963). These individuals were presumably living on Sea Trout. Unless physiological races of this parasite exist, it would therefore appear that, like its close relative *S. salmonea* (L.), a parasite of the Salmon, *Salmo salar* L., and like its salmonid hosts, it is markedly euryhaline. Although some populations, such as those established on Brown Trout in regions far from the sea — such as the River Rye — are obviously permanently established in freshwater, these are undoubtedly of marine ancestry and presumably became permanent inhabitants of freshwater in post-glacial times.

I have seen a specimen of *S. gordonii* collected on Trout in the type locality in 1960 by Mr. A. Storey, and can now add two further localities, both in Yorkshire. One of these, the River Swale at Richmond, where a single specimen was taken by Mr. M. L. Parry from under the operculum of a Brown Trout, is not entirely surprising for both Rye and Swale ultimately join the Ouse. The other record appears distinctly puzzling at present, but this may be due merely to our ignorance of the habits and abilities of *S. gordonii*.

Among the parasites taken from Perch in Bretton Park Lake one was picked out as being different from the rest, and subsequent dissection and examination of its cephalic appendages showed that it was undoubtedly *S. gordonii*. In view of the fact that this species is otherwise known only as a parasite of salmonid fishes, its occurrence on Perch, which belongs to an entirely different family is surprising. However, as all the parasites were collected at the same time and place from only four host fishes, and as no-one could confuse a Perch with a Trout, the provenance of the host of this individual cannot be doubted. That it should co-exist with *A. percarum* when so few localities of either are known is also surprising and could perhaps indicate that these parasites are more widely distributed than is at present realised.

What seems possible is that Trout in the lake are infected with *S. gordonii* and that, although this appears to be unusual from what we know at present, the parasite is capable of attaching itself to and reaching maturity on the Perch. The specimen in question was an egg-bearing female. Preparation of this note was delayed for some time in the hope that further material might be forthcoming from Bretton Park, but this hope has not yet materialised.

In spite of their allocation to different genera these two parasites are similar in certain respects, and have been confused in the past. Indeed, as yet undescribed species may have been involved in the confusion in Scotland (Friend, 1939). The two can, however, be separated by unambiguous differences in the cephalic appendages and, on gross examination, by the absence of clear signs of segmentation of the hind body of *S. gordonii* (compared with distinct signs in *A. percarum*), and by distinct differences in the shape of the cephalothorax, that of *S. gordonii* being distinctly triangular when viewed dorsally (Fig. 2, b; Fig. 3, b) while that of *A. percarum* is more or less rectangular (Fig. 3, a). In specimens with an intact bulla, separation presents no difficulty (cf. Figs. 1, f and 2, d).

The addition of *A. percarum* to the fauna of the Yorkshire Ouse system brings to four the total number of lernaepodid copepods now known to parasitise its fishes. In addition to the two species discussed here, *Salmincola thymalli* (Kessler) is recorded as a parasite of the Grayling in the River Rye (Gurney, 1933), where it still occurs, and *Tracheliastes polycolpus* Nordmann has been found in several places as a parasite of the Dace, *Leuciscus leuciscus* (L.) and Chub, *Squalius cephalus* (L.) (Aubrook & Fryer, 1965). Of these *A. percarum* and *Tracheliastes polycolpus* are probably comparatively recent introductions to the British fauna though it is just possible that the former has

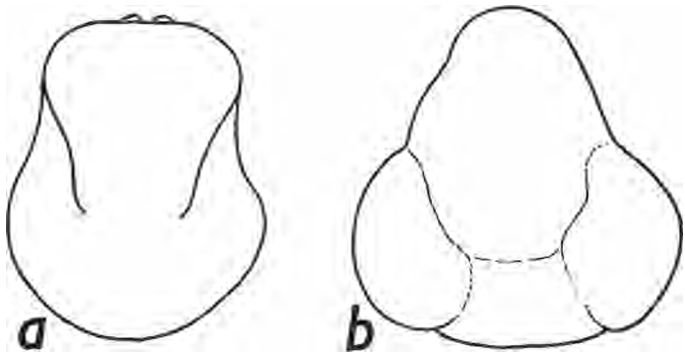


Fig. 3. Outlines of the cephalothorax of — a: *Achtheres percarum* and b: *Salmincola gordonii*, from above.

long been present in Britain but has escaped detection. A further species which may be added to the lernaeopodid fauna of the Ouse if search be made for it is *S. salmonea* (L.) which parasitises the Salmon and Sea Trout. Material of this or any other parasitic crustaceans would be much appreciated should it be collected by anglers or others.

I am grateful to Messrs. A. Rennie and E. W. Aubrook who placed most of the material studied at my disposal.

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