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Zoological Results of the Third Tanganyika Expedition,
conducted by Dr. W. A. Cunningham, 1904-1905.—
Report on the Parasitic Eucopepoda. By WILLIAM A.
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(Plate I.* & Text-figure 1.)

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1. Introduction

In addition to the parasitic Copepods belonging to the order Branchiura, the collections made during the Third Tanganyika Expedition contain a very few specimens of parasitic Eucopepoda belonging to the family Lernaeidae†. While there are many parasitic forms of Eucopepoda, comparatively few of them have been found on freshwater hosts, and these, perhaps, have received less attention than the forms infesting marine fishes. In the family Lernaeidae, the genus *Lernaeocera*‡ is the only one which is known to occur in fresh water, and it is to this well-known genus that our specimens have been referred.

Through the kindness of Dr. Calman I have been allowed to examine a good many examples of *Lernaeocera* from the Nile, which belong to the British Museum§. Since these specimens have not been examined or described, and since they add considerably to the scanty material which we possess from the African continent, an account of them is included in the present paper. So far as I am aware, the existence of the genus in Africa has never been put on record before, the species hitherto known being either European or American. The following is

* For explanation of the Plate, see p. 829.

† Certain parasitic Eucopepoda belonging to the family Ergasilidae were obtained by the Expedition, in addition to the forms described in this paper. They were taken in the last free stage, in tow-nettings associated with non-parasitic Copepods, and in consequence were dealt with by Prof. G. O. Sars in his paper on the Copepoda of the Third Tanganyika Expedition (Proc. Zool. Soc. 1909, p. 63).

‡ The generic name is written throughout in the form in which it is almost universally quoted, and *not* as it was originally spelled by Blainville, viz. *Lerneocera*. The word is derived from the Linnæan genus *Lernæa*.

§ By the courtesy of the authorities of the Berlin Museum, specimens of *L. cyprinacea* and *L. esocina* (the latter, one of the original examples studied by von Nordmann) were lent to the British Museum for the purpose of comparison with the forms described here. I am particularly indebted to Dr. E. Vanhöffen for the trouble he has taken in the matter.

a list of the African forms described for the first time in this paper:—

LAKE TANGANYIKA.

Lernæocera diceracephala.

Lernæocera haplocephala.

RIVER NILE.

Lernæocera haplocephala.

Lernæocera temnocephala.

For the purpose of illustration, I have made use of photomicrographs taken from the actual specimens themselves. They are by no means easy objects to photograph, but in spite of imperfections, the figures will make clear the various external characters which have been used for the systematic descriptions. I have to thank Prof. Dendy, of King's College, London, for permission to do this photographic work in his laboratory.—The plan has been adopted of giving in each case a view of the head and cephalic arms from above. This was done by von Nordmann, one of the earliest writers on the genus, but his example has not been widely copied. It needs some trouble to support the specimens in the position necessary to secure such a view, but the figures obtained illustrate the nature of the head region far better than any others could do.

2. *Systematic Notes and Description of New Species.*

The literature which deals with the different species of the genus *Lernæocera* is somewhat scattered and not always easy to obtain. Although a list of the known species with synonyms is given by Bassett-Smith*, it is marked by material inaccuracies, so that it would seem worth while at this point to include a list which may be useful to future investigators as a starting point for their researches. No attempt has been made to give an exhaustive list of the authors by whom the species have been cited, as this would take up a good deal of space and serve no useful purpose. Only those works are referred to which have a bearing on the synonymy or which contain a record of original observations.

List of described Species with Synonyms.

1. *LERNÆOCERA CYPRINACEA*† (Linnaeus)‡.

“*Lerneæa* tentaculis quatuor: duobus apice lunulatis.”

Linnaeus, *Fauna Suecica*, Ed. I. 1746, p. 367, tab. ii.

Lernæa cyprinacea Linnaeus, *Systema Naturæ*, Ed. X. 1758, p. 655.

* Proc. Zool. Soc. 1899, p. 480.

† So far as I can ascertain, no one has ever fixed the type species or genotype of *Lernæocera*. Assuming this to be the case, in order to maintain the usage of all modern writers, I hereby select *cyprinacea* as genotype of *Lernæocera*.

‡ Parentheses enclosing the Author citation after specific names are used in accordance with Art. 23 of the International Rules of Nomenclature.

- Lerneocera cyprinacea* Blainville, Journal de Physique, t. 95, 1822, p. 377.
- Lerneocera cyprinacea* Burmeister, Nova Acta Acad. Cæs.-Leop. Bd. 17, 1835, p. 309.
2. LERNÆOCERA ESOCINA * Burmeister.
- Lerneocera cyprinacea* v. Nordmann, Mikrograph. Beitr. Naturgesch. wirbelloser Thiere, Heft 2, Berlin, 1832, p. 123 (non *L. cyprinacea* Linn.).
- Lerneocera esocina* Burmeister, Nova Acta Acad. Cæs.-Leop. Bd. 17, 1835, pp. 309 & 312.
- Lerneocera gasterostei* Brühl, Mitt. K. K. zool. Inst. d. Univ. Pest, 1860 (Wien), p. 1.
- Lerneocera gobina* Claus, Würzb. naturw. Zeitschr. Bd. ii. 1861, p. 11.
- Lerneocera esocina* Claus, Beobachtungen über *Lerneocera*, *Peniculus* und *Lernæa*. Marburg, 1868, p. 1.
3. LERNÆOCERA CRUCIATA Lesueur.
- Lerneocera cruciata* (? *Lerneænicus*) Lesueur, Journ. Acad. Nat. Sci. Philadelphia, vol. iii. 1824, p. 286.
4. LERNÆOCERA PHOXINACEA Krøyer.
- Lerneocera phoxinacea* Kollar MS., Krøyer, Naturhistorisk Tidsskrift, ser. 3, vol. ii., Copenhagen, 1863-64, p. 399.
5. LERNÆOCERA LAGENULA Heller.
- Lerneocera lagenula* Heller, Reise der Novara—Crustaceen (Wien, 1865), p. 246.
6. LERNÆOCERA POMOTIDIS Krøyer.
- Lerneocera pomotidis* Krøyer, Naturhistorisk Tidsskrift, ser. 3 vol. ii., Copenhagen, 1863-64, p. 397.
7. LERNÆOCERA CATOSTOMI Krøyer.
- Lerneocera catostomi* Krøyer, Naturhistorisk Tidsskrift, ser. 3, vol. ii., Copenhagen, 1863-64, p. 395.

It is perhaps well to point out here that the classification of the parasitic Eucopepoda has hardly received the attention devoted to that of free-living forms. At the same time it is clear that a satisfactory basis on which to classify the former is unusually difficult to find, on account of the extraordinary degree of modification commonly undergone by the female on the adoption of a parasitic mode of life. It is possible, indeed probable, that

* It has been suggested by some modern writers (cf. Bassett-Smith, *op. cit.* p. 480, and Brian, 'Copepodi Parassiti dei Pesci d'Italia,' Genova, 1906, p. 79) that the species *esocina* and *cyprinacea* should be united. Their contention does not seem to rest on personal observations, but on their interpretation of the original descriptions. After an examination of the actual specimens, I have no hesitation in confirming the view of the older authors, namely that the species are perfectly distinct.

individual variations of form will be more than usually common as concerns the greatly distended bodies or the cephalic processes for attachment to the host, as the exact shape would seem without significance for the life of the parasite. Yet it is precisely such details which are employed for the purposes of classification. Thus within the limits of the genus *Lernæocera* itself it is difficult to be sure how far the specific characters employed will prove constant and therefore trustworthy, for even among the specimens that I have examined a considerable lack of uniformity has been observed.

Genus LERNÆOCERA Blainville.

It does not seem desirable to re-define the genus here, although the species now included in it would not strictly come under Blainville's original generic description. Indeed, his account is based upon certain misconceptions, notably the view—shared by contemporary writers—of the absence of appendages on the body, for he says “Aucune trace d'appendices au corps.” Nevertheless a number of species have been placed in this imperfectly defined genus, but it is open to question whether they should all remain there. A careful study of these forms has given me the impression that two or three of them may merit separation as distinct genera, or at least sub-genera; but without opportunities for a more comprehensive examination, it is impossible to express a very definite opinion, and the course least open to objection is to leave matters as they are.

Before proceeding to give descriptions of the new species, there remain one or two matters which need some explanation. It is characteristic of most of the species, including those which are described in this paper, that they exhibit the peculiar boot-like shape of the terminal portion of the body which was first referred to by von Nordmann* in his account of *L. esocina*. This is produced, in the first place, by a protuberance immediately in front of the genital apertures, which forms the “heel,” and which we may call the *pre-genital prominence*. In the second place, there is generally a dorsal curvature of the hindmost portion of the body (posterior to the genital apertures and corresponding to the abdomen according to Claus), which, owing to the lateral torsion undergone by the hinder part of the body, comes to lie on one side or other of the mid-line and represents the “toe.”

This explanation of the appearance we owe to Claus†, but the matter is made yet clearer by the conceptions on torsion in the Lernæidæ quite recently put forward by Quidor‡. The latter assumes that the torsion is the direct result of the mode of fixation of the parasite and the mechanical reaction of the external medium. Admitting the probability of this statement, and admitting that the orientation of a parasite to its host is

* *Op. cit.* p. 124.

† *Vide* “Beobachtungen über *Lernæocera*,” etc., p. 2.

‡ *Comptes Rendus Acad. Sci. Paris*, Tome 154, 1912, p. 87.

probably constant for a given species, we are furnished with an explanation of the otherwise perplexing fact that this lateral torsion may be either to right or left. It will be the one or the other according to the particular side of the host which formed the point of attachment for the parasite. Quidor, moreover, gives evidence for believing that the amount of torsion is constant for a given species, and can be used as a character of systematic value.

The appendages appear to show comparatively minor differences within the limits of this genus, and have not been appealed to for the purpose of establishing new species. Thus I have not deemed it necessary to study in detail the head appendages of my new forms, since these are by no means easy to investigate, and my material, with one exception, was very scanty. So far as I have been able to make out, there are no points of striking difference in any of the types from the arrangement which is usual in the group. Accordingly in the specific descriptions which follow, no special mention of head appendages, swimming-feet or furcal appendages is made, it being implied that these are present in the normal manner, without having any bearing on the distinctions between the species.

In addition to the photographs reproduced in the plate, the accompanying text-figure is given, showing in outline for the three new species the appearance of the head and cephalic arms from above.

Text-figure 1.

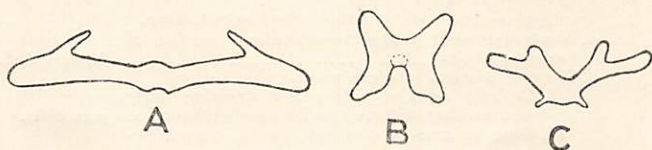


Diagram showing cephalic arms, as viewed from above.

A. *Lernaeocera diceracephala*. B. *L. haplocephala*. C. *L. temnocephala*.

In order to facilitate identification, and in order to emphasise in very concrete form the chief features which characterise the new species, a key to all the known species of *Lernaeocera* has been prepared. This did not prove a very easy task, as unfortunately it has been possible for me to examine specimens of only two of the forms which have been described. For particulars of the remaining species I have been dependent entirely upon the descriptions and figures of the authors concerned, and in such cases no more can be done than to repeat certain statements which would seem of value for key-making. Thus I am not responsible for the rather remarkable assertion that *L. catostomi* possesses *three* cephalic arms, which, of course, renders the head quite asymmetrical. That is a feature which enables us to

contrast the form sharply with the typical species of *Lernæocera*, and which might serve as a claim to more than specific distinction.

It might be well to indicate here, briefly, the other forms which in my judgment differ materially from the more normal members of the genus. The species *L. lagenula*, as described and figured by Heller, retains in a great measure the primitive segmentation of the body which is usually lost, and at the same time fails to show the pre-genital prominence and characteristic boot-like shape of the posterior end. It has also undergone a very slight amount of torsion. The North American form *L. pomotidis* shows, according to the figure, a complete absence of any torsion, though otherwise it might rank as a typical *Lernæocera*. Finally, it must be admitted that the form to be described below as *L. diceracephala* exhibits certain features which are non-characteristic, and one feature which is not shared by any other species of the genus. This peculiarity, to which reference is made in the specific name, is the existence of only two cephalic horns—apparently the dorsal pair—instead of four. Beyond this, the lobed nature of the body, suggestive of segmentation, and the apparent absence of any torsion, are further points of distinction.

Key to the Species of LERNÆOCERA.

- a. Single pair of cephalic arms present *diceracephala*.
- a'. Cephalic arms markedly asymmetrical, three in number *catostomi*.
- a''. Two pairs of cephalic arms present.
- b. Cephalic arms simple without any indication of forking.
- c. Ventro-lateral tubercles present behind junction of arms and body *haplocephala*.
- c'. No ventro-lateral tubercles present.
- d. Cephalic arms very long and straight; body terminating in three broadly-rounded tubercles. *pomotidis*.
- d'. Cephalic arms of moderate length, curved forwards; body terminating in five rounded tubercles *cruciata*.
- b'. Cephalic arms forked.
- c. Pre-genital prominence absent *lagenula*.
- c'. Pre-genital prominence present.
- d. Dorsal cephalic arms simple; ventral arms with process *phoxinacea*.
- d'. Dorsal cephalic arms forked; ventral arms simple.
- e. Ventral cephalic arms nearly as stout as dorsal arms; egg-sacs oval, $\frac{1}{2}$ — $\frac{1}{4}$ length of body *esocina*.
- e'. Ventral cephalic arms much more slender than dorsal arms.
- f. Dorsal cephalic arms T-shaped; egg-sacs cylindrical, $\frac{1}{2}$ — $\frac{1}{4}$ length of body ... *cyprinacea*.
- f'. Dorsal cephalic arms Y-shaped *temnocephala*.

1. *LERNÆOCERA DICERACEPHALA*, sp. n. (Pl. I. figs. 1–3.)

Description.—(Adult female.) Cephalic arms only two in number, of considerable length and projecting laterally from the region of the head-tubercle at about right angles to the body.

The arms are dilated distally and bear, at about one-third their length from the end, a stout postero-dorsal process which is bluntly pointed. The body is bent dorsally through a considerable angle at a little less than one-half its length from the head. It is not uniform in diameter, but shows a marked constriction at about the middle and an otherwise irregular contour which may indicate disappearing segmentation. Pre-genital prominence not very conspicuous, simple or slightly bilobed; terminal portion of body not upturned and rotated very little, if at all. The egg-sacs are long and tapering, about two-fifths length of body. They contain from four to five rows of eggs at their widest part. The eggs are slightly oval, 14×12 mm.

Total length of complete specimen (excluding egg-sacs), 8.4 mm.*

Length of longer egg-sac, 3.5 mm.

Remarks.—The two specimens on which this new species is founded are, unhappily, neither of them quite perfect. One of them, in fact, only consists of the main part of the body, without head, cephalic arms, or egg-sacs. This very incomplete individual affords, however, valuable evidence in certain respects, for the sharp bend in the body and the noticeable constriction referred to above, are equally recognisable here, so that we may assume them to be definite features of the species. The specimen on which the description mainly rests has lost a portion of one cephalic arm, but we may fairly suppose it to have been the same as the one which is whole. In text-fig. 1, the missing part has been restored for the sake of affording a comparison with the other species. It is open to question how far the lobed nature of the body, which is so conspicuous, is indicative of segmentation. The fact that the most typical members of the genus show the body dilated into an almost formless sac, might suggest that we are dealing in the present case with a less modified condition. On the other hand, the position of the four pairs of swimming-feet, which appear to have no definite relation to the body lobes, is an argument against such a belief.

The reference in the foregoing description to the terminal portion of the body, sufficiently indicates that in this form there is also complete or almost complete absence of the characteristic torsion of the body. This fact is, of course, equally displayed by the position of the swimming-feet, which are visible in a ventral view approximately in the middle line. All this implies, further, that the hinder end of the body cannot exhibit the usual boot-like shape as a consequence of deflection and rotation, as is generally the case, and yet it must be granted that the appearance in this respect is fairly typical. There is, of course, an important difference, namely that the shape in question is visible only in a lateral view, whereas it is shown in a ventral view of the more normal types as a result of the body torsion. In the present

* This is the actual measurement of the specimen without taking into consideration its bent state. It would measure more if straightened out.

instance, then, the effect is produced rather by an incision in the region of the genital apertures than by the combination of characters which has been already fully explained.

The most striking characteristic of this species is the existence of only one pair of cephalic arms instead of two pairs. There seems little doubt from the relation they bear to the head-tubercle, that these correspond to the dorsal cephalic arms of species in which two pairs of arms are present. Such an important difference from the common type might be considered sufficient to warrant a generic distinction for this species, but I have preferred to leave it for the present in the genus *Lernæocera*.

Occurrence.—Sumbu, Lake Tanganyika, 13. 10. 04. From gill-arches of a large *Clarias mossambicus*. Two specimens, one very incomplete.

2. *LERNÆOCERA HAPLOCEPHALA*, sp. n. (Pl. I. figs. 4-7.)

Description.—(Adult female.) Cephalic arms four, of about equal size, short and stout, without any indication of forking and being so placed as to form a particularly regular cross. The dorsal arms are simple and bluntly pointed; the ventral differ from them only slightly, exhibiting an obvious swelling on their ventral aspects. The body is almost straight, unsegmented and cylindrical. The anterior third is slender, the body dilating gradually behind to become about twice as thick. Pre-genital prominence well marked, simple and not bilobed; terminal portion of body rather slightly upturned and rotated through somewhat less than 90°. Immediately behind the junction of the arms with the body, and just external to the second pair of swimming-feet, a pair of rounded tubercles are situated, which project ventro-laterally. The egg-sacs are moderately long and tapering, about one-fifth length of body. They contain from four to five rows of eggs at their widest part. The eggs are approximately round, and their diameter is about .1 mm.

Total length of largest specimen (excluding egg-sacs), 14.3 mm.

Remarks.—This species is represented in my material by a considerable number of specimens from different sources, which would suggest that it is a relatively common form. Unfortunately, the bulk of the specimens have suffered severely from lack of care in preservation, having been preserved apparently in the same manner as their host, or even with it, and they are in consequence greatly shrunken and shrivelled. It is thus the more satisfactory that all these can be readily identified as belonging to this species by the presence of the characteristic ventro-lateral tubercle mentioned above. The single specimen from Tanganyika, on which the description is largely based, and which is figured on Plate I., is unluckily devoid of egg-sacs, but this defect is made good in one from the Nile (fig. 7), which happens to be damaged elsewhere. The Tanganyika specimen proves also considerably longer than any of the individuals from the Nile, which is doubtless accounted for in part by the contracted nature of the latter.

In two tubes, each containing a number of Nile specimens, the lengths vary from 6.2–9.0 mm. and from 8.8–11.7 mm.

A careful examination showed the lateral torsion of the body to vary in direction, as was expected. Unfortunately, minute details as to the position of the parasites on the host are missing for the Nile material, so that it is impossible to test the accuracy of Quidor's assumptions in relation to this species. The individual from Tanganyika was, however, taken from the soft region at the junction of the pelvic fins,—a spot more nearly ventral than lateral. At the same time, it is hardly probable that the point of attachment was so strictly median as to preclude the possibility of lateral torsion in conformity with this view.

Fig. 7 serves also to show how strikingly these parasitic forms may in turn be covered by other organisms. In this case, the latter are Vorticellids, which infest many of these Lernæids from the Nile to such a degree as to render difficult the study of their anatomy. Among a considerable number of specimens taken on a *Polypterus senegalus*, almost all are infested, some of them as markedly as the one photographed. The region where the Vorticellids are most thickly attached is about the junction of the thin anterior third of the body with the more dilated posterior portion. It seems highly probable that the manner in which these parasitic Copepods can be so densely encrusted by such organisms (other cases are referred to in the literature of the subject), is directly related to the peculiar fact that after fixation to their host they appear no longer to undergo ecdysis*.

Occurrence.—Kituta, Lake Tanganyika, 24. 8. 04. From the soft region at the junction of the pelvic fins of a large *Polypterus congicus*. One specimen.

White Nile. From the fleshy region at the junction of the pair of pectoral fins of a *Polypterus senegalus*. Eighteen specimens, some of them incomplete, belonging to the collection of the British Museum.

Fashoda, White Nile. Eight further specimens (one incomplete) from the British Museum collection. The only particulars stated are:—"From *Polypterus birchir*, Fashoda."

It is interesting to note that this species of *Lernæocera* has been taken only on the Ganoid *Polypterus*, albeit on different species of that genus.

3. LERNÆOCERA TEMNOCEPHALA, sp. n. (Pl. I. figs. 8 & 9.)

Description.—(Adult female.) Cephalic arms four, of unequal size. The dorsal arms are long and stout, and fork distally in a Y-shaped manner, terminating in rounded lobes. The ventral arms are quite short, slender and simple, being bluntly pointed at their ends. The body is almost straight, unsegmented and cylindrical. The anterior third or less is moderately slender, the body dilating gradually behind. Pre-genital prominence

* Cf. Jungersen, Mindeskrift for J. Steenstrup, xvi, Copenhagen, 1914, p. 6.

well marked, simple or slightly bilobed; terminal portion of body not upturned.

Total length of specimen, 10.0 mm.

From tip to tip of dorsal cephalic arms, 4.2 mm.

Remarks.—It is unfortunate that this species has to be described from a single specimen. Although no egg-sacs are present, it is almost certainly adult, and there seems no reasonable doubt that it represents a distinct form. This unique individual has unluckily been badly preserved, and as a result the body is nearly flattened towards its posterior end. It thus becomes impossible to determine the real diameter of this part of the body, and so to express the amount of dilatation which it has undergone. Similarly, an artificial twist in the body makes it virtually impossible to state the nature and degree of torsion. From the shape of the cephalic arms, this form may be placed not far from the oldest known European species, *L. cyprinacea* and *L. escocina*, from which it is nevertheless perfectly distinguishable. The dorsal cephalic arms in this specimen, as will be seen from fig. 9, are not quite bilaterally symmetrical, a condition of things which is met with in the genus from time to time.

Occurrence.—The specimen belongs to the collection of the British Museum. Particulars are given as follows:—"From *Barbus bynni*, bought in Old Cairo fish bazaar—caught in the Nile, Loat Coll., no. 26."

3. General Remarks.

It is clear that, whatever may be the case for marine fishes, the fishes of fresh water are relatively seldom the prey of parasitic Eucopepoda under natural conditions. This is indicated by the paucity of material in the collections under review, for the specimens on which this paper is based come from eight individuals only. On the Third Tanganyika Expedition, of which I can speak personally, very large numbers of fish were examined, on only two of which were such parasites discovered. It is instructive to compare with this the occasions on which Argulidæ—also external parasites—were obtained. They were taken 18 times in Lake Tanganyika, and in some cases on two or three individuals of the same species at the same time, while with lesser opportunities, they were found on three separate fish in the Victoria Nyanza, as against no record at all of parasitic Eucopepods. A study of the literature of the subject confirms our conclusion. There are, it is true, other families besides the Lernæidæ which are represented in fresh water, but they do not constitute a very formidable assemblage, while the genus *Lernæocera*, sole representative of its family, contains but a small number of species. Of these species it is certainly true to say that they are not very common, and in the majority of cases the remark is equally true of the other parasitic forms. When natural limits are transgressed, as they usually are in the stocking of ponds and rivers with fish, there not infrequently occur

serious epidemics due to vast numbers of parasites which have multiplied under conditions abnormally favourable to them.

It is worth while to mention that a few other specimens belonging to the British Museum have passed through my hands without receiving any notice in the general text. This is because they were too much damaged to permit of identification or description, but they can be referred to the genus *Lernæocera* almost with certainty, and as such are worthy of putting on record. They were all taken on Nile fish, and came from three separate individuals. One specimen was taken on a *Clarias lazera*, two more on another *Clarias* (? *lazera*), while two further specimens are labelled as follows:—"From *Barbus bynni*—Damietta Nile, near Samannud. Loat Coll., no. 691."

As regards the distribution of these African species of Lernæidæ, it is to be noted that while one species has been found only in Tanganyika and another only in the Nile, the third form occurs in both. There is, then, no indication of that peculiar nature and superior richness of fauna which in so many cases characterises the lake. At the same time, we know as yet so extremely little of the distribution of these forms in Africa, that it would be out of place to lay much stress on the facts which have so far come to light. It is, indeed, a fact that the Tanganyikan species, *Lernæocera diceracephala*, is so far peculiar that it may be found necessary to establish a new genus for its reception, while the two Nile species are much more typical members of the genus *Lernæocera*. Further, if we deal with the parasitic Eucopepoda as a whole, including the Ergasilidæ, we still find that the fauna of Tanganyika is exceptional and unusually rich in diverse forms. Prof. Sars described* a new genus—*Ergasiloides*—with three endemic species from Lake Tanganyika, and from Lake Nyasa only a single species of *Ergasilus* not further determined, but which is probably the same as that recorded by Mrázek from the Victoria Nyanza.

EXPLANATION OF THE PLATE.

(All figures by about 5.)

Lernæocera diceracephala.

- Fig. 1. Ventral view.
- 2. Lateral view.
- 3. View of cephalic arms from above.

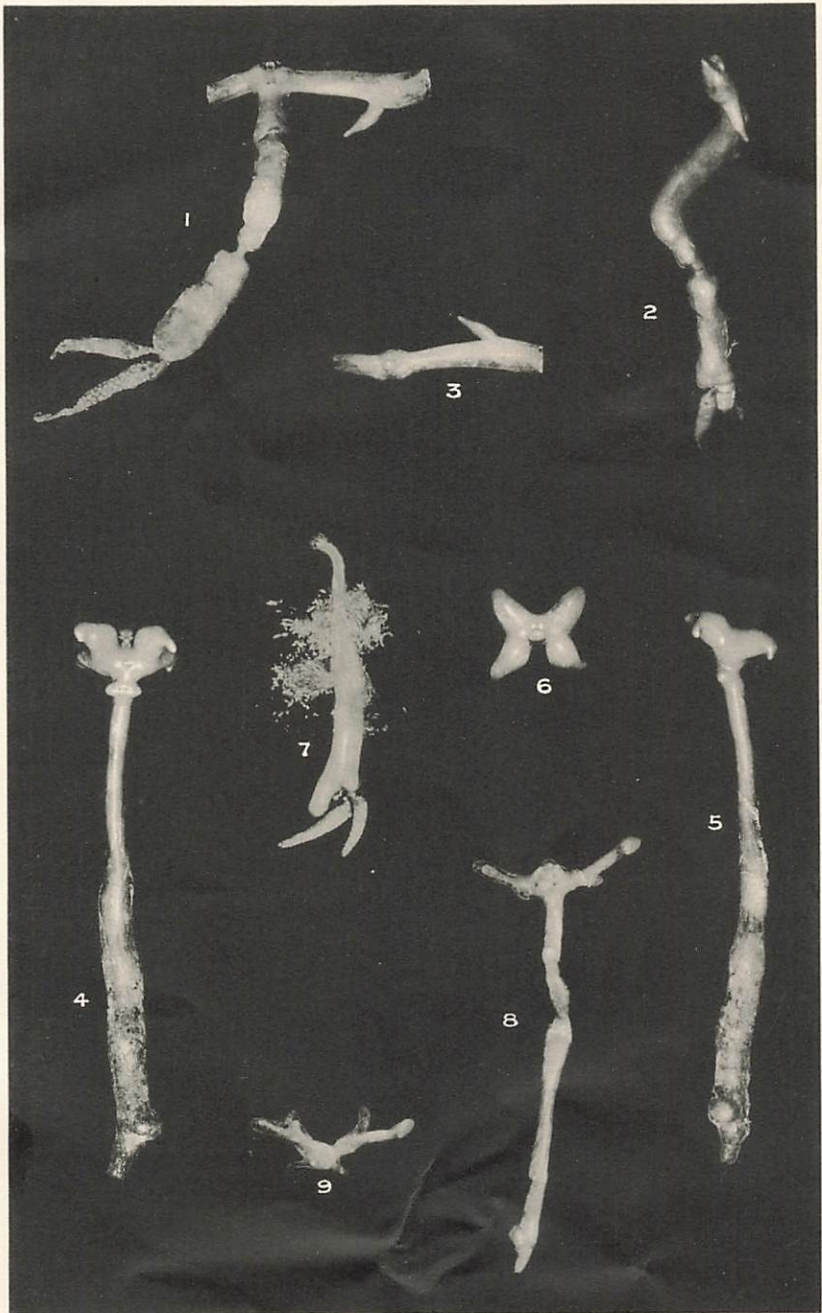
Lernæocera haplocephala.

- Fig. 4. Ventral view.
- 5. Lateral view.
- 6. View of cephalic arms from above.
- 7. Lateral view of specimen infested with Vorticellids.

Lernæocera tenuocephala.

- Fig. 8. Ventral view.
- 9. View of cephalic arms from above.

* P. Z. S. 1909, p. 63.



W.A.C. photo.

London Stereoscopic Co., imp.

1-3. LERNAEOCERA DICERACEPHALA.

4-7. L. HAPLOCEPHALA. 8, 9. L. TEMNOCEPHALA.