The Parasitic Copepod *Ergasilus sieboldi* Nordmann New to Britain

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Reprinted from the April—June 1969 issue of *The Naturalist* (No. 909)

THE PARASITIC COPEPOD *ERGASILUS SIEBOLDI* NORDMANN, NEW TO BRITAIN

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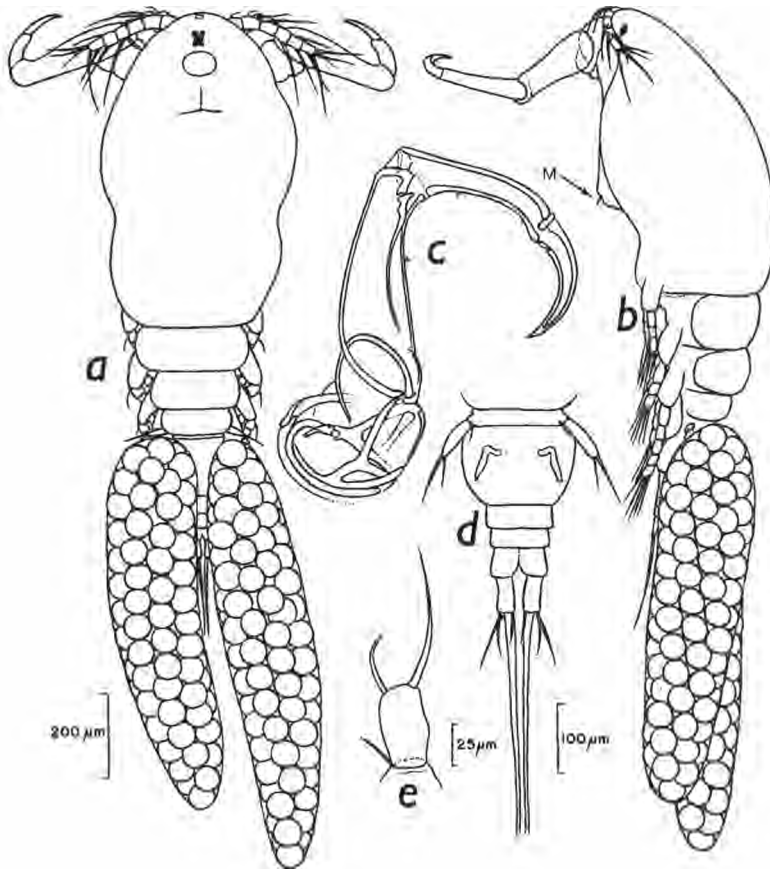
Although not hitherto recorded in Britain, the parasitic copepod *Ergasilus sieboldi* is common on many species of freshwater fishes in continental Europe. Because of this, and because he thought that it may either occur in this country and have escaped detection or be introduced in the future, Gurney (1933) included a description of it in his monograph of the British freshwater Copepoda. More than thirty years later Gurney's expectation was fulfilled when, in July 1967, Mr. R. G. Templeton of the Yorkshire Ouse and Hull River Authority found 12 dead Trout, *Salmo trutta* L, in the Howbrook Reservoir (Nat. Grid Ref. MR 330976) which lies between Sheffield and Barnsley, Yorkshire, and is in the Don drainage area. The gills of these were infested with parasitic copepods which he sent to me for examination and which proved to be *E. sieboldi.*

As Gurney's monograph — in which the illustration of *E. sieboldi* is borrowed from Markewitsch (1931) — is not readily available, and as British naturalists and anglers are seldom familiar with these parasites, the following notes and illustrations are presented in order to give some idea of the form and habits of this species. In essentials *E. sieboldi,* females of which are usually about 1 to 2 mm. in length, resembles a cyclopoid copepod in which the antennae (Fig. 1, *a-c)* have been modified for embracing the gill filaments of its host, to which organs it is confined, and in which the mouthparts have become specialised for the laceration of the gill tissues. When the parasite grasps the gill filament, to which its ventral surface is opposed, the mouth is brought against the host epithelium. The mandibles can sometimes be detected in individuals viewed laterally (Fig. 1 *b,* M). It is only recently that accurate information on its feeding habits has been obtained (Einszporn 1965) and, because of the difficulty of observing living animals *in situ,* the mechanism of food collection is still incompletely understood. Always the parasite is attached with its head directed towards the base of the gill filament, and it is only females which so attach themselves. These produce *Cyclops-like* egg sacs. The males are free-swimming, survive as adults for a much shorter period of time than the females, and are therefore much less frequently seen. They naturally lack the adaptations for a parasitic way of life shown by the females. Larval development is basically similar to that of cyclopoid copepods.

The only point of anatomy that calls for comment concerns the fifth pair of legs. These, which are shown in Fig. 1, *d* and *e,* are generally described as being composed of one segment. This, however, is arguable for close inspection shows that they in fact arise, not directly from the fifth somite, but from a minute pedicel which should perhaps be regarded as representing a much reduced basal segment. Such is the case also in certain non-European species of the genus. The apparent shape of the fifth leg differs, according to the angle at which it happens to be lying, as can be seen by comparing the right and left legs in Fig. i, *d,* and particularly by comparing the shape as it appears in this view with that revealed when, as in Fig. 1, *e,* the limb is seen in face view.

Markewitsch (1931), who described the anatomy of *E. sieboldi* in considerable detail refers to and figures two terminal setae and a basal seta. Gurney (1933), who paid meticulous attention to detail and who is renowned for the supreme accuracy of his illustrations, shows only two terminal setae. His meticulous nature is shown by the fact that, although he used Markewitsch's illustration of the whole animal, on which leg 5 appears as a minute structure, he nevertheless removed the basal seta, being presumably convinced that it did not exist. Examination of the present material at first suggested that Gurney was correct, but very careful examination with an oil immersion lens usually succeeded in revealing the basal seta, and in individuals whose leg is suitably orientated the seta is in fact clearly apparent (Fig. 1, *e).* It is, however, delicate and cannot always be found, though this may be the result of inevitable rough handling during dissection. This seta arises from the minute basal pedicel.

Infestations of *E. sieboldi* are sometimes heavy. Schäperclaus (5954) mentions a Tench, *Tinca tinca* (L), 36 cm. in length, with about 3,100 individuals on its gills, and Gurney cites Neuhaus who found 3,000 specimens on a Tench only 25 cm. in



Ergasilus sieboldi. *a*. Adult female, dorsal. *b*. The same, lateral. (The right antenna, which can be brought into focus by deep focussing, is omitted for clarity.) *c*. Antenna. Note the complex chitinous skeleton basally which serves for the insertion of an equally complex muscular system and also permits articulation of the segments involved. Note also the minute protuberances on the penultimate and ante-penultimate segments which enhance the efficiency of the grasping appendage. *d*. Posterior region of the body, ventral, to show the fifth pair of legs, the genital somite, abdomen and furcal rami. *e*. Leg, 5, face view.

Legend: M = Mandible.

length. As a result of the destruction of the gill tissues, withdrawal of blood, particularly leucocytes which have migrated to the seat of damage (Einszporn 1965), and the frequent bacterial and fungal infection of the wounds inflicted, less heavy infestations that this can lead to the death of the host. This parasite is therefore a highly undesirable inhabitant of fish ponds or other heavily stocked waters where the chances of re-infection are particularly high. Non-fatal infestations also influence the condition of the host, and Schaperclaus (1954) shows how the condition factor of the Tench is inversely related to the number of *E. sieboldi* carried.

Only detached gills from one of the infected Trout from Howbrook Reservoir were available. This specimen, 6.5 inches *(c* 16.5 cm.) in length, carried over 130 parasites on six incomplete sets of gill filaments. As numerous additional specimens had been detached, the total infestation was probably as high as 200 parasites — which is a considerable number for such a small fish. Sometimes two parasites were present on a single gill filament.

The infected Howbrook fishes were apparently part of a batch of Brown Trout which had been introduced to the reservoir about six weeks previously, when they were presumably free from infection. If this be so, then the infestation must have built up quickly, which suggests a large population of parasites in the reservoir. The period of maximum reproduction is usually during the warmest part of the year — which is when the fishes were introduced. As yet no information is available to show that other species of fishes in the reservoir are infected, though this is presumably the case.

I am grateful to Mr. R. G. Templeton, the discoverer of *E. sieboldi* in Britain, for providing me with material through the good offices of Messrs. I. Lambert and J. Robinson.

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