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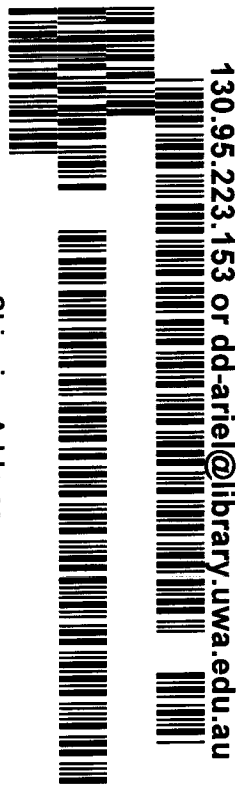
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Figs. 94-104. *Trypanosoma perca*, from the Perch, all from preparations stained with iron-haematoxylin, except 94, 95, 103, 104. 97, 98, fixed with Schaudinn's fluid after previous exposure to osmic vapour; 98-102, fixed with Mann's micro-corrosive-formol; 103, osmic vapour followed by absolute alcohol, 104, dried off and fixed with absolute alcohol, both stained with Giemsa's stain.

94, 95. Sketch of *Trypanosoma perca*, large forms, drawn living; 94, a specimen showing two dots at the hinder end (kinetonucleus and blepharoplast?); 95, a specimen showing a refringent dot, lodged in a vacuole, close behind the trophonucleus.

96. Specimen showing myonemes on both surfaces of the body, from a preparation in which the stain was but slightly extracted.

97. Middle portion of another specimen, very contracted, showing myonemes, from the same preparation as the last.

98. Specimen showing a large blepharoplast, connected with the kinetonucleus (or division of the kinetonucleus?).

99. Another specimen from the same preparation as the last.

100-102. Trophonuclei of different specimens.

103, 104. Stout forms drawn to show the distribution of the cytoplasmic granules; in 104 many of the granules are in pairs, as if dividing or recently divided.

2. Zoological Results of the Third Tanganyika Expedition, conducted by Dr. W. A. Cunningham, F.Z.S., 1904-1905.—Report on the Copepoda. By Prof. G. O. Sars, C.M.Z.S.

[Received September 11, 1908.]

(Plates VI.-XXIII.)\*

INTRODUCTION.

The Entomostracan fauna of the great inland waters of Central Africa is still very imperfectly known. Only one of the big lakes, viz., Victoria Nyanza, has been partly explored in this respect by German naturalists, the results being published in the great work 'Die Thierwelt Deutsch Ost-Afrikas,' whereas the other large lakes have remained almost entirely unexplored, so far as regards the Entomostraca. During the third Tanganyika Expedition the conductor, Dr. W. A. Cunningham, made collections not only in Victoria Nyanza, but also in two other lakes, viz., Nyasa and Tanganyika. The higher Crustacea contained in these collections have already been worked out and the results published in the present journal, for the Brachyura by Dr. Cunningham, for the Macrura by Dr. Calman. It has hereby been proved that Lake Tanganyika differs remarkably in its faunistic character from the other two lakes, and on the whole exhibits a much richer and more specialized fauna, as regards these two groups. Of course, it would be of great interest to know if an analogous difference also exists as regards the lower Crustacea or Entomostraca. Material for the solution of this question has fortunately been procured by Dr. Cunningham, who by the aid of more or less fine-meshed tow-nets has collected from each of the three lakes a number of samples chiefly taken at the

\* For explanation of the Plates see p. 72.

surface, but in some cases so near the shores as also to contain some material from the bottom. At the request of Dr. Cunnington, I have undertaken the examination of these samples, and have been much interested in selecting from them the several forms of Entomostraca therein contained. The Cladocera have been sent back to Dr. Cunnington, who desired to report on that group himself, whereas the Copepoda and the Ostracoda will be worked out by me.

The material which has been placed in my hands for examination, consists of a large series of tubes containing samples carefully preserved in formalin, and exactly numbered, both as to date and locality. To these samples were added some few smaller tubes containing Copepoda and Ostracoda, selected by Dr. Cunnington from some of the larger tubes. The greatest number of samples are derived from Lake Tanganyika. There are, however, a sufficient number of samples also from the two other lakes for instituting a comparison of the Entomostracan fauna of all three lakes.

At the first sight, the samples looked rather unpromising, some of them being apparently quite devoid of Entomostraca, and others partly filled up with a compact muddy deposit which seemed quite unfit for investigation. Yet, by a very careful microscopical examination of all the tubes, I have succeeded in bringing to light a considerable number of different forms, both of Copepoda and Ostracoda, many of them apparently new to science. Some of the latter are of a quite particular interest, and will necessitate a renewed discussion about the origin of the fauna in the lakes. At the close of this Report some general remarks on this and other questions will be given.

Owing to the great number of new and imperfectly known forms found in the samples, and which need to be described and figured, I have found it appropriate to divide my Report into two parts, the one treating of the Copepoda, the other of the Ostracoda. To these will be added a smaller paper on some larval stages of prawns, mostly found in the samples from Lake Tanganyika. The present part of the Report is wholly devoted to the Copepoda, which is by far the most richly represented group of Crustacea in the lakes.

#### SYSTEMATIC NOTES AND DESCRIPTIONS OF NEW OR IMPERFECTLY KNOWN SPECIES.

The Copepoda found in the samples belong to the three leading divisions: Calanoida, Harpacticoida, and Cyclopoida. The first-named division, as is well known, contains forms which, as a rule, lead an errant or sub-pelagic life, and of course will chiefly characterise the surface-plankton of the lakes. On the other hand, the forms belonging to the second division are exclusively bottom-dwellers. The third division contains both planktonic and true bottom-forms.

### I. CALANOIDA.

Of this division five species have been found in the collection, all of which belong to a single genus

#### Genus DIAPTOMUS Westwood.

Of this genus, as is well known, a very great number of species have been described, chiefly distributed in the lakes of the northern hemisphere. South of the equator the genus *Boeckella* seems to replace *Diaptomus*, only a very limited number of species of the latter genus having hitherto been recorded, viz., 2 from Victoria Nyanza, 2 from the Cape Colony, 2 from Australia, and 6 from South America. Of the five species here recorded, two have been previously, though rather imperfectly, described, whereas the other three species are new to science. I give below short diagnoses of all the five species, and on the accompanying plates carefully-drawn habitus- and detail-figures of each.

#### 1. DIAPTOMUS GALEBOIDES, nom. nov. (Plate VI. figs. 1-8.)

Syn.: *Diaptomus galebi* Mrázek (not Barrois).

*Specific Characters.*—FEMALE. Body (figs. 1 & 2) moderately slender, with the anterior division oblong in form, slightly narrowed both in front and behind, the greatest width occurring anterior to the middle. Last segment of metasome not defined from the preceding one, except by a very slight notch on each side, lateral corners scarcely at all projecting, nearly rectangular, with a very small and delicate mucro at the tip (see figs. 3 & 4); inner part rounded off, without any mucro. Urosome (fig. 3) almost quite symmetrical, with the genital segment only very slightly dilated in front, and carrying on each side an extremely small and delicate, hair-like point. Last two segments imperfectly defined, and combined about half the length of the genital segment. Caudal rami comparatively short, with the marginal setæ of quite normal appearance. Anterior antennæ slender and elongated, when reflexed exceeding the body by the last 2 or 3 joints (see fig. 2). Last pair of legs (fig. 5) with the inner ramus quite short, not attaining half the length of the proximal joint of the outer; claw of the latter ramus of moderate size and finely ciliated inside; terminal joint only faintly defined at the base; inner apical seta extending beyond the tip of the claw. Ovisac (see fig. 1) comparatively small, and containing, as a rule, only four ova arranged regularly in pairs.

MALE (fig. 6) somewhat smaller than female and of more slender form. Last segment of metasome with the lateral corners simple, scarcely produced behind. Urosome narrow cylindrical in form, 5-articulate. Right anterior antenna with the projection of the antepenultimate joint (see fig. 7) very small, not nearly attaining half the length of the penultimate joint, and scarcely at all curved at the tip; last joint without any hook at the end. Last pair of legs (fig. 8) somewhat resembling in structure those

in *D. galebi*, though, on a closer comparison, differing in some particulars. Right leg with the 2nd basal joint produced at the end, on the posterior face, to a short, somewhat falciform incurved lamella, inner edge perfectly smooth; proximal joint of outer ramus terminating outside in an obtuse corner; distal joint pyriform in shape, with a very delicate scale-like projection on the posterior face, about in the middle between the apical claw and the lateral spine, the latter attached much nearer to the base than to the end of the joint; apical claw much curved and finely denticulated inside for some part of its length. Left leg with the outer ramus distinctly biarticulate and terminating in a well defined digit accompanied by a small ciliated bristle; inner edge divided into two rounded and finely ciliated lobules.

Length of adult female 1.30 mm.

*Remarks.*—This form has been identified by Dr. Mrázek with the Egyptian species, *D. galebi* Barrois, apparently owing to a certain similarity in the structure of the last pair of legs in the two sexes. I find, however, that the present form differs in so many other points from the above-named species, as more fully described by Dr. Richard\*, that I have felt justified in regarding it as specifically distinct, though nearly related to *D. galebi*. The specific name here proposed alludes to this near relationship of the two species.

*Occurrence.*—This form occurred in great abundance in a sample taken 25/4/05 off the island Bukoba, western shore of Victoria Nyanza. The same species has also been recorded previously by Dr. Mrázek and Dr. von Daday from other localities, and seems indeed to be one of the most characteristic plankton-forms of that lake. Together with the usual form, there also occurred in the same sample a much smaller variety of somewhat more slender body and with the anterior antennæ more elongated, but otherwise agreeing in all structural details exactly with the larger form.

## 2. DIAPTOMUS MIXTUS, sp. n. (Plate VII. figs. 9–17.)

*Specific Characters.*—FEMALE. Body (figs. 9 & 10) comparatively more slender than in the preceding species, with the anterior division narrow oblong in form and having its greatest width about in the middle. Last segment of metasome, as in *D. galeboides*, confluent with the preceding one, but having the lateral corners distinctly projecting, each armed with two well-defined, sharply-pointed mucros (see fig. 11), the one issuing somewhat more dorsally. Urosome conspicuously asymmetrical, its terminal part being more or less turned to left side; genital segment (fig. 11) gradually widening in front, and armed on each side with a small, though distinct mucro; last two segments confluent, and combined not attaining half the length of the genital segment. Caudal setæ normal. Anterior antennæ very slender

\* Revue biologique du nord de la France, tome v. 1892–93.

and elongated, when reflexed exceeding the body by the last three joints. Last pair of legs (fig. 12) rather short and stout; inner ramus about half the length of the proximal joint of the outer; claw of the latter ramus smooth inside; terminal joint very small, with the inner apical seta not extended beyond the tip of the claw.

MALE (fig. 13) with the lateral corners of last segment of metasome produced backwards and each tipped with a well defined mucro, the right one more prominent than left. Urosome very slender and more or less turned to right side. Right anterior antenna (fig. 14) with the middle section rather dilated; terminal section, as usual, composed of four joints, the antepenultimate one produced at the end anteriorly to a rather strong hook-like projection (fig. 15) considerably exceeding half the length of the penultimate joint. Last pair of legs (fig. 16) rather strongly built; right leg with the 2nd basal joint produced at the end, on the posterior face, to a short and broad, securiform plate projecting into three angular corners (fig. 17); inner ramus extremely small and rudimentary; outer ramus with the proximal joint short and obtusely produced outside; distal joint very large, oblong, pyriform in shape, and so attached that it forms nearly a right angle with the axis of the leg; scale-like projection of posterior face occurring just inside the lateral spine, the latter rather slender and attached close to the base; apical claw strong and much curved. Left leg of a similar structure to that in *D. galeboides*.

Length of adult female 1.55 mm.

*Remarks.*—In the general appearance, the distinctly developed mucros on the last segment of the metasome, and the conspicuously asymmetrical urosome, this form much more resembles *D. galebi* than does the preceding species. Yet it is quite certainly distinct from both these species, as proved by the rather different structure of the last pair of legs, especially in the male. The somewhat mixed characters of this species have given rise to the specific name here proposed.

*Occurrence.*—A single adult female and some few male specimens of this form were picked up from a sample taken 13/6/04 in Anchorage Bay, southern end of Lake Nyasa. The sample contained a considerable quantity of a dark muddy deposit, and thus has apparently been taken from very shallow water. A few not fully adult specimens of the same species occurred also in another sample taken 11/6/04 in that bay.

## 3. DIAPTOMUS STUHLMANNI Mrázek. (Plate VIII. figs. 18–24.)

*Diaptomus stuhlmanni* Mrázek, Die Copepoden Ost-Afrikas, p. 7, pl. iii. figs. 1–3, 6, 7.

*Specific Characters.*—FEMALE. Body (figs. 18 & 19) comparatively short and stout, with the anterior division somewhat dilated in front, the greatest width occurring across the cephalic segment. Last segment of metasome, as in the two preceding

species, confluent with the preceding one; lateral corners rather projecting, and each terminating in a strong mucro pointing outwards (fig. 20). Urosome comparatively short and perfectly symmetrical; genital segment nearly of equal width throughout and without any distinct lateral mucros; last two segments confluent, and combined not nearly attaining half the length of the genital segment. Caudal rami and setæ normal. Anterior antennæ, when reflexed, scarcely extending beyond the tip of the caudal rami. Last pair of legs (fig. 21) with the inner ramus more produced than in the two preceding species, considerably exceeding half the length of the proximal joint of the outer, and tipped with two slender setæ; claw of outer ramus of moderate size and quite smooth; terminal joint imperfectly defined at the base, inner apical seta extending to the tip of the claw. Ovisac comparatively small, with a somewhat varying number of ova (from two to eight).

MALE with the antepenultimate joint of right anterior antenna produced at the end to a slender mucroniform process nearly as long as the penultimate joint (fig. 22). Last pair of legs (fig. 23) with the squamiform expansions of 1st basal joint simple, not spiniferous; 2nd basal joint of right leg without any projection at the end; proximal joint of outer ramus terminating outside in an obtuse corner; distal joint oblong oval in form, with a small scale-like projection on the posterior face just inside the lateral spine, the latter of moderate size and attached about in the middle of the outer edge; apical claw about twice the length of the distal joint and somewhat curved in the middle. Left leg with the outer ramus unarticulate and somewhat spoon-shaped, terminating in a small digit accompanied by a short ciliated bristle; inner edge evenly curved and finely denticulated; anterior face with a small ciliated lobule not projecting beyond the inner edge (fig. 24).

Length of adult female 1.12 mm.

*Remarks.*—This form has been described, though rather imperfectly, under the above name by Dr. Mrázek in the above quoted paper. It is nearly allied to the two preceding species, but evidently specifically distinct, being especially distinguished by the short and stout form of the body, the projecting lateral corners of the last segment of the metasome, and the structure of the last pair of legs in both sexes.

*Occurrence.*—This form occurred rather plentifully together with *D. galebooides* in the above-mentioned sample from Victoria Nyanza. It was also found in another sample from the same lake, taken 20/4/05 in about the same region. Dr. Mrázek records it also from the island Djume.

#### 4. DIAPTOMUS SIMPLEX, sp. n. (Plate VIII. figs. 25–32.)

*Specific Characters.*—FEMALE. Body (figs. 25 & 26) rather short, with the anterior division regularly oblong-oval in form, gradually narrowed both in front and behind. Last segment of metasome

(see fig. 27) wholly coalesced with the preceding one, and having the lateral parts quite simple, not expanded laterally, each with a very delicate hair-like point on the outer edge (fig. 28). Urosome (fig. 27) rather slender and narrow, and perfectly symmetrical; genital segment slightly widening in front and without any lateral mucros; the last two segments confluent, and combined fully half the length of the genital segment. Caudal rami somewhat more produced than in the three preceding species; marginal setæ normal. Anterior antennæ slender and elongated, when reflexed exceeding the body by the last two joints (see figs. 25 & 26). Last pair of legs (fig. 29) comparatively large; inner ramus somewhat exceeding half the length of the proximal joint of the outer and finely ciliated on the tip; claw of this ramus comparatively short and thick; terminal joint extremely minute, nodiform, with the inner apical seta not extended to the tip of the claw. Ovisac rather large, broadly rounded in form, and containing a greater number of ova than in any of the preceding species.

MALE with the antepenultimate joint of right anterior antenna (fig. 30) produced at the end to a slender spiniform process slightly curved at the tip, and fully as long as the penultimate joint. Last pair of legs (fig. 31) with the squamiform expansions of 1st basal joint, as in *D. stuhlmanni*, simple, not spiniferous; 2nd basal joint of right leg without any projection at the end; proximal joint of outer ramus terminating outside in an obtuse corner; distal joint broadly oval in form and without any scale-like projection of the posterior face; lateral spine comparatively short and attached much nearer to the end than the base of the joint; apical claw of moderate size and only slightly curved. Left leg with the outer ramus pronouncedly spoon-shaped and unarticulate, inner edge evenly curved and minutely spinulose; terminal digit very small and partly concealed, accompanying bristle likewise small; anterior face of the ramus provided with a small linguiform lamella, finely ciliated at the edge (see fig. 32).

Length of adult female 1.10 mm.

*Remarks.*—This is a rather small species, and is prominently distinguished not only from the four preceding species, but also from most other known Diaptomi, by the simple, not expanded lateral parts of the last segment of metasome in the female; hence the specific name here proposed.

*Occurrence.*—This form occurred rather abundantly in two of the samples from Tanganyika, the one taken 18/11/04 off Kala, eastern shore of the lake, the other 1/3/05 off Kaboge, north-western shore. It was also found occasionally in some other samples, and seems indeed to be one of the most characteristic plankton-forms of that lake.

#### 5. DIAPTOMUS CUNNINGTONI, sp. n. (Plate IX. figs. 33–42.)

*Specific Characters.*—FEMALE. Body (figs. 33 & 34) comparatively short and stout, with the anterior division somewhat

dilated in its anterior part and but slightly narrowed behind. Last segment of metasome (see fig. 35) confluent with the preceding one, and having the lateral parts conspicuously expanded, each terminating in an acutely produced corner pointing outwards, their posterior edge being boldly rounded off and without any mucro (figs. 36 & 37); left expansion a little larger than right. Urosome (fig. 35) comparatively short, with the genital segment slightly asymmetrical and almost of uniform width throughout; last two segments confluent, and combined not attaining half the length of the genital segment. Caudal rami short, with the marginal setæ normal. Anterior antennæ (see figs. 33 & 34) remarkably short, when reflexed scarcely extending beyond the middle of the genital segment. Last pair of legs (fig. 38) with the inner ramus rather produced, extending almost to the end of the proximal joint of the outer, and tipped with two slender setæ; claw of the latter ramus comparatively short and smooth inside; terminal joint very small and imperfectly defined at the base, its inner apical seta not extending as far as the claw.

**MALE** (fig. 39) with the lateral corners of the last segment of metasome produced backwards, that on right side the more prominent, each tipped with a delicate, hair-like mucro. Antepenultimate joint of right anterior antenna (fig. 40) produced at the end to a strong spiniform process extending to the end of the succeeding joint. Last pair of legs (fig. 41) with the squamiform expansions of 1st basal joint each tipped with a slender hair-like spine; right leg with the 2nd basal joint simple, without any projection at the end; proximal joint of outer ramus produced at the outer corner to an acute spiniform process; distal joint oval in form and provided on the posterior face, somewhat in front of the middle, with a slightly curved spiniform projection; lateral spine comparatively short and attached near the end of the joint; apical claw rather strong, and abruptly curved in the middle. Left leg with the outer ramus pronouncedly spoon-shaped and unarticulate; inner edge evenly curved and fringed with short hairs; apical digit very short and obtuse at the tip; anterior face of the ramus hollowed and provided with a delicate ciliated lappet not projecting beyond the inner edge (fig. 42).

Length of adult female 1.25 mm.

*Remarks.*—This form is at once distinguished from the other four species here described by the shortness of the anterior antennæ. Moreover, several well-marked differences are found in the other structural details, as pointed out in the above diagnosis. I have much pleasure in naming this distinct species in honour of the distinguished conductor of the Expedition.

*Occurrence.*—This species is peculiar to Lake Nyasa. I have found it very abundantly in three of the samples from that lake, one of them being taken 17/6/04 in Monkey Bay, the other two off Karonga, north end of the lake.

## II. HARPACTICOIDA.

The forms of this division found in the collection belong to two distinct genera, both of which have hitherto been regarded as strictly marine. Each of these genera belongs to a separate family, the one to the Diosaccidæ, the other to the Cletodidæ, both families represented in the sea by numerous genera and species.

### Family DIOSACCIDÆ.

One of the most prominent characters of this family, as indicated by the name, is the presence in the female of two ventral ovisacs, a feature very seldom met with in the Harpacticoida, and not found in any of the hitherto described fresh-water forms, which, like the great majority of marine forms, have only a single ovisac. Indeed, this character was formerly regarded as peculiar to the whole division, in contradistinction to the Cyclopoida, where constantly two ovisacs are present in the female. The present family comprises as yet about five distinct genera.

### Genus SCHIZOPERA G. O. Sars.

*Generic Characters.*—Body more or less slender, cylindric in form, with no sharp demarcation between the anterior and posterior divisions. Cephalic segment of moderate size and provided in front with a well-developed rostrum, distinctly defined at the base, and generally of narrow lanceolate form. Epimeral plates of the three succeeding segments rounded. Last pedigerous segment without true epimeral plates. Urosome scarcely narrower than the anterior division; genital segment in female imperfectly divided in the middle. Caudal rami more or less produced, generally somewhat lamellar, each with a strong spine outside accompanied by a slender seta, and with another delicate seta arising from the upper face; tip truncated and carrying three setæ, the innermost extremely small, the outermost much shorter than the middle one, which generally is very strongly developed. Anterior antennæ in female comparatively short, 8-articulate; 4th joint somewhat produced at the end and carrying a slender band-like sensory appendage, terminal part consisting of four joints, the last much the longest; those in male hinged in the usual manner. Posterior antennæ comparatively short and stout, geniculate; outer ramus small, biarticulate. Mandibles with the palp well developed, biramous. Maxilla and maxillipeds of usual structure. First pair of legs more or less distinctly prehensile; outer ramus 3-articulate, and generally shorter than the inner; the latter somewhat varying in structure in the different species, consisting of three or only two joints, the first of which is the largest and provided inside at some distance from the end with a strong ciliated seta. Natatory legs, as a rule, very slender, with both rami 3-articulate and provided inside with a very limited number of spiniform setæ; inner ramus of 2nd pair of

legs in male transformed, carrying near the tip outside a strong spiniform appendage. Last pair of legs comparatively small, distal joint with generally six very unequal and partly spiniform marginal setae, inner expansion of proximal joint rather short and provided with four spiniform setae; these legs in male, as usual, still smaller and with the number of setae reduced. Ovisacs in female narrow and closely juxtaposed, each containing a very limited number of ova, in some cases arranged in a single row.

*Remarks.*—This genus was established by the present author in the year 1905\*, to comprise a species, *S. longicauda* G. O. Sars, found in a brackish lagoon on the Chatham Islands. It was, however, subsequently† withdrawn, as I found it somewhat difficult to distinguish it exactly from the much diversified genus *Amphiascus* G. O. Sars. Having, however, now become acquainted with a number of new species agreeing with that originally observed in the more essential characters, I am disposed to restore the present genus, which seems to form a quite natural group. None of the Norwegian species of *Amphiascus* can properly be referred to it. On the other hand, a well-marked species occurs in the Caspian Sea, and another species I have recently found in a sample from the brackish lake, Birket el Qurun, in Egypt. In the present collection I have determined no less than eight different species, to be described below.

#### 6. SCHIZOPERA INOPINATA, sp. n. (Plate X. figs. 43–58.)

*Specific Characters.*—FEMALE. Body (figs. 43 & 44) moderately slender and of the usual subcylindric form, with the anterior division longer than the posterior. Rostrum (see fig. 45) rather prominent, narrow lanceolate in form, and somewhat curved at the tip. Last caudal segment (see fig. 55) shorter than the preceding one, and having the anal opercle very small and perfectly smooth. Caudal rami about the length of that segment and rather divergent, being gradually narrowed distally, inner edge straight and very finely ciliated; spine of outer edge attached about in the middle, dorsal seta somewhat nearer the tip, the latter narrowly truncated and armed above the insertion of the apical setae with a transverse row of four small denticles. Anterior antennae (see fig. 45) comparatively slender, though not nearly attaining the length of the cephalic segment. Posterior antennae (fig. 46) remarkably short and stout, with the outer ramus (fig. 47) very narrow. Oral parts (figs. 48 & 49) of the structure characteristic of the genus. First pair of legs (fig. 50) with the outer ramus about the length of the 1st joint of the inner, and having the last joint considerably longer than the other two; inner ramus distinctly 3-articulate, with the last two joints incurved and combined scarcely attaining half the length of the 1st; last joint armed at the tip with a slender claw-like spine and two unequal

\* Zool. Jahrbücher, Bd. xxi. Heft 4, p. 383.

† Account of the Crustacea of Norway, vol. v. p. 148.

setae. Natatory legs (figs. 51–53) with no seta inside the 1st joint of the rami. Last pair of legs (fig. 54) with the distal joint oval quadrangular in form, proximal seta of outer edge rather strong and spiniform, innermost seta but one likewise strongly developed; inner expansion of proximal joint somewhat narrowed and extending to about the middle of the distal joint. Ovisacs narrow oblong, with the ova partly arranged in a single row.

MALE with the anterior antennae (fig. 56) distinctly hinged. Inner ramus of 2nd pair of legs (fig. 57) transformed in the usual manner. Last pair of legs (fig. 58) very small, with only four setae on the distal joint and two setae on the end of the inner expansion of proximal joint.

Length of adult female 0.45 mm.

*Remarks.*—This was the first species which came to my sight, and I have therefore given to it the above specific name. From the typical species, *S. longicauda*, it is easily distinguished by the comparatively shorter urosome and the somewhat different shape of the caudal rami. Moreover, there are some differences to be found in the structure of the legs. The present species is also rather inferior in size.

*Occurrence.*—This form was found occasionally in two of the samples from Tanganyika, the one taken 28/9/04 at Mbete, south end of the lake, the other, 13/10/04, at Sumbu, south-western border.

#### 7. SCHIZOPERA VALIDIOR, sp. n. (Plate XI. figs. 59–63.)

*Specific Characters.*—FEMALE. Body (fig. 59) on the whole more strongly built than in the preceding species, with the integuments of coarser consistency. Rostrum somewhat less produced, but of a similar narrow lanceolate form. Caudal rami (fig. 63) rather large and broad, pronouncedly lamellar, and of oval form, less divergent than in *S. inopinata*; inner edge distinctly curved and densely hairy, spine of outer edge somewhat shorter than in that species, and attached much nearer to the end than to the base of the ramus; dorsal seta, on the other hand, issuing rather in front of the middle; end of the ramus without any denticles above. Anterior antennae (fig. 61) of a similar structure to that in *S. inopinata*, though perhaps a little shorter. Posterior antennae less robust. First pair of legs (fig. 61) with the outer ramus about as in the last-mentioned species, inner ramus distinctly 3-articulate; 1st joint not fully as long as the outer ramus, the last two joints comparatively more elongated than in *S. inopinata*, and combined considerably exceeding half the length of the 1st; last joint, as in that species, armed on the tip with a slender claw-like spine and two unequal setae. Natatory legs with a well-developed seta inside the 1st joint of the inner ramus in the two posterior pairs. Last pair of legs (fig. 62) with the distal joint of a more regular oval form than in *S. inopinata* and somewhat conically produced at the tip; proximal seta of outer edge very long and abruptly deflexed; innermost seta but

one likewise more elongated than in that species; inner expansion of proximal joint comparatively larger, extending somewhat beyond the middle of the distal joint. Ovisacs (see fig. 59) broader than in that species, and containing a greater number of ova arranged in a double row.

Length of adult female 0.49 mm.

*Remarks.*—This form is closely allied to *S. inopinata*, but of somewhat larger size and more robust form of body. It also differs somewhat in the shape of the caudal rami and in the structure of the legs, as indicated in the above diagnosis.

*Occurrence.*—Only a single female specimen of this form has come to my notice. It was found in one of the two samples in which the preceding species occurred, viz., that from Sumbu.

#### 8. SCHIZOPERA CONSIMILIS, sp. n. (Plate XI. figs. 64–67.)

*Specific Characters.*—FEMALE. Body (fig. 64) considerably more slender than in the two preceding species, and somewhat attenuated behind. Rostrum about as in *S. validior*. Urosome almost attaining the length of the anterior division, last segment somewhat shorter and narrower than the preceding one and having the anal aperture smooth. Caudal rami (fig. 67) considerably produced, exceeding in length the anal segment, and rather divergent, being nearly of uniform width throughout, inner edge straight and finely ciliated, spine of outer edge attached much nearer to the end than to the base of the ramus; dorsal seta likewise issuing somewhat behind the middle; tip transversely truncated and armed above the insertion of the apical setae with a transverse row of about seven small denticles. Antennae about as in *S. validior*. First pair of legs (fig. 65) comparatively shorter and stouter; outer ramus with the last joint shorter than the other two; inner ramus distinctly 3-articulate, with the 1st joint a little longer than the outer ramus, last two joints comparatively short, and combined scarcely attaining one-third of the length of the 1st; last joint, as in the two preceding species, armed with a slender claw-like spine and two unequal setae. Natatory legs of a similar structure to those in *S. validior*. Last pair of legs (fig. 66) with the distal joint comparatively small, rounded oval in form; marginal setae about as in *S. validior*; inner expansion of proximal joint rather short, not extending to the middle of the distal joint. Ovisacs oblong in form, with the ova arranged in a double row.

Length of adult female 0.51 mm.

*Remarks.*—This is perhaps the form which comes nearest to the typical species, *S. longicauda*. On a closer comparison it is, however, found to differ in some particulars, for instance in the shape of the caudal rami, and also somewhat in the structure of the legs, proving it to be in reality specifically distinct.

*Occurrence.*—Some few specimens of this form were found, partly in the same sample in which *S. validior* occurred, partly in another sample from Tanganyika, taken 29/10/04 in Vua

Harbour, western shore of the lake. Finally a single female specimen was found in the above-mentioned sample from Victoria Nyanza.

#### 9. SCHIZOPERA UNGULATA, sp. n. (Plate XI. figs. 68–71.)

*Specific Characters.*—FEMALE. Body (fig. 68) rather slender, sublinear in form or very slightly attenuated behind. Rostrum long and prominent. Last caudal segment a little shorter than the preceding one, but scarcely narrower; anal opercle very small and perfectly smooth. Caudal rami (fig. 71) rather large and broad, conspicuously lamellar and somewhat divergent; inner edge curved and densely hairy; spine of outer edge attached nearer to the end than to the base of the ramus; dorsal seta originating about in the middle; end narrowly truncated and without any denticles above. Anterior antennae rather slender, but of usual structure. First pair of legs (fig. 69) with the outer ramus comparatively short and stout, having the last joint longer than the others; inner ramus strongly built, but only composed of two joints, the 1st considerably longer than the outer ramus and slightly curved, the 2nd quite short and abruptly incurved, carrying on the tip a strong claw and a comparatively short seta, accompanied by a small hair-like bristle. Natatory legs rather strongly built, but scarcely differing in their structure from those in the two preceding species. Last pair of legs (fig. 70) with all the marginal setae, except that issuing from the tip of the distal joint, remarkably strong and spiniform, being also much shorter than in the three preceding species; inner expansion of proximal joint extending almost to the tip of the distal joint.

Length of adult female 0.50 mm.

*Remarks.*—This species is chiefly distinguished from the preceding ones by the rather different structure of the 1st pair of legs, the inner ramus of which is composed of only two joints and is more prominently prehensile than in those species. It also differs somewhat in the shape of the caudal rami and the structure of the last pair of legs.

*Occurrence.*—Only a single specimen of this form, a female with well developed ovaria, but without ovisacs, has come to my notice. It was found in the same sample in which *S. validior* occurred.

#### 10. SCHIZOPERA MINUTICORNIS, sp. n. (Plate XII. figs. 72–77.)

*Specific Characters.*—FEMALE. Body (fig. 72) very slender and narrow, sublinear in form, with the posterior division fully as long as the anterior. Rostrum (see fig. 73) acutely produced. Last caudal segment a little shorter and narrower than the preceding one; anal opercle very small and quite smooth. Caudal rami (fig. 77) pronouncedly lamellar and of oval form, being only slightly divergent; inner edge evenly curved and very finely ciliated, spine of outer edge not very strong and attached at a



short distance from the end of the ramus; dorsal seta issuing about in the middle, apical setæ comparatively short. Anterior antennæ (see fig. 73) unusually small, though composed of the normal number of joints. First pair of legs (fig. 74) with the outer ramus of normal structure; inner ramus almost twice as long, but composed of only two joints of about equal length, the distal one linear in form and scarcely at all incurved, carrying on the tip a slender claw-like spine and a single still more slender seta. Natatory legs (fig. 75) with the seta at the inner corner of the terminal joint of outer ramus very small and rudimentary; 1st joint of inner ramus in 2nd pair of legs without any seta inside. Last pair of legs (fig. 76) with the distal joint comparatively short, rounded oval in form, marginal setæ of the usual appearance; inner expansion of proximal joint extending about as far as the distal joint.

Length of adult female 0.46 mm.

*Remarks.*—This species is at once distinguished by the unusually small anterior antennæ, a character which has given rise to the specific name here proposed. It also can be distinguished by the anomalous structure of the 1st pair of legs.

*Occurrence.*—Of this form also only a solitary specimen has come to my notice, a fully grown female with well-developed ovaria, but without ovisacs. It was found in the same sample as the preceding species.

11. SCHIZOPERA SPINULOSA, sp. n. (Plate XII. figs. 78-81.)

*Specific Characters.*—FEMALE. Body (fig. 78) not particularly slender, with the posterior division much shorter than the anterior and slightly tapering behind. Rostrum of the usual shape. Last caudal segment somewhat shorter than the preceding one, and exhibiting above, on each side of the anal area, an oblique row of about five small spinules; anal opercle perfectly smooth. Caudal rami (fig. 81) broadly oval in form and pronouncedly lamellar; inner edge evenly curved and armed with a row of slender spinules continued across the end of the ramus above the insertion of the apical setæ; spine of outer edge rather strong and attached at a short distance from the end; dorsal seta issuing at about the middle. Anterior antennæ comparatively slender and of quite normal structure. First pair of legs (fig. 79) somewhat resembling in structure those in *S. unguolata*, the inner ramus being composed of only two very unequal joints; the 1st long and slender, considerably exceeding in length the outer ramus; the 2nd quite short and armed on the tip with a strong claw and a comparatively short seta accompanied by a small hair. Natatory legs about as in the four preceding species. Last pair of legs (fig. 80) resembling in shape those in *S. minuticornis*, though wanting one of the small marginal spines on the distal joint.

Length of adult female 0.43 mm.

*Remarks.*—The peculiar armature of the anal segment and of the caudal rami will suffice for distinguishing at once this species from any of the preceding, and it is from this character that the specific name here proposed is derived. In the structure of the 1st pair of legs it differs conspicuously from the type.

*Occurrence.*—A single female specimen of this form was found in the above-mentioned sample taken in Tanganyika at Mbete.

12. SCHIZOPERA FIMBRIATA, sp. n. (Plate XII. figs. 82-86.)

*Specific Characters.*—FEMALE. Body (fig. 82) moderately slender and slightly attenuated behind. Rostrum well defined and of the usual narrow lanceolate form. Last caudal segment fully as long as the preceding one, and, as in *S. spinulosa*, armed above on each side of the anal area with an oblique row of small spinules; anal opercle well developed, semilunar, and fringed with a regular row of about 16 similar spinules. Caudal rami (fig. 86) considerably shorter than the anal segment and of oval form; inner edge somewhat curved at the base; spine of outer edge short and thick, curved outwards, and attached somewhat nearer to the end than to the base; dorsal seta likewise issuing behind the middle; upper face of each ramus armed with three transverse rows of extremely fine spinules, the 1st crossing the base, the 2nd extending from the inner edge to the dorsal seta, the 3rd occurring just above the insertion of the apical setæ. Anterior antennæ comparatively short, but composed of the normal number of joints. First pair of legs (fig. 83) with both rami comparatively short, last joint of outer ramus not attaining the length of the middle one; inner ramus composed of only two joints, the 1st about the length of the outer ramus, the 2nd scarcely more than one-third as long and armed on the tip with a claw-like spine and a slender seta accompanied by a small hair-like bristle. Natatory legs (fig. 84) with unusually short rami, but otherwise of normal structure. Last pair of legs (fig. 85) likewise shorter than usual; distal joint scarcely longer than it is broad, and, as in *S. spinulosa*, only provided with five marginal setæ; inner expansion of proximal joint extending about as far as the distal joint.

Length of the specimen examined 0.44 mm.

*Remarks.*—The most characteristic feature of this species is undoubtedly the structure of the anal opercle, which, as in the species of the genus *Nitocra*, is fringed with a regular row of spinules, and it is indeed from this character that the specific name here proposed is derived. Moreover, the peculiar shape of the outer spine of the caudal rami is rather characteristic and affords another easily observable specific mark.

*Occurrence.*—A single, apparently not yet fully grown female specimen of this form was found in a sample from Lake Nyasa, taken 13/6/04 in Anchorage Bay, south end of the lake.

## 13. SCHIZOPERA SCALARIS, sp. n. (Plate XIII. figs. 87-92.)

*Specific Characters.*—MALE. Body (fig. 87) slender and elongated, with rather coarse integuments and, all the segments very sharply marked off from each other, giving it a scalariform appearance. Rostrum well defined at the base, but of a somewhat unusual form, being very broad, lamellar, and terminating in an obtuse point. Segments of the anterior division each with a small nodiform prominence laterally. Last caudal segment shorter and narrower than the preceding one and without any spinules dorsally; anal opercle perfectly smooth. Caudal rami (fig. 92) much produced and very narrow, sublinear in form; inner edge straight and quite smooth; spine of outer edge moderately strong and attached at a short distance from the end; dorsal seta likewise issuing far behind the middle; median apical seta very strong and elongated. Anterior antennæ (fig. 88) of moderate size, and hinged in the usual manner. First pair of legs (fig. 89) with a highly chitinized, obtusely pointed projection issuing from the inner corner of the 2nd basal joint, in addition to the usual spine; outer ramus of quite normal structure; inner ramus distinctly prehensile, 3-articulate, 1st joint long and slender, considerably exceeding in length the outer ramus, the other two joints quite short and somewhat imperfectly separated; last joint armed at the tip with a strong curved claw and a slender seta accompanied by a small hair-like bristle. Natatory legs well developed and of the structure characteristic of the genus; inner ramus of 2nd pair of legs (fig. 90) transformed in the usual manner. Last pair of legs (fig. 91) with the distal joint comparatively small and somewhat fusiform in shape, with only five very unequal marginal setæ; inner expansion of proximal joint short and truncated at the tip, which carries two thickish juxtaposed setæ ciliated in their outer part.

Length of the specimen examined 0.49 mm.

*Remarks.*—In its external appearance this form looks very different from the other species, and by its pronouncedly scalariform body, the broad rostral plate, and the slender and narrow caudal rami, it much more resembles some species of the genera *Laophonte* and *Cletodes*. The anatomical examination has, however, proved it to be a genuine member of the present genus.

*Occurrence.*—The above-described male specimen, the only one that has come to my notice, was found in a sample from Tanganyika, taken 24/2/05 at Baraka, north-western shore of the lake.

## Family CLETODIDÆ.

This family is chiefly distinguished from the *Laophontidæ*, to which it bears some resemblance, by the non-prehensile 1st pair of legs. The type of the family is the genus *Cletodes* Brady, to which in recent times several other genera have been added, all from the sea.

## Genus ILYOPHILUS Lilljeborg.

*Generic Characters.*—Body more or less cylindrical in form, with rather thin and flexible integuments and the segments sharply marked off from each other. Cephalic segment large, and projecting in front to a rounded rostral plate not defined at the base. Urosome attenuated behind, with the genital segment distinctly divided in the middle. Caudal rami more or less produced, not lamellar, with one of the apical setæ very strong, spiniform. Anterior antennæ in female composed of only five joints, thickly clothed with partly spiniform setæ; those in male distinctly hinged. Posterior antennæ rather strong, with the distal joint armed with coarse claw-like spines; outer ramus small, unarticulate. Mandibular palp likewise unarticulate. Maxillæ and maxillipeds comparatively short and stout. First pair of legs only slightly differing from the succeeding ones, and not prehensile; inner ramus in this and the two succeeding pairs biarticulate and much smaller than the outer, that of the 4th pair quite rudimentary, unarticulate; 3rd pair of legs in male slightly transformed. Last pair of legs comparatively small, with the distal joint well defined or confluent with the proximal one; inner expansion of the latter broad, but not projecting. A single ovisac present in female.

*Remarks.*—This genus was established in the year 1902 by Prof. Lilljeborg, to comprise a small Harpacticoid, *I. flexibilis* Lilljeborg, found by him off the shores of the Baltic in the neighbourhood of Stockholm. I have myself met with the same species near Christiania, in shallow bays of the Fjord, and thus have had an opportunity of examining it more closely. Prof. Lilljeborg refers this genus to the subfamily Nannopodinae of Brady, which, according to that author, comprises the two genera *Nannopus* and *Platychelipus*. The first of these genera is still very imperfectly known, but is apparently referable to the family Cletodidæ. The second genus, in my opinion, is very different, and ought to be referred to the family Laophontidæ. In any case, the present genus seems to me to be a genuine Cletodid, exhibiting, as it does, all the essential characters of that family.

## 14. ILYOPHILUS PERPLEXUS, sp. n. (Plate XIII. figs. 93-104.)

*Specific Characters.*—FEMALE. Body (figs. 93 & 94) rather short and stout, more or less curved, and gradually attenuated from before backwards, with no sharp demarcation between the anterior and posterior divisions. All the segments of the body sharply defined, and having the hind edge somewhat raised but quite smooth. Cephalic segment very large and broad, with a slight dorsal depression about in the middle, and with the lateral parts boldly curved anteriorly. Rostral projection evenly rounded at the tip and densely clothed with fine hairs (see fig. 95). The four succeeding segments comparatively short and obtusely produced laterally. Urosome almost as long as the anterior division;

genital segment very distinctly divided in the middle; last segment fully as long as the preceding one and slightly widening at the end; anal opercle small, but somewhat prominent, and perfectly smooth. Caudal rami about twice as long as they are broad, sub-linear in form and slightly diverging, each carrying on the tip a strong spiniform seta tipped with a slender bristle and accompanied on each side by a very small hair-like bristle; seta of outer edge likewise small, hair-like, and attached about in the middle; dorsal seta issuing somewhat nearer to the end. Anterior antennæ (fig. 95) rather strong and curved, with the 1st joint very thick, though scarcely longer than the 2nd; 3rd joint carrying at the end anteriorly the usual sensory filament, which is rather small; the last two joints, forming together the terminal part, very unequal, the 1st quite short, the 2nd somewhat lamellar and armed with two strong spines and several thin flexible setæ. Posterior antennæ (fig. 96) with five strong claw-like spines on the distal joint, increasing in length distally; outer ramus very small and only provided with three setæ at the tip. Mandibular palp (fig. 97) likewise smaller than in the typical species. Maxillæ (fig. 98) and anterior maxillipeds (fig. 99) of about the same appearance as in that species. Posterior maxillipeds (fig. 100), however, comparatively less powerful. 1st pair of legs (fig. 101) with the inner corner of 2nd basal joint conically produced and tipped with a strong spine; terminal joint of outer ramus armed with three slender spines and a single seta issuing from the inner corner; inner ramus scarcely longer than the 1st joint of the outer. The two succeeding pairs of legs (fig. 102) only differing from the 1st in the want of a spine at the inner corner of the 2nd basal joint, and in the terminal joint of outer ramus being somewhat broader and provided with one or two additional setæ. 4th pair of legs (fig. 103) with one of these setæ shortened and spiniform; inner ramus quite rudimentary, consisting of a single small, nodiform joint tipped with a slender seta. Last pair of legs (fig. 104) rather small, with the distal and proximal joints wholly confluent, forming together a short and broad lamella produced outside to a conical process, to which a slender hair-like bristle is attached; posterior edge of the lamella irregularly indented and fringed with seven thickish, finely ciliated setæ.

Length of adult female 0.49 mm.

*Remarks.*—The above-described form unquestionably is referable to the genus *Ilyophilus*, as defined by Prof. Lilljeborg, but is quite certainly specifically distinct from the typical species *I. flexibilis*, differing, as it does, in some points very markedly. Thus the caudal rami are much more produced, and the last pair of legs are distinguished by the complete coalescence of the two joints of which these legs are originally composed. It is also rather inferior in size.

*Occurrence.*—Only a single female specimen of this remarkable form has come to my notice. It was picked up from some muddy deposit contained in a sample from Tanganyika, taken 13/10/04

at Sumbu, western shore of the lake. From the same sample also several of the above described species of the genus *Schizopera* were derived.

### III. CYCLOPOIDA.

The Cyclopoida found in the collection are referable to two particular sections of that extensive division, viz., the Gnathostomata and the Pæcilostomata. The first of these sections comprises the typical free-living Cyclopoida, in which the oral parts are normally developed. To the second section, on the other hand, are referred forms which lead a more or less parasitic life, and in which therefore the oral parts have been transformed in accordance therewith, though not to such an extent as in a third section, not represented in the collection, the Siphonostomata.

#### Sect. Gnathostomata.

#### Family CYCLOPIDÆ.

#### Genus CYCLOPS Müller.

By far the great majority of Copepod-species found in the collection belong to this extensive and widely distributed genus. No less than 20 different species have been determined, 16 of which have proved to be new to science.

The distinction of the species of this genus is in some cases determined with no small difficulty. For, whereas some of them are at once recognised, there are other species which are so closely related, that a very careful examination is needed for distinguishing the one from the other. For the discrimination of nearly allied species, much stress has generally been laid on the structure of the rudimentary last pair of legs. The examination of these diminutive appendages is, however, by no means easy, and cannot be effected without a very careful dissection of the specimens. There are several other characters, which are much more easily accessible for examination and consequently of more practical value. Among them may be mentioned the mutual relation in length of the caudal setæ. As this relation has proved to be perfectly constant in all individuals of the same species, and admits of being examined at once, without any dissection of the specimens, it affords one of the practically best characters for the distinction of nearly-related species. Especially is the mutual relation between the innermost and outermost apical seta in many cases very characteristic.

Owing to the great number of species comprised within this genus, it will probably in future be found advisable to effect a subdivision of it into several nearly allied genera. It is well known indeed that Dr. Schmeil, in his excellent account of the fresh-water Cyclopidae, has arranged the European species in several groups, and in recent times some attempts have been made

to raise these groups to distinct genera or subgenera. In the present paper I find it, however, appropriate to retain the old generic name *Cyclops* for all the species here recorded, though they are enumerated in a definite succession according to their affinity.

15. *CYCLOPS LEUCKARTI* Claus. (Plate XIV. figs. 105-107.)

*Occurrence*.—This truly cosmopolitan species was found in several of the samples from all three lakes. In some of the samples from Tanganyika it occurred in great abundance, and may, together with *Diaptomus simplex*, form a chief part of the surface-plankton of that lake. In a sample from Nyasa, taken 13/6/04 in the Anchorage Bay, a smaller variety occurred not unfrequently. For comparison with the two succeeding species, I give on the accompanying plate a figure of a typical female specimen from Victoria Nyanza, together with two detail-figures.

16. *CYCLOPS EMINI* Mrázek. (Plate XIV. figs. 108-112.)

*Cyclops emini* Mrázek, Die Copepoden Ost-Afrikas, p. 4, pl. ii. figs. 1-3, 5, 6, 8.

*Specific Characters*.—FEMALE. Body (fig. 108) rather slender, with the anterior division oblong-oval in form and slightly widening anteriorly, front narrowly truncated. Last pedigerous segment small, not produced laterally. Urosome slender and narrow, considerably exceeding half the length of the anterior division; genital segment only very slightly widening in front. Caudal rami (fig. 112) much longer than the anal segment and rather narrow, being somewhat divergent; seta of outer edge attached a little behind the middle; innermost apical seta more than twice as long as the outermost, but considerably shorter than the outer mediate one; dorsal seta unusually long and slender, extending beyond the innermost apical seta. Anterior antennæ very long and slender, almost attaining the length of the whole anterior division, and 17-articulate. Posterior antennæ (fig. 109) likewise unusually slender, with the terminal joint narrow linear in form, and the penultimate joint only provided with four anteriorly-curving setæ. Natatory legs with the rami comparatively long and slender; inner ramus of fourth pair (fig. 110) with the two apical spines very unequal, the inner one rather slender, the outer scarcely more than one-third as long, both distinctly denticulate. Last pair of legs (fig. 111) very small, distal joint narrow oblong in form, and having the lateral spine longer than the apical seta. Ovisacs comparatively small and somewhat divergent, each with a rather limited number of ova.

Length of adult female 0.79 mm.

*Remarks*.—This form has been described, though somewhat imperfectly, under the above name by Dr. Mrázek. It is closely allied to the European species, *C. oithonoides* G. O. Sars, exhibiting a very similar external appearance, though at once distinguished

by the comparatively shorter innermost caudal seta. In *C. oithonoides* this seta is about the same length as the outer mediate one, whereas in the present species it is scarcely more than two-thirds as long. The extraordinary length of the dorsal seta has also been noted by Dr. Mrázek. He has, however, not been aware of the rather striking difference from most other species in the structure of the posterior antennæ. According to its organisation, this species, like *C. leuckarti*, may be regarded as a true limnetic or planktonic form.

*Occurrence*.—I have only found this form in one of the samples, viz., that from Bukoba, Victoria Nyanza. It did not occur in any abundance. Dr. Mrázek has recorded it also from the island Djuma in the same lake.

17. *CYCLOPS NEGLECTUS*, nom. nov. (Plate XIV. figs. 113-117.)

Syn.: *Cyclops hyalinus* Richard (not Rehberg).

„ *oithonoides* Mrázek (not G. O. Sars).

*Specific Characters*.—FEMALE. Body (fig. 113) much shorter and stouter than in the preceding species, with the anterior division regularly oval in form and the front evenly rounded. Last pedigerous segment small, not produced laterally. Urosome about half the length of the anterior division, and having the genital segment slightly widening in front. Caudal rami (fig. 117) very short, scarcely exceeding in length the anal segment, and almost twice as long as they are broad; seta of outer edge attached at about the posterior third of the ramus; apical setæ comparatively short, innermost one not attaining half the length of the outer mediate seta and scarcely twice as long as the outermost; dorsal seta of moderate length. Anterior antennæ not nearly attaining the length of the anterior division of the body, and 17-articulate. Posterior antennæ (fig. 114) of normal appearance, with about nine anteriorly-curving setæ on the penultimate joint. Natatory legs with the rami less slender than in *C. emini*; inner ramus of fourth pair (fig. 115) with the apical spines very unequal in size. Last pair of legs (fig. 116) resembling those in the said species, though having the lateral spine of the distal joint comparatively shorter. Ovisacs not very large, oval in form, and only containing a limited number of ova.

Length of adult female 0.73 mm.

*Remarks*.—This form is closely allied to the European species *C. hyalinus* Rehberg, and indeed Dr. Richard, and formerly also I myself, identified it with that species. It is, however, on a closer comparison, at once distinguished by the much shorter innermost caudal seta. Whereas in *C. hyalinus* this seta is about the same length as the outer mediate one, it is in the present form scarcely more than half as long. Dr. Mrázek has identified this form with *C. oithonoides* G. O. Sars, to which species it in reality bears only a very remote resemblance.

*Occurrence.*—Of this species specimens were found in samples from all three lakes; but only in one of them, taken 13/6/04 in the Anchorage Bay, Nyasa, it occurred in any abundance.

*Distribution.*—Senegal at Rufinesque (*Richard*), Sumatra (*G. O. Sars*); ? Germany (*Richard*).

18. *CYCLOPS TENELLUS*, sp. n. (Plate XIV. figs. 118–127.)

*Specific Characters.*—**FEMALE.** Body (fig. 118) rather slender, with very thin and fragile integuments. Anterior division of body regularly oval in form, with the cephalic segment very large and somewhat truncated in front. Last pedigerous segment very small. Urosome slender and narrow, exceeding half the length of the anterior division; genital segment only very slightly dilated in front. Caudal rami (fig. 127) about twice as long as they are broad and scarcely divergent; seta of outer edge attached nearly in the middle, innermost apical seta very small, scarcely longer than the outermost, inner mediate seta very slender and almost twice as long as the outer, dorsal seta likewise rather much produced. Anterior antennæ (fig. 119) slender and elongated, attaining almost the length of the anterior division of the body, though composed of only twelve articulations clothed with slender bristles, some of them of quite an unusual length. Posterior antennæ (fig. 120) likewise rather slender, with a very limited number of setæ (5) on the penultimate joint. Both pairs of maxillipeds (fig. 121) unusually produced. Natatory legs well developed; terminal joint of outer ramus in the two anterior pairs (figs. 122 & 123) provided with five slender spines and five setæ, in 3rd pair (fig. 124) with only four spines; 1st joint of same ramus, except in the 1st pair, without any seta inside; 4th pair (fig. 125) with both rami very slender and devoid of the seta inside the 1st joint; apical spines of inner ramus very unequal in size. Last pair of legs (fig. 126) extremely small, though apparently of normal structure, apical seta the longest.

Length of adult female 0.38 mm.

*Remarks.*—This is perhaps the smallest of all the species of *Cyclops*, and is also distinguished rather conspicuously from the other known forms both in its external appearance and the structure of the appendages. It therefore appears somewhat difficult to decide to which group of the genus *Cyclops* it should more properly be referred. I place it provisionally here, next to the three preceding species, to which it exhibits a certain similarity as to the general habitus. To judge from its very thin and pelucid integument and the delicate structure of the appendages, it seems to be a true limnetic form.

*Occurrence.*—I have only found this tiny species in two of the samples from Tanganyika, one taken 24/2/05 at Baraka, north-western shore of the lake, the other 1/3/05 at Kaboge, in the same region of the lake. Most of the specimens were more or less damaged, owing to the extremely fragile structure of their bodies.

19. *CYCLOPS ALBIDUS* (Jurine). (Plate XV. figs. 128–130.)

*Occurrence.*—Some few specimens of this well-known species, most of them of the male sex, were found in a sample from Lake Nyasa, taken 11/6/04 in the Anchorage Bay. I give on the accompanying plate a figure of a male specimen together with two detail-figures.

*Distribution.*—Europe, Asia, North and South America, Australia, Hawaii Islands.

20. *CYCLOPS ATTENUATUS*, sp. n. (Plate XVI. figs. 131–138.)

*Specific Characters.*—**FEMALE.** Body (fig. 131) comparatively slender and attenuated behind, with the anterior division oval in form and evenly rounded in front. Last pedigerous segment slightly produced on each side. Urosome somewhat exceeding half the length of the anterior division, and gradually tapering behind; genital segment only slightly dilated in front. Caudal rami (fig. 138) rather produced, exceeding in length the last two segments combined, and of narrow linear form, being not at all divergent; seta of outer edge somewhat remote from the end; innermost apical seta very thin and about twice the length of the outermost, which is somewhat spiniform; the two middle setæ long and slender, the inner one exceeding the outer by rather more than one-third of its length and almost attaining half the length of the whole body. Anterior antennæ (fig. 132) comparatively short, not nearly attaining the length of the cephalic segment, and composed of only ten articulations. Posterior antennæ (fig. 133) of normal structure, with six anteriorly-curving setæ on the penultimate joint. Natatory legs (figs. 134–136) short and stout, with both rami bi-articulate, the last two joints being wholly coalesced. Last pair of legs (fig. 137) with the proximal joint not defined, its seta issuing from the side of the segment itself; distal joint very small, narrow conical in form and tipped with a single seta. Ovisacs small, rounded, each as a rule containing only two or three globular ova.

Length of adult female 0.65 mm.

*Remarks.*—This form is nearly allied to the European species, *C. varicans* G. O. Sars, having, like the latter, both rami of the natatory legs bi-articulate, and the last pair of legs partly confluent with the pertaining segment. It differs, however, in the somewhat more slender form of the body, the more produced caudal rami, and in the anterior antennæ being composed of only 10 articulations, whereas in *C. varicans* they are distinctly 12-articulate.

*Occurrence.*—Several specimens of this form were picked up from the muddy deposit contained in one of the samples from Tanganyika, taken 13/10/04 at Sumbu, south-western shore of the lake, and two specimens, male and female, were found in another sample, taken 28/9/04 at Mbete, south end of the lake.

21. *CYCLOPS VARICANS* G. O. Sars. (Plate XVI. figs. 139, 140.)

*Occurrence*.—A single female specimen of this form was found in a sample from Lake Nyasa, taken 13/6/04 in the Anchorage Bay, and another somewhat smaller specimen in a sample from Tanganyika, taken 28/9/04 at Mbete, south end of the lake.

*Distribution*.—Europe, New Zealand (*G. O. Sars*).

22. *CYCLOPS EXIGUUS*, sp. n. (Plate XVI. figs. 141, 142.)

*Specific Characters*.—FEMALE. Body (fig. 141) rather narrow, with the anterior division oblong-oval in form and obtusely produced in front. Last pedigerous segment with the lateral parts slightly prominent and each tipped with a slender bristle. Urosome slender, considerably exceeding half the length of the anterior division; genital segment only very slightly dilated in front. Caudal rami (fig. 142) not attaining the length of the last two segments combined, of nearly uniform width throughout, and scarcely at all divergent; seta of outer edge attached somewhat behind the middle, innermost apical seta very thin and fully twice as long as the outermost, the two middle setae of moderate length and having the cilia of their proximal part much coarser than those of the distal part, the inner one exceeding the outer by about one-third of its length. Anterior antennae rather short, and composed of only 11 articulations. Legs of a similar structure to those of the two preceding species.

Length of adult female 0.53 mm.

*Remarks*.—The present form is closely allied to the European species, *C. bicolor* G. O. Sars, but is of smaller size and more narrow form of body. It also differs in the shorter anterior antennae and in the less produced caudal rami.

*Occurrence*.—Only a single female specimen of this form has come to my notice. It was found in a sample from Tanganyika, taken 28/9/04 at Mbete, south end of the lake.

23. *CYCLOPS CUNNINGTONI*, sp. n. (Plate XVII. figs. 143-150.)

*Specific Characters*.—FEMALE. Body (fig. 143) comparatively short and robust, with the anterior division rather broad and pronouncedly depressed, having its greatest width somewhat behind the middle. Cephalic segment very large, and gradually narrowed in front to an obtusely conical point. Lateral parts of the three succeeding segments somewhat expanded, but with the hind corners rounded off. Last pedigerous segment forming on each side a short obtuse prominence tipped with a slender ciliated seta. Urosome rather thick, about half the length of the anterior division and slightly tapering behind; genital segment somewhat dilated in its anterior part. Caudal rami (fig. 150) not nearly attaining the length of the last two segments combined and slightly widening at the end; seta of outer edge attached somewhat behind the middle; innermost apical seta only slightly longer

than the outermost, which is spiniform; the two middle setae rather coarse, almost spiniform, and of moderate length; the inner one exceeding the outer by about one-third of its length, dorsal seta not much produced. Anterior antennae (fig. 144) comparatively short and thick at the base, consisting of 12 articulations densely clothed with slender curved setae especially on the proximal part. Posterior antennae (fig. 145) with the seta attached to the hind corner of the basal joint rather short; penultimate joint provided with nine anteriorly-curving setae, and about the length of the terminal joint. Natatory legs (figs. 146-148) short and stout and, as in the three preceding species, having both rami bi-articulate. Last pair of legs (fig. 149) quite rudimentary, each consisting of only a very small conical joint tipped with a single seta, the basal joint being wholly confluent with the pertaining segment. Ovi-sacs of moderate size, oblong oval in form, and somewhat divergent, each containing from ten to sixteen ova.

Length of adult female 0.86 mm.

*Remarks*.—This is a very distinct and easily recognisable form, being especially distinguished from the three preceding species, with which it agrees in the structure of the legs, by the short and robust body, the broad, pronouncedly depressed anterior division, and the conically produced cephalic segment. It is indeed one of the most characteristic endemic forms of Lake Tanganyika, and I have therefore thought it right to associate with it the name of the distinguished conductor of the Expedition.

*Occurrence*.—I have found this pretty form in four of the samples from Tanganyika. In one of these samples, the same which contained the above-described species, *C. attenuatus*, it occurred rather frequently, more rarely in the three other samples. Of these one was taken 12/12/04 at Karema, eastern shore of the lake, another 1/3/05 at Kaboge, north-western shore, and a third 28/9/04 at Mbete, south end of the lake.

24. *CYCLOPS PACHYCOMUS*, sp. n. (Plate XVII. figs. 151-156.)

*Specific Characters*.—FEMALE. Body (fig. 151) considerably more slender than in *C. cunningtoni*, with the anterior division less expanded and the cephalic segment obtusely rounded in front. Last pedigerous segment about as in that species. Urosome somewhat exceeding half the length of the anterior division and gradually tapering behind. Caudal rami (fig. 156) somewhat narrower than in *C. cunningtoni*, though scarcely longer, and not at all diverging; seta of outer edge attached about in the middle, innermost apical seta scarcely longer than the outermost, the two middle setae rather slender and elongated, the inner one almost twice as long as the outer and exceeding half the length of the whole body. Anterior antennae (fig. 152) very short and robust, and composed of only 11 articulations thickly covered with very coarse, almost spiniform setae, several of which are distinctly ciliated. Posterior antennae (fig. 153) likewise shorter and stouter than in the preceding species. Natatory legs of a very similar

structure to that in *C. cunningtoni*, except that the spines on both rami of the 4th pair (fig. 154) are shorter and blunt at the tip. Last pair of legs (fig. 155) exhibiting the same rudimentary structure as in that species.

Length of adult female 0.62 mm.

*Remarks.*—Though closely allied to the preceding species, this form is at once distinguished by the less expanded anterior division of the body, the different shape of the cephalic segment, the more slender caudal setæ, and finally by the shorter and thicker anterior antennæ, which moreover are only 11-articulate, and have the setæ of the anterior edge and upper face remarkably coarse. The specific name here proposed is derived from this last character.

*Occurrence.*—Some few female specimens of this form were found in two of the samples from Tanganyika, the one taken 28/9/04 at Mbete, south end of the lake, the other 13/10/04 at Sumbu, south-western shore.

25. *CYCLOPS SEMISERRATUS*, sp. n. (Plate XVIII. figs. 157–169.)

*Specific Characters.*—FEMALE. Body (fig. 157) moderately slender, with the anterior division regularly oval in form, the greatest width occurring about in the middle. Cephalic segment large and obtusely truncated in front. Last pedigerous segment with the lateral parts slightly expanded and clothed with fine hairs. Urosome somewhat exceeding half the length of the anterior division; genital segment comparatively short and distinctly dilated at the base, carrying on each side a slender bristle (see fig. 167). Caudal rami (fig. 169) long and slender, considerably exceeding in length the last three segments combined, and of narrow linear form, slightly widening at the tip; outer edge armed for about half its length with a row of very small denticles, seta of this edge small and attached close to the end somewhat dorsally, innermost apical seta only slightly longer and much thinner than the outermost; middle setæ rather slender with the cilia of uniform appearance throughout, the inner one exceeding the outer by rather more than one-third of its length and abruptly bent outwards at the middle. Anterior antennæ (fig. 158) comparatively slender, considerably exceeding the cephalic segment in length, and composed of 12 articulations. Posterior antennæ (fig. 159) of moderate length, and having the seta of the basal joint well developed. Oral parts (figs. 160–163) and natatory legs (figs. 164–166) built on the same type as in *C. serrulatus* Fischer. Last pair of legs (figs. 167, 168) as in that species, each composed of a single small, somewhat lamelliform joint, trilobate at the end and carrying two slender bristles and at the inner corner a ciliated spine, the latter, however, much smaller than in *C. serrulatus*. Ovisacs regularly oval in form and only very slightly divergent.

Length of adult female 0.86 mm.

*Remarks.*—This form, like the six succeeding species, belongs to the group of Cyclops for which *C. serrulatus* Fischer is the type, and which has proved to contain several well-defined species formerly generally regarded as only varieties of the said species. The present form is nearly allied to *C. macruroides* Lilljeborg, differing, however, in some particulars, for instance in the armature of the caudal rami and the mutual relation in length of the apical seta, so it may be more properly regarded as specifically distinct.

*Occurrence.*—This form occurred very abundantly in one of the samples from Tanganyika, taken 19/9/04 at Niamkolo Island, south end of the lake. It was not found in any of the other samples.

26. *CYCLOPS LÆVIMARGO*, sp. n. (Plate XIX. figs. 170–175.)

*Specific Characters.*—FEMALE. Body (fig. 170) comparatively more robust than in the preceding species, with the anterior division slightly dilated in front. Last pedigerous segment and urosome about as in that species. Caudal rami (fig. 175) of a similar narrow linear form, but with the outer edge perfectly smooth, without any trace of the regular row of denticles found in that species; innermost apical seta scarcely longer than the outermost, the two middle setæ comparatively shorter than in *C. semiser-ratus* and quite uniformly ciliated, the inner one only exceeding the outer by one-fourth of its length and slightly bent outwards at the middle. Anterior antennæ (fig. 171) much shorter than in that species, scarcely attaining the length of the cephalic segment, though composed of the same number of articulations. Posterior antennæ (fig. 172) likewise shorter and stouter. Fourth pair of legs (fig. 173) with the spines on the outer ramus comparatively short and blunt at the tip. Last pair of legs (fig. 174) with the spine of the inner corner small, though perhaps a little longer than in the preceding species. Ovisacs comparatively small and scarcely divergent.

Length of adult female 0.85 mm.

*Remarks.*—The present form differs conspicuously from the preceding one by the much shorter anterior antennæ and by the absolute absence on the outer edge of the caudal rami of the regular series of denticles generally found in the species belonging to this group. It is from this last character that the specific name here proposed is derived.

*Occurrence.*—This form also was only found in one of the samples from Tanganyika, but in this rather abundantly. The sample was taken 12/12/05 at Karema, eastern shore of the lake.

27. *CYCLOPS ANGUSTUS*, sp. n. (Plate XIX. figs. 176–180.)

*Specific Characters.*—FEMALE. Body (fig. 176) very slender and narrow, with the anterior division oblong in form and obtusely truncated in front. Last pedigerous segment with the lateral parts only slightly expanded. Urosome attaining about two-

thirds of the length of the anterior division; genital segment conspicuously dilated at the base. Caudal rami (fig. 180) exceedingly slender and elongated, almost attaining the length of the remaining part of the urosome; outer edge perfectly smooth, seta of this edge attached at only a short distance from the end and accompanied at the base in front by a transverse row of four small denticles; innermost apical seta about the length of the outermost; the two middle setæ rather slender and uniformly ciliated, the inner one exceeding the outer by about one-third of its length. Anterior antennæ 12-articulate and of moderate length, being about as long as the cephalic segment, their outer joints (fig. 177) conspicuously longer than in *C. levimargo*. Natatory legs of normal structure. Last pair of legs (fig. 179) extremely small, with the spine of the inner corner very short. Ovisacs about as in the two preceding species.

Length of adult female 0.82 mm.

*Remarks.*—This form at the first sight looks very like the European species, *C. macrurus* G. O. Sars. On a closer comparison, however, it is found to differ in the comparatively more slender anterior antennæ, and more particularly in the structure of the caudal rami. In the European species the seta of the outer edge is much more remote from the end, and in front of it four denticles occur, which do not form a transverse row, as in the present species, but are arranged along the edge. Moreover, the innermost apical seta is considerably longer than the outermost, and the spine of the inner corner in the last pair of legs more fully developed.

*Occurrence.*—Some few specimens of this form were found in a sample from Tanganyika, taken 18/11/04 at Kala, eastern shore of the lake. One female and two male specimens of apparently the same species occurred in a sample from Lake Nyasa, taken 13/6/04 in the Anchorage Bay.

28. *CYCLOPS RARISPINUS*, sp. n. (Plate XIX. figs. 181, 182.)

*Specific Characters.*—FEMALE. Body (fig. 181) comparatively short and stout, with the anterior division ovoid in form and narrowly truncated in front. Last pedigerous segment with the lateral parts somewhat produced and clothed with fine hairs. Urosome slightly exceeding half the length of the anterior division, and having the genital segment rather much dilated at the base. Caudal rami (fig. 182) much shorter than in the three preceding species and also less narrow, scarcely widening at the end; outer edge armed with a short row of about eight small denticles not extending to the middle of the ramus, inner edge finely ciliated in its proximal half; innermost apical seta nearly twice as long as the outermost; the two middle setæ rather slender and uniformly ciliated, the inner one exceeding the outer by rather more than one-third of its length. Anterior antennæ moderately slender and distinctly 12-articulate. Legs apparently of normal structure. Ovisacs comparatively small and scarcely divergent.

Length of adult female 0.80 mm.

*Remarks.*—In the form and armature of the caudal rami this form somewhat resembles a species recorded by Dr. Mrázek from small ponds at Bukoba, Victoria Nyanza, and named *C. stuhlmanni*. To judge from the figure given by that author, this form is, however, much more slender in shape, and the anterior antennæ are composed of only 10 articulations, whereas in the present form they are distinctly 12-articulate, as in all the other species belonging to this group.

*Occurrence.*—Only a single female specimen of this form has come to my notice. It was found in a sample from Tanganyika, taken 18/11/04 at Kala, eastern shore of the lake.

29. *CYCLOPS AGILOIDES*, sp. n. (Plate XX. figs. 183–188.)

*Specific Characters.*—FEMALE. Body (fig. 183) rather slender, with the anterior division gradually widening anteriorly, front evenly rounded. Last pedigerous segment short, but rather broad. Urosome slender, considerably exceeding half the length of the anterior division; genital segment somewhat dilated at the base. Caudal rami (fig. 188) of moderate length, about as long as the last two segments combined, and slightly divergent; outer edge armed with a row of very small denticles, which in the proximal part of the ramus are somewhat withdrawn from the edge and become so minute that they easily may escape attention; innermost apical seta nearly twice as long as the outermost; the two middle setæ of moderate length and uniformly ciliated, the inner one exceeding the outer by rather more than one-third of its length. Anterior antennæ rather slender, considerably exceeding in length the cephalic segment, and 12-articulate, the last three joints (fig. 184) with a distinct smooth longitudinal keel. Posterior antennæ (fig. 185) of quite normal structure. Fourth pair of legs (fig. 186) with the spines of both rami finely denticulate, the apical ones of the inner ramus slightly unequal in size. Last pair of legs (fig. 187) with the spine of the inner corner well developed and coarsely denticulate.

Length of adult female 0.90 mm.

*Remarks.*—This form is closely allied to the European species, *C. agilis* Koch (= *C. varius* Lilljeborg), but differs in some particulars, especially as regards the form and armature of the caudal rami, so as more properly to be regarded as specifically distinct.

*Occurrence.*—A single female specimen (that described above) of this form was found in the above-mentioned sample from Victoria Nyanza, and two other specimens of apparently the same species were derived from Tanganyika, the one from a sample taken 19/9/04 at Niamkolo, south end of the lake, the other in a sample taken 13/10/04 at Sumbu, south-western shore.

30. *CYCLOPS EUACANTHUS*, sp. n. (Plate XX. figs. 189–192.)

*Specific Characters.*—FEMALE. Body (fig. 189) comparatively



slender, with the anterior division oblong-oval in form and narrowly truncated in front. Last pedigerous segment with the lateral parts slightly produced and finely hairy. Urosome exceeding half the length of the anterior division, and having the genital segment somewhat dilated in front. Caudal rami (fig. 192) about half the length of the remaining part of urosome and somewhat divergent, outer edge armed with a comb-like row of rather strong denticles extending almost to the base of the ramus; innermost apical seta very thin and quite naked, being more than twice as long as the outermost, the latter pronouncedly spiniform and pointing almost straight outwards, its anterior edge fringed with fine spinules, posterior edge smooth; middle setae slender and uniformly ciliated, the inner one exceeding the outer by rather more than one-third of its length. Anterior antennae scarcely as long as the cephalic segment, and 12-articulate; last and penultimate joints (see fig. 190) each provided with a finely denticulated longitudinal keel. Fourth pair of legs (fig. 191) with the spines attached to the terminal joint of both rami unusually large, lanceolate in form, with a dense fringe of delicate spinules on each side. Last pair of legs not examined. Ovisacs of moderate size and oval in form, slightly divergent.

Length of adult female 0.79 mm.

*Remarks.*—This form is especially distinguished by the very conspicuous comb-like series of denticles on the outer edge of the caudal rami, the strong spiniform outermost apical seta, and finally by the unusual development of the spines attached to the terminal joint of both rami in the fourth pair of legs. It is from this latter character that the specific name here proposed is derived.

*Occurrence.*—Two female specimens of this form had been mounted by Dr. Cunningham, together with some other Entomostraca, on a slide, which was kindly sent to me for examination. According to the label, they were collected from the Lofu river, Tanganyika.

### 31. CYCLOPS CILIATUS, sp. n. (Plate XX. figs. 193, 194.)

*Specific Characters.*—FEMALE. Body (fig. 193) resembling, as to the general form, that of the preceding species, though perhaps somewhat less slender. Caudal rami (fig. 194) comparatively narrower, with the denticles of the outer edge smaller, inner edge clothed throughout its whole length with delicate, somewhat distant cilia; innermost apical seta distinctly ciliated and only slightly exceeding in length the outermost; the latter moderately strong, with the outer edge minutely denticulated, the inner clothed with long cilia; middle setae rather slender, with the cilia of the proximal part coarser and more distant than those of the distal part, the inner one almost twice as long as the outer. Anterior antennae more slender and elongated than in the preceding species, with no keel on the outer joints. Fourth pair of legs with the spines of quite normal appearance. Last pair of legs (not figured) with the spine of the inner corner very small.

Length of adult female 0.86 mm.

*Remarks.*—The present form is distinguished from the preceding one, to which it bears some resemblance in its external appearance, by the comparatively more elongated anterior antennae, the quite normal structure of the spines attached to the rami of the fourth pair of legs, and finally by the somewhat different form and armature of the caudal rami. The distinctly ciliated inner edge of these rami is another character by which the present species is distinguished, and which has given rise to the specific name here proposed.

*Occurrence.*—Two female specimens of this form (of which one was dissected) were found in a sample from Tanganyika, taken 28/9/04 at Mbete, south end of the lake.

### 32. CYCLOPS OLIGARTHUS, sp. n. (Plate XXI. figs. 195–202.)

*Specific Characters.*—FEMALE. Body (fig. 195) rather strongly built and somewhat depressed, with the anterior division ovoid in form, frontal part conically produced. Last pedigerous segment short but rather broad, and having the lateral parts densely clothed with stiff hairs (see fig. 201). Urosome somewhat robust, with the genital segment considerably dilated at the base. Caudal rami (fig. 202) rather produced, about equalling in length the last three segments combined, and slightly diverging; dorsal face armed, in front of the very small seta of the outer edge, with an obliquely transverse row of very small denticles; all the apical setae pronouncedly spiniform and without true cilia, the innermost and outermost ones of about equal size; inner mediate seta nearly three times as long as the outer, both clothed in their distal part with very minute denticles; dorsal seta quite short. Anterior antennae (fig. 196) unusually short and compact, scarcely exceeding half the length of the cephalic segment, and composed of only six articulations densely clothed with coarse setae, some of which exhibit a comb-like series of thin spinules on the one edge, one of these setae issuing from the end of the first joint being particularly strong and extending along the outer part of the antenna to its very tip. Posterior antennae (fig. 197) likewise unusually short and stout, with the outer two joints imperfectly separated and the seta of the basal joint very long. Natatory legs (figs. 198–200) resembling in structure those in *C. fimbriatus* Fischer, the middle joint of the inner ramus being very large and acutely produced at the outer corner, with the edge in front of the latter coarsely spinulose. Last pair of legs (fig. 201) each consisting of a single somewhat irregular joint armed with three strong spines, the outermost of which is much the largest and distinctly denticulate, pointing outwards, so as to project on each side of the pertaining segment (see fig. 195). Ovisacs comparatively small, and each containing only a very limited number of ova.

Length of adult female 0.69 mm.

*Remarks.*—The nearest ally of this form is unquestionably the European species, *C. fimbriatus* Fischer, with which it agrees in

the more general characters. Yet it is quite certainly specifically distinct from that species, exhibiting as it does a number of well-marked differences, of which may be named the spiniform character of the caudal setæ, the coarse spines with which the last pair of legs are armed, and the unusually small number of joints in the anterior antennæ. No other true *Cyclops* has such a small number of joints in these antennæ, and it is only in the genus *Halicyclops* that a similar composition of the anterior antennæ is met with. The specific name here proposed refers to this last character.

*Occurrence*.—Some few specimens of this remarkable form were found in a sample from Tanganyika, taken 28/9/04 at Mbete, south end of the lake. Two specimens (male and female) occurred in another sample, taken 12/12/04 at Karema, eastern shore of the lake.

### 33. CYCLOPS COMPACTUS, sp. n. (Plate XXI. figs. 203, 204.)

*Specific Characters*.—FEMALE. Body (fig. 203) of a very compact structure, with the anterior division broadly oval in form and pronouncedly depressed. Cephalic segment gradually contracted anteriorly, with the frontal part narrowly rounded. Lateral parts of the three succeeding segments somewhat expanded. Last pedigerous segment short, but rather broad. Urosome considerably exceeding half the length of the anterior division and only very slightly tapering behind; last segment comparatively short, and clothed laterally with fine spinules. Caudal rami somewhat produced, equalling in length the last two segments combined; inner edge straight and perfectly smooth, outer edge armed somewhat behind the middle with two or three small denticles, seta of this edge very small and attached near the end somewhat dorsally; tip obliquely truncated, with the innermost seta much smaller than the outermost; middle setæ well-developed and clothed for some part of their length with small spinules, the inner one much elongated, considerably exceeding half the length of the body and fully twice as long as the outer. Anterior antennæ comparatively short and not much dilated at the base, being composed of 10 articulations. Last pair of legs (see fig. 204) each composed of a short joint extending laterally and carrying three unusually large recurved setæ, the longest of which extends as far as the second caudal segment, all the setæ clothed with scattered spinules.

Length of adult female 0.75 mm.

*Remarks*.—This form is closely allied to the European species, *C. phaleratus* Koch, but is easily distinguished by the much more produced caudal rami and by the great development of the setæ attached to the last pair of legs.

*Occurrence*.—A single female specimen of this form occurred in the same mounted slide which contained the two specimens of the above-described species, *C. euacanthus*.

### 34. CYCLOPS DUBIUS, sp. n. (Plate XXI. figs. 205–207.)

*Specific Characters*.—FEMALE. Body (fig. 205) rather slender, with the anterior division oblong-oval in form and obtusely rounded in front. Last pedigerous segment (see fig. 206) with the lateral parts rounded off and clothed with unusually long and delicate hairs. Urosome considerably exceeding half the length of the anterior division and somewhat tapering behind; genital segment only slightly widened in front. Caudal rami (fig. 207) long and slender, sublinear in form and slightly divergent, considerably exceeding in length the last two segments combined, outer edge perfectly smooth with a small seta near the end; innermost apical seta small, being much shorter than the outermost, which is spiniform; middle setæ of moderate length and uniformly ciliated, the inner one about twice as long as the outer; dorsal seta not much produced. Anterior antennæ rather short, not nearly attaining the length of the cephalic segment and composed of 12 articulations. Last pair of legs (see fig. 206) each consisting of a single somewhat lamellar joint extended laterally, and provided with three comparatively short spiniform setæ.

Length of adult female 0.62 mm.

*Remarks*.—The exact relation of this form to the other known species is as yet somewhat doubtful, as the solitary specimen examined has not been dissected. Yet, in spite of the perfectly smooth outer edge of the caudal rami, the short anterior antennæ, and the laterally extended last pair of legs, it may probably belong to the group for which *C. serrulatus* is the type. In any case it may be regarded as a rather abnormal form.

*Occurrence*.—The above-described specimen was found in a sample from Nyasa, taken 13/6/04 in the Anchorage Bay, south end of the lake.

#### Sect. Pœcilostomata.

#### Fam. ERGASILIDÆ.

This family comprises a peculiar group of pœcilostomatous Cyclopoida, which in some respects forms as it were a transition to the true parasites, Caligoida and Lernæoida. The adult females, which in some cases appear rather much deformed, are found firmly attached, by the aid of their clawed posterior antennæ, to the gills of several species of freshwater fishes. The copulation of the sexes in all probability takes place before the fixation of the female, in the last free stage of the latter. We know of two distinct genera of this family, viz. *Ergasilus* Nordman and *Thersites* Pagenstecher. To these a third genus is here added.

#### Genus ERGASILOIDES, n. g.

*Generic Characters*.—Body of female (in last free stage) cyclopoid in shape, subdepressed in front, and attenuated behind; in

male of more slender form. Head distinctly defined from metasome and very large, more or less scutiform and without any rostrum. Segments of metasome rapidly diminishing in size, the fifth or last very small, almost obsolete. Urosome short, and consisting in female of only two, in male of three segments; genital segment in both sexes large and tumid, that of male having the postero-lateral corners produced and tipped with a small spine. Caudal rami short, each carrying on the inner corner a strong seta, which in some cases is bifid, outer corner provided with three much smaller setae, one of which is extended outwards. Anterior antennae of a similar structure in the two sexes, comparatively short and stout, 5- or 6-articulate, and densely clothed with delicate setae. Posterior antennae transformed into strong prehensile organs, larger in female than in male. Oral area produced in the form of a short tube issuing from the ventral face of the head behind, and provided inside with two pairs of incurved appendages (mandibles and maxillae), outside with a small lamella (maxilliped), which in male is transformed into a well-developed prehensile organ terminating in a clawed hand. Natatory legs with the rami more or less incurved and clothed at the end with slender ciliated setae: those of the fourth pair much smaller than the others, with the number of joints in the outer ramus reduced. Last pair of legs extremely small and rudimentary, knob-like, with a single small seta on the tip. Adult stage of female still unknown.

*Remarks.*—This new genus is chiefly distinguished from *Ergasilus*, to which it bears a close resemblance, by the reduced number of segments in the urosome of both sexes. In the corresponding stage of *Ergasilus* the urosome is composed in the female of four well-defined segments and in the male of five such segments. Moreover, the very rudimentary condition of the last pair of legs and of the segment to which they are attached, is rather characteristic. Three different species of this genus have been determined.

35. *ERGASILOIDES MEGACHEIR*, sp. n. (Plate XXII. figs. 208–222.)

*Specific Characters.*—FEMALE in last free stage. Body (figs. 208 & 209) comparatively short and stout, pronouncedly depressed, and, viewed dorsally, subpyriform in outline. Head very large and expanded, almost quadrangular in form; dorsal face with a well-marked transverse fold at about the posterior third of its length, and moreover exhibiting two small but sharply defined areas, the one of circular form and occurring in front of the middle, the other cordiform and placed near the posterior edge; frontal edge of the head transversely truncated, postero-lateral corners only slightly prominent and rounded. The four anterior segments of metasome with the lateral parts slightly produced backwards but obtusely rounded at the end. Last segment almost wholly concealed. Urosome scarcely exceeding in length one-third of

the metasome; genital segment much dilated, rounded oval in form. Caudal rami about the length of the last segment, with the seta of the inner corner simple and pointing straight behind. Anterior antennae (fig. 210) consisting of six well-defined articulations gradually diminishing in size. Posterior antennae (fig. 211) very largely developed; propodus twice as long as the basal joint and oblong in form, being scarcely narrowed distally, anterior edge with a thin hyaline border not fully extending to the base; dactylus about half the length of the propodus and somewhat twisted, its terminal claw comparatively short, with a recurved denticle inside. Oral parts (see figs. 212–215) exhibiting the structure characteristic of the genus. Natatory legs (figs. 216–218) with both rami distinctly 3-articulate, except the outer ramus of 4th pair (fig. 218), which is only biarticulate. Last pair of legs (fig. 219) extremely small.

MALE (fig. 220) smaller than female and of considerably more slender form. Head much less expanded and rounded in front, its dorsal face without any distinct sculpturing. Segments of metasome evenly rounded laterally. Urosome more slender than in female and about half the length of the metasome. Anterior antennae only 5-articulate. Posterior antennae (fig. 221) much smaller than in female and of simpler structure. Maxillipeds (fig. 222) well developed, with the dactylus very slender.

Length of female in last free stage 0.62 mm., of male 0.55 mm.

*Remarks.*—This form is especially distinguished by the great size and peculiar structure of the prehensile posterior antennae in the female, which character has given rise to the specific name here proposed.

*Occurrence.*—Three female specimens (in the last free stage) and some few immature ones were found in a sample from Tanganyika, taken 13/10/04 at Sumbu, south-western shore of the lake.

36. *ERGASILOIDES MACRODACTYLUS*, sp. n. (Plate XXIII. figs. 223, 224.)

*Specific Characters.*—FEMALE (in last free stage). Body (fig. 223) resembling in its general shape that of the preceding species, though perhaps a little more slender. Head very large and expanded, subquadrate in outline, with the dorsal face sculptured in a similar manner to that in the preceding species, frontal margin transversely truncated, postero-lateral corners distinctly projecting, subangular. Urosome with the genital segment less tumid, inner caudal seta simple. Anterior antennae composed of only five articulations. Posterior antennae (fig. 224) very long and slender; propodus fully twice as long as the basal joint and attenuated distally, with no hyaline border; dactylus remarkably elongated, almost attaining the length of the propodus, with the terminal claw slender and perfectly smooth. Legs of apparently the same structure as in the preceding species.

Length of female (in last free stage) 0.50 mm.

*Remarks.*—This form is nearly allied to the preceding one, but of smaller size, and moreover easily distinguished by the rather different shape of the prehensile posterior antennæ, the dactylus of which is unusually long and slender. The specific name here proposed refers to this last character.

*Occurrence.*—A solitary female specimen of this form was found in the same sample in which the preceding species occurred.

37. *ERGASILOIDES BREVIMANUS*, sp. n. (Plate XXIII. figs. 225–231.)

*Specific Characters.*—FEMALE (in last free stage). Body (fig. 225) somewhat fusiform in shape, the head bulging considerably in its posterior part and gradually tapering anteriorly, front obtusely rounded. Dorsal face quite smooth without any trace of the peculiar sculpture found in the two preceding species. Segments of metasome evenly rounded laterally. Urosome (fig. 230) of a similar structure to that in the two preceding species. Caudal rami, however, distinguished by the seta of the inner corner being bifid, or divided near the base into two somewhat unequal prongs, the outer one being the longer. Anterior antennæ composed of only five articulations. Posterior antennæ (fig. 226) much shorter and stouter than in the two preceding species, with the propodus scarcely longer than the basal joint and quite simple; dactylus strong and somewhat dilated at the base, its terminal claw evenly curved and perfectly smooth. Natatory legs (figs. 227–229) with the outer two joints of the rami confluent.

MALE (fig. 231) resembling in its external appearance that of *E. megacheir*, but at once recognisable by the bifid inner caudal setæ.

Length of female 0.62 mm., of male 0.47 mm.

*Remarks.*—This form may be easily distinguished from the two preceding species by the different shape of the head in the female, the peculiar bifid inner caudal setæ, and more particularly by the much shorter and stouter posterior antennæ in the female, which latter character has given rise to the specific name here proposed.

*Occurrence.*—Two or three females and one male specimen of this form were found in a sample from Tanganyika, taken 28/9/04 at Mbete, south end of the lake. A single female specimen occurred in a sample from Nyasa, taken 13/6/04 in Anchorage Bay.

Genus *ERGASILUS* Nordman.

38. *ERGASILUS* sp.

*Occurrence.*—A single female specimen (in the last free stage) of a genuine *Ergasilus*, with distinctly 4-articulate urosome and

the last pair of legs developed in exactly the same manner as in the European species, is present in a mounted slide containing some other Entomostraca, which, according to the label, are from Lake Nyasa. The specimen has not yet been examined in detail, and is therefore only mentioned here. Dr. Mrázek also records a species of this genus, probably the same as that here mentioned, from Victoria Nyanza.

GENERAL REMARKS.

The working out of the Copepoda of the Tanganyika Expedition has involved no small difficulty and trouble, both as regards the selection of the specimens from the samples, and the examination and determination of the species, some of which, especially of the genus *Cyclops*, are so closely related to each other and to European species, that a very minute and careful examination has been needed to make out their true relationship. Yet, I think that the labour thereon bestowed may not have been in vain. For the final results of my examination have turned out to be on the whole very satisfactory, and have indeed far surpassed the expectation at first entertained. I hope therefore that the present Report will furnish a not unimportant contribution both to the exact definition of species, and to the general characterisation of the fauna in the three great Central African lakes.

The number of Copepod-species examined and mentioned in the present Report amounts to no less than 38 in all, belonging to six different genera. Of these species the far greater number, viz. 30, have proved to be new to science, and of the genera two have previously been known only from salt or brackish water. Finally, one new genus, *Ergasiloides*, has been established, to comprise three species allied to *Ergasilus* Nordman.

The annexed table is intended to show the distribution in the three lakes of the species here recorded, and, at the same time, the number of species found in each of them. It will at once appear from this table that Lake Tanganyika is by far the richest in Copepoda, no less than 29 species having been recorded from there, whereas a rather limited number of species is found in the two other lakes, viz., in Nyasa 11, in Victoria Nyanza only 7 species. This agrees pretty well with the results which other authors have obtained, in regard to the richness and specialisation of forms in that lake, as compared with the fauna of the other African lakes.

In striking contrast hereto stands, however, the apparently total absence in Tanganyika of Cladocera. Although I have with the greatest care sought for forms of this group in the numerous samples from this lake, I have only succeeded in finding in one of them a solitary specimen of a *Moina*, and this specimen in all probability has only quite accidentally been carried into the lake from some neighbouring stream.

Table of Distribution.

Names of Species.	Tanganyika.	Nyasa.	Victoria Nyanza.	Europe and other parts of the world.
<i>Diaptomus galeoides</i> G. O. S.	..	..	+	
" <i>mixtus</i> G. O. S.	..	+		
" <i>stuhmanni</i> Mrázek	..	..	+	
" <i>simplex</i> G. O. S.	+	..		
" <i>cunningtoni</i> G. O. S.	..	+		
<i>Schizopera inopinata</i> G. O. S.	+	..		
" <i>validior</i> G. O. S.	+	..		
" <i>consimilis</i> G. O. S.	+	..	+	
" <i>ungulata</i> G. O. S.	+	..		
" <i>minuticornis</i> G. O. S.	+	..		
" <i>spinulosa</i> G. O. S.	+	..		
" <i>fimbriata</i> G. O. S.	..	+		
" <i>scalaris</i> G. O. S.	+	..		
<i>Ilyophilus perplexus</i> G. O. S.	+	..		
<i>Cyclops leuckarti</i> Claus	+	+	+	+
" <i>emini</i> Mrázek	..	..	+	
" <i>neglectus</i> G. O. S.	+	+	+	+
" <i>tenellus</i> G. O. S.	+	..		
" <i>albidus</i> Jurine	..	+		+
" <i>attenuatus</i> G. O. S.	+	..		
" <i>varicans</i> G. O. S.	+	+	..	+
" <i>exiguus</i> G. O. S.	+	..		
" <i>cunningtoni</i> G. O. S.	+	..		
" <i>pachycomus</i> G. O. S.	+	..		
" <i>semiserratus</i> G. O. S.	+	..		
" <i>lavimargo</i> G. O. S.	+	..		
" <i>angustus</i> G. O. S.	+	+		
" <i>rarispinus</i> G. O. S.	+	..		
" <i>agiloides</i> G. O. S.	..	..	+	
" <i>enacanthus</i> G. O. S.	+	..		
" <i>ciliatus</i> G. O. S.	+	..		
" <i>oligarthrus</i> G. O. S.	+	..		
" <i>compactus</i> G. O. S.	+	..		
" <i>dubius</i> G. O. S.	..	+		
<i>Ergasiloides megacheir</i> G. O. S.	+	..		
" <i>macrodactylus</i> G. O. S.	+	..		
" <i>brevimanus</i> G. O. S.	+	+		
<i>Ergasilus</i> sp.	..	+		

Dr. Cunnington also has noticed this peculiar feature of Lake Tanganyika. In the other two lakes, on the other hand, a number of well-marked species of that group occur, both true limnetic and bottom-forms.

Of the six genera of Copepoda here recorded, the genus *Cyclops* is represented by far the greatest number of species, viz., in all 20; next to it comes the genus *Schizopera* with 8 species, the genus *Diaptomus* with 5 species, the genus *Ergasiloides* with 3 species, and finally the genera *Ilyophilus* and *Ergasilus*, each with a single species.

As to the distribution of the species, it ought to be noted that the three lakes have each their particular forms of *Diaptomi* not found out of the respective lakes, one species occurring in

Tanganyika, two in Nyasa, and two others in Victoria Nyanza. Of the genus *Schizopera* a single species (*S. fimbriata*) seems to be peculiar to Lake Nyasa; all the other seven species are found in Tanganyika, and of these only one (*S. consimilis*) is stated to occur also in one of the other lakes (Victoria Nyanza). The remarkable genus *Ilyophilus*, as above stated, is only represented by a single species from Tanganyika. Of the 20 species of the genus *Cyclops*, 17 have been stated to occur in Tanganyika. Two of these (*C. leuckarti* and *C. neglectus*) are common to all three lakes; three species (*C. varicans*, *C. angustus*, and *C. agiloides*) occur occasionally also in the other lakes, the first two in Nyasa, the last in Victoria Nyanza. The remaining 12 species, on the other hand, seem to be endemic forms of Lake Tanganyika. Of the three species which have not yet been found in Tanganyika, one (*C. emini*) seems to be an endemic form of Victoria Nyanza; the second (*C. albidus*) is a widely distributed, almost cosmopolitan species, like *C. leuckarti*; and the third (*C. dubius*) is as yet only known from a solitary specimen found in Nyasa. The three species of the genus *Ergasiloides* occur all in Tanganyika, and only one of them (*C. brevimanus*) is occasionally also found in Nyasa. In the latter lake, finally, a still undetermined species of the genus *Ergasilus* occurs.

Particular attention ought to be paid to the two remarkable genera, *Schizopera* and *Ilyophilus*. Both these genera must evidently be regarded as of marine origin, and the question thus arises, how we shall explain the occurrence of species of these genera in the purely freshwater lakes of Central Africa. The most obvious inference appears to be the belief, that these species are true "relict" forms, that is to say, the remains of an ancient marine fauna prevailing here at a time when the lakes formed part of the Ocean; and indeed a supposition in favour of such a conclusion was advanced some time ago by Mr. J. E. S. Moore, who is of opinion that Lake Tanganyika might be the modified remains of part of an ancient Jurassic Sea, and that its fauna accordingly in some instances exhibits distinct traces of more primitive (marine) characters. Recent investigation of this lake tends, however, to disprove the supposition set forth by Mr. Moore about the fauna of Lake Tanganyika, and to show that it is on the contrary a highly specialised one, and does not exhibit any true relation to marine forms. I am myself also of opinion that the theory of Mr. Moore about his so-called "halolimnic" (relict) forms can scarcely be supported. But, how are we to explain the presence in Lake Tanganyika of species of the two above-mentioned genera? I think that we need not regard these as true "relict" forms, although their marine origin seems to be indisputable. We have in this case recourse to another explanation, which may prove to be fully sufficient, namely, the accidental transport by the aid of migratory aquatic birds. The importance of such a transport for the distribution of small freshwater animals has long been recognised. It is indeed easily

understood, that not rarely it may happen that parcels of mud adhering to the feet of such birds and containing germs of small organisms, may be transported from one basin to another for rather a long distance. Several of these germs, for instance the resting ova of Rotatoria, Planaria, Bryozoa, and small Crustacea, may be kept for years in a dried condition, without losing their developing power, and of course will easily develop when brought under favourable conditions. Even in the case of animals, which do not produce such resting ova, a successful transport in this way may be effected. A very interesting discovery has recently been made by Prof. Birge and Mr. Juday at the Laboratory of the Wisconsin Geol. and Nat. Hist. Survey, in the case of a common species of the genus *Cyclops* (*C. bicuspidatus* Claus)\*. It has been stated by these authors that this form, at certain periods of the season, is subjected to a peculiar encysting process, small, still immature specimens enveloping themselves with a rather firm cocoon of muddy particles held together by some glutinous matter. It is very easy to believe that such cocoons may be kept in a dry condition for a long time without any damage to the enclosed young *Cyclops*, and that consequently an accidental transport of them by migratory birds may be as successful as that of true resting ova. It also appears very probable that a similar encysting process may be found to be present in other species of this genus. In any case, the discovery of Prof. Birge and Mr. Juday cannot fail to throw an unexpected light upon certain difficult questions regarding the distribution of some species of the genus *Cyclops*, and perhaps also of forms not belonging to that genus.

The above remarks on the accidental transport of animals by the aid of migratory birds, chiefly concerns true freshwater forms. However, as the said birds not only visit freshwater lakes, but also the coasts of the sea, it is evident that a transport of mud from the sea-shores to freshwater lakes may occasionally take place. In most cases, certainly, the germs contained in such mud will not develop when brought into purely fresh water, yet it is not impossible that the development of some few forms may in reality be effected under such circumstances. This may be assumed to be the case with marine animals that have accustomed themselves to live in more or less brackish water, and this is precisely the case with the type species of both the two above-mentioned genera. One of them, *Ilyophilus flexibilis*, has even been stated by Prof. Lilljeborg to occur occasionally also in purely fresh water, having been found, besides in the Baltic, also in the neighbouring Lake Mælaren, and this fact clearly proves that such brackish water animals in reality possess the power of accustoming themselves to living in fresh water.

It has been stated above, that no less than eight different

\* "A summer resting-stage in the development of *Cyclops bicuspidatus* Cls."

species of the genus *Schizopera* have been found in the Central African lakes, seven of them occurring in Lake Tanganyika. On a closer examination, it has been proved that none of these species is identical with the type-species, *S. longicauda*, exhibiting as they do some well-marked differences of apparently specific value. Of course, it would be quite unreasonable to assume that all these species have been transported to the lake in the above-mentioned manner. In my opinion these species have developed independently in the lake from a single ancestral form (perhaps *S. longicauda*), which in some remote time has found its way to the lake in the above-mentioned manner, and which, owing to the altered condition of life and isolation, has gradually changed its characters and undergone a divergent development into several varieties. These varieties in their turn have at last attained the character of distinct species.

In a similar manner the African species, *Ilyophilus perplexus*, may have been originally derived from the type species, *I. flexibilis*, though the alteration of characters, which has taken place, is great enough to distinguish it as a well-marked species. The occasional occurrence of two species of the genus *Schizopera* in the two other African lakes, in all probability is due to an accidental transport from the neighbouring Lake Tanganyika, and the same may also be the case with some other Copepod-species stated to occur both in that lake and in one or other of the two remaining lakes. It may be observed here, that Lake Tanganyika in its general physical characters differs from the other two lakes. It is extremely long and narrow, in some places exhibiting very considerable depths, and we have historical evidence to prove that its water was formerly somewhat brackish in character. Nyasa, it is true, while not so long, is also deep and relatively narrow, but Victoria Nyanza is very broad and quite shallow. The above-mentioned and other physical and perhaps also biological peculiarities of Lake Tanganyika seem to have favoured, during a long period of isolation, a divergent development of certain species, and this development in some cases has proceeded to such an extent as to produce even new generic types, all of which, however, have conserved the stamp of their phylogenetic relation to other forms occurring in the same lake or otherwise. Such highly specialised forms, representing particular genera, have been recorded among the Brachyura by Dr. Cunningham, and among the Macrura by Dr. Calman. Also among the Copepoda a new generic type has been found, viz., *Ergasiloides*, with three well-marked species. The phylogenetic relation of this genus to the genus *Ergasilus* is very obvious, the generic difference chiefly consisting in a somewhat retrograde transformation of the posterior part of the body.

A development, in comparatively recent times, of new species and even genera in isolated basins, is by no means a unique feature exclusively peculiar to Lake Tanganyika. We know of similar cases also from other parts of the world. Thus, it is well

known that Lake Baikal in Siberia distinguishes itself in a quite remarkable manner from the other Asiatic lakes by its astonishing richness in various species of Gammarid Amphipoda. It is impossible to explain this peculiarity of Lake Baikal without assuming that a divergent development from one or a few ancestral forms has taken place here. In the Caspian Sea, too, we meet with a quite similar case, not only in the Amphipoda, but also in other groups of Crustacea, viz. Mysidæ, Cumacea, Polyphemidæ, as is shown by the present author in his several papers on the Carcinological Fauna of that interesting basin.

## EXPLANATION OF THE PLATES.

## PLATE VI.

*Diaptomus galeboides* G. O. Sars.

- Fig. 1. Adult, ovigerous female, dorsal view.  
 2. Same, viewed from left side.  
 3. Urosome together with part of metasome, more highly magnified, and viewed from the dorsal face.  
 4. Right lateral corner of last segment of metasome, still more highly magnified.  
 5. Leg of last pair.  
 6. Adult male, dorsal view.  
 7. Terminal section of right anterior antenna.  
 8. Last pair of legs.

## PLATE VII.

*Diaptomus mixtus* G. O. Sars.

- Fig. 9. Adult female, dorsal view.  
 10. Same, viewed from left side.  
 11. Posterior part of metasome and genital segment, dorsal view.  
 12. Leg of last pair.  
 13. Adult male, dorsal view.  
 14. Middle and terminal sections of right anterior antenna.  
 15. End of terminal part of same antenna, more highly magnified.  
 16. Last pair of legs.  
 17. Projection of the 2nd basal joint of right leg, more highly magnified.

## PLATE VIII.

*Diaptomus stuhlmanni* Mrázek.

- Fig. 18. Adult ovigerous female, dorsal view.  
 19. Same, viewed from left side.  
 20. Left lateral part of last segment of metasome.  
 21. Leg of last pair.  
 22. Terminal part of right anterior antenna in male.  
 23. Last pair of legs of same.  
 24. Outer ramus of left leg, viewed from the anterior face, more highly magnified.

*Diaptomus simplex* G. O. Sars.

- Fig. 25. Adult ovigerous female, dorsal view.  
 26. Same, viewed from left side.  
 27. Urosome together with posterior part of metasome, dorsal view.  
 28. Right lateral part of last segment of metasome, somewhat more magnified.  
 29. Leg of last pair.  
 30. Outer three joints of right anterior antenna of male.  
 31. Last pair of legs of same.  
 32. Outer ramus of left leg, viewed from the anterior face, and more highly magnified.

## PLATE IX.

*Diaptomus cunningtoni* G. O. Sars.

- Fig. 33. Adult female, dorsal view.  
 34. Another female, with attached spermatophore, viewed from left side.  
 35. Urosome together with posterior part of metasome, dorsal view.  
 36. Left lateral part of last segment of metasome, with adjoining part of genital segment, dorsal view.  
 37. Same part viewed from the exterior face.  
 38. Last pair of legs.  
 39. Adult male, dorsal view.  
 40. Terminal part of right anterior antenna of same.  
 41. Last pair of legs.  
 42. Outer ramus of left leg, viewed from the anterior face, and more highly magnified.

## PLATE X.

*Schizopera inopinata* G. O. Sars.

- Fig. 43. Adult ovigerous female, dorsal view.  
 44. Same, viewed from left side.  
 45. Rostrum together with right anterior antenna, dorsal view.  
 46. Right posterior antenna.  
 47. Outer ramus of same, highly magnified.  
 48. Mandible with palp.  
 49. Posterior maxilliped.  
 50. Leg of 1st pair.  
 51. Leg of 2nd pair.  
 52. Leg of 3rd pair.  
 53. Leg of 4th pair.  
 54. Last pair of legs.  
 55. Extremity of urosome, with the caudal rami, dorsal view.  
 56. Anterior antenna of male.  
 57. Inner ramus of a leg of 2nd pair of same.  
 58. Leg of last pair of same.

## PLATE XI.

*Schizopera validior* G. O. Sars.

- Fig. 59. Adult ovigerous female, dorsal view.  
 60. Anterior antenna.  
 61. Leg of 1st pair.  
 62. Leg of last pair.  
 63. Right caudal ramus.

*Schizopera consimilis* G. O. Sars.

- Fig. 64. Adult ovigerous female, dorsal view.  
 65. Leg of 1st pair.  
 66. Leg of last pair.  
 67. Right caudal ramus.

*Schizopera ungulata* G. O. Sars.

- Fig. 68. Adult female, dorsal view.  
 69. Leg of 1st pair.  
 70. Leg of last pair.  
 71. Left caudal ramus.

## PLATE XII.

*Schizopera minuticornis* G. O. Sars.

- Fig. 72. Adult female, dorsal view.  
 73. Rostrum together with right anterior antenna, dorsal view.  
 74. Leg of 1st pair.  
 75. Leg of 2nd pair.  
 76. Leg of last pair.  
 77. Left caudal ramus, with adjoining part of urosome, dorsal view.

*Schizopera spinulosa* G. O. Sars.

- Fig. 78. Adult female, dorsal view.  
 79. Leg of 1st pair.  
 80. Leg of last pair.  
 81. Left caudal ramus, with adjoining part of urosome, dorsal view.

*Schizopera fimbriata* G. O. Sars.

- Fig. 82. Female (not fully grown), dorsal view.  
 83. Leg of 1st pair.  
 84. Leg of 4th pair.  
 85. Leg of last pair.  
 86. Left caudal ramus, with adjoining part of urosome, dorsal view.

## PLATE XIII.

*Schizopera scalaris* G. O. Sars.

- Fig. 87. Adult male, dorsal view.  
 88. Anterior antenna.  
 89. Leg of 1st pair.  
 90. Leg of 2nd pair.  
 91. Leg of last pair.  
 92. Extremity of urosome, with right caudal ramus, dorsal view.

*Ilyophilus perplexus* G. O. Sars.

- Fig. 93. Adult female, dorsal view.  
 94. Same, viewed from left side.  
 95. Rostrum, together with left anterior antenna, dorsal view.  
 96. Right posterior antenna.  
 97. Mandible with palp.  
 98. Maxilla.  
 99. Anterior maxilliped.  
 100. Posterior maxilliped.  
 101. Leg of 1st pair.  
 102. Leg of 3rd pair.  
 103. Leg of 4th pair.  
 104. Leg of last pair.

## PLATE XIV.

*Cyclops leuckarti* Claus.

- Fig. 105. Adult female, dorsal view.  
 106. Terminal joint of inner ramus of a leg of 4th pair.  
 107. Leg of last pair.

*Cyclops emini* Mrázek.

- Fig. 108. Adult ovigerous female, dorsal view.  
 109. Posterior antenna.  
 110. Inner ramus of a leg of 4th pair.  
 111. Leg of last pair.  
 112. Extremity of urosome, with the caudal rami, dorsal view.

*Cyclops neglectus* G. O. Sars.

- Fig. 113. Adult ovigerous female, dorsal view.  
 114. Posterior antenna.  
 115. Inner ramus of a leg of 4th pair.  
 116. Leg of last pair.  
 117. Extremity of urosome, with the caudal rami, dorsal view.

## PLATE XV.

*Cyclops tenellus* G. O. Sars.

- Fig. 118. Adult female, dorsal view.  
 119. Anterior antenna.  
 120. Posterior antenna.  
 121. The two maxillipeds on left side.  
 122. Leg of 1st pair.  
 123. Leg of 2nd pair.  
 124. Outer ramus of a leg of 3rd pair.  
 125. Leg of 4th pair.  
 126. Leg of last pair.  
 127. Extremity of urosome with the caudal rami, dorsal view.

*Cyclops albidus* (Jurine).

- Fig. 128. Adult male, dorsal view.  
 129. Inner ramus of a leg of 4th pair.  
 130. Right half of the last pedigerous segment and of the genital segment viewed from the ventral face, exhibiting the corresponding leg of last pair and genital lamella, as also an enclosed spermatophore.

## PLATE XVI.

*Cyclops attenuatus* G. O. Sars.

- Fig. 131. Adult ovigerous female, dorsal view.  
 132. Anterior antenna.  
 133. Posterior antenna.  
 134. Leg of 1st pair.  
 135. Leg of 3rd pair.  
 136. Leg of 4th pair.  
 137. Lateral part of last pedigerous segment, with the corresponding rudimentary leg.  
 138. Extremity of urosome, with the caudal rami, dorsal view.

*Cyclops varicans* G. O. Sars.

- Fig. 139. Adult female, dorsal view.  
 140. Extremity of urosome, with the caudal rami.

*Cyclops exiguus* G. O. Sars.

- Fig. 141. Adult female, dorsal view.  
 142. Extremity of urosome, with the caudal rami.

## PLATE XVII.

*Cyclops cunningtoni* G. O. Sars.

- Fig. 143. Adult ovigerous female, dorsal view.  
 144. Anterior antenna.  
 145. Posterior antenna.  
 146. Leg of 1st pair.  
 147. Leg of 3rd pair.  
 148. Leg of 4th pair.  
 149. Lateral part of last pedigerous segment, with the corresponding rudimentary leg.  
 150. Left caudal ramus, with adjoining part of urosome, dorsal view.

*Cyclops pachycomus* G. O. Sars.

- Fig. 151. Adult female, dorsal view.  
 152. Anterior antenna.  
 153. Posterior antenna.  
 154. Leg of 4th pair.  
 155. Lateral part of last pedigerous segment, with the corresponding rudimentary leg.  
 156. Extremity of urosome, with the caudal rami, dorsal view.



## PLATE XVIII.

*Cyclops semiserratus* G. O. Sars.

- Fig. 157. Adult ovigerous female, dorsal view.  
 158. Anterior antenna.  
 159. Posterior antenna.  
 160. Mandible with rudimentary palp.  
 161. Maxilla.  
 162. Anterior maxilliped.  
 163. Posterior maxilliped.  
 164. Leg of 1st pair.  
 165. Leg of 3rd pair.  
 166. Leg of 4th pair.  
 167. Lateral part of last pedigerous segment, with adjoining part of genital segment, exhibiting the corresponding leg and seta, ventral view.  
 168. Leg of last pair isolated and more highly magnified.  
 169. Extremity of urosome, with the caudal rami, dorsal view.

## PLATE XIX.

*Cyclops levimargo* G. O. Sars.

- Fig. 170. Adult ovigerous female, dorsal view.  
 171. Anterior antenna.  
 172. Posterior antenna.  
 173. Leg of 4th pair.  
 174. Leg of last pair.  
 175. Right caudal ramus, with adjoining part of urosome, dorsal view.

*Cyclops angustus* G. O. Sars.

- Fig. 176. Adult ovigerous female, dorsal view.  
 177. Outer part of an anterior antenna.  
 178. Posterior antenna.  
 179. Leg of last pair.  
 180. Right caudal ramus, with adjoining part of urosome, dorsal view.

*Cyclops rarispinus* G. O. Sars.

- Fig. 181. Adult ovigerous female, dorsal view.  
 182. Left caudal ramus, with adjoining part of urosome.

## PLATE XX.

*Cyclops agiloides* G. O. Sars.

- Fig. 183. Adult female, dorsal view.  
 184. Outer part of an anterior antenna.  
 185. Posterior antenna.  
 186. Leg of 4th pair.  
 187. Leg of last pair.  
 188. Left caudal ramus, with adjoining part of urosome, dorsal view.

*Cyclops euacanthus* G. O. Sars.

- Fig. 189. Adult ovigerous female, dorsal view.  
 190. Extremity of an anterior antenna.  
 191. Leg of 4th pair.  
 192. Right caudal ramus, with adjoining part of last segment, dorsal view.

*Cyclops ciliatus* G. O. Sars.

- Fig. 193. Adult female, dorsal view.  
 194. Left caudal ramus, with adjoining part of urosome, dorsal view.

## PLATE XXI.

*Cyclops oligarthrus* G. O. Sars.

- Fig. 195. Adult ovigerous female, dorsal view.  
 196. Anterior antenna.  
 197. Posterior antenna.  
 198. Leg of 1st pair.  
 199. Leg of 3rd pair.  
 200. Inner ramus of a leg of 4th pair.  
 201. Lateral part of last pedigerous segment, with the corresponding leg.  
 202. Right caudal ramus, with adjoining part of anal segment, dorsal view.

*Cyclops compactus* G. O. Sars.

- Fig. 203. Adult female, dorsal view.  
 204. Lateral parts of the last two pedigerous segments and of the genital segment, exhibiting the corresponding leg of last pair, and the short seta, dorsal view.

*Cyclops dubius* G. O. Sars.

- Fig. 205. Adult female, dorsal view.  
 206. Posterior part of metasome and adjoining part of genital segment, viewed from the dorsal face, and exhibiting the peculiar ciliation of the last pedigerous segment, and the projecting legs of last pair.  
 207. Left caudal ramus, with adjoining part of urosome, dorsal view.

## PLATE XXII.

*Ergasiloides megacheir* G. O. Sars.

- Fig. 208. Female in last free stage, viewed from dorsal face.  
 209. Same, viewed from left side.  
 210. Anterior antenna.  
 211. Posterior prehensile antenna.  
 212. Oral area, viewed from the ventral face, and exhibiting the oral parts *in situ*.  
 213. Mandible highly magnified.  
 214. Maxilla.  
 215. Rudimentary maxilliped.  
 216. Leg of 1st pair.  
 217. Leg of 3rd pair.  
 218. Leg of 4th pair.  
 219. Rudimentary leg of last pair, together with part of the likewise rudimentary corresponding segment.  
 220. Adult male, dorsal view.  
 221. Posterior antenna of same.  
 222. Maxilliped of same.

## PLATE XXIII.

*Ergasiloides macrodactylus* G. O. Sars.

- Fig. 223. Female in last free stage, dorsal view.  
 224. Posterior prehensile antenna.

*Ergasiloides brevimanus* G. O. Sars.

- Fig. 225. Female in last free stage, dorsal view.  
 226. Posterior prehensile antenna.  
 227. Leg of 1st pair.  
 228. Leg of 3rd pair.  
 229. Leg of 4th pair.  
 230. Urosome, with the caudal rami, dorsal view.  
 231. Male, viewed from the dorsal face.

- Fig. 15. Encysted form of *Trypanosoma perca*, from the same slide as 9 and 10. Osmic vapour, absolute alcohol, Giemsa.  
 Fig. 16. Young form of *T. perca*? or vermicle of a haemogregarine? From the same slide as the last.  
 Figs. 17-19. Leucocytes of the Perch, showing peculiar enclosures. From a preparation dried off, fixed with absolute alcohol, and stained with Giemsa's stain.

## PLATE II.

- Figs. 20-26. *Trypanosoma remaki* of the Pike. 20-22 & 25, small forms (var. *parva*); 23, 24, & 26, large forms (var. *magna*); 20-24, from preparations fixed with osmic vapour followed by absolute alcohol; 25, 26, from preparations dried off, fixed with absolute alcohol, all stained with Giemsa's stain.  
 Figs. 27-29. *Trypanosoma tinca*, from the Tench. 27, dried, absolute alcohol, Giemsa; 28, 29, osmic vapour, absolute alcohol, Giemsa.  
 Figs. 30-32. *Trypanosoma abramis*, from the Bream. 30, 31, osmic vapour, absolute alcohol, Giemsa; 32, dried off, absolute alcohol, Giemsa.  
 Figs. 33-39. *Trypanoplasma gurneyorum*, from the Pike. 33-36, osmic vapour, absolute alcohol, Giemsa; 37-39, dried off, absolute alcohol, Giemsa.

## PLATE III.

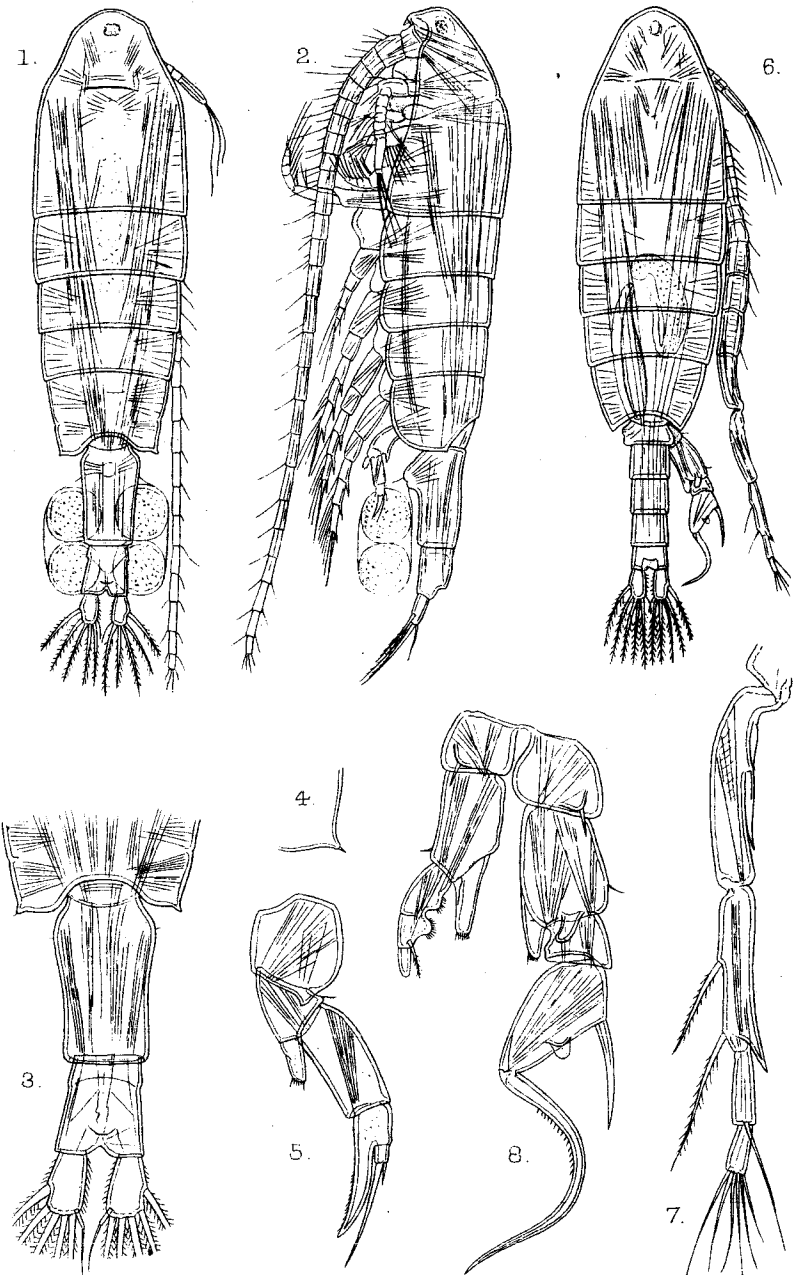
- Figs. 40-44. *Trypanoplasma keysselitzi*, from the Tench. 40, 41, large forms; 42-44, ordinary forms; 40-43, osmic vapour, absolute alcohol, Giemsa; 44, dried off, absolute alcohol, Giemsa.  
 Figs. 45-48. Large uninucleate leucocytes of the Tench, showing peculiar pink-staining enclosures; preparation dried off, fixed with absolute alcohol, stained with Giemsa's stain.  
 Figs. 49-54. *Trypanoplasma abramidis*, from the Bream. 49, fixed with sublimate-acetic (95:5); 50-52, fixed with osmic vapour followed by absolute alcohol; 53, 54, dried off, fixed with absolute alcohol; all stained with Giemsa's stain.  
 Fig. 55. *Trypanoplasma borreli*, from the Rudd. Osmic vapour, absolute alcohol, Giemsa.

## PLATE IV.

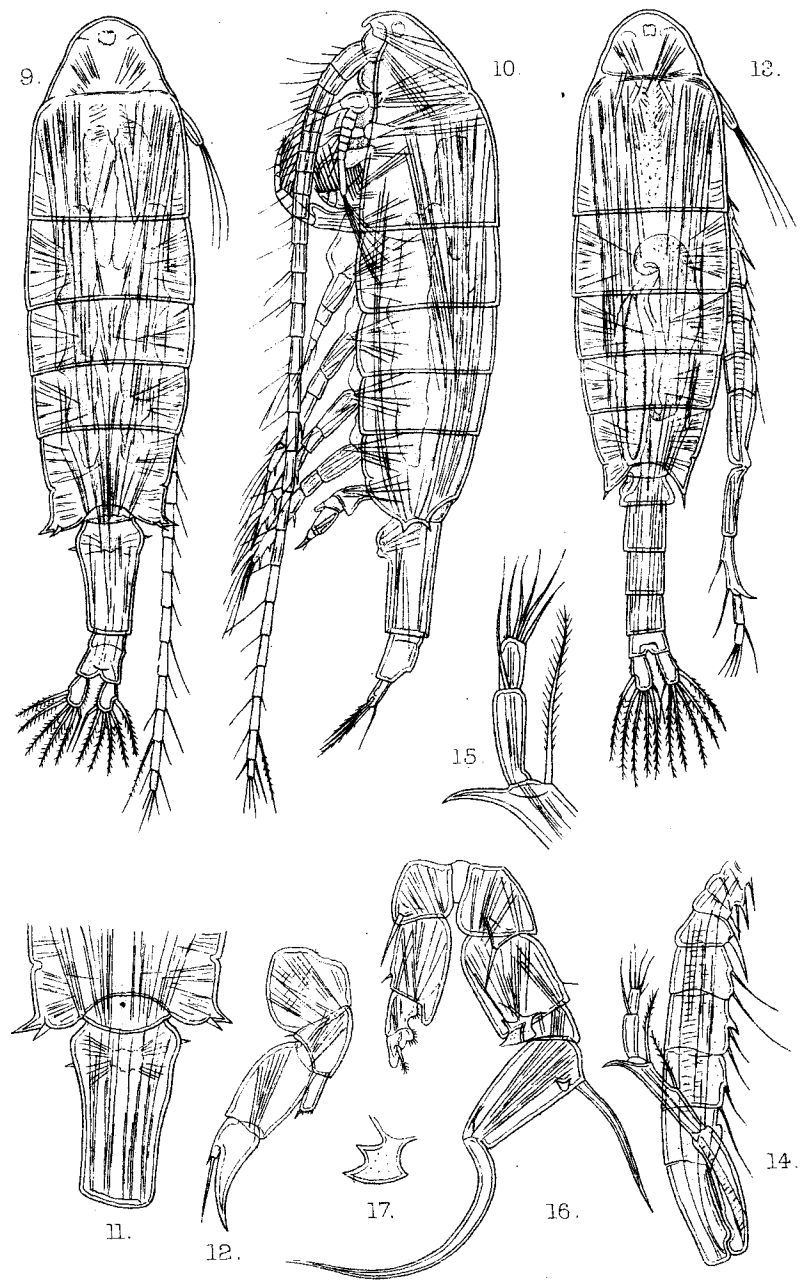
- Figs. 56-65. *Trypanoplasma gurneyorum*, from the Pike. 56, large form, from a preparation stained with Giemsa's stain, all the others from preparations stained with iron-haematoxylin; 56, osmic vapour, absolute alcohol; 57-61 & 63, sublimate-acetic (95:5); 62, 64, 65, Mann's picro-corrosive with formol.  
 Figs. 66-73. *Trypanoplasma keysselitzi*, from the Tench; all from preparations stained with iron-haematoxylin. 66-69, large forms; 70-73, ordinary forms; 66, Schaudinn's fluid; 67 & 70, sublimate-acetic (95:5); 68, 69, & 71-73, Mann's picro-corrosive with formol.  
 Figs. 74-76. *Trypanosoma tinca*, from the Tench, all from preparations stained with iron-haematoxylin; 74, Schaudinn's fluid direct; 75-76, Schaudinn's fluid preceded by exposure to osmic vapour.  
 Fig. 77. *Trypanoplasma abramidis*, from the Bream, sketched living.

## PLATE V.

- Figs. 78-93. *Trypanosoma granulolum*, from the Eel, all from preparations stained with iron-haematoxylin. 78-82 & 85-93, fixed with Mann's picro-corrosive-formol mixture; 83, 84, fixed with sublimate-acetic (95:5).  
 78-80. Small forms.  
 81-82. Medium-sized forms; in 82 only the posterior part figured, to show the double line in the undulating membrane, the outer line representing the flagellum, the inner line representing the limit of the extension of the endoplasm into the membrane.  
 83. Large form, anterior half, the stain but slightly extracted, showing the cytoplasmic granules; whole length of the flagellum not drawn.  
 84. Large forms, anterior half, stain under-extracted, showing the myonemes; whole length of the flagellum not drawn.  
 85. Large form.  
 86-93. Trophonuclei of different specimens, all from the same preparation, and all from large forms.

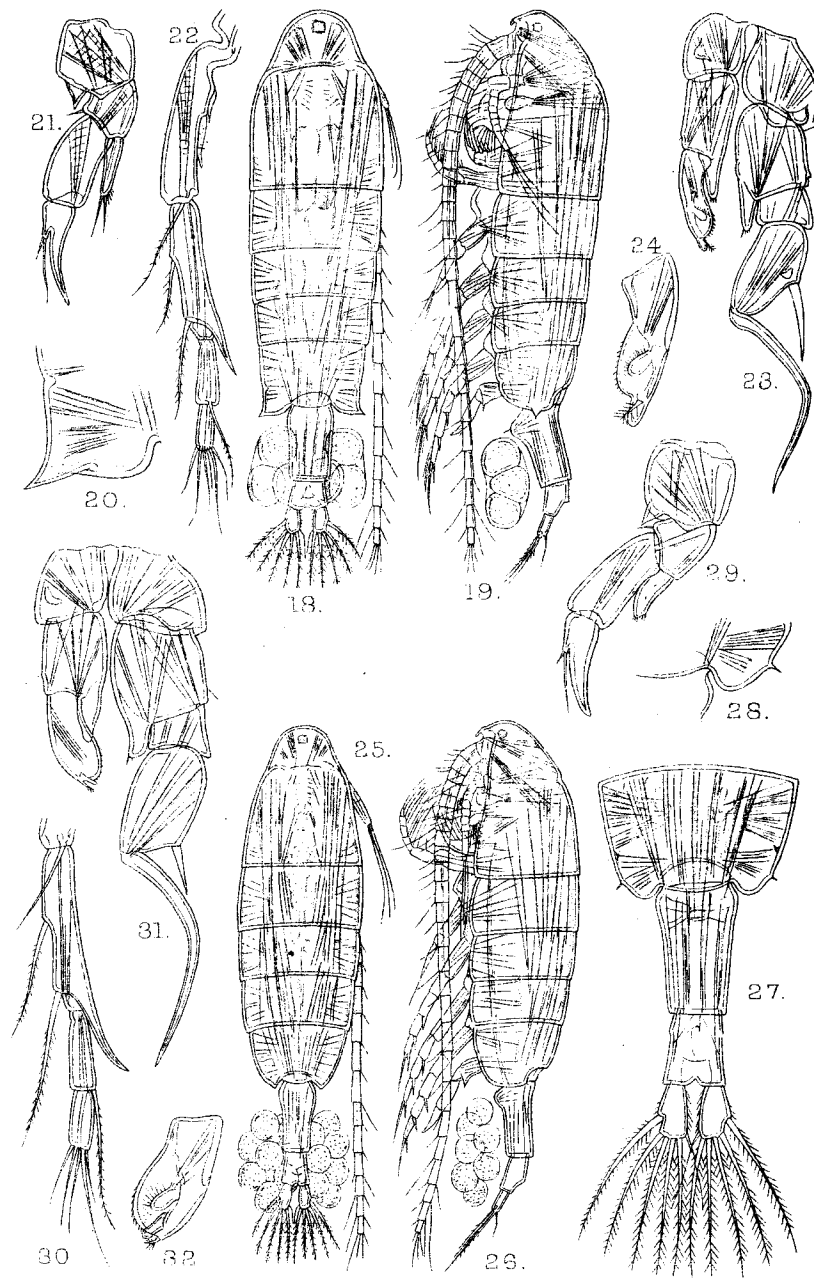


M.P. Parker lith.



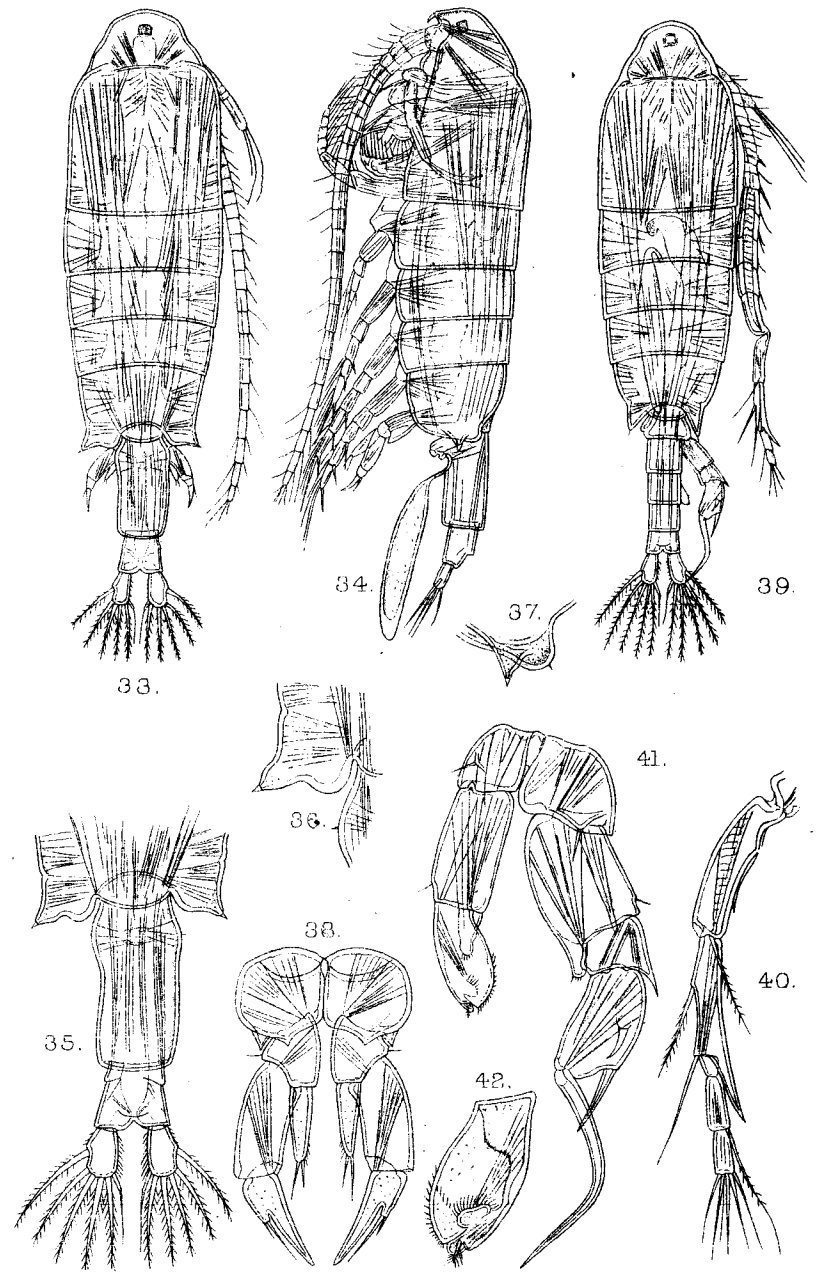
M. P. Parker del.

DIAPTOMUS MIXTUS, G. O. Sars.



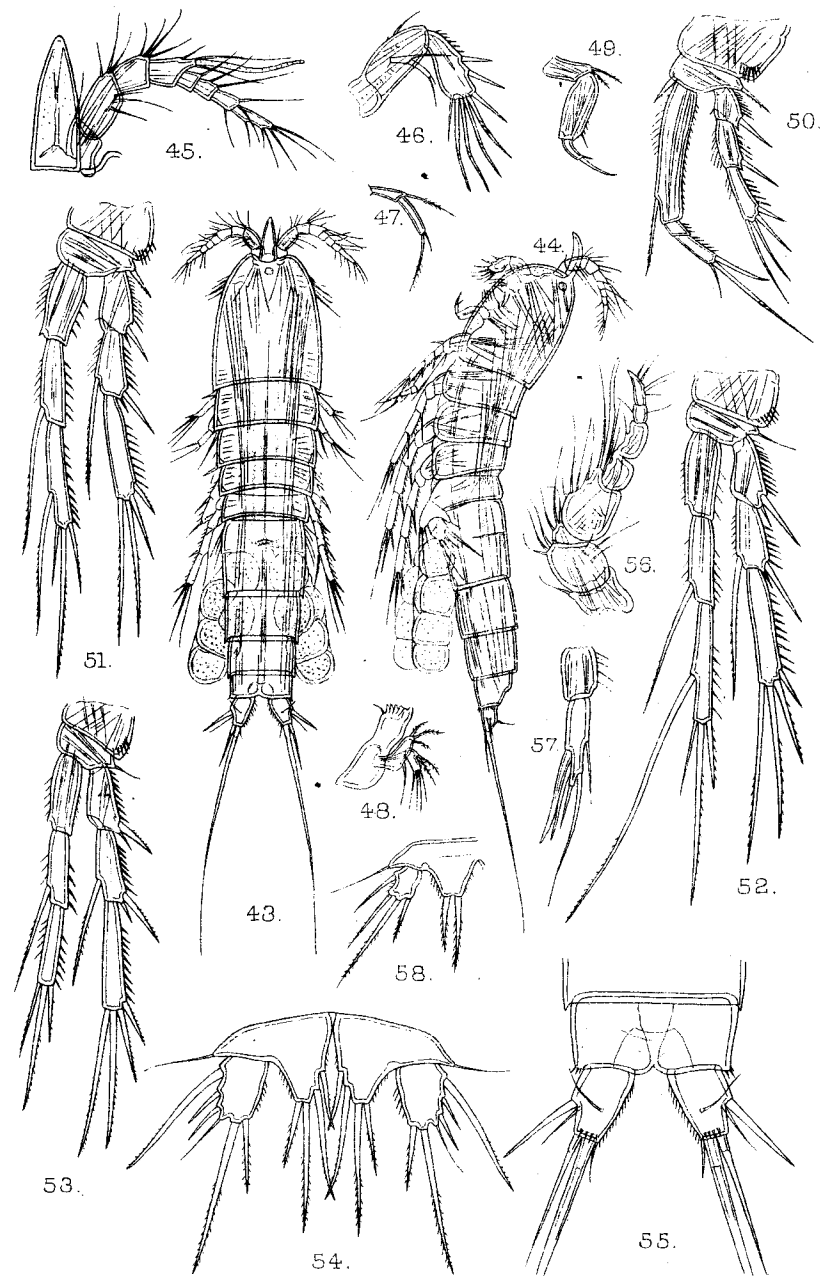
M. E. Parzer lith.

18-24. DIAPTOMUS STUHLMANNI, Mrázek.  
 25-32, DIAPTOMUS SIMPLEX, G. O. Sars.



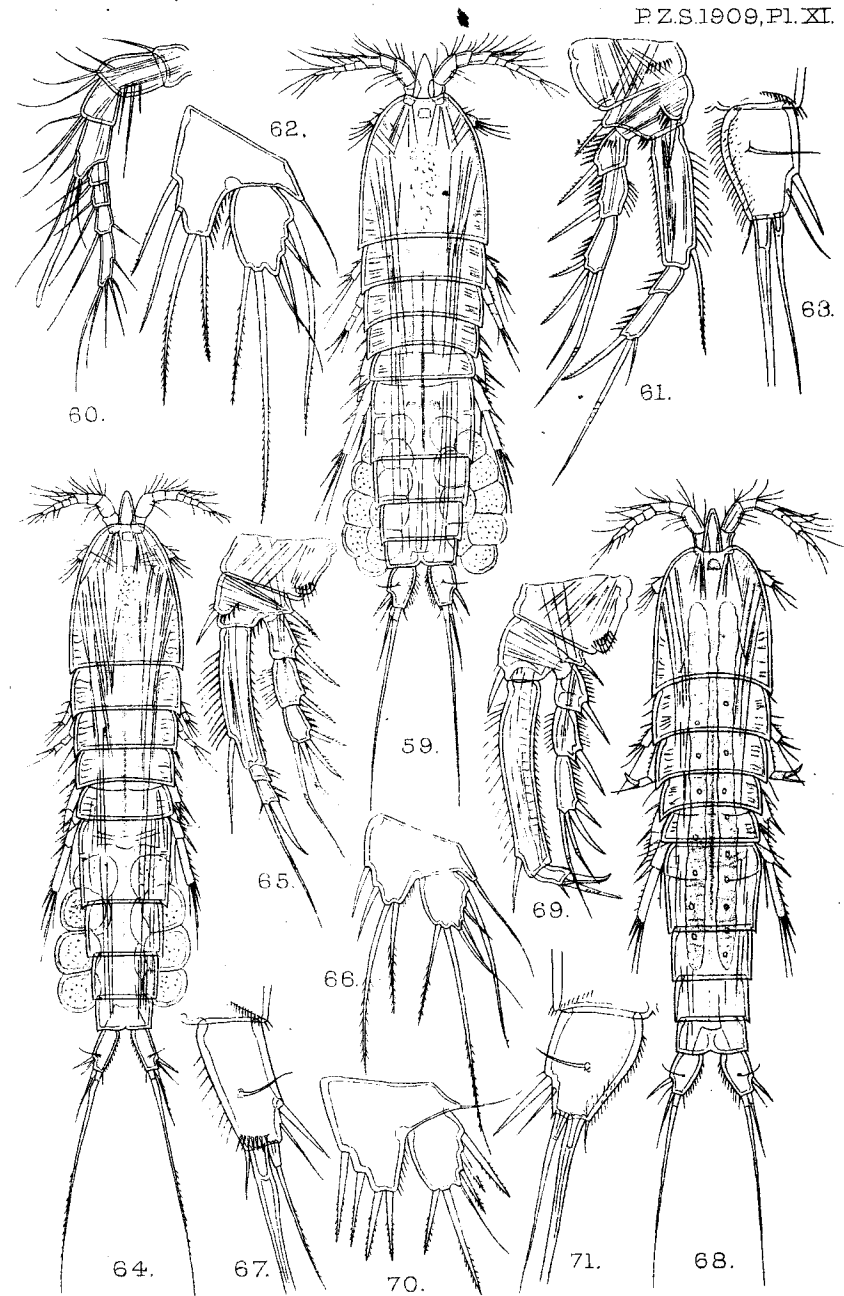
M.P. Parker lith.

DIAPTOMUS CUNNINGTONI, G. O. Sars.



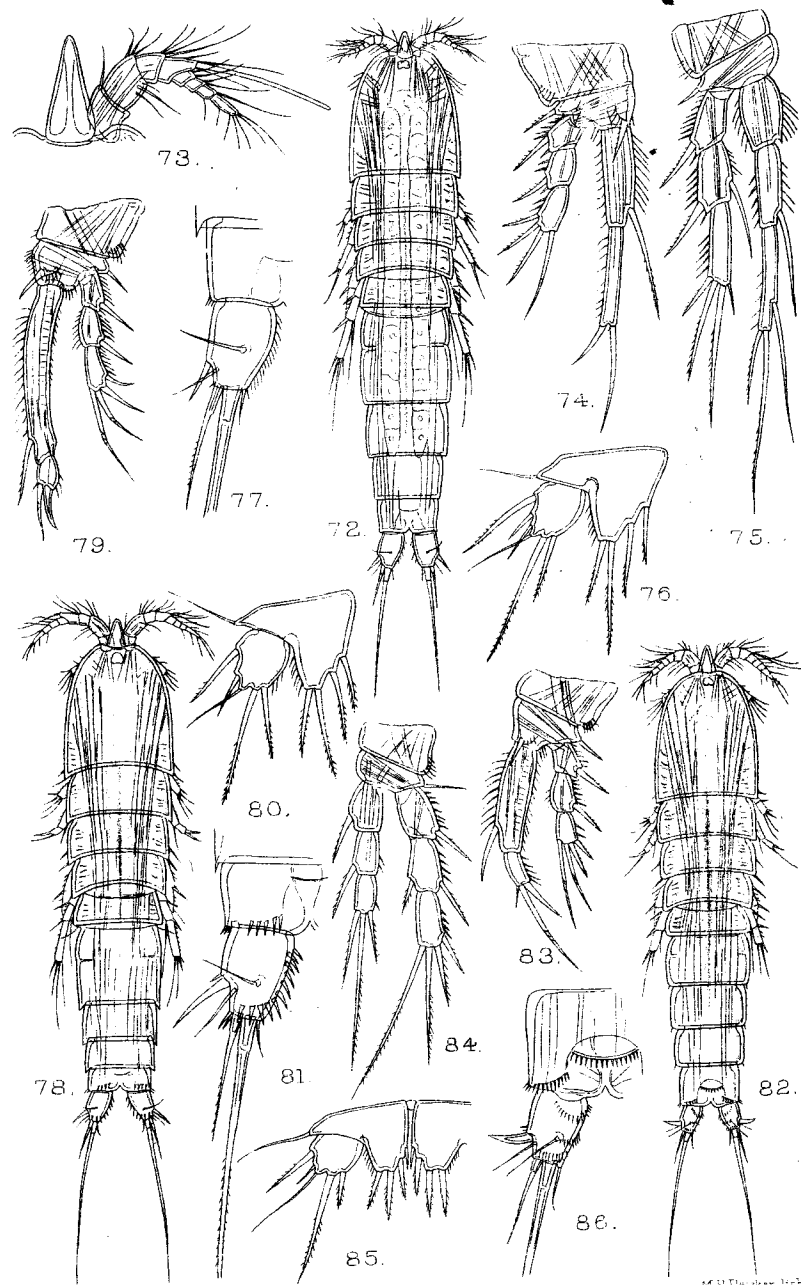
M. P. Parker, lith.

SCHIZOPERA INOPINATA, G. O. Sars.



59-63, SCHIZOPERA VALIDIOR, G. O. Sars.  
 64-67, SCHIZOPERA CONSIMILIS, G. O. Sars.  
 68-71, SCHIZOPERA UNGULATA, G. O. Sars.

M. P. Parker, lith.



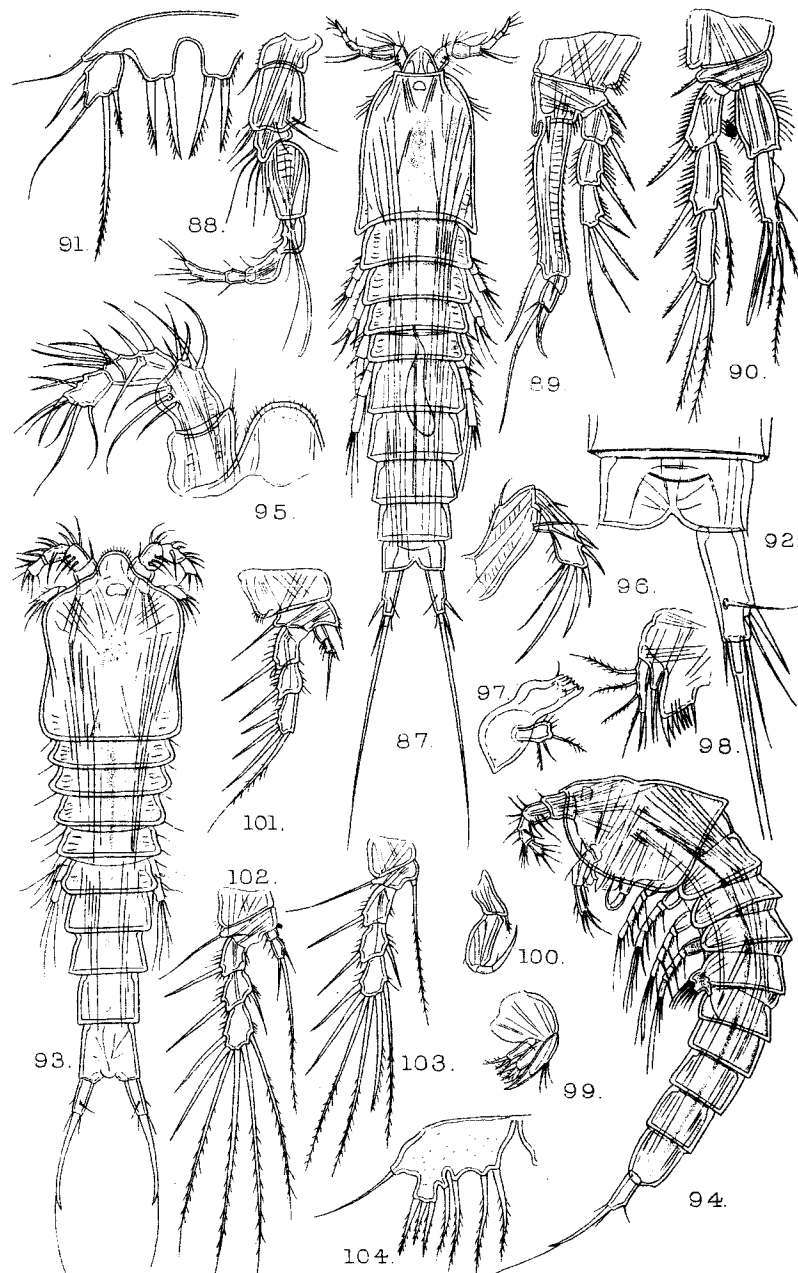
72-77, SCHIZOPERA MINUTICORNIS, G.O. Sars.

78-81, SCHIZOPERA SPINULOSA, G.O. Sars.

82-86, SCHIZOPERA FIMBRIATA, G.O. Sars.

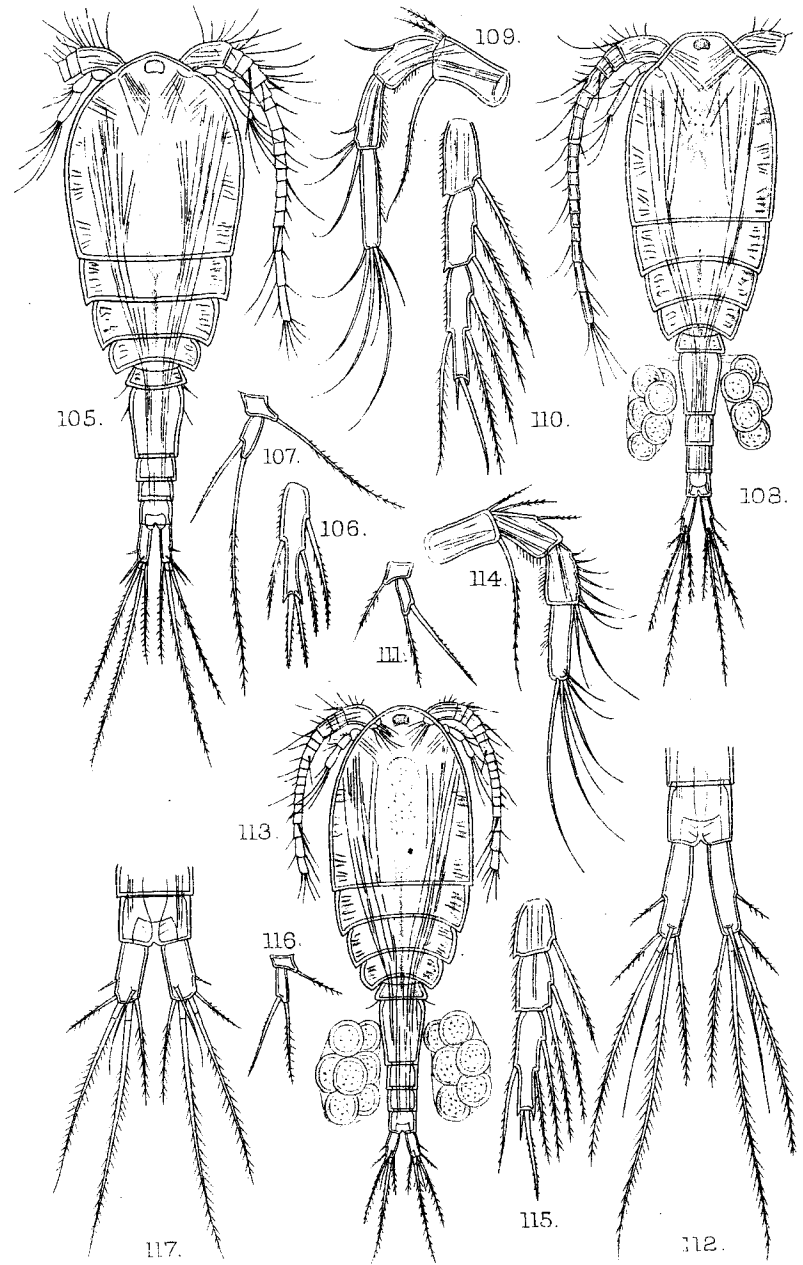
M.H. Packer del.



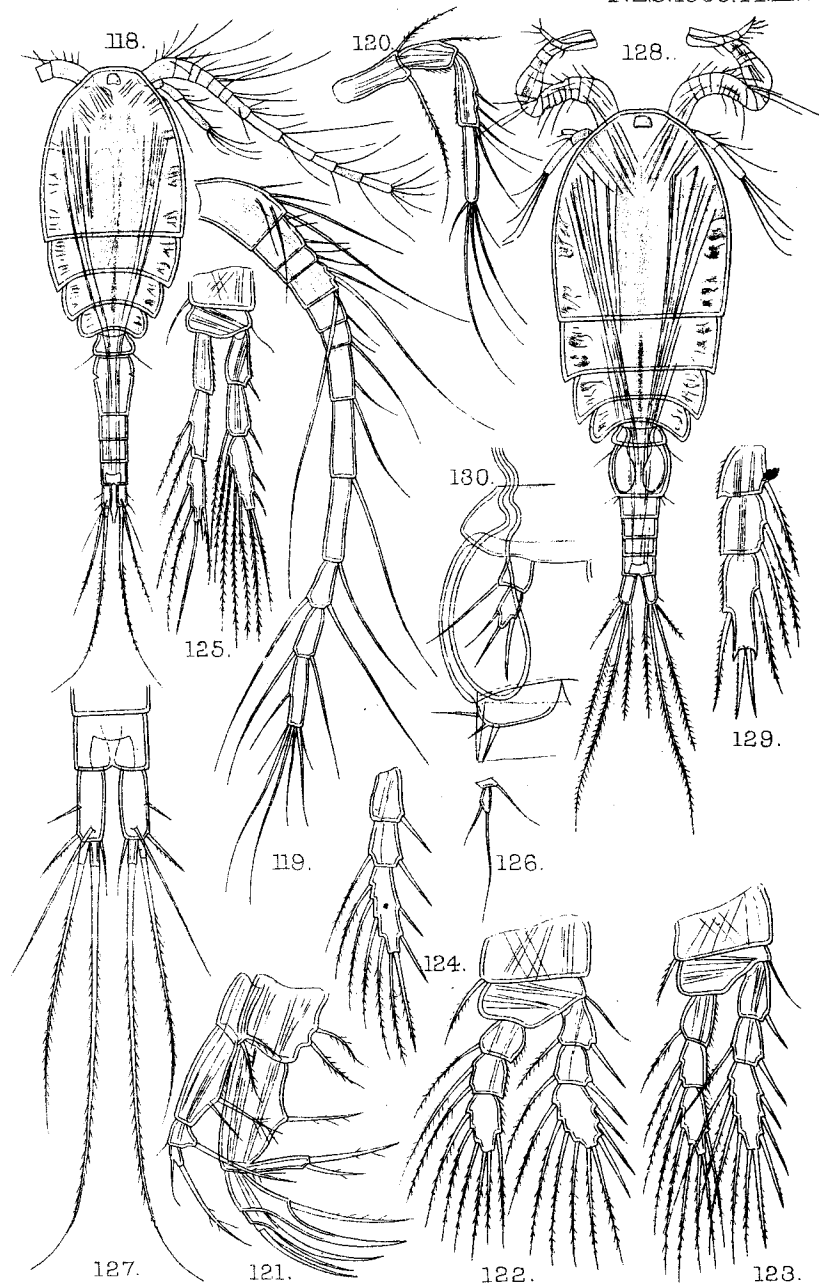


M. P. Parker lith.

87-92, SCHIZOPERA SCALARIS, G.O. Sars.  
 93-104, ILYOPHILUS PERPLEXUS, G.O. Sars.

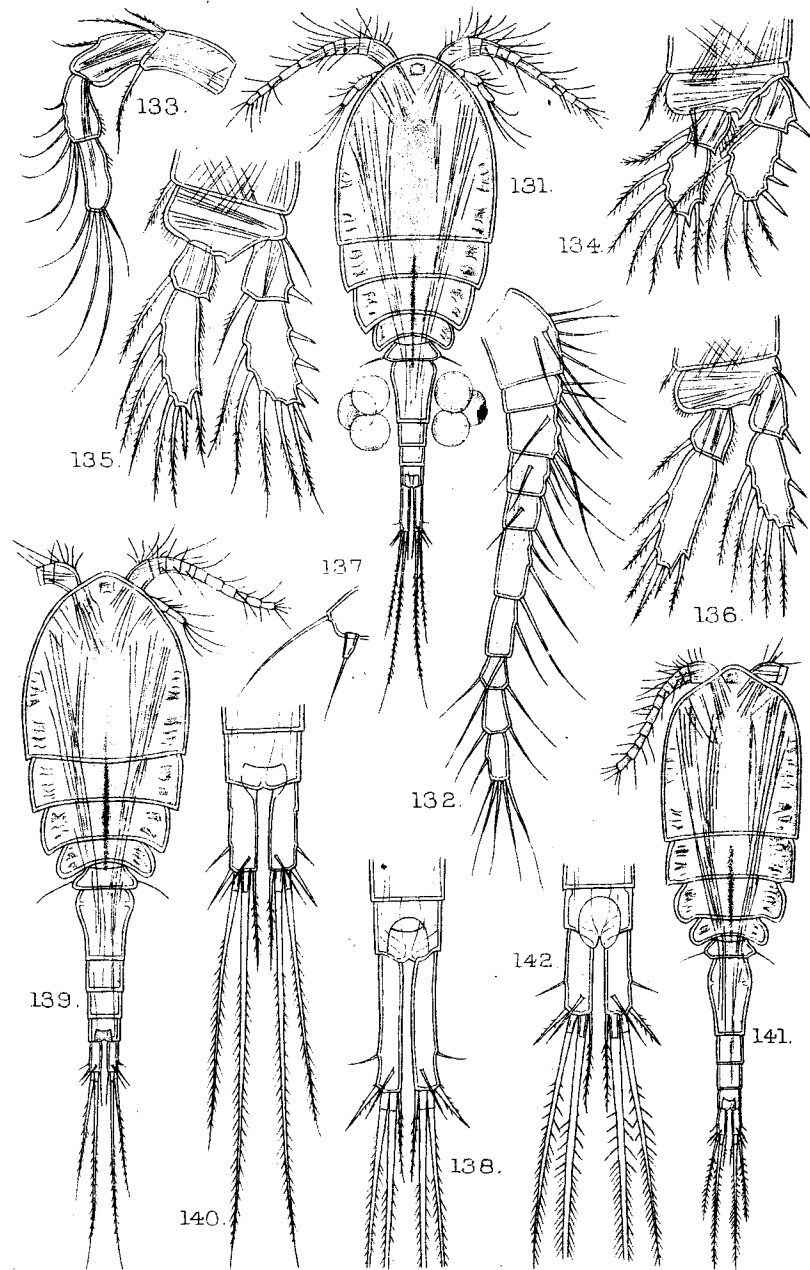


105-107, CYCLOPS LEUCKARTI, Claus. M. P. Packard Lab.  
 108-112, CYCLOPS EMINI, Mrázek.  
 113-117, CYCLOPS NEGLECTUS, G. O. Sars.



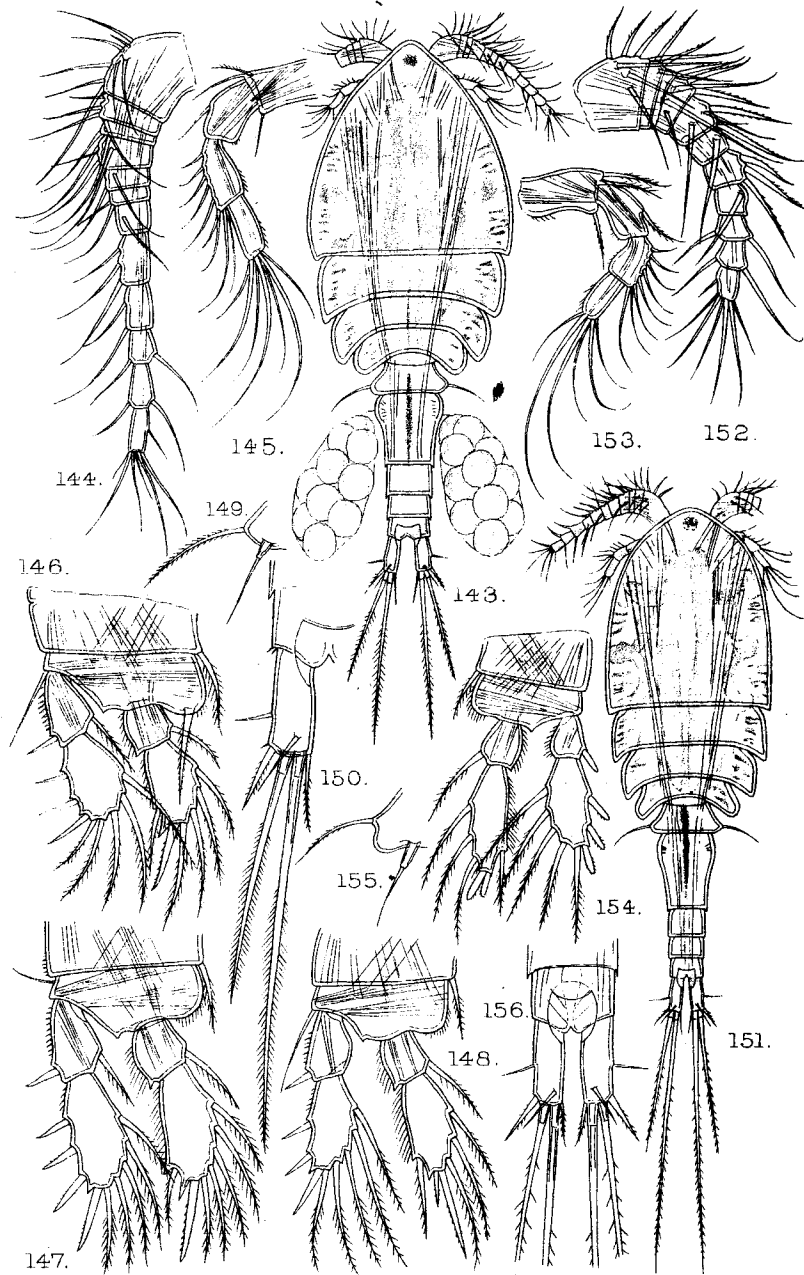
118-127, CYCLOPS TENELLUS, G. O. Sars.  
128-130, CYCLOPS ALBIDUS, (Jurine).

M. F. Parkes lith.



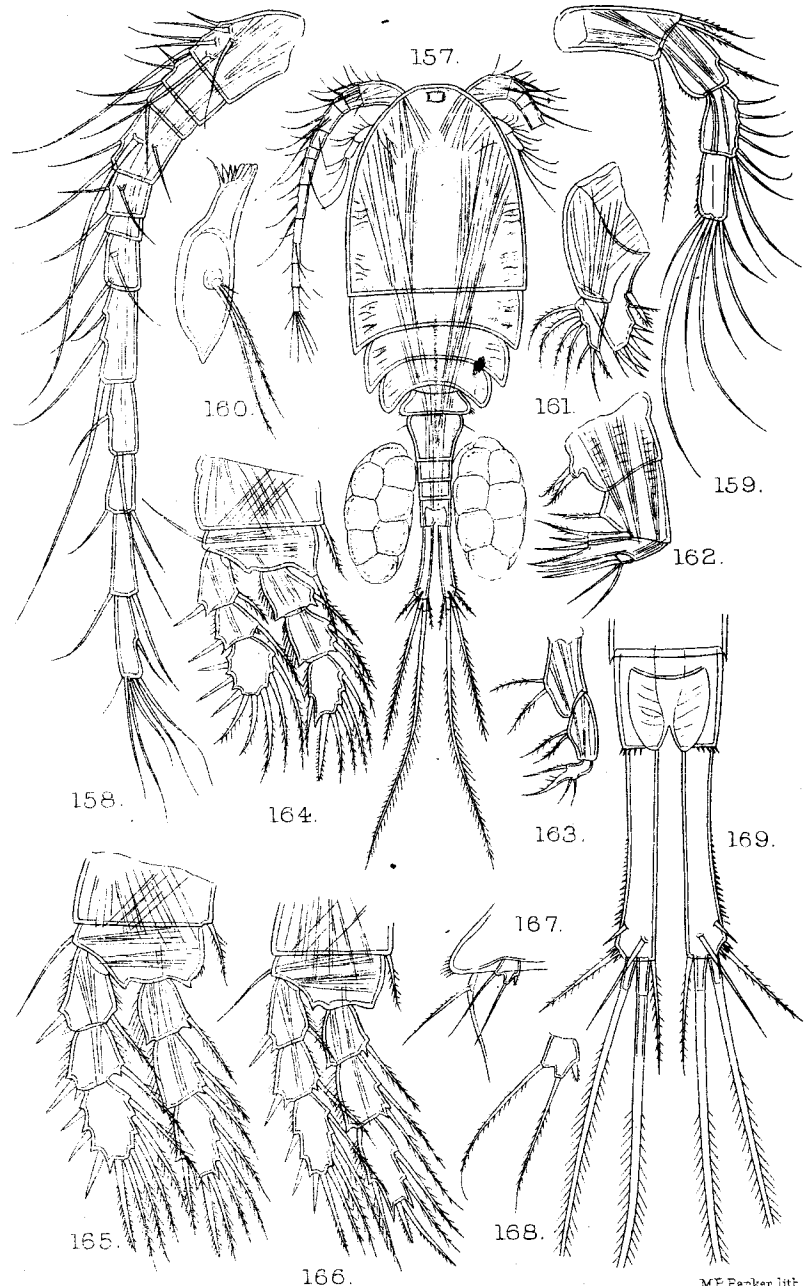
M.F.Parker lith.

131-138, CYCLOPS ATTENUATUS, G.O Sars.  
 139,140, CYCLOPS VARIGANS, G.O Sars.  
 141,142, CYCLOPS EXIGUUS, G.O Sars.



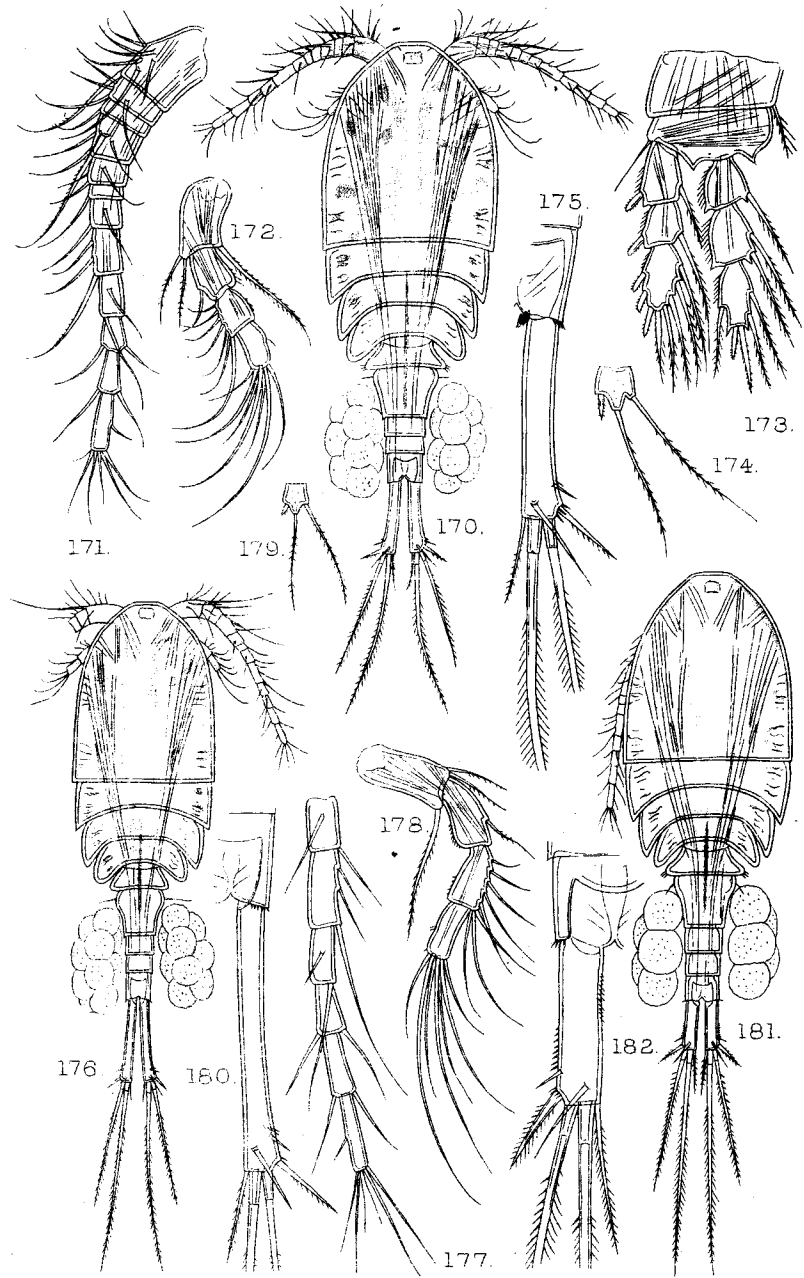
M.P. Parker lith.

143-150, CYCLOPS CUNNINGTONI, G.O. Sars.  
151-156, CYCLOPS PACHYCOMUS, G.O. Sars.



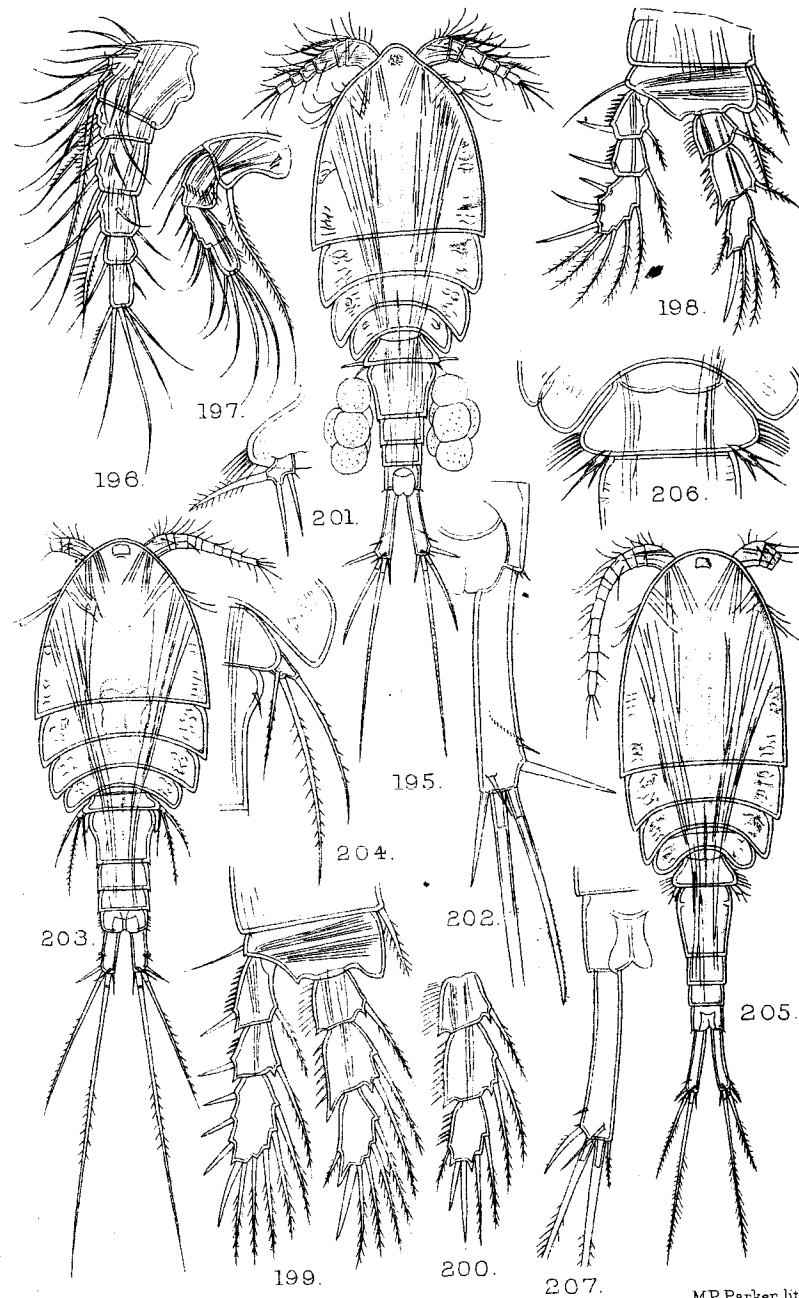
CYCLOPS SEMISERRATUS, G.O. Sars.

M.F. Parker lith.



M.F. Parker lith.

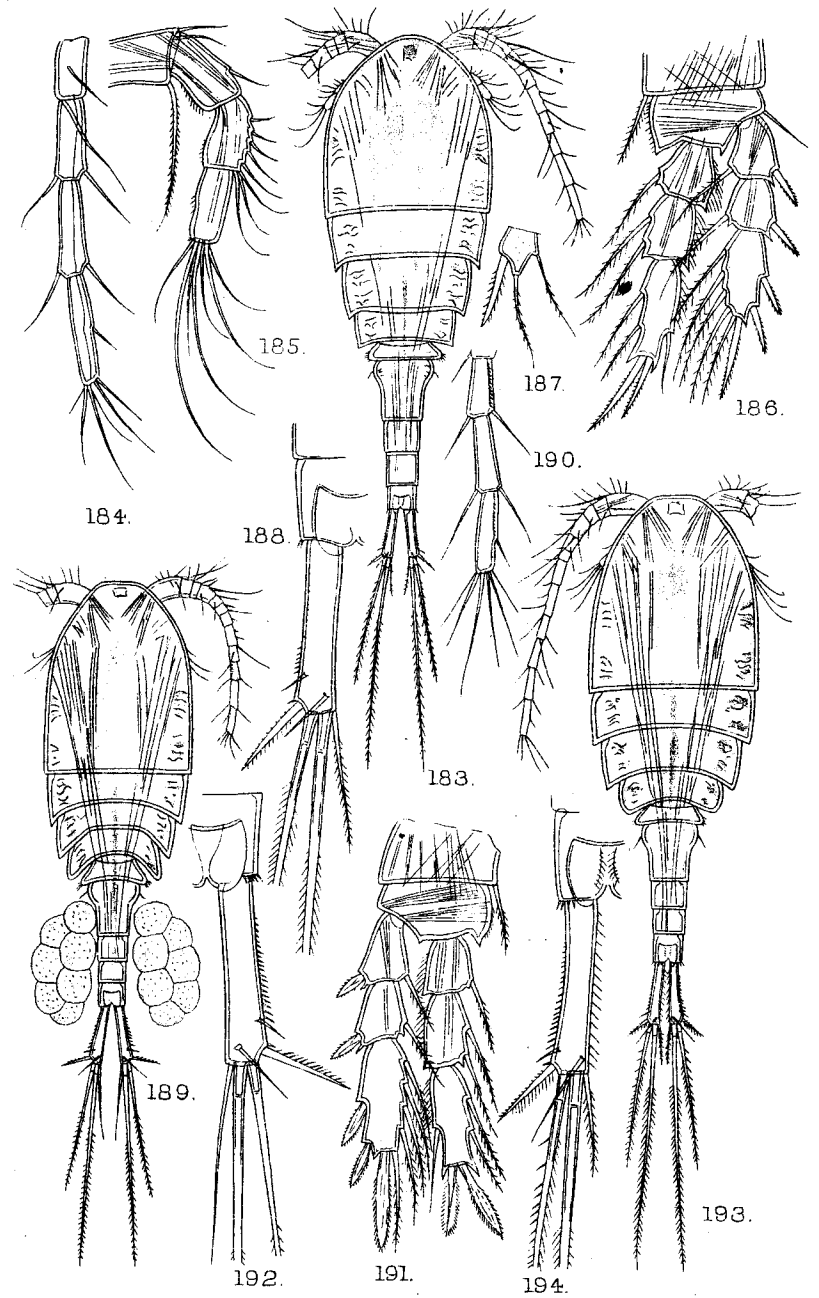
170-175, CYCLOPS LAEVIMARGO, G. O. Sars.  
176-180, CYCLOPS ANGUSTUS, G. O. Sars.  
181, 182, CYCLOPS RARISPINUS, G. O. Sars.



MP Parker lith.

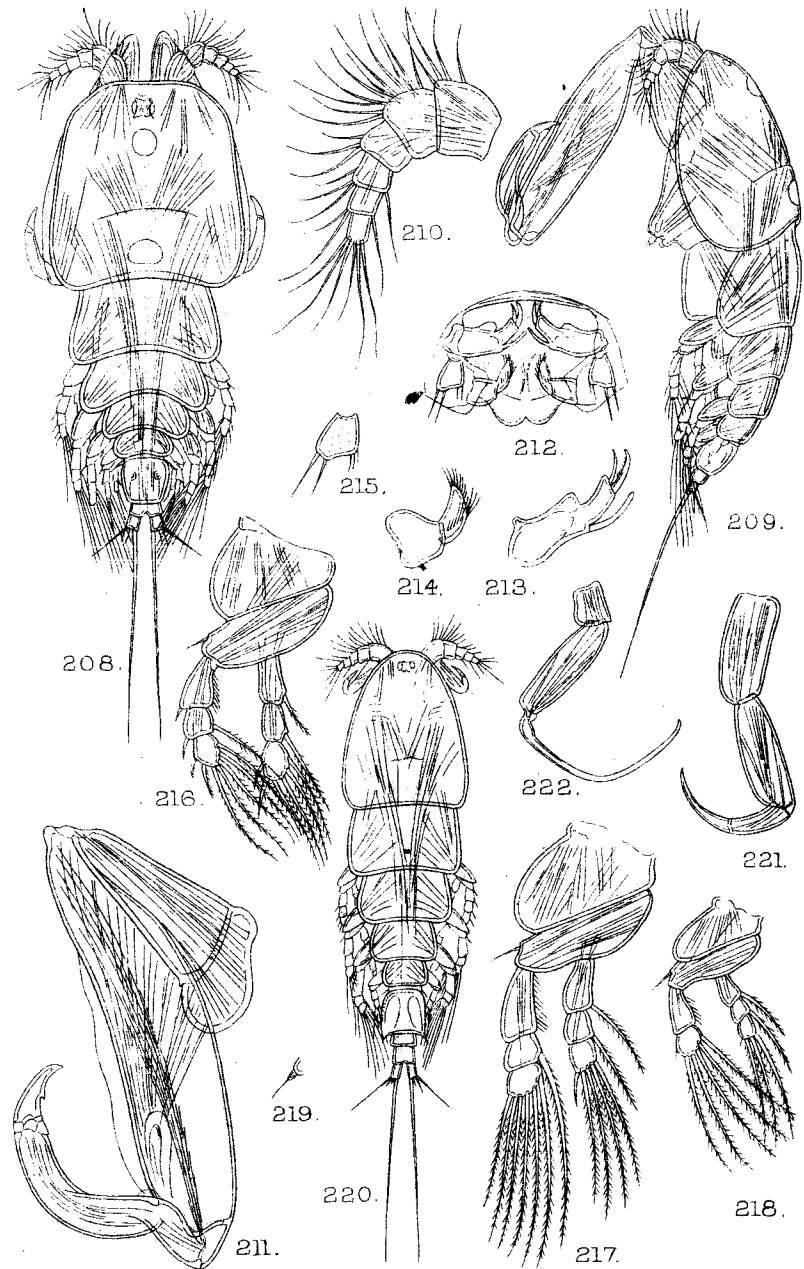
195-202, CYCLOPS OLIGARTHURUS, G.O.Sars.  
 203, 204, CYCLOPS COMPACTUS, G.O.Sars.  
 205-207, CYCLOPS DUBIUS, G.O.Sars.





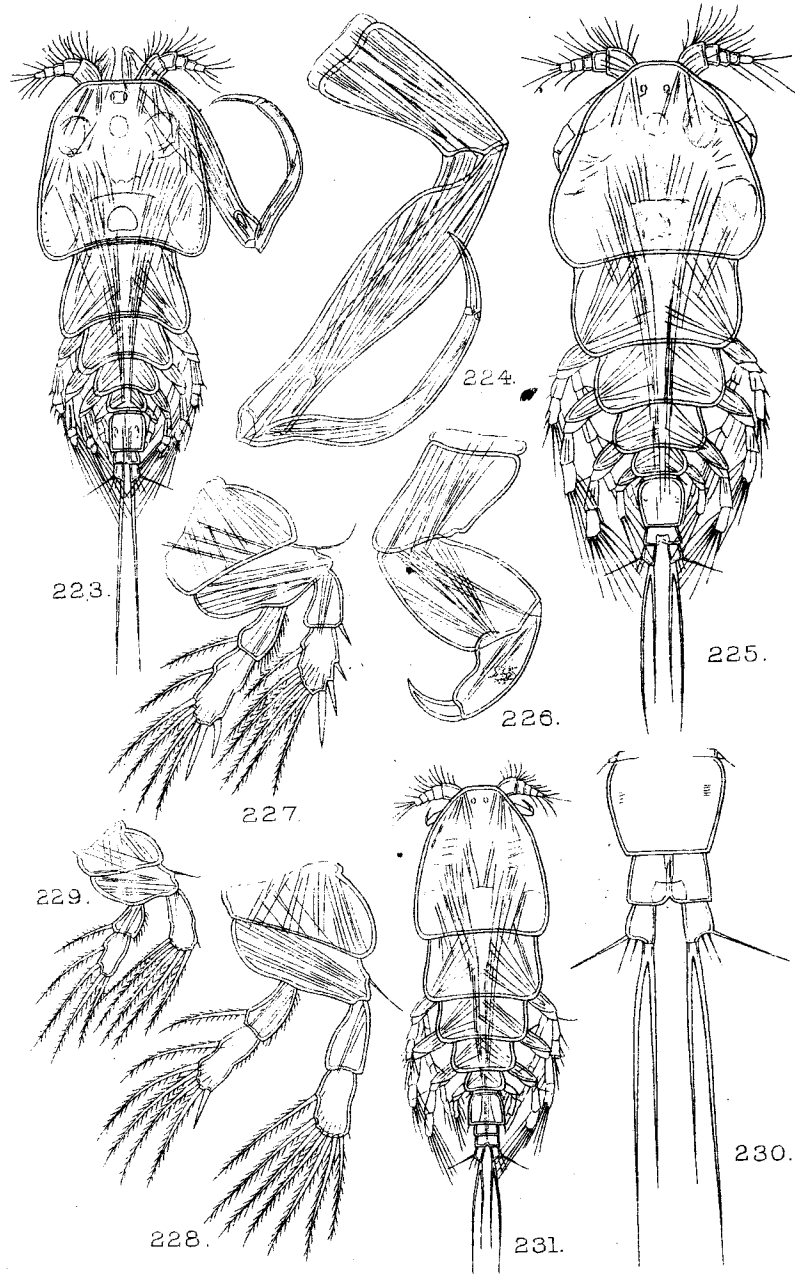
183-188, CYCLOPS AGILOIDES, G.O. Sars.  
 189-192, CYCLOPS EUACANTHUS, G.O. Sars.  
 193, 194, CYCLOPS CILIATUS, G.O. Sars.

M.P. Parber lith.



ERGASILOIDES MEGACHEIR, G.O. Sars.

M.F. Parker lith.



223, 224, ERGASILOIDES MACRODACTYLUS, G. O. Sars.  
225-231, ERGASILOIDES BREVIMANUS, G. O. Sars.

M.P. Parker lith.