CRUSTACEA : CLADOCERA

BY

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INTRODUCTION

G. O. Sars (1909), when reporting on a rich collection of copepods collected by W. A. Cunnington from Lake Tanganyika, remarked that there seemed to be a complete absence of Cladocera in the Lake. It is interesting, therefore, to note that the expedition made by the « Exploration hydrobiologique du Lac Tanganika », 1946-1947, contained no less than 27 species of Cladocera, 6 of them collected from the Lake itself, though only in shallow waters.

The other species come from inland waters, from Lake Kivu and a pond near Lake Edward.

LIST OF SPECIES.

Pseudosida szalayi Daday.
Diaphanosoma sarsi Richard.
Daphnia curvirostris Eylmann.
Simocephalus serrulatus (Koch).
Simocephalus exspinosus (Koch).
Ceriodaphnia cornuta Sars.
Moinodaphnia macleayi (King).
Moina dubia Guerne and Richard.
Moina sp. cf. *wierzejskii* Richard.
Ilyocryptus spinifer Herrick.
Macrothrix triserialis Brady.
Macrothrix goeldii Richard.
Grimaldina brazzai Richard.
Camptocercus rectirostris Schödler.
Acroperus harpae (Baird).
Kurzia longirostris (Daday).
Euryalona occidentalis Sars.
Oxyurella tenuicaudis Sars.
Alona affinis (Leydig).
Alona pulchella King.
Alona monacantha Sars.
Alona verrucosa Sars.
Alona diaphana King.
Graptoleberis testudinaria (Fischer).
Dunhevedia serrata Daday.
Pleuroxus chappuisi Brehm.
Chydorus eurynotus Sars.

Every one of the species found has a wide geographical distribution and although it is well known that the Cladocera are little restricted by geographical barriers, the Tanganyika species are much more cosmopolitan than was expected since most groups of fresh-water animals have a number of endemic species in the lake. G. O. Sars, for example, found that 30 out of the 38 species of free-living copepod described in the paper mentioned above were new to science. However, this is not all the case with the Cladocera. None of the species in the present collection is new to science and most of them are cosmopolitan to a greater or lesser extent. There is, indeed, not a single species which is not also known in some part of the world outside the African continent. *Simocephalus exspinosus*, *S. serrulatus*, *Graptoleberis testudinaria* and *Alona affinis* have been

found in all parts of the world, the last two species in particular being tolerant of all climatic conditions from the equatorial to the arctic. *Ceriodaphnia cornuta*, *Moinodaphnia macleayi*, *Ilyocryptus spinifer*, *Alona pulchella* and *Alona diaphana* are pan-tropical in distribution. The remaining species are found in one or more of the major geographical regions of the world, in addition to Ethiopia: the Palearctic, the Nearctic, the Neo-tropical, the Oriental, and the Australian. The detailed distribution of each species is given under the systematic account which follows.

Station n°	Date	Locality
A	8.XI.1946	Albertville baie, lavage de *Najas*.
B	25.XI.1946	Étang Kalumbe au Sud d'Albertville (en bordure du lac).
C	XI.1946	Étang non précisé sur les bords du lac Tanganika.
18	15.XII.1946	Baie de Kasoje, à l'embouchure de la rivière Lubulungu.
58	9.I.1947	Ujiji, étang au Nord et étang au Sud du chemin conduisant du mémorial Stanley-Livingstone au lac.
68	15-16.I.1947	Petite baie au Sud du cap Tembwe.
130	18.II.1947	Baie d'Utinta, dans la rivière Kafumbwe.
172	14.III.1947	Moba, à l'embouchure de la rivière Moba.
212	31.III.1947	Baie de Sumbu, à l'ancre.
253	18.IV.1947	Étang de Kaluwe, sur la crête d'Ubwari, transversale Baraka-Rumonge.
260	24.IV.1947	Étang Bangwe, en bordure du lac entre Kigoma et Ujiji.
283	7.V.1947	Costermansville, lac Kivu, à la sortie de la Ruzizi.
340	14.VIII.1947	Rivière Kibumbu, route de Kioko, exutoire du marais Ludjingi.
343	16.VIII.1947	Étang marécageux à Kioko Nyumba. Nom indigène : Bikoma.
345	17.VIII.1947	Étang marécageux à Kioko Nyumba. Nom indigène : Ludjinge.
347	20.VIII.1947	Rivière Katamba à Tengo.
505	20.VI.1947	Lac Kivu, à 300 m à l'Ouest de l'île située en face de Shangugu.
506	22.VI.1947	Lac Kivu, Katana, 200 m au large de la rive, devant la clinique Fomulac et récoltes le long des berges.
507	22.VI.1947	Katana, embouchures marécageuses canalisées de deux ruisseaux, jardin Fomulac.
509	22-23.VI.1947	Katana, étang de barrage dans la vallée au Sud de l'hôpital des noirs et cours d'eau affluents.
535	8.VIII.1947	Parc National Albert, plaine de la Ruindi, mare temporaire.

COMPOSITION OF THE SAMPLES.

STATIONS N°	SPECIES
A	*Macrothrix goeldii* RICHARD, 20 ♀♀.
	Alona pulchella KING, 12 ♀♀.
	Alona verrucosa SARS, 7 ♀♀.
B	*Diaphanosoma sarsi* RICHARD, 10 ♀♀.
	Ceriodaphnia cornuta SARS, 2 ♀♀.
	Moinodaphnia macleayi (KING), 3 ♀♀.
C	*Pseudosida szalayi* DADAY, 2 ♀♀.
	Ceriodaphnia cornuta SARS, 6 ♀♀.
	Moinodaphnia macleayi (KING), 15 ♀♀.
	Grimaldina brazzai RICHARD, 4 ♀♀.
	Kurzia longirostris (DADAY), 4 ♀♀.
	Diaphanosoma sarsi RICHARD, 10 ♀♀.
18	*Macrothrix goeldii* RICHARD, 1 ♀.
58	*Pseudosida szalayi* DADAY, 50 ♀♀, 81 ♂♂.
	Ceriodaphnia cornuta SARS, 10 ♀♀.
	Macrothrix triserialis BRADY, 2 ♀♀.
	Macrothrix goeldii RICHARD, 1 ♀.
	Alona diaphana KING, 2 ♀♀.
68	*Macrothrix triserialis* BRADY, 1 ♀.
130	*Macrothrix triserialis* BRADY, 6 ♀♀.
172	*Macrothrix goeldii* RICHARD, 1 ♀.
	Alona pulchella KING, 4 ♀♀.
212	*Alona diaphana* KING, 4 ♀♀.
	Dunhevedia serrata DADAY, 1 ♀.
253	*Simocephalus serrulatus* (KOCH), 9 ♀♀.
	Moina dubia GUERNE and RICHARD, 50 ♀♀.
	Moinodaphnia macleayi (KING), 12 ♀♀.
	Oxyurella tenuicaudis SARS, 1 ♀.
260	*Moinodaphnia macleayi* (KING), 10 ♀♀.
	Macrothrix triserialis BRADY, 9 ♀♀.
	Oxyurella tenuicaudis SARS, 2 ♀♀.
	Euryalona occidentalis SARS, 2 ♀♀.
	Camptocercus rectirostris SCHÖDLER, 1 ♀.
283	*Moina dubia* GUERNE and RICHARD, 30 ♀♀.
340	*Macrothrix triserialis* BRADY, 6 ♀♀.
	Ilyocryptus spinifer HERRICK, 3 ♀♀.
	Grimaldina brazzai RICHARD, 1 ♀.
	Alona affinis (LEYDIG), 1 ♀, 1 juv. ♀.
	Chydorus eurynotus SARS, 10 ♀♀.
343	*Graptoleberis testudinaria* (FISCHER), 2 ♀♀.
	Alona verrucosa SARS, 10 ♀♀.
	Alona affinis (LEYDIG), 6 ♀♀.
	Chydorus eurynotus SARS, 8 ♀♀.

STATIONS N°	SPECIES
345	*Macrothrix triserialis* BRADY, 2 ♀♀.
	Grimaldina brazzai RICHARD, 1 ♀.
	Alona verrucosa SARS, 2 ♀♀.
	Alona pulchella KING, 1 ♀.
	Alona monacantha SARS, 10 ♀♀.
	Macrothrix goeldii RICHARD, 1 ♀.
347	*Pleuroxus chappuisi* BREHM, 1 ♀.
	Acroperus harpae (BAIRD), 7 ♀♀.
505	*Daphnia curvirostris* EYLMANN, 2 ♀♀.
	Ceriodaphnia cornuta SARS, 10 ♀♀.
	Moina dubia GUERNE and RICHARD, 5 ♀♀.
506	*Ceriodaphnia cornuta* SARS, 7 ♀♀.
	Moina dubia GUERNE and RICHARD, 10 ♀♀.
507	*Simocephalus exspinosus* (KOCH), 8 ♀♀.
	Ceriodaphnia cornuta SARS, 5 ♀♀.
	Alona pulchella KING, 1 ♀.
	Moina dubia GUERNE and RICHARD, 1 ♀.
509	*Ceriodaphnia cornuta* SARS, 1 ♀.
535	*Moina* sp. cf. *wierzejskii* RICHARD, 2 ♀♀.

CRUSTACEA : CLADOCERA

Pseudosida szalayi Daday, 1898.

Pseudosida szalayi Daday, 1898, p. 64, figs. 33 *a-d*; Stingelin, 1904, p. 335, pl. 11, figs. 1-2.
Parasida szalayi Daday, 1910, p. 151, figs. 4 *a-c*.

Origin.

N° C : Étang non précisé sur les bords du lac Tanganika (XI.1946).

N° 58 : Ujiji, étang au Nord et étang au Sud du chemin conduisant du mémorial Stanley-Livingstone au lac (9.I.1947).

Specimens of this species were found in two of the samples. In the first (N° C), there were two large females, 1,4 mm long. In the other tube (N° 58) there were many smaller females with eggs, also a few males. The setae of the edge of the shell shown by T. Stingelin, could not be seen, presumably because they had been broken off. E. Daday (1910) records it in many places round Lake Nyasa, and there are specimens in the British Museum collected from the mouth of the Kirando River, Tanganyika. *Pseudosida szalayi* is also known from Ceylon, Sumatra and Siam. The species most often found in various parts of Africa is *P. bidentata*.

Diaphanosoma sarsi Richard, 1895.

(Figs. 1, 2.)

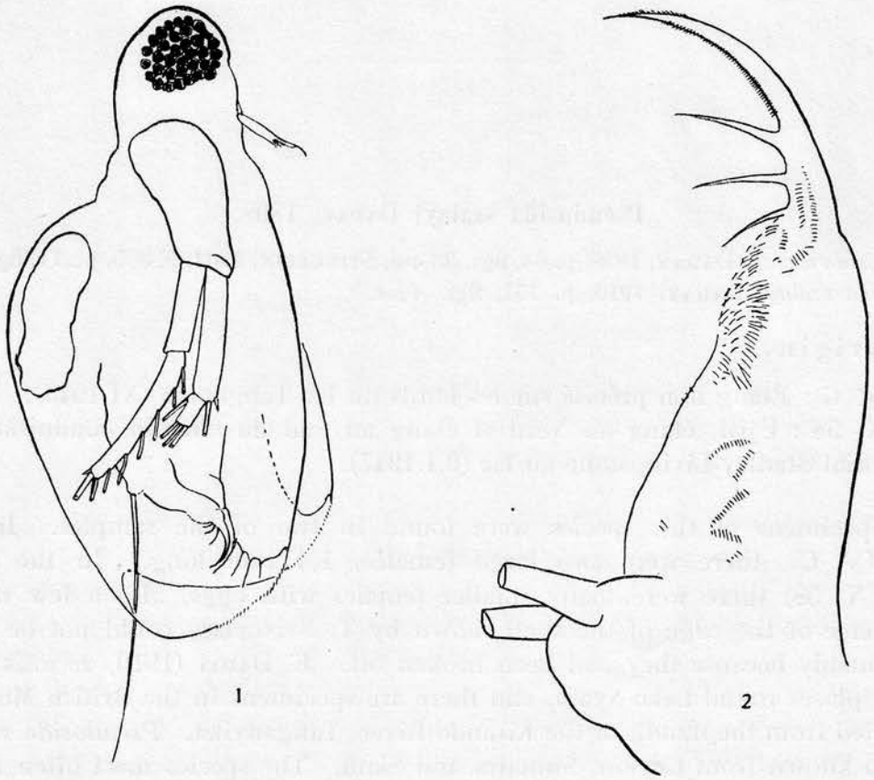
Diaphanosoma sarsi Richard, 1895 *a*, p. 568, figs. 4-5, 1895 *b*, p. 365, pl. 15, figs. 1, 8; Daday, 1901, p. 41, fig. 19; Stingelin, 1904, p. 338, pl. 11, figs. 5-8; Sars, 1901, p. 10, pl. 2, figs. 1-10; Bar, 1924, p. 87, figs. 1-3; Jenkin, 1929, p. 247, fig. *x*; Uéno, 1932, p. 244, fig. 2; Brehm, 1933 *a*, p. 653, figs. 2, 5, pl. 78, figs. 6-10, pl. 79, figs. 11-14, pl. 80, figs. 15-16; Uéno, 1938, p. 126, fig. 3.
Diaphanosoma singalense Daday, 1898, p. 62, fig. 32.

Origin.

N° B : Étang Kalumbe, au Sud d'Albertville (en bordure du lac) (25.XI.1946).

N° C : Étang non précisé sur les bords du lac Tanganika (XI.1946).

A few specimens of this species were found in two of the samples from Lake Tanganyika (samples Nos 1 and 12). The precise shape of the head is difficult to determine in preserved material, but the specimens agree very well with the description of *D. sarsi* as shown by the lateral view given in figure 1. The



FIGS. 1, 2. — *Diaphanosoma sarsi* RICHARD.
1. Adult female, × 80. 2. Tail, × 500.

arrangement of some very fine hairs on the tail is shown in figure 2. *D. sarsi* was first described from Sumatra and is known from many localities in the East Indies, New Guinea, Ceylon, Brazil, Paraguay, the New Hebrides, China and Formosa. J. RICHARD (1895 *b*) found some specimens from the French Congo very near to *D. sarsi*, but with antennae reaching to the hinder edge of the carapace. H. GAUTHIER (1951) has described a form *leptocephalum* from Senegal, but the species which is most often found in Africa is *D. excisum* including its varieties *stingelini* JENKIN and *owenae* HARDING.

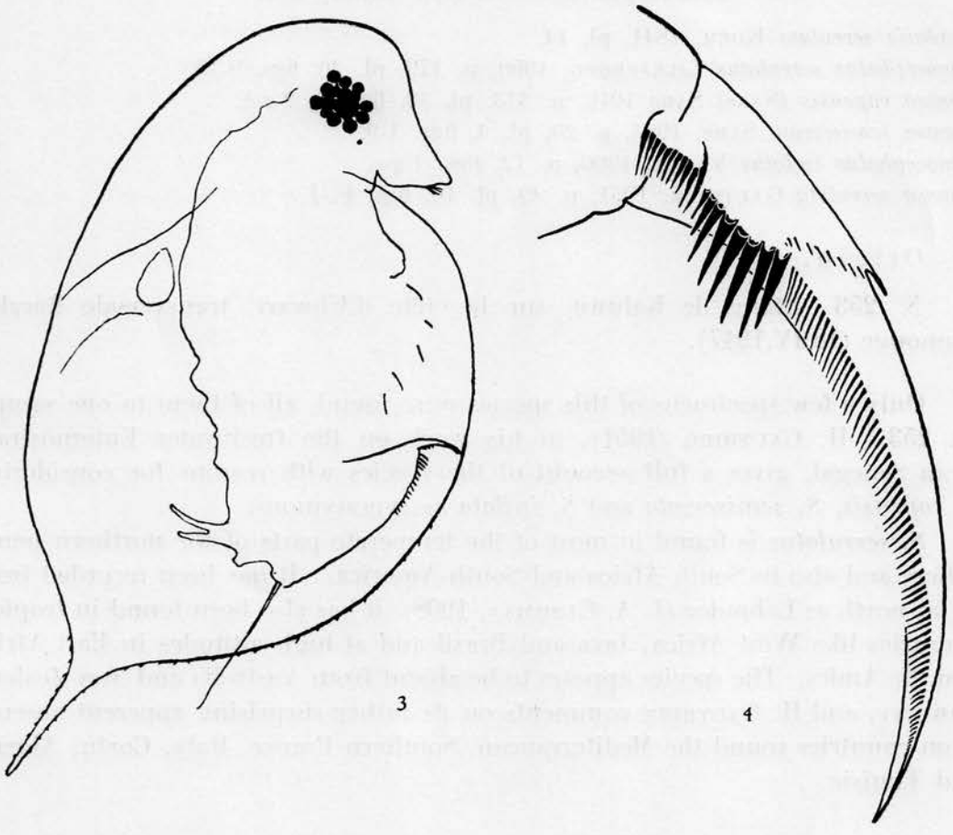
Daphnia curvirostris Eylmann, 1886.

(Figs. 3, 4.)

Daphnia curvirostris Eylmann, 1886, p. 17, pl. 3, figs. 7-8; Richard, 1896, p. 264, pl. 25, figs. 7, 15, 16, 17; Johnson, 1952, p. 448, figs. 4 *b*, 6 *a*, *b*, *d*.

Origin.

N° 505 : Lac Kivu, à 300 m à l'Ouest de l'île située en face de Shangugu (20.VI.1947).



Figs. 3, 4. — *Daphnia curvirostris* Eylmann.
3. Female, × 80. 4. Claw of tail showing combs, × 850.

The genus *D. curvirostris* was represented in the collection by only two specimens, both being females in sample St. 505 from Lake Kivu.

In E. Eylmann's original description, and also in J. Richard's too much emphasis was placed on the shape of the rostrum of *D. curvirostris*, and in the Kivu specimens this is not typically developed but short like that of *D. pulex* (fig. 3). In all other features, however, the specimens agree very

well with D. S. Johnson's (1952) re-description of the species. The antennule is vestigal and the abdominal processes are naked (fig. 3). The number of teeth in the two combs at the base of the comb comes within the range given by D. S. Johnson, 11 in the proximal comb and 8 in the distal one (fig. 4).

The species is known from North and South America and Europe, but owing to frequent confusion with *D. pulex*, the full geographical distribution of the species is still to be determined.

Simocephalus serrulatus (Koch, 1841).

Daphnia serrulata Koch, 1841, pl. 14.
Simocephalus serrulatus Lilljeborg, 1900, p. 179, pl. 26, figs. 9-16.
Simosa capensis (Sars) Sars 1916, p. 313, pl. 32, figs. 2, 2 *a-b*.
Simosa semiserrata Sars, 1901, p. 23, pl. 4, figs. 1-9.
Simocephalus inflatus Vavra, 1900, p. 12, figs. 1 *a-c*.
Simosa serrulata Gauthier, 1951, p. 49, pl. 10, figs. F.-J.

Origin.

N° **253** : Étang de Kaluwo, sur la crête d'Ubwari, transversale Baraka-Rumonge (18.IV.1947).

Only a few specimens of this species were found, all of them in one sample St. **253**. H. Gauthier (1951), in his work on the freshwater Entomostraca from Senegal, gives a full account of the species with reasons for considering *S. capensis*, *S. semiserrata* and *S. inflata* as synonymous.

S. serrulatus is found in most of the temperate parts of the northern hemisphere and also in South Africa and South America. It has been recorded from as far north as Labrador (J. A. Cushman, 1908), it has also been found in tropical countries like West Africa, Java and Brazil and at high altitudes in East Africa and the Andes. The species appears to be absent from Australia and New Zealand however, and H. Gauthier comments on its rather surprising apparent absence from countries round the Mediterranean, Southern France, Italy, Corfu, Algeria and Tunisia.

Simocephalus exspinosus (Koch, 1841).

Daphnia exspinosa Koch, 1841, pl. 11.
Simocephalus exspinosus Lilljeborg, 1900, p. 173, pl. 25, figs. 8-18, pl. 26, figs. 1-8.
Daphnia australiensis Dana, 1853, p. 1271, pl. 89, figs. 4, *a-e*.
Simocephalus australiensis Sars, 1888, p. 15, pl. 2, figs. 1-5.
Simosa australiensis Sars, 1916, p. 311, pl. 31, figs. 3, 3 *a-b*.

Origin.

N° **507** : Katana, embouchures marécageuses canalisées de deux ruisseaux, jardin Fomulac (**22**.VI.1947).

Eight rather immature specimens with their shapes rather badly preserved were present in sample St. 507 from Lake Kivu. The posterior dorsal edge of the shell was rather smoother than usual in these specimens but as they are evidently immature, no great significance can be placed on this.

S. exspinosus is a cosmopolitan species. G. O. Sars (1888) considered that the species in Australia differed from that in Europe, in the shape of the shell, in the width of the tail and in the armature of the claw and gave them J. M. Dana's name *S. australiensis*. In 1916, he described specimens from South Africa which he identified with the Australian form, but he now considered that the species *S. australiensis* and *S. exspinosus* differed only in the shape of the shell. I have examined specimens from Australia, South Africa and Great Britain and I am convinced that none of the differences G. O. Sars gave are sufficient to enable specimens from different countries to be seperated and that until a character or characters are found which will enable this to be done, they should all be considered to belong to one species, *S. exspinosus*. There has been a tendency for systematists to name any specimen of *Simocephalus* which has a comb, *S. australiensis* if it has come from the Australian or African regions and *S. exspinosus* if it is from the northern hemisphere. This misleading practice gives the impression that there are two well defined geographical subspecies, when the only evidence is unsubstantiated opinion.

Ceriodaphnia cornuta Sars, 1885.

(Figs. 5, 6.)

Ceriodaphnia cornuta Sars, 1885, p. 26, pl. 5, figs. 1-3; Gauthier, 1951, p. 55, pls. 11 and 12.

Ceriodaphnia rigaudi Richard, 1894, p. 239; Sars, 1916, p. 319, pl. 34, figs. 3, 3 *a*, *b*; Jenkin, 1934, p. 144, figs. 3-6.

Origin.

N° B : Étang Kalumbe au Sud d'Albertville (en bordure du lac) (25.XI.1946).

N° C : Étang non précisé sur les bords du lac Tanganika (XI.1946).

N° 58 : Ujiji, étang au Nord et étang au Sud du chemin conduisant du mémorial Stanley-Livingstone au lac (9.I.1947).

N° 505 : Lac Kivu, à 300 m à l'Ouest de l'île située en face de Shangugu (20.VI.1947).

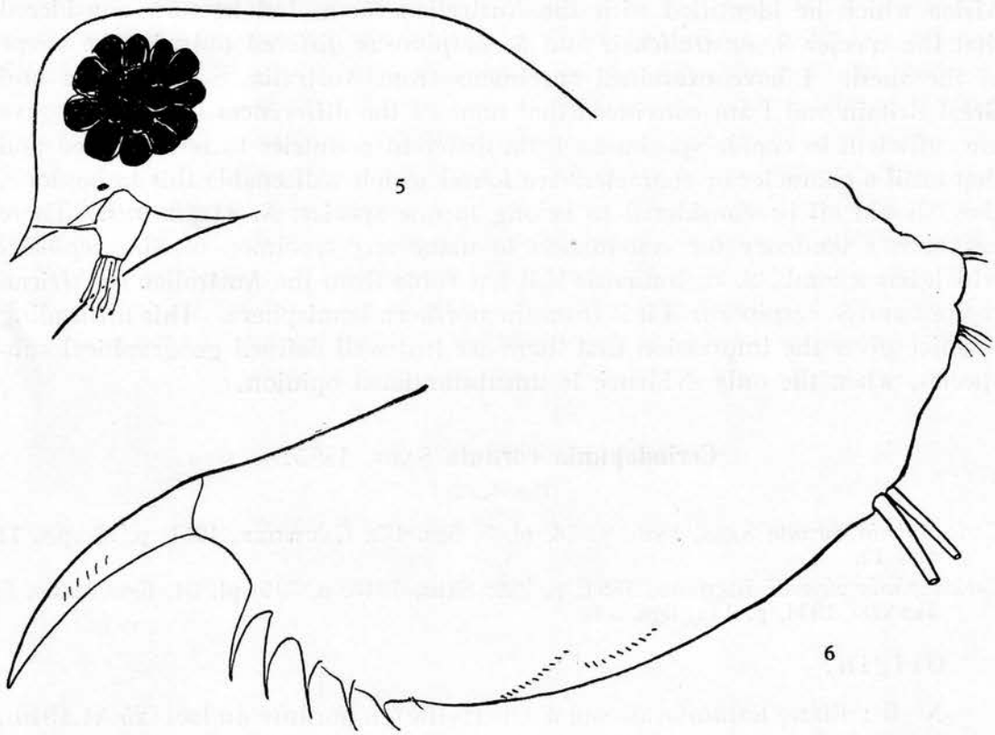
N° 506 : Lac Kivu, Katana, 200 m au large de la rive, devant la clinique Fomulac et récoltes le long des berges (22.VI.1947).

N° 507 : Katana, embouchures marécageuses canalisées de deux ruisseaux, jardin Fomulac (22.VI.1947).

N° 509 : Katana, étang de barrage dans la vallée au Sud de l'hôpital des noirs et cours d'eau affluents (22-23.VI.1947).

A number of females were found in samples St. 505, 506, 507, 509 from Lake Kivu and also in samples St. C, 12 and 58 which were taken from parts of Lake Tanganyika or near to it.

In this paper I am on the side of those who consider that *C. rigaudi* is a synonym to *C. cornuta*. H. GAUTHIER (1951) has reviewed the controversy and gives a careful analysis of specimens from Senegal where, as in many other tropical places, the horned and unhorned forms of them occur in the same sample. The species is widely distributed in equatorial and tropical parts of the world and in these regions both horned and unhorned populations are found, as well as mixed populations. In the northern limits of its range only the



FIGS. 5, 6. — *Ceriodaphnia cornuta* SARS.
5. Head of female, × 430. 6. Tail, × 850.

unhorned form is usually found. For example, H. GAUTHIER has only found unhorned specimens in Algeria and Tunisia. A. L. BEHNING, 1941, states that specimens from the southern republics of the U.S.S.R., Georgia, Armenia and Uzbekistan, show no trace of a horn and the same is probably true of Manchuria and also of the southern states of the U.S.A.

The only exception I can find is M. UÉNO's form from Japan which in addition to a frontal horn has a more posterior spine — a « nachenzahn » (M. UÉNO, 1932). H. GAUTHIER points out that the young stages are without horns and suggests that under certain conditions the animal matures « prematurely », that is before the horn has had time to develop and he gives some evidence

from careful measurements of specimens from a mixed population in which he shows that specimens without horns are on the whole a little smaller than specimens with horns. Unfortunately, he does not consider P. M. JENKIN's (1934) suggestion that two species *C. cornuta* and *C. rigaudi* can be separated, not on the basis of the presence or absence of the horn, but on other characters, the length of the antennule and the position of its lateral seta and of the number of anal spines.

In the present specimens, I have found no trace of a horn and the number of anal spines is 5, 6 or at most 7 (fig. 6). These characters are among those for *C. rigaudi* as defined by J. RICHARD in his original description. The length of the antennule is short relative to that of the rostrum (fig. 5), but the position of the lateral seta I have found to be rather variable.

Moinodaphnia macleayi (KING, 1853).

Moina macleayii KING, 1853 *a*, p. 251.
Moinodaphnia macleayi SARS, 1901, p. 16, pl. 3, figs. 1-10; DADAY, 1910, p. 143, pl. 8, fig. 7; BREHM, 1933 *b*, p. 56, fig. 3; UÉNO, 1936 *a*, p. 515, figs. 2, A-D.
Moinodaphnia mocquerysi RICHARD, 1892, p. 222, figs. 7-8.
Moina submucronata BRADY, 1886, p. 294, pl. 37, figs. 4-5.

Origin.

N° B : Étang Kalumbe au Sud d'Albertville (en bordure du lac) (25.XI.1946).

N° C : Étang non précisé sur les bords du lac Tanganika (XI.1946).

N° 253 : Étang de Kalumbe, sur la crête d'Ubwari, transversale Baraka-Rumonge (18.IV.1947).

N° 260 : Étang Bangwe, en bordure du lace entre Kigoma et Ujiji (24.IV.1947).

Several specimens of this species were collected from ponds. The species is well known and is found throughout the tropics.

Moina dubia GUERNE and RICHARD, 1892.

Moina dubia GUERNE AND RICHARD, 1892, p. 527, figs. 1-2; SARS, 1916, p. 322, pl. 35, figs. 4, 4 *a*, *b*; GAUTHIER, 1951, p. 26, many figs.

Origin.

N° 253 : Étang de Kalumbe sur la crête d'Ubwari, transversale Baraka-Rumonge (18.IV.1947).

N° 283 : Costermansville, lac Kivu, à la sortie de la Ruzizi (7.V.1947).

N° 505 : Lac Kivu, à 300 m à l'Ouest de l'île située en face de Shangugu (20.VI.1947).

N° 506 : Lac Kivu, Katana, 200 m au large de la rive, devant la clinique Fomulac et récoltes le long des berges (22.VI.1947).

N° 507 : Katana, embouchures marécageuses canalisées de deux ruisseaux, jardin Fomulac (22.VI.1947).

This species was present in four of the samples from Lake Kivu and also from a pond near Lake Tanganyika. There were several specimens in each sample but they were all parthenogenetic females. *Moina dubia* is a very variable species. Unfortunately, there were no males or ephippial females in the collection.

H. Gauthier (1955) has made a very careful study of this and some other African species of *Moina* and the present specimens agree with his diagnosis for *Moina dubia* s.str. The six or seven lateral ciliated processes on the tail are roughly three times as long as they are broad.

This species has been recorded on numerous occasions from East and West Africa, the type locality being Rufisque in Senegal. G. O. Sars (1916) records females from South Africa, R. Gurney (1927) records females from Queensland, W. Rammner has described forms of the species from Java (1937), Venezuela (1933) and Leipzig (1931), and A. L. Behning (1941) gives many records of it from the Caucasus and beyond and M. Uéno has recorded the species or a variety of it from Mongolia (1938 *a*) and Manchuria (1939), the Yangtze Delta (1944) and Formosa (1938).

Moina sp., cfr **wierzejskii** Richard, 1895.

(Figs. 7-9.)

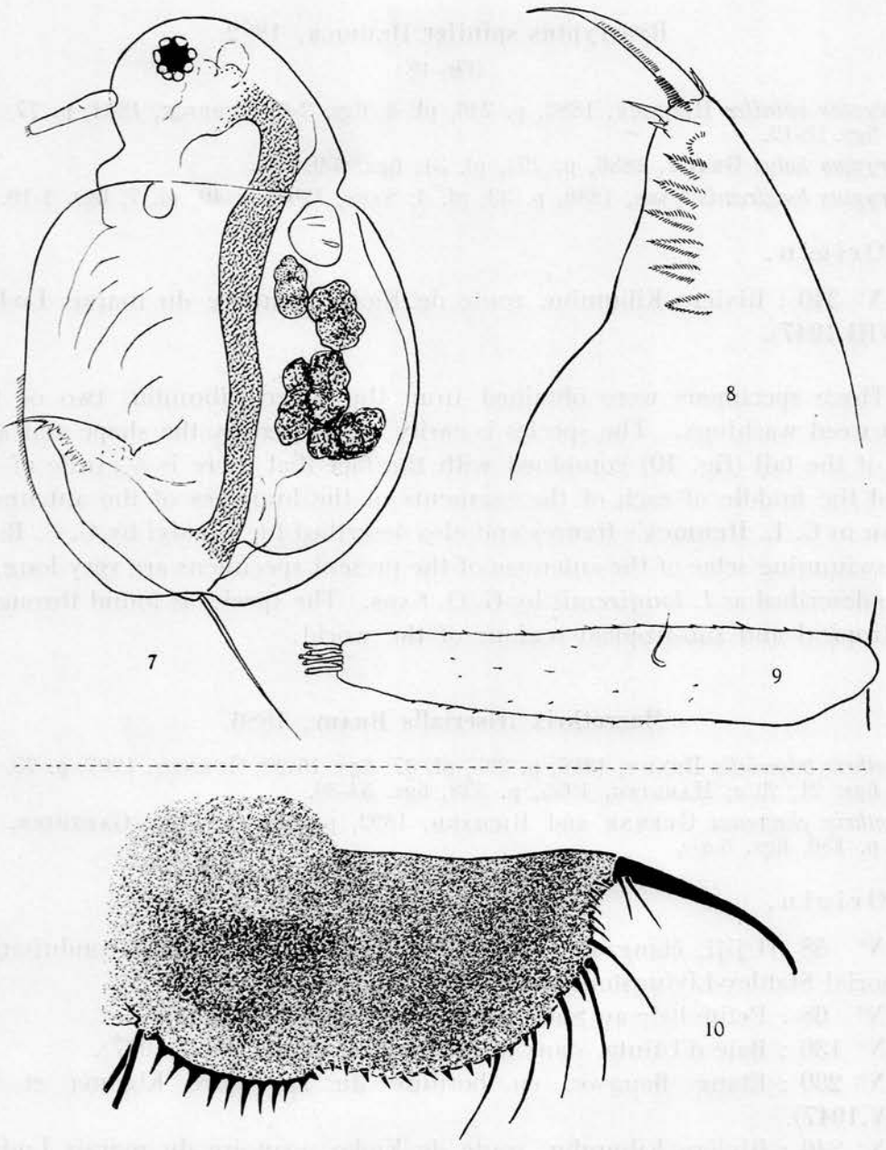
? *Moina wierzejskii* Richard, 1895, p. 195, figs. 9-13.
? *Moina belli* Gurney, 1905, p. 299, pl. 18, figs. 3-4; Stephanides, 1948, p. 17, pl. 6, figs. 50-52, pl. 7, figs. 53-56.
? *Moina turkomanica* Keiser, 1931, p. 366, figs. 14-21.

Origin.

N° 535 : Parc National Albert, Plaine de la Ruindi, mare temporaire (8.VIII.1947).

A second species of *Moina* is represented by two adult females from Station St. 535. Both specimens are very well preserved; but without males or ephippial females, I have been unable to name them with any certainty.

Moina wierzejskii from the West Indies, *M. belli* from South Africa and Corfu and *M. turkomanica* from Central Asia all have an evenly rounded head and the claw of the tail with a fine comb similar to that of the present specimen shown in figure 8. The size of 1,1 mm also agrees with that of these species. In general appearance and in the proportions of the body and the rounded head, (fig. 7), and in the tail, the tip of which is shown in figure 8, the specimens agree very well with R. Gurney's description and figures of *M. belli*, but there are no hairs on the back of the head and the antennule (fig. 9) is also without hairs. I have R. Gurney's type specimens and find that the hairs he describes are quite conspicuous.



FIGS. 7-9. — *Moina* sp., cf. *wierzejskii* RICHARD.
7. Adult female, × 80. 8. Terminal part of tail, × 325. 9. Antennule, × 325.
FIG. 10. — *Ilyocryptus spinifer* HERRICK, tail, × 225.

M. turkomanica which also has hairs on the back of its head is probably a later synonym of *M. belli*. It is because of the absence of hairs on the back of the head that I refer the species to *M. wierzejskii*, but although that species has no hairs on the back of the head, it has them on the antennule and so is not identical with the present specimens.

Ilyocryptus spinifer Herrick, 1882.

(Fig. 10.)

Ilyocryptus spinifer Herrick, 1882, p. 246, pl. 8, figs. 2-6; Herrick, 1884, p. 77, pl. C, figs. 18-19.

Ilyocryptus halyi Brady, 1886, p. 294, pl. 31, figs. 6-9.

Ilyocryptus longiremis Sars, 1888, p. 33, pl. 4; Sars, 1901, p. 40, pl. 7, figs. 1-10.

Origin.

N° 340 : Rivière Kibumbu, route de Kioko, exutoire du marais Ludjingi (14.VIII.1947).

Three specimens were obtained from the River Kibumbu, two of them from weed washings. The species is easily recognized by the shape and armature of the tail (fig. 10) combined with the fact that there is a girdle of setae round the middle of each of the segments of the branches of the antennae as shown in C. L. Herrick's figures and also described for *I. halyi* by G. S. Brady. The swimming setae of the antennae of the present specimens are very long, like those described as *I. longiremis* by G. O. Sars. The species is found throughout the tropical and sub-tropical regions of the world.

Macrothrix triserialis Brady, 1886.

Macrothrix triserialis Brady, 1886, p. 295, pl. 37, figs. 16-20; Gurney, 1907, p. 25, pl. 2, figs. 21, 21 *a*; Harding, 1955, p. 338, figs. 34-36.

Macrothrix chevreuxi Guerne and Richard, 1892, p. 530, figs. 3-6; Gauthier, 1939, p. 156, figs. 6 *a-c*.

Origin.

N° 58 : Ujiji, étang au Nord et étang au Sud du chemin conduisant du mémorial Stanley-Livingstone au lac (9.I.1947).

N° 68 : Petite baie au Sud du cap Tembwe (15-16.I.1947).

N° 130 : Baie d'Utinta, dans la rivière Kafumbwe (18.II.1947).

N° 260 : Étang Bangwe, en bordure du lac entre Kigoma et Ujiji (24.IV.1947).

N° 340 : Rivière Kibumbu, route de Kioko, exutoire du marais Ludjingi (14.VIII.1947).

N° 345 : Étang marécageux à Kioko Nyumba. Nom indigène : Ludjinge (17.VIII.1947).

A few females of this species were found in station 130 in Lake Tanganyika. From the station there were two samples containing the species, one of them being from weed washings. The species was also found in samples from the River Kimbubu and from a marshy pool in Kioko-Nyumba. The species is found throughout the tropics and, south of the tropics, in South Africa and New South Wales.

Macrothrix goeldii Richard, 1897.

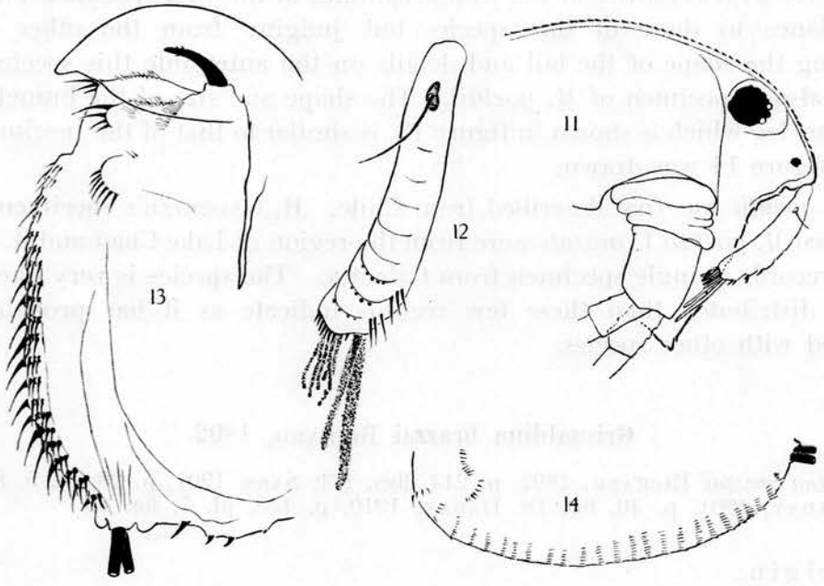
(Figs. 11-14.)

Macrothrix goeldii Richard, 1897, p. 281, figs. 32-34.
Macrothrix goeldii forme *murati* Gauthier, 1939, p. 162, figs. 7-8.

Origin.

N° A : Albertville, baie, lavage de *Najas* (8.XI.1946).

N° 18 : Baie de Kasoje, à l'embouchure de la rivière Lubulungu (15.XII.1946).



Figs. 11-14. — *Macrothrix goeldii* Richard.
11. Head of female, × 216. 12. Right antennule, anterior view, × 433.
13. Tail of female with branchial lobe of the last leg, × 433.
14. Dorsal part of tail of another specimen, × 433.

N° 58 : Ujiji, étang au Nord et étang au Sud du chemin conduisant du mémorial Stanley-Livingstone au lac (9.I.1947).

N° 172 : Moba, à l'embouchure de la rivière Moba (14.III.1947).

N° 345 : Étang marécageux à Kioko Nyumba. Nom indigène : Ludjinge (17.VIII.1947).

There were about 20 specimens in a sample from Albertville from washings of plants (*Najas*). Single specimens were also found in samples 18, 58, 172 from Lake Tanganyika and from sample 345, a marshy point at Kioko-Nyumba. All the specimens were parthenogenetic females.

The dorsal margin of the head is finely serrated as shown in figure 11; this

serration is the result of a delicate squamous reticulation which covers the whole surface of the shell. The antennule broadens distally and seen from the side (fig. 11) it curves backwards. It has slight notches along the anterior margin which correspond to the edges of the broad scales as shown in the view from the front in figure 12. There are two long sensory setae at the end of the antennule and 7 short ones. There are a few small spinules as shown in the figures but there is no strong spine as found in *M. triserialis*. The tail of the specimen from Kioko-Nyumba, shown in figure 13, had rows of strong spinules along the dorsal edge. Usually these rows consist of fine hairs as shown in figure 14. The other specimen of *Macrothrix* from Kioko-Nyumba belonged to the species *M. triserialis* and the course spinules of the first specimen bore some resemblance to those of this species but judging from the other features including the shape of the tail and details on the antennule this specimen was clearly also a specimen of *M. goeldii*. The shape and size of the branchial sacs of the last leg which is shown in figure 13, is similar to that of the specimen from which figure 14 was drawn.

M. goeldii was first described from Chile. H. GAUTHIER's specimens which he named *M. goeldii* f. *murati* were from the region of Lake Chad and R. GURNEY (1907) records a single specimen from Calcutta. The species is very likely more widely distributed than these few records indicate as it has probably been confused with other species.

Grimaldina brazzai RICHARD, 1892.

Grimaldina brazzai RICHARD, 1892, p. 214, figs. 1-3; SARS, 1901, p. 28, pl. 5, figs. 1-14; DADAY, 1901, p. 40, fig. 18; DADAY, 1910, p. 138, pl. 7, fig. 26.

Origin.

N° C : Étang non précisé sur les bords du lac Tanganika (XI.1946).

N° 340 : Rivière Kibumbu, route de Kioko, exutoire du Marais Ludjingi (14.VIII.1947).

N° 345 : Étang marécageux à Kioko Nyumba. Nom indigène : Ludjinge (17.VIII.1947).

There were four females in sample St. C and one female in each of samples 340 and 345, all three samples being from marshy pools.

The species was first described from the French Congo and has since been recorded from many places in East and Central Africa, from Brazil, from Southern U.S.A. and from New Guinea. Only the one species is known in the genus. E. DADAY (1910) describes and figures some fine hairs on the tail of his African specimens, but the present specimens cannot be distinguished from the type description in this way.

Camptocercus rectirostris SCHÖDLER, 1862.

Camptocercus rectirostris SCHÖDLER, 1862, p. 25, pl. 2, fig. 43; LILLJEBORG, 1900, p. 402. pl. 61, fig. 14, pl. 62, figs. 1-17; GAUTHIER, 1930, p. 98, fig. 3; BEHNING, 1941, p. 248, fig. 103; UÉNO, 1944, p. 413, fig. 5; STEPHANIDES, 1948, p. 22, pl. 10, figs. 84-85,

Camptocercus australis SARS, 1896, p. 45, pl. 6, figs. 9-10; GURNEY, 1911, p. 29.

Camptocercus australis var. *dadayi* STINGELIN, 1914, p. 620, figs. 21-22.

Camptocercus aloniceps EKMAN, 1900, p. 75, pl. 4, figs. 21-24; BRADY, 1913, p. 468, pl. 38, fig. 1.

Camptocercus similis SARS, 1901, p. 89, pl. 12, figs. 4, 4 *a*.

Camptocercus adhaerens BREHM, 1911, p. 170, figs. 1-2.

Camptocercus naticochensis DELACHAUX, 1918, p. 27, pl. 2, figs. 1-3.

Camptocercus atavus BREHM, 1928, p. 318.

Origin.

N° **260** : Étang Bangwe, en bordure du lac entre Kigoma et Ujiji (**24.IV.1947**).

The genus *Camptocercus* was represented in the collection by only one specimen, a female frome some weed washings from the margin of Étang Bangwe between Kigoma and Ujiji, Station **260**.

H. GAUTHIER (1930) discusses the various names given to specimens belonging to this genus from Africa, South America and Australia which are similar to the European species *C. rectirostris* except that they lack the teeth on the posterior ventral corner of the shell. The names are listed in the above synonymy and I am in full agreement with him that all these forms are best considered to belong to one and the same species. The presence of teeth on the post-ventral corner of the shell of European specimens is a fairly constant feature, however, and it seems to be universally absent in specimens from the countries listed above. A good case could be made for treating those forms without these teeth as a separate sub-species for which the oldest available name is *australis*, particularly as the two forms occupy different geographical regions. These specimens are also considerably smaller than the European specimens (0,7 to 0,9 mm instead of 1,0 to 1,4 mm). *C. atavus* BREHM from New Zealand seems on the whole to be distinct from *C. australis* as it is larger in size and has single bristles in place of the lateral groups of hairs on the tail.

The single specimen in the present collection is about 0,7 mm in length. It has a pointed rostrum and 16 teeth along the dorsal edge of the tail. The lateral groups of fine hairs along the sides of the tail are easily seen with a 2 mm oil immersion objective but could quite easily be overlooked if lower powers of the microscope were used.

Acroperus harpae (BAIRD, 1836).

Lynceus harpae BAIRD, 1836, p. 100, pl. 2, fig. 17.

Acroperus harpae LILLJEBORG, 1900, p. 418, pl. 63, figs. 14-24, pl. 64, figs. 1-10; BREHM, 1933 *a*, p. 699; BREHM, 1933 *b*, p. 61, fig. 7.

Origin.

N° 347 : Rivière Katamba à Tengo (20.VIII.1947).

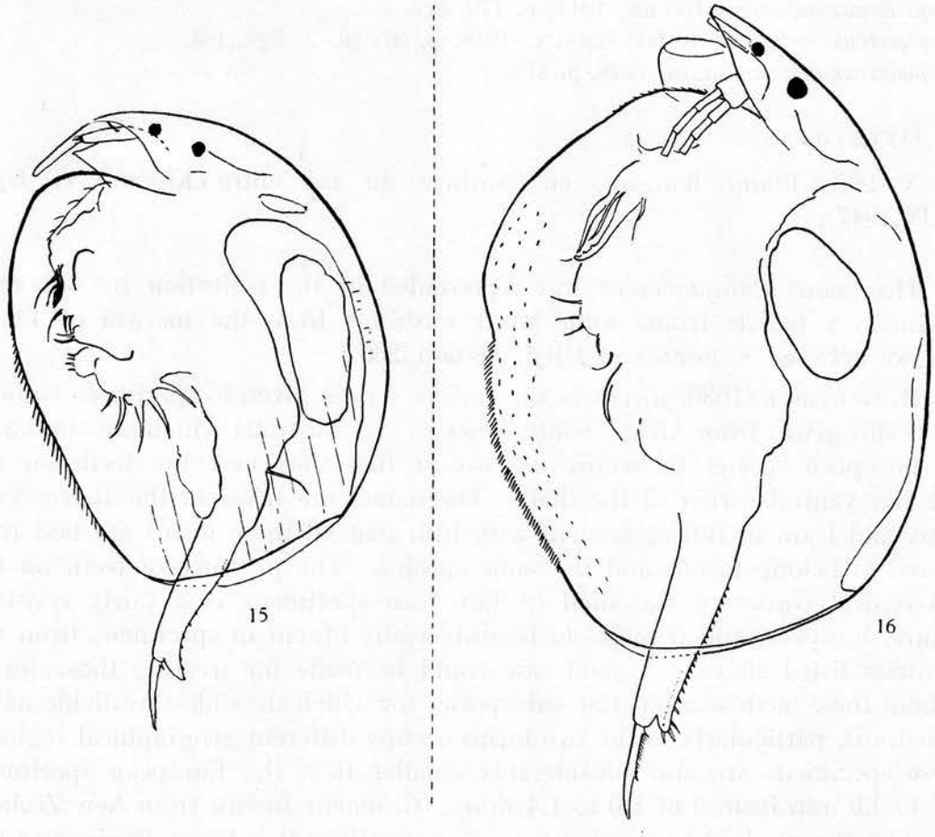


FIG. 15. — *Kurzia longirostris* (DADAY), adult female, × 115.

FIG. 16. — *Euryalona occidentalis* SARS, adult female, × 115.

Sample St. 347 from River Katamba contains 7 females of this species. V. BREHM (1933 *a* and 1933 *b*), who found the species in Java and Sumatra at high altitudes and in French West Africa at an altitude of only 600 metres, discusses the curious distribution of the species. It is common in Northern Europe and North America and often met with in arctic regions. It is very rare in the tropics and almost unknown in the southern hemisphere.

Kurzia longirostris (Daday, 1898).

(Fig. 15.)

Alona longirostris Daday, 1898, p. 34, fig. 14 *a-c.*

Alona macrorhyncha Daday, 1901, p. 39, fig. 17 *a-b.*

Pseudalona longirostris Sars, 1901, p. 87, pl. 12, figs. 3, *a-b*; Daday, 1905, p. 184, pl. 11, fig. 18; 1910, p. 136, pl. 7, figs. 23-24; Brehm, 1933 *a*, p. 39, figs. 10-11; Brehm, 1933 b, p. 63; Gauthier, 1937, p. 94, pl. 7, figs. *d-e.*

Origin.

N° C : Étang non précisé sur les bords du lac Tanganika (XI.1946).

Four females about 0,8 mm long were present in sample St. C. The generic name *Pseudalona* Sars (1901) is pre-occupied by *Kurzia* Dybowski & Grochowski (1894), *Alona latissima* Kurz being the type species for both these generic names. H. Gauthier (1937) describes and figures specimens from Mauritania which are very similar to the present specimens, lacking any reticulation of the shell and having very fine teeth along the dorsal margin of the tail. H. Gauthier was unable to see any fascicles of fine hairs along the sides of the tail of his specimens; but fascicles can easily be seen with an oil immersion lens in the present specimens. They are not shown in figure 15 because they were invisible with the 16 mm lens under which this figure was drawn. The species is known from Ceylon (the type locality), the East Indies, New Guinea, Brazil, Paraguay, East and West Africa.

Euryalona occidentalis Sars, 1901.

(Fig. 16.)

Alonopsis orientalis Daday, 1895, p. 45, figs. 21 *a-d*, 22 *a-b.*

Euryalona occidentalis Sars, 1901, p. 81, pl. 12, figs. 1 *a-b*;

Euryalona orientalis Daday, 1910, p. 134, pl. 7, figs. 18-20; Gauthier, 1930, p. 100, figs. 4 *a-c*; Brehm, 1935, p. 151, fig. 7.

Origin.

N° 260 : Étang Bangwe, en bordure du lac entre Kigoma et Ujiji (24.IV.1947).

There were only two specimens of this species, both females from sample St. 260. As I have shown elsewhere (J. P. Harding, 1956) the African species of *Euryalona*, which has a distinct spinule in the middle of the claw and a basal spine which is little, if any, larger than it, is identical with the South American species *E. occidentalis*. I have compared the present specimens with Sars' type specimens of that species and can find no difference. The labrum has a curious lateral crease, as shown in figure 16. This is similar to the labrum shown in H. Gauthier's (1930) figure of a specimen from the Sahara. The species is quite distinct from *E. colletti* which has no such crease in its labrum

and the claw of the tail has a very long spine at its base and a very inconspicuous spinule in the middle.

E. occidentalis may be a synonym of *E. orientalis* E. DADAY, but if this is so DADAY's figure of the claw on the first leg is very inaccurate. T. STINGELIN (1904) considered that *E. orientalis* and *E. occidentalis* may be distinguished by differences in the arrangement of the teeth on the claw of the first foot. *E. occidentalis* has about three teeth in the middle of the claw as well as distally but according to T. STINGELIN specimens from Ceylon, Java and Siam have only the distal teeth. V. BREHM (1935) gives a figure of the first foot of the specimens from the Omo Expedition, which I have compared with the present specimens and also with the type specimens of *E. occidentalis* and find them all to be exactly similar.

Oxyurella tenuicaudis (SARS, 1862).

(Figs. 17-19.)

Alona tenuicaudis SARS, 1862, p. 37.
Lynceus tenuicaudis LILLJEBORG, 1900, p. 461, pl. 68, figs. 2-8.
Euryalona tenuicaudis GAUTHIER, 1931, p. 379.
Euryalona tenuicaudis DADAY, 1905, p. 178, pl. 11, figs. 12-13.
Odontalona tenuicaudis BIRGE, 1910, pl. 71, figs. 5-6.
Oxyurella tenuicaudis DYBOWSKI AND GROCHOWSKI, 1894, p. 381.

Origin.

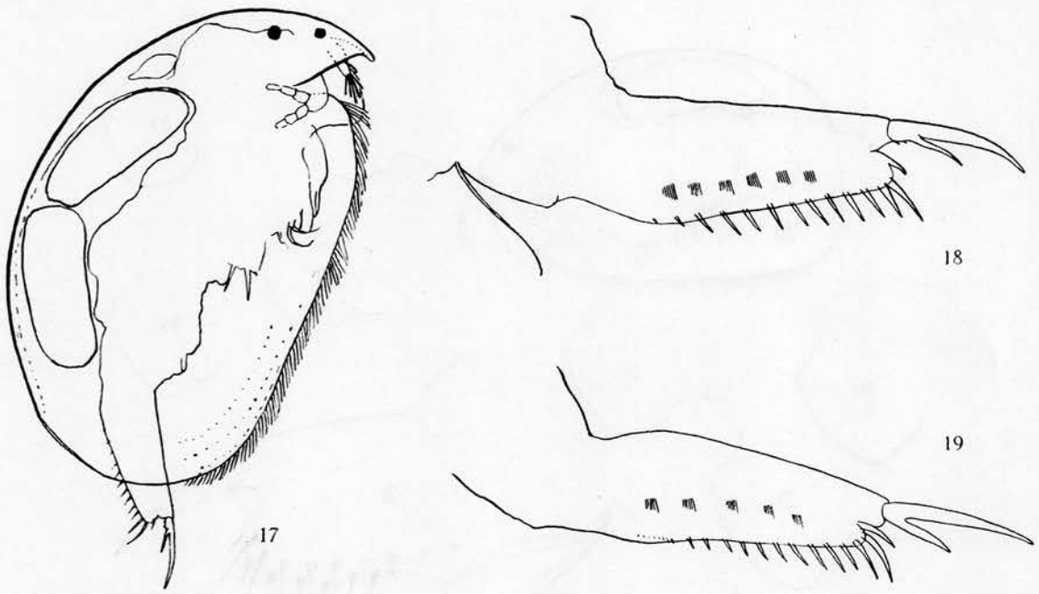
N° **253** : Étang de Kaluwe, sur la crête d'Ubwari, transversale Baraka-Rumonge (18.IV.1947).

N° **260** : Étang Bangwe, en bordure du lac entre Kigoma et Ujiji (24.IV.1947).

There were only two specimens of this species, one female in each of samples St. **253** and **260** from Lake Tanganyika. The synonymy given above indicates the difficulty there is in placing this species into its correct genus. *Odontalona* can be eliminated under the rules of priority but the other names are all a matter of judgment on the part of specialists. No-one today would place the species in *Lynceus* since this is a conchostracan genus but it can only be a matter of opinion whether it is kept in the genus *Alona* or not. It differs from typical members of *Alona* most noticeably in the shape of its tail. It is the shape of the tail that has led some authors to place it in the genus *Euryalona*; but as E. A. BIRGE (1910) pointed out, it lacks all the important features of this genus. The first foot of the female is without a strong claw armed with teeth and there is no gap between the valves of the shell opposite the first foot. The setae of the valves are not restricted to the middle as they are in *Euryalona*.

The species is widely distributed in the Palearctic region and in North America, and P. PARIS (1916) has recorded it from the Gold Coast. E. DADAY (1905) described a form from Paraguay which he thought was the same species; but E. A. BIRGE (1910) showed that this differed in several ways and gave it

a new name, *longicaudis*. *O. tenuicaudis* has a long spine at the base of the claw but in *O. longicaudis* this spine is near the middle of the concave side of the claw, and between it and the base of the claw is a row of fine spinules forming a little comb. The arrangement of the claw and the spines along the dorsal margin of the tail of the specimen from sample St. **253** (fig. 19) seems



FIGS .17-19. — *Oxyurella tenuicaudis* SARS.
17. Adult female, × 115. 18. Tail of the same specimen, × 225.
19. Tail of specimen from another station, × 225.

to be identical with that of European specimens but the specimen from sample St. **260** (figs. 17 and 18) has a spine arising a short distance away from the base and proximally to it there are two small spinules. This specimen thus departs slightly from the normal arrangement towards that of *E. longicaudis*.

Alona affinis (LEYDIG, 1860).

Lynceus affinis LEYDIG, 1860, p. 223, pl. 9, figs. 68-69; LILLJEBORG, 1900, p. 454, pl. 66, figs. 18-21, pl. 67, figs. 1-17, pl. 68, fig. 1.

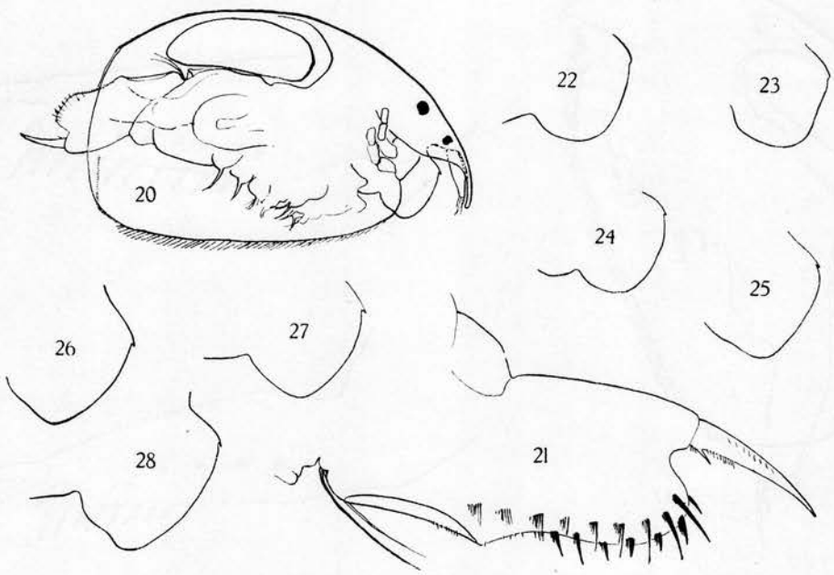
Alona affinis SARS, 1901, p. 48, pl. 9, figs. 1 *a-d*; SARS, 1916, p. 331, pl. 39, figs. 1, 1 *a*.

Origin.

N° **340** : Rivière Kibumbu, route de Kioko, exutoire du marais Ludjingi (**14.VIII.1947**).

N° **343** : Étang marécageux à Kioko Nyumba. Nom indigène : Bikoma (**16.VIII.1947**).

This well-known and easily recognised species was represented by a few specimens, mostly empty skins, in samples St. **340** from the River Kibumbu and St. **343**, a marshy pond at Kioko-Nyumba. The species is known from all parts of the world including places as different climatically as Siberia and Greenland on the one hand and the tropical East Indies on the other. It has been found in all parts of Africa.



FIGS. 20-28. — *Alona verrucosa* SARS.
20. Adult female, × 150. 21. Tail, × 430. 22-28. Labral keels, × 300.
22, 23. From station 345. 24. From station A. 25-28. From station 343.

Alona pulchella KING, 1853.

Alona pulchella KING, 1853 *b*, p. 260, pl. 8, fig. *b*; SARS, 1896, p. 37, pl. 6, figs. 3-4; DADAY, 1910, p. 128, pl. 6, figs. 30-36, pl. 7, figs. 1-4; SARS, 1916, p. 335, pl. 40, figs. 2, 2 *a*; GAUTHIER, 1928, p. 269, fig. 32, A-L; GAUTHIER, 1929, p. 152, fig. 5.

Alona cambouei GUERNE AND RICHARD, 1893, p. 242, figs. 10, 11; RICHARD, 1894 *b*, p. 371, figs. 5-8; SARS, 1904, p. 633, figs. 6, 6 *a-c*; DADAY, 1905, p. 172, pl. 11, figs. 1-2; DELACHAUX, 1918, p. 28, pl. 2, fig. 10; JENKIN, 1934, p. 287, figs. 16, 16 *a*, *b*; UÉNO, 1936 *b*, p. 6, figs. 3 *a-b*; HARDING, 1955, p. 343, figr. 61-64.

Alona glabra SARS, 1901, p. 55, pl. 9, figs. 6-6 *a*; DADAY, 1905, p. 173, pl. 11, figs. 3-4; DELACHAUX, 1918, p. 29, pl. 2, fig. 6; BREHM, 1933, p. 725, fig. 31, BIRABEN, 1939, p. 658, figs. 9-10.

Alona pulchella cf. *cambouei* GAUTHIER, 1951, p. 74, pl. 14, figs. J-K.

Origin.

N° A : Albertville, baie, lavage de *Najas* (8.XI.**1946**).

N° **172** : Moba, à l'embouchure de la rivière Moba (**14.III.1947**).

N° 345 : Étang marécageux à Kioko Nyumba. Nom indigène : Ludjinge (17.VIII.1947).

N° 507 : Katana, embouchures marécageuses canalisées de deux ruisseaux, jardin Fomulac (22.VI.1947).

There were about a dozen specimens in weed washings from Albertville (sample A) and a few specimens in samples St. 172, 345, and 507. Because this species is rather variable it is known by at least three names, of which the oldest is *A. pulchella*, a name sometimes restricted to populations of individuals with striated shells and an angular post-dorsal corner to the tail. *A. cambouei* is used for forms with a reticulated shell and *A. glabra* for forms with a rounded corner to the tail. Often the populations are mixed but in the present instance all the specimens had a very angular corner to the tail and neither a striation nor a reticulation was visible on the shell. The fascicles of fine hairs on the sides of the tail were well developed and not like the form described by H. Gauthier (1951) with only single bristles in place of the fascicles. The species is found in all tropical and sub-tropical regions of the world.

Alona verrucosa Sars, 1901.

(Figs. 20-28.)

Alona verrucosa Sars, 1901, p. 56, pl. 9, figs. 7, 7 *a*; Jenkin, 1934, p. 292, figs. 18, 18 *a-c*; Brehm, 1937, p. 504.
Alona verrucosa Lutz, 1878.

Origin.

N° A : Albertville baie, lavage de *Najas* (8.XI.1946).

N° 343 : Étang marécageux à Kioko Nyumba. Nom indigène : Bikoma (16.VIII.1947).

N° 345 : Étang marécageux à Kioko Nyumba. Nom indigène : Ludjinge (17.VIII.1947).

About 10 specimens were collected from a marshy pond at Kioko-Nyumba, samples St. 343 and 345, and 7 specimens from sample A, washings of plants collected in Lake Tanganyika at Albertville. The two specimens in sample St. 345 were amongst a larger number of specimens of the next species of *Alona*. Only one or two of the specimens showed any tubercles on the shell which were such a characteristic feature of the type specimens. Neither is there much striation to be seen on the shell. In other respects, however, as shown in figures 20 and 21, the specimens agree very well with Sars' original description and also with the later description by P. M. Jenkin. Most of the specimens have a distinct notch on the anterior part of the labrum. Figures 22 to 28 are camera lucida drawings of the labrum of adult females taken at random. Figures 22 and 23 are of two individuals which were found in sample St. 345 along with several specimens of the following species. The notch is less distinct in these two specimens than it was in the other specimens from sample A (fig. 24)

and sample St. 343 (figs. 25 to 28). Figure 28 shows a rather abnormal labrum. The distal bristle of each fascicle reaches well beyond the margin of the tail. The post-dorsal part of the tail is rounded and rather protuberant, forming a deep sinus at the base of the claws. The claw has a rather short basal spinule followed by a fine comb.

A. verrucosa is known from South America, East Africa and Singapore.

An application to the International Commission for Zoological Nomenclature for the name *A. verrucosa* SARS to be placed on the official list of specific names has recently been made by Dr D. S. JOHNSON (1) and it is in anticipation of this being agreed to that I use the name here.

Alona monacantha SARS, 1901.

(Figs. 29-38.)

Alona monacantha SARS, 1901, p. 54, pl. 9, figs. 5 *a-b*; DADAY, 1905, p. 176; BIRGE, 1918, p. 722, fig. 1128.

Alona acuticostata SARS, 1903, p. 15, pl. 1, figs. 5, 5 *a-c*.

? *Alona acuticostata* var. *tridentata* STINGELIN 1904, p. 349, pl. 12, figs. 18-19.

? *Alona verrucosa* UÉNO, 1936 *a*, p. 517, figs. 2 *g-i*.

Origin.

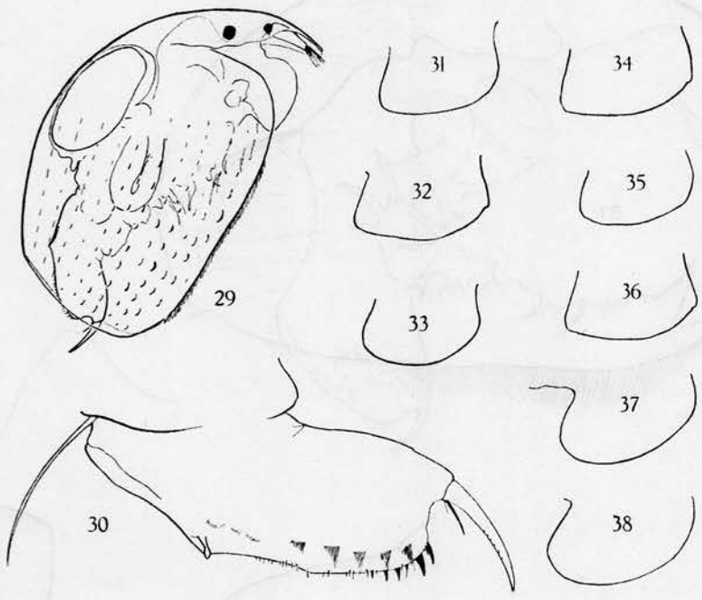
N° 345 : Étang marécageux à Kioko Nyumba. Nom indigène : Ludjinge (17.VIII.1947).

There were about 10 specimens in a single sample from the marshy pond at Kioko-Nyumba (St. 345). This was a rich sample and in addition to this species contained two other species of *Alona*, *A. verrucosa* and *A. pulchella*. The length of the adult female is about 0,34 mm and the height 0,21 mm. The dorsal margin from its junction with the free hind edge of the shell to the tip of the rostrum is in one continuous curve. The free hind margin is equal to two-thirds of the total height of the shell. The ventral margin of the shell is almost straight and has the usual fringe of setae. At the posterior end of this fringe there is a single tooth on the margin of the shell and from this point the post-ventral corner of the shell makes an open curve running smoothly into the posterior margin (fig. 29). The surface of the shell has about 12 longitudinal striations which, particularly in the post ventral quarter, are broken up into *verrucosa*-like tubercles.

The keel to the labrum, as shown in figure 29, and also in figures 31 to 36, is long in proportion to its depth. Posteriorly it is rather angular and anteriorly it is usually evenly rounded, although sometimes as shown in figures 32, 34 and 36 the curvature of the anterior part is interrupted by a slight notch. The tail (fig. 30) is very similar to that figured by P. M. JENKIN (1934) under the name *A. novae-zealandae*. Using her system of measurement the relative length of

(1) Bull. Zool. Nom. 12 [In press.]

the pre-anal part (L) is 0,39. The width of the post anal part (W) is 0,39 and the depth of the pre-anal part (D) is 0,31. There are only 5 or 6 lateral fascicles with a few irregular groups of short hairs near the pre-anal angle. The marginal denticles are few and rather irregular. There are a few well-formed denticles near the post-dorsal corner but otherwise the denticles are represented by some stiff bristles. The claw is only about a third of the length of the tail and has a long basal spine of nearly a third of its own length with a very fine spinule proximal to it.



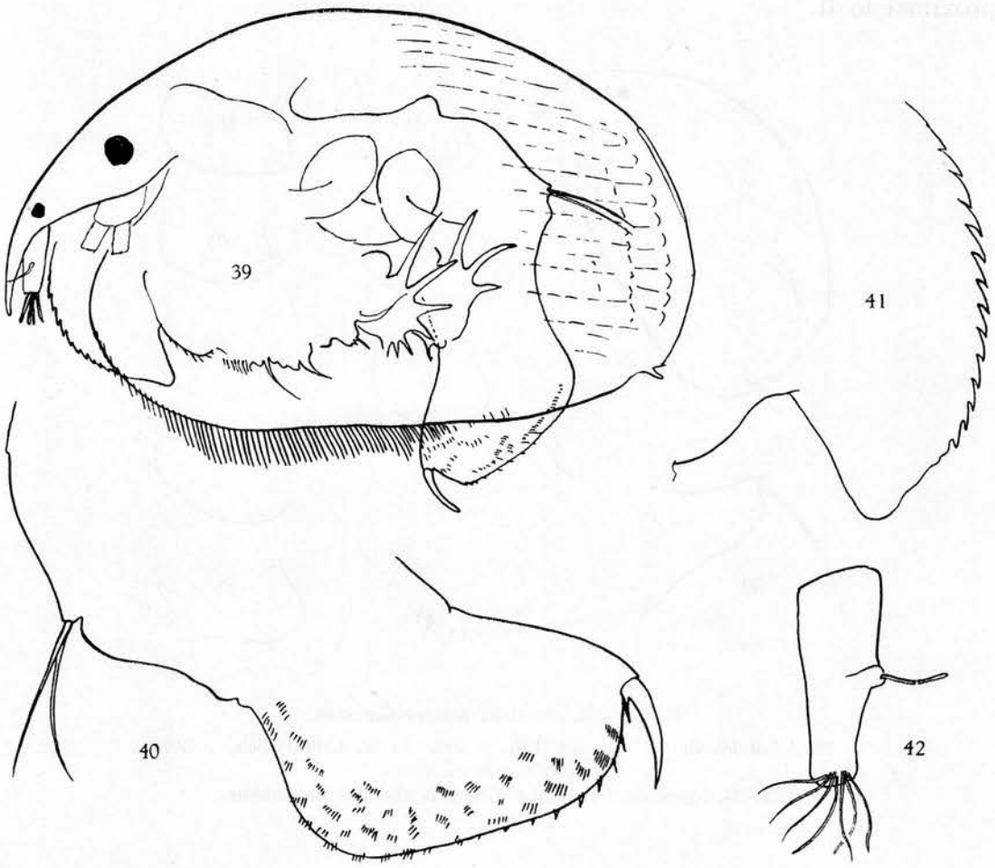
FIGS. 29-38. — *Alona monacantha* SARS.
29. Adult female, × 150. 30. Tail, × 430. 31-38. Labral keels, × 300.
31-36. From Station 345.
37, 38. Specimen from Lake Young in the British Museum.

The genus *Alona* is notoriously difficult, having a large number of species differing from one another in small details and many of the species being very variable. In its shape and size these specimens are very similar to *A. verrucosa*, a species which was present in the same sample, but there was no overlap between the characteristics of the two species. The shape of the rostrum and the length of the basal spine on the claw of the tail are sufficient to distinguish the two species. Some of JENKIN's specimens named *A. novae-zealandae* are on a slide in the British Museum; they have a very much more rounded labrum (figs. 37 and 38) and also lack a tooth on the post-ventral corner of the shell; but in other ways are very similar to the present specimens.

Alona diaphana King, 1853.

Alona diaphana King, 1853 *b*, p. 260, pl. 8 C; Uéno, 1938 *b*, p. 130, fig. 9; Harding, 1955, p. 345, figs. 65-68.

Alonella diaphana Sars, 1888, p. 47, pl. 5, figs. 5-7; Sars, 1901, p. 60, pl. 10, figs. 3 *a*, *b*; Birge, 1918, p. 735, fig. 1161; Gurney, 1927, p. 74, fig. 8 *c-d*; Brehm, 1933 *a*, p. 734, figs. 33; Biraben, 1939, p. 663, figs. 17, 18.



Figs. 39-42. — *Dunhevedia serrata* Daday.
39. Adult female, × 225. 40. Tail, × 450. 41. Serrated labral keel, × 650.
42. Antennule, × 650.

Alona davidi Richard, 1895, p. 192, figs. 5-8; Stingelin, 1904, p. 351, pl. 12, fig. 23; Rammner, 1933, p. 366, fig. 9.

Alona davidi var. *iheringi* Richard, 1897, p. 294, figs. 42, 43; Delachaux, 1917, p. 86, figs. 13, 14; Gauthier, 1937, p. 95.

Alona punctata Daday, 1898, p. 39, figs. 18 *a-c*.

Alonella punctata Daday, 1905, p. 163, pl. 10, fig. 12-17; Daday, 1910, p. 122, pl. 6, figs. 6-8.

Alona davidi var. *punctata* Gauthier, 1939, p. 176, fig. 10.

Origin.

N° 58 : Ujiji, étang au Nord et étang au Sud du chemin conduisant du mémorial Stanley-Livingstone au lac (9.I.1947).

N° 212 : Baie de Sumbu, à l'ancre (31.III.1947).

A few females were found at two stations, 58 and 212.

My views on the synonymy of the species have been expressed elsewhere (J. P. Harding, 1955) and there is no need to repeat them here.

Alona diaphana is found in tropical parts of the world, including East and West Africa, Ceylon, the East Indies, South America, Queensland, Formosa and the Riu Kiu Islands, and also in the southern parts of the United States. It seems, however, to be unrecorded from any part of the mainland of the Eurasian Continent.

Graptoleberis testudinaria (Fischer).

Origin.

N° 343 : Étang marécageux à Kioko Nyumba. Nom indigène : Bikoma (16.VIII.1947).

There were only two specimens of this species, both females in sample 343, from the marshy pond at Kioko-Nyumba. The species has been found in most parts of the world from Greenland and Iceland on the one hand to Ceylon on the other.

Dunhevedia serrata Daday, 1898.

(Figs. 39-42.)

Duvenhedia [sic] *serrata* Daday, 1898, p. 32, figs. 13 *a-d*.
Dunhevedia serrata Birge, 1918, p. 726, fig. 1135.

Origin.

N° 212 : Baie de Sumbu, à l'ancre (31.III.1947).

There was only one specimen of this species, a female, in station 212 from Lake Tanganyika. The serrated labral keel (fig. 41) is sufficient to identify this species which has been recorded from Ceylon, Texas, Louisiana and from East and West Africa. The tail (fig. 40) is very similar to that of the better known species *D. crassa*. The lateral seta of the antennule is about in the middle of its length (fig. 42).

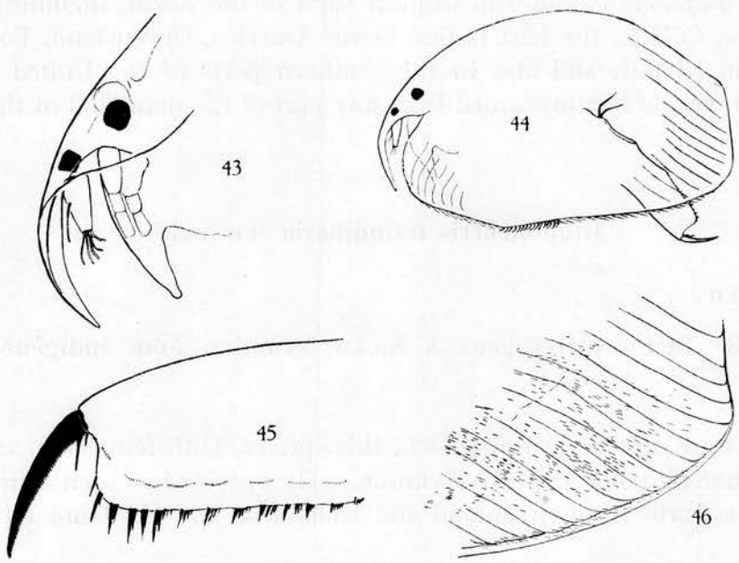
Pleuroxus chappuisi Brehm, 1933.

(Figs. 43-45.)

Pleuroxus chappuisi Brehm, 1933 *b*, p. 69, figs. 17-19; Brehm, 1937, p. 507, fig. 4.
Pleuroxus striatoides Sramek-Husek, 1946, p. 232, figs. 1 *b*, *d*, *f*, *g*, 2 *a*, *b*.

Origin.

N° **347** : Rivière Katamba à Tengo (**20.VIII.1947**).

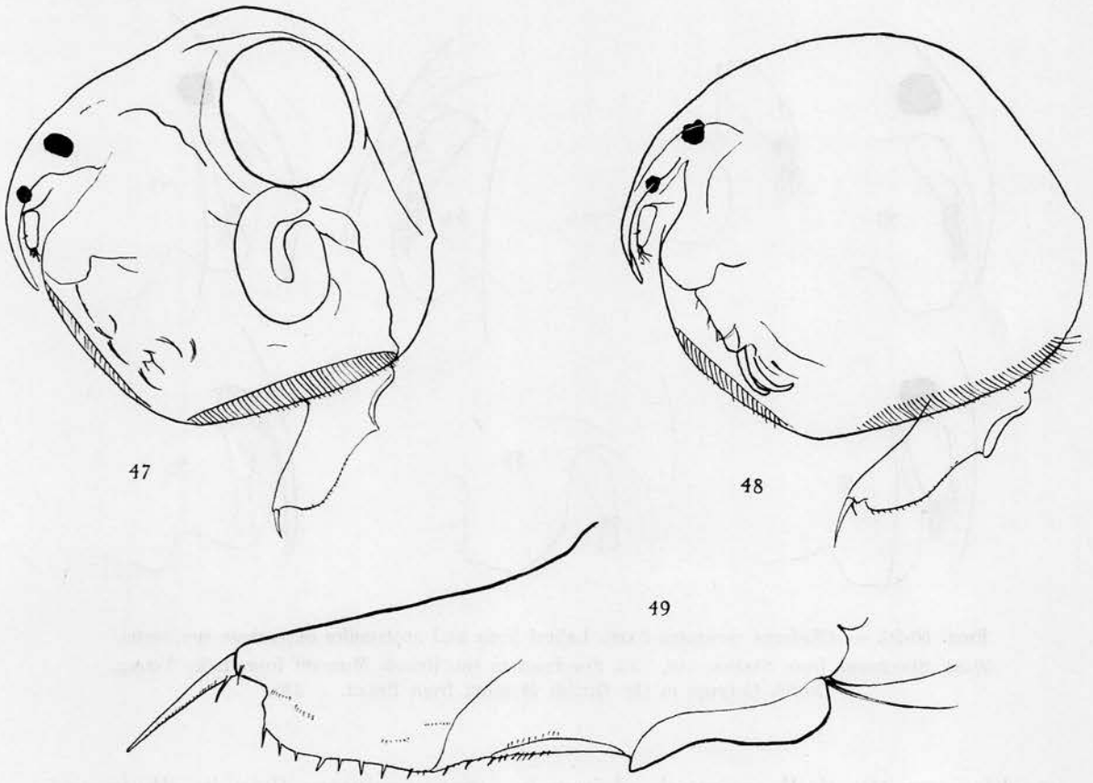


Figs. 43-46. — *Pleuroxus chappuisi* Brehm.
43. Head of female, × 220. 44. Adult female, × 110. 45. Distal part of shell, × 430.
46. Post ventral part of shell, × 430.

A single female was found in station **347**, the marshy pond at Kioko-Nyumba. It agrees very well with V. Brehm's description of *P. chappuisi*, a characteristic feature being the rows of fine hair-like streaks or « wrinkles » between the striations of the shell. V. Brehm gives no indication of the shape of the labral keel but in the present specimen it is long and pointed (fig. **43**).

The specimen is very similar to R. Sramek-Husek's figures of *P. striatoides* in the general shape of the body and in the arrangement of the coarse striations of the shell (fig. **44**). The armature of the tail (fig. **45**) is also more like that figured by R. Sramek-Husek than it is like V. Brehm's figure; in particular the teeth of the dorsal edge of the tail (fig. **45**) are slender and tend to be broken up into groups of spinules. Neither V. Brehm nor R. Sramek-Husek show any fascicles on the sides of the tail but in the present specimen these are represented by a few rows of very fine and short hairs. The very fine hairlike « wrinkles »

on the surface of the integument are similar to those figured by V. Brehm and R. Sramek-Husek but much more irregular in their arrangement (fig. 46). The small dots which these authors describe amongst the « wrinkles » could not be seen. *P. chappuisi* is known from French West Africa, from Kenya (V. Brehm, 1935) and if *P. striatoides* is the same species, as I believe it is, from Czechoslovakia.



Figs. 47-49. — *Chydorus eurynotus* Sars.
47, 48. Adult females from the same sample, × 165. 49. Tail, × 450.

Chydorus eurynotus Sars, 1901.

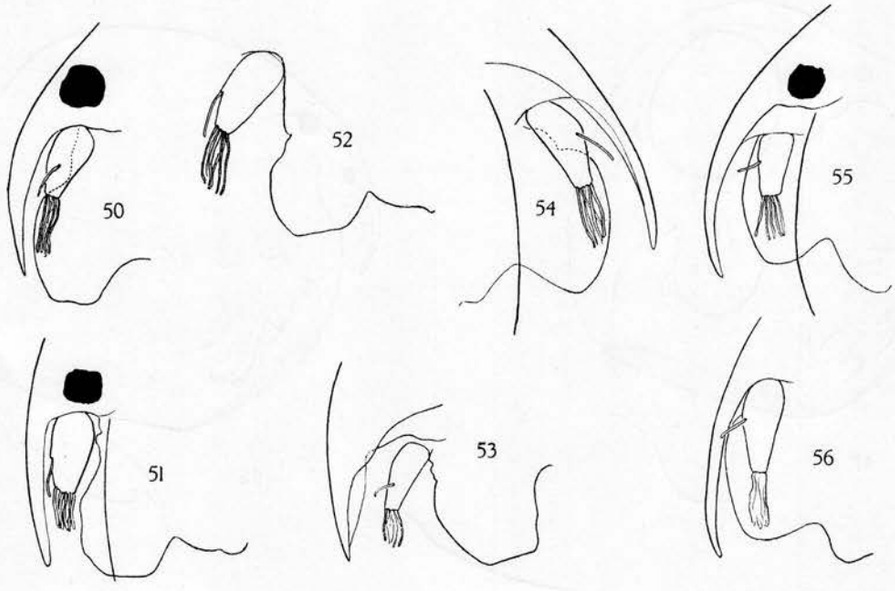
Chydorus eurynotus Sars, 1901, p. 70, pl. 11, figs. 3, *a-c*; Gauthier, 1939, p. 183, fig. 11, *a-e*; Harding, 1955, p. 350, figs. 95-98.
Chydorus cf. *eurynotus* Brehm, 1935, p. 157, figs. 10-12.

Origin.

N° 340 : Rivière Kibumbu, route de Kioko, exutoire du marais Ludjingi (14.VIII.1947).

N° 343 : Étang marécageux à Kioko Nyumba. Nom indigène : Bikoma (16.VIII.1947).

There were about 10 females in each of samples St. 340, the River Kibumbu on the route to Kioko, and St. 343, the marshy pond at Kioko-Nyumba. The shape of the shell is very variable as can be seen from figures 47 and 48, which are both from the same sample. Sometimes the shell is very gibbous and sometimes not. The specimens agree very well with the descriptions of specimens from the region of Lake Chad given by H. GAUTHIER (1939). The hexagonal



FIGS. 50-56. — *Chydorus eurynotus* SARS. Labral keels and antennules of various specimens. 50-52. Specimens from Station 340. 53. Specimen in the British Museum from Lake Young. 54-56. Cotypes in the British Museum from Brazil. × 330.

markings on the shell are much plainer in some specimens than in others and in some of them the wavy lines described by H. GAUTHIER can be seen. Type specimens of *C. eurynotus* from Brazil are in the British Museum. They are very similar. In a few of them the hexagonal markings can be seen but I have not been able to see the wavy lines in either the type specimens or in any of the specimens from Lake Titicaca also in our collections. The ventral part of the labral keel is flattened in the present specimen (figs. 50-52). This seems to be typical of African specimens. It is also the case in a specimen from Lake Young in East Africa (fig. 53) and V. BREHM's specimens from Kenya and H. GAUTHIER's from the region of Lake Chad also show it. The labral keel of the type specimens is not flattened, however (figs. 54 to 56). The shape of the labral keel in Titicaca specimens was very variable (J. P. HARDING, 1955, figs. 95 to 97) but rarely if ever flattened. *C. eurynotus* is known from Brazil, Colombia, Peru and East and West Africa.

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