# THE ROTIFER FAUNA OF WISCONSIN.—III.

## A Revision of the Genera Lecane and Monostyla

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Notes from the Biological Laboratory of the Wisconsin Geological and Natural History Survey. XXVI.

## INTRODUCTION.

Many eminent specialists have declared the "invertebrate" fauna of North America virtually unknown and it is perhaps superfluous to add to this our growing conviction that this is nowhere more readily demonstrable than in the relatively small phylum which we have been studying for some time. When Jennings compiled the records of rotifers found in the United States at the close of the Great Lakes Biological Investigations in 1899, the total number of species was 246, quite a number of these now unidentifiable. In the two papers already published on the rotifers of Wisconsin no less than 136 species are described from personal observations of a part of the family Notommatidae. Of these only 27 species are to be found in Jennings's list, or less than one fifth. As a result of our collections in Wisconsin and a study of the rotifers of Mount Desert Island, undertaken at the suggestion and with the hearty cooperation of Dr. Dahlgren, director of the Mount Desert Island Biological Laboratory, over one hundred undescribed species belonging to the family already dealt with are now on hand. Under the circumstances we may perhaps be granted forgiveness for departing somewhat from our original plans, or rather from their last revision. We had intended to conclude, temporarily at least, the work on the Notommatidae with a revision of the forcipate group or Dicranophorinae, as defined in the second paper. At the time of closing the manuscript we had some 50 identified species belonging to this group. The Mount Desert collections added at least 25 more, or a sufficient number to convince us that we were very far from being able to "see the bottom", in fact, we could not even discover a halting place, where we might at least temporarily feel

that we had in hand a fair proportion of the species that were likely to be found in the immediate future. It is very evident that more field work is necessary before a satisfactory revision of the Dicranophorinae can be undertaken with any hope of its being serviceable for even a few years; we are therefore compelled to postpone this for the moment, hoping that it may shortly appear to be a more promising undertaking.

A large amount of material for a revision of the genera Lecane and Monostyla has been accumulating for some years as a sort of by-product and this seems now to offer some possibility for reasonable permanency when worked up. Undescribed species belonging to these two genera are slowly and steadily decreasing in numbers; this is especially true of Monostyla, where a new species is now rarely found.

Lecane and Monostyla are very closely related and individual species do not as a rule exhibit striking differences. We have therefore limited the descriptions strictly to what is necessary for the determination of the species; no attempt has been made to deal with the anatomy, which seems to be quite uniform throughout the two genera. The outline of the lorica, its surface markings and the form and length of the toes are very constant; for this reason special emphasis has been placed upon these features and no effort has been spared to represent them as accurately as possible in the figures. The descriptions must be considered largly supplementary; it seems impossible to state in words with sufficient clearness the slight, but important, differences of form and ornamentation of these animals.

A few words on the classification of the rotifers may not be out of place. The one employed by Hudson and Gosse, a modification of Dujardin's, is now generally considered unsatisfactory. Some radical changes were suggested by Wesenberg-Lund in 1899, and De Beauchamp provided ten years later the rational basis needed for a revision, but did not carry it out in detail. In his latest paper Wesenberg-Lund offers some modifications to his earlier outline, bringing it into fair agreement with De Beauchamp's ideas, with the notable exception of the relationship of the families with malleo-ramate mastax. With this material available we have by degrees arrived at the tentative classification given below; as will be noted, it is mainly De Beauchamp's, with some modifications suggested by personal observations, and includes only the Ploima, around which the prin-

cipal differences of opinion are centered. The number of families has been reduced somewhat, and this will probably not be considered objectionable. There is no obvious advantage in having a separate family for each genus; any system of classification put forward must be a means of expressing the author's ideas on the mutual relationship of the component parts; placing each in a separate box is a confession of failure.

We have divided the Ploima into six major groups, which may be termed suborders, tribes, superfamilies or anything else that individual fancy may suggest. This regrouping seems, on the evidence available, to give a better perspective of the order. No detailed evidence for the placement of the individual genera will be offered at this time; on the whole we do not anticipate any violent dissent, but welcome constructive criticism. The reasons that appear to favor this arrangement will be given in future papers on the rotifer fauna of Wisconsin; in the absence of a thorough revision it is hardly possible to do more. However, in spite of, or perhaps on account of, this serious shortcoming, a useful purpose may be served in calling attention once more to some of the as yet unsettled problems of rotatorian taxonomy.

## Order PLOIMA.

NOTOMMATOIDEA.

Family NOTOMMATIDAE.

Subfamily PROALINAE.

Genus *Proales.*

*Proalinopsis.*

*? Squatinella.*

Subfamily NOTOMMATINAE.

Genus *Notommata.*

*Taphrocampa.*

*Drilophaga.*

*Pleurotrocha.*

*Cephalodella.*

*Dorystoma.*

*Rousseletia.*

*Tylotrocha.*

*Resticula.*

*Eosphora.*

*Eothinia.*

*Sphyrias.*

*Scaridium.*

*Monommata.*

Subfamily TETRASIPHONINAE.

Genus *Tetrasiphon.*
Subfamily LINDIINAE.
Genus *Lindia.*
Subfamily BIRGEINAE.
Genus *Birgea.*
Subfamily DICRANOPHORINAE.
Genus *Dicranophorus.*
*Encentrum.*
*Erignatha.*
*Albertia.*
Family SYNCHAETIDAE.
Genus *Synchaeta.*
*Parasynchaeta.*
*Ploesoma.*
*Polyarthra.*
*Anarthra.*
*? Microcodon.*
Family GASTROPODIDAE.
Genus *Gastropus.*
*Ascomorpha.*
*Chromogaster.*
Family TRICHOCERCIDAE.
Genus *Trichocerca.*
*Diurella.*
*Elosa.*

**ASPLANCHNOIDEA.**
Familiy ASPLANCHNIDAE.
Genus *Asplanchna.*
*Asplanchnopus.*
*Harringia.*

**BRACHIONOIDEA.**
Family BRACHIONIDAE.
Genus *Brachionus.*
*Schizocerca.*
*Platyias.*
*Keratella.*
*Notholca.*
*Anuraeopsis.*
Family EPIPHANIDAE.
Genus *Epiphanes.*
*Rhinoglena.*
*Cyrtonia.*
*Proalides.*
*Mikrocodides.*
Family EUCHLANIDAE.
Genus *Euchlanis.*
*Dipleuchlanis.*
*Lecane.*

*Monostyla.*
*Lepadella.*
*Colurella.*
*Mytilina.*
*Trichotria.*
*Lophocharis.*
*Wolga.*
*Macrochaetus.*

FILINIOIDEA.
Family FILINIIDAE.
Genus *Filinia.*
*Tetramastix.*
*Pedalia.*

TESTUDINELLOIDEA.
Family TESTUDINELLIDAE.
Genus *Testudinella.*
*Pompholyx.*

TROCHOSPHAEROIDEA.
Family TROCHOSPHAERIDAE.
Genus *Trochosphaera.*

### Genus LECANE Nitzsch.

Euchlanid rotifers with illoricate, retractile head and loricate body, strongly compressed dorso-ventrally and oval or ovate in outline; dorsal and ventral plates connected by a flexible membrane, forming lateral and posterior sulci; foot with two extremely short, rudimentary joints, of which only the posterior is movable; toes two; corona of family type; mastax modified malleate, with a piston attached to its ventral wall; eyespot single and at the posterior end of ganglion; retrocerebral sac usually present, but no subcerebral glands.

*Type of the genus.—Lecane luna* (Müller)=*Cercaria luna* Müller.

This genus includes *Cathypna* Gosse and *Distyla* Eckstein; as pointed out by Murray there are no real differences between the species referred to them that would warrant their maintainance. In his Infusionsthierchen Ehrenberg pointed out that if *Euchlanis luna* were to be separated from *Euchlanis,* it would have to take the generic name *Lecane* Nitzsch, an injunction ignored by Gosse.

Quite a number of species have been described which we have

not seen. Some of these are of doubtful validity, and others appear to be good species; a list is given below.

*Cathypna affinis* LEVANDER.

*Cathypna affinis* LEVANDER, Acta Soc. Fauna et Flora Fennica, vol. 12, No. 3, 1895, p. 50, pl. 3, fig. 31.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 346.

*Distyla affinis* IROSO, Mon. Zool. Italiano, vol. 21, 1910, p. 302; Atti R. Ist. Incorr. Napoli, vol. 64 (for 1912), 1913, p. 466, fig. 13.—LUCKS, Rotatorienfauna Westpreussens, 1912, p. 110.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 176.

*Cathypna amban* STEWART, Rec. Indian Mus., vol. 2, 1908, p. 320, text fig.

*Cathypna diomis* GOSSE, Journ. Royal Micr. Soc., 1887, p. 362, pl. 8, fig. 2; HUDSON and GOSSE, Rotifera, Suppl., 1889, p. 41, pl. 31, fig. 38.

*Cathypna gossei* LORD, Science Gossip, vol. 26, 1890, p. 202, text fig.

*Cathypna gracilis* SACHSE, Arch. Hydrobiol., vol. 10, 1914, p. 70, fig. 10.

*Cathypna hudsoni* LORD, Science Gossip, vol. 26, 1890, p. 202, text fig.

*Cathypna latifrons* GOSSE, Journ. Royal Micr. Soc., 1887, p. 362, pl. 8, fig. 3.—HUDSON and GOSSE, Rotifera, Suppl., 1889, p. 42, pl. 31, fig. 37.

*Cathypna magna* STENROOS, Acta Soc. Fauna et Flora Fennica, vol. 17, No. 1, 1898, p. 161, pl. 2, fig. 21.

*Cathypna magna tenuior* STENROOS, Acta Soc. Fauna et Flora Fennica, vol. 17, No. 1, 1898, p. 161, pl. 2, fig. 22.

*Cathypna rotundata* OLOFSSON, Zool. Bidr. Uppsala, vol. 6, 1918, p. 593, fig. 53.—IDELSON, Trudy Plovuch. Morsk. Nauchn. Inst., pt. 12, 1925, p. 90.

*Cathypna rusticola* GOSSE, in Hudson and Gosse, Rotifera, 1886, vol. 2, p. 95, pl. 24, fig. 6. —SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 173, fig. 341.

*Cathypna spenceri* SHEPHARD, Victorian Nat., vol. 9, 1892, p. 15.

*Cathypna sulcata* GOSSE, in Hudson and Gosse, Rotifera, 1886, vol. 2, p. 96, pl. 24, fig. 5.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 173, fig. 340.—? MURRAY, Journ. Royal Micr. Soc., 1913, p. 557, pl. 22, fig. 5.

*Cathypna weberi* MOLA, Zool. Anz., vol. 42, 1913, p. 115, figs. 5, 6; Ann. Biol. Lac., vol. 6, 1913, p. 261.

*Distyla acinaces* MOLA, Zool. Anz., vol. 42, 1913, p. 119, figs. 11, 12; Ann. Biol. Lac., vol. 6, 1913, p. 260.

*Distyla aculeata* JAKUBSKI, Zool. Anz., vol. 39, 1912, p. 542, figs. 3, 4.

*Distyla branchicola* PIOVANELLI, Mon. Zool. Italiano, vol. 14, 1903, p. 348.

*Distyla gissensis* ECKSTEIN, Zeitschr. Wiss. Zool., vol. 39, 1883, pl. 383, pl. 27, fig. 51.—HUDSON and GOSSE, Rotifera, 1886, vol. 2, p. 96, pl. 24, fig. 8.—WEBER, Rev. Suisse Zool., vol. 5, 1898, p. 597, pl. 22, figs.

6, 7.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 175, figs. 343, 344.—MOLA, Ann. Biol. Lac., vol. 6, 1913, p. 261.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 186.

*Distyla korschelti* MOLA, Zool. Anz., vol. 42, 1913, p. 117, figs. 7, 8.

*Distyla minnesotensis* HERRICK, Bull. Denison Univ., vol. 1, 1885, p. 5, pl. 2, fig. 17.

*Distyla striata* GOSSE, Journ. Royal Micr. Soc., 1887, p. 5, pl. 2, fig. 17.—HUDSON and GOSSE, Rotifera, Suppl., 1889, p. 43, pl. 31, fig 40.

*Distyla terracianoi* MOLA, Zool. Anz., vol. 42, 1913, p. 118, figs. 9, 10; Ann. Biol. Lac., vol. 6, 1913, p. 260.

*Lecane carinata* (JAKUBSKI).

*Distyla carinata* JAKUBSKI, Zool. Anz., vol 39, 1912, p. 542, figs. 1, 2.

*Lecane carinata* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 60.

*Lecane muscicola* (BRYCE).

*Distyla musicola* BRYCE, Science Gossip vol. 27, 1891, p. 206, text fig.

*Distyla muscicola* BRYCE, Science Gossip, vol. 27, 1891, p. 236.

? *Cathypna muscicola* MURRAY, Journ. Royal Micr. Soc., 1913, p. 555, pl. 23, fig. 19.

*Lecane musicola* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 61.—HAUER, Mitt. Geogr. Ges. u. Naturhist. Mus. Lübeck, ser. 2, No. 30, 1925, p. 168.

### LECANE CURVICORNIS (Murray).

Plate VIII, figures 1, 2.

*Cathypna curvicornis* MURRAY, Journ. Royal Micr. Soc., 1913, p. 346, pl. 14, fig. 22.

*Cathypna nitida* MURRAY, Journ. Royal Micr. Soc., 1913, p. 347, pl. 14, fig. 24.

*Cathypna lofuana* MURRAY, Journ. Royal Micr. Soc., 1913, p. 551, pl. 22, fig. 1.

*Lecane curvicornis* HARRING, Proc. U. S. Nat. Mus., vol. 17, 1914, p. 535, pl. 17, fig. 3.

The lorica is broadly pyriform in outline; the anterior margins are somewhat variable according to the stage of contraction, but normally coincident, with a broad, V-shaped sinus; at the external angles are two fairly large spines. The dorsal plate is oval, truncate posteriorly and considerably narrower than the ventral plate. Specimens from certain localities show a very faint dorsal facetting, but the boundaries of the individual facets are so indistinct that we have not attempted to figure them. The lateral sulci are deep, but do not quite reach the anterior margin. The ventral plate is more distinctly pyriform than the dorsal and much wider; the transverse fold is very strongly

marked. The posterior segment is small and rounded posteriorly; the coxal plates are moderately large and obtusely pointed. The first foot joint is large and parallel-sided but somewhat indistinct; the second fairly large and subsquare. The toes are very long, slender and parallel-sided, ending in a small claw with basal spicule; their length is about one-third of the total length.

Total length 280$\mu$; length of dorsal plate 120$\mu$, of ventral plate 132$\mu$; width of dorsal plate 95$\mu$, of ventral plate 113$\mu$; anterior points 63$\mu$; toes wihout claw 69$\mu$; claw 10$\mu$.

*Lecane curvicornis* is very abundant in certain localities; Murray found it in Brazil, it was collected by the Panama Biological Survey in the Panama Canal Zone, by Myers at Los Angeles, California, by Dr. E. A. Birge and Mr. C. Juday in Texas and Arkansas, by Dr. Birge during the Great Lakes Investigations in 1899 at various points around Lake Erie and by Mr. Juday in Guatemala. Murray's *C. lofuana* was collected in a tributary to Lake Tanganyika in Africa. From this it will be seen to be widely, but erratically distributed; where it is found, it is usually abundant.

As noted by Harring, the three species described by Murray are one and the same species; through the kindness of the late Mr. Rousselet we had an opportunity to examine the original specimens from which Murray described them and after comparison with material from other sources we have no doubt of their identity.

**LECANE ACRONYCHA Harring and Myers, new species.**

Plate VIII, figures 3, 4.

The outline of the lorica is a moderately elongate oval; the anterior dorsal margin is almost straight, projecting slightly in front of the ventral margin, which is somewhat concave; at the external angles are two large, triangular cusps. The dorsal plate is oval and without markings or facetting; it is considerably narrower than the ventral plate and its edges do not reach the anterior margin. The ventral plate is of the same general outline as the dorsal; it is marked by a fairly distinct transverse ridge in front of the foot joint. The lateral sulci are fairly deep. The posterior segment is rather small and somewhat indistinct; the coxal plates are small and obtusely pointed. The first foot joint is indistinct, the second moderately large and trapezoidal in

form. The toes are long and fairly robust, very slightly enlarged above the relatively short claw; this has a small basal spicule. The length of the toes is more than one third of the total.

Total length 290$\mu$; length of dorsal plate 162$\mu$, of ventral plate 182$\mu$; width of dorsal plate 136$\mu$, of ventral plate 146$\mu$; anterior points 80$\mu$; length of toes without claw 90$\mu$; claw 12$\mu$.

*Lecane acronycha* appears to be confined to regions with soft, acid water; we have found it abundant in Vilas and Oneida counties, Wisconsin, around Atlantic City, New Jersey and on Mt. Desert Island, Maine. It is related to *L. ungulata* and is its equal in length, but not in bulk; it is readily distinguished by its regular oval form, narrow anterior margin, small, rounded posterior segment and the short claws.

### LECANE UNGULATA (Gosse).

Plate IX, figures 3, 4.

*Cathypna ungulata* GOSSE, Journ. Royal Micr. Soc., 1887, p. 361, pl. 8, fig. 1.—HUDSON and GOSSE, Rotifera, Suppl., 1889, p. 42, pl. 31, fig. 36.—WIERZEJSKI, Rozpr. Akad. Umiej., Wydz. Mat.-Przyr., Krakow, ser. 2, vol. 6, 1893, p. 242.—BILFINGER, Jahresh. Naturk. Württemberg, vol. 50, 1894, p. 58.—JENNINGS, Bull. U. S. Fish Comm., vol. 19 (for 1899), 1900, p. 91, pl. 19, figs. 26, 27.—DADAY, Zoologica, pt. 44, 1905, p. 111; pt. 59, 1910, p. 84.—ROUSSELET, Journ. Royal Micr. Soc., 1906, p. 406, pl. 15, fig. 1.—MEISSNER, Izv. Turkestansk. Otd. Imp. Russk. Geogr. Obshch., vol. 4, pt. 8, 1908, p. 20, pl. 1, fig. 4.—DE BEAUCHAMP, Arch. Zool. Expér., ser. 4, vol. 10, 1909, p. 160, pl. 3, fig. 22.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 173, fig. 335.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 31.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 190.—OPARINA-KHARITONOVA, Izv. Biol. Nauchno-Issl. Inst. Permsk. Univ., vol. 3, 1925, p. 44.

*Cathypna glandulosa* STOKES, Ann. Mag. Nat. Hist., ser. 6, vol. 19, 1897, p. 632, pl. 14, fig. 8–10.

*Cathypna magna* LUCKS, Rotatorienfauna Westpreussens, 1912, p. 109, fig. 32; not *Cathypna magna* STENROOS.

*Cathypna ungulata magna* SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 173.—IDELSON, Trudy Plovuch. Morsk. Nauchn. Inst. pt. 12, 1925, p. 89; not *Cathypna magna* STENROOS.

*Cathypna minnesotensis* MURRAY, Journ Royal Micr. Soc., 1913, p. 345, pl. 13, fig. 18.—SACHSE, Arch. Hydrobiol., vol. 10, 1914, p. 69, fig. 9; not *Cathypna minnesotensis* HERRICK.

*Lecane ungulata* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 62; Proc. U. S. Nat. Mus., vol. 47, p. 535; Rep. Canadian Arctic Exp.

1913—18, vol. 8 pt. E, p. 9.—KOZAR, Zool. Anz., vol. 44, 1914, p. 420.—JAKUBSKI, Kosmos (Lwów), 1918–1919, p. 28.

The lorica is broadly oval in outline; the anterior dorsal margin is virtually straight, the ventral very slightly concave; at the external angles are two large, triangular cusps. The dorsal plate is oval and without markings of any kind; it is considerably narrower than the ventral and the margins become indistinguishable before reaching the anterior edge. The ventral plate is of the same general outline as the dorsal, but somewhat narrower at the beginning of the posterior segment; its markings are limited to an indistinct, broken, transverse fold some distance in front of the foot joint. The lateral sulci are deep. The posterior segment is very broad and slightly truncate; it projects slightly beyond the foot; the coxal plates are large and obtusely pointed. The first foot joint is very indistinct, the second short and fairly broad. The toes are straight and nearly parallel-sided, very slightly enlarged posteriorly and end in a long, stout claw with a fairly prominent basal spicule; their length is more than one third of the total length.

Total length 285$\mu$; length of dorsal plate 220$\mu$, of ventral plate 255$\mu$; width of dorsal plate 180$\mu$, of ventral plate 195$\mu$; anterior points 135$\mu$; length of toes without claw 75$\mu$; claw 45$\mu$.

*Lecane ungulata* is very common and widely distributed in the United States; it seems to be less common in Europe; according to Rousselet it is rare in England. It is the largest known species of the genus and is readily recognized by its robust form, the broad posterior segment and long claws.

### LECANE SIBINA Harring.

Plate IX, figures 1, 2.

*Lecane sibina* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 535, pl. 23, figs. 5–7.

The lorica is broadly pyriform; the anterior margins of the dorsal and ventral plates are nearly coincident and slightly concave with distinct lateral cusps. The dorsal plate is subcircular and without facetting; a low, median, anterior hump is formed by the retraction of the head. The ventral plate is oval, slightly narrower than the dorsal, and its only surface markings are some faint transverse ridges on the posterior third; the anterior margin has a very small, median, lunate sinus.

The lateral sulci are moderately deep and do not reach the anterior margin. The posterior segment is prominent and projects some distance over the base of the toes; the large and obtusely triangular coxal plates do not extend beyond the second foot joint. The first foot joint is very indistinct, the second short and broadly triangular. The toes are very nearly parallel-sided, about one third of the total length and end in a long, stout claw with a basal spicule; a short distance in front of the claw are one or two indistinct annular constrictions.

Total length 200$\mu$; length of dorsal plate 130$\mu$, of ventral plate 135$\mu$; width of dorsal plate 125$\mu$, of ventral plate 116$\mu$, width of anterior margin 78$\mu$; length of toes without claw 42$\mu$; claw 20$\mu$.

*Lecane sibina* is related to *L. ungulata;* it is much smaller and the lorica is relatively broader. It was described from material collected in the Panama Canal Zone and has since been found by Mr. C. Juday at Puerto Barrios, Guatemala.

### LECANE GRANDIS (Murray).

Plate X, figures 1, 2.

*Cathypna grandis* MURRAY, Journ. Royal Micr. Soc., 1913, p. 344, pl. 13, fig. 20.

*Lecane grandis* FADEEV, Trudy Kharkovsk. Obshch. Isp. Prir., vol. 50, 1925, p. 8, pl. 1, fig. 6.

The outline of the lorica is broadly ovate and truncate posteriorly. The anterior margins of both dorsal and ventral plates are nearly straight; the dorsal plate projects slightly beyond the anterior ventral margin and the lorica consequently remains partly open when the head is completely retracted. The dorsal and ventral plates are of the same width and differ very slightly in outline; no surface markings are present. The lateral sulci are not very deep. The posterior segment is short and very broad, projecting but little beyond the dorsal plate. The coxal plates are large and sharply pointed. The foot joints are unusually broad and rather short. The toes are long, very slightly blade-shaped and straight on the inner edges, ending in a conical claw with a small basal spicule.

Total length 240$\mu$; length of dorsal plate 165$\mu$, of ventral plate 175$\mu$; width of lorica 140$\mu$; anterior margin, dorsal, 100$\mu$, ventral 118$\mu$; toe without claw 60$\mu$; claw 12$\mu$.

*Lecane grandis* is common in brackish or salt tide pools; it was first found by Murray at Rio de Janeiro; we have collected it around Atlantic City, New Jersey, and it has recently been reported by Fadeev from salt lagoons at Novorossiisk, on the Black Sea.

**LECANE LEONTINA (Turner).**

Plate X, figures 3–5.

*Cathypna leontina* TURNER, Bull. Denison Univ., vol. 6, 1892, p. 61, pl. 1, fig. 12.—KELLICOTT, Trans. Amer. Micr. Soc., vol. 19, 1897, p. 53.—JENNINGS, Bull. Michigan Fish Comm., No. 3, 1894, p. 24; Bull. U. S. Fish Comm., vol. 19 (for 1899), 1900, p. 91, pl. 19, fig. 25.—HEMPEL, Bull. Illinois State Lab. Nat. Hist., vol. 5, 1898, p. 374.—DADAY, Zoologica, pt. 44, 1905, p. 109, pl. 6, fig. 12; pt. 59, 1910, p. 83.—ROUSSELET, Journ. Royal Micr. Soc., 1906, p. 405, pl. 14, fig. 6.—KOFOID, Bull. Illnois State Lab. Nat. Hist., vol. 6, No. 1, 1908, p. 197.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 345, pl. 13, fig. 21.

*Cathypna scutaria* STOKES, Ann. Mag. Nat. Hist., ser. 6, vol. 19, 1897, p. 631, pl. 14, fig. 7.

*Cathypna macrodactyla* DADAY, Math. Termész. Ertes., vol. 16, 1898, p. 92; Termész. Füzetek, vol. 21, Suppl., 1898, p. 15, fig. 3.

*Cathypna leontina bisinuata* DADAY, Zoologica, pt. 44, 1905, p. 109, pl. 6, fig. 18.

*Cathypna biloba* DADAY, Math. Termész. Ertes., vol. 23, 1905, p. 330; zoologica, pt. 44, 1905, p. 111, pl. 6, fig. 17.

*Cathypna incisa* DADAY, Math. Termész. Ertes., vol. 23, 1905, p. 330; Zoologica, pt. 44, 1905, p. 111, pl. 6, fig. 14.

*? Cathypna appendiculata* DADAY, Zoologica, pt. 44, 1905, p. 110, pl. 6, fig. 13.

*Lecane leontina* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 61; Proc. U. S. Nat. Mus., vol. 47, 1914, p. 536.

The lorica is broadly pyriform in outline; the anterior dorsal margin is slightly concave; the ventral margin has a broad, V-shaped sinus, rounded at the posterior angle; at the external angles are two small, triangular spines. The dorsal plate is nearly as wide as the ventral and of the same general form; it is rounded posteriorly and without markings. The ventral plate has an indistinct transverse fold in front of the foot. The lateral sulci are deep. The posterior segment is continued over the base of the foot as a tail-like projection, widest posteriorly, rarely with two long, divergent spines, as in fig. 3. The coxal plates are large and obtusely pointed. The first foot joint is parallel-sided and somewhat indistinct; the second foot joint is sub-

square. The toes are extremely long, slender, straight and parallel-sided, ending in a fairly long claw with basal spicule; they are nearly as long as the entire body.

Total length 330$\mu$; length of dorsal plate 170$\mu$, of ventral plate 210$\mu$; width of dorsal plate 140$\mu$, of ventral plate 145$\mu$; anterior points 90$\mu$; toes without claw 135$\mu$; claw 15$\mu$. The form with posterior spines shown in figure 3 measures: total length 370$\mu$; length of dorsal plate 165$\mu$, of ventral plate 240$\mu$; width of dorsal plate 147$\mu$; of ventral plate 152$\mu$; anterior points 90$\mu$; toes without claw 140$\mu$; claw 15$\mu$.

*Lecane leontina* is common in weedy ponds all over the United States; records from other countries are not numerous. The variety with posterior spines is rare; the specimen figured was collected at the Fish Hatchery at Delafield, Wisconsin.

### LECANE DEPRESSA (Bryce).

Plate XVI, figures 1, 2.

*?Cathypna latifrons* GOSSE, Journ. Royal Micr. Soc., 1887, p. 362, pl. 8, fig. 3.—HUDSON and GOSSE, Rotifera, suppl., 1889, p. 42, pl. 31, fig. 37.

*? Proales prehensor* GOSSE, Journ. Royal Micr. Soc., 1887, p. 366, pl. 8, fig. 12.—HUDSON and GOSSE, Rotifera, Suppl., 1889, p. 24, pl. 31, fig. 12.

*Distyla depressa* BRYCE, Science Gossip, vol. 27, 1891, p. 205, text fig.

*Cathypna depressa* MURRAY, Journ. Royal Micr. Soc., 1913, p. 555, pl. 23, fig. 17.

*Lecane depressa* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 61; Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 9.

*? Cathypna levistyla* OLOFSSON, Zool. Bidr. Uppsala, vol. 5, 1917, p. 280, fig. 10.

The outline of the lorica is broadly ovate; its width is about three fourths of the length. The anterior dorsal margin is nearly straight; the ventral margin has a shallow, V-shaped sinus. At the external angles are two small, stout anterior spines. The dorsal plate is broadly ovate and rounded posteriorly; the ventral plate is oval and somewhat narrower than the dorsal; both are entirely without facetting or surface markings. The lateral sulci are fairly deep. The posterior segment is fairly large and projects considerably beyond the dorsal plate; at the level of the base of the toes are two small, but very distinct marginal indentations. The coxal plates are rather small and rounded

posteriorly. The first foot joint is narrow and overlaps the second joint with a small, rounded, median lobe only; the second joint is subsquare and some distance in front of the posterior margin. The toes are fairly long, about one fourth of the total length, parallel-sided for half their length and taper to acute points; the inner edges are straight.

Total length 130$\mu$; length of dorsal plate 90$\mu$, of ventral plate 95$\mu$; width of dorsal plate 75$\mu$, of ventral plate 65$\mu$; width of anterior margin 54$\mu$; length of toes 30$\mu$.

*Lecane depressa* is widely distributed and seems to be a typical wet sphagnum species. It is closely related to *L. mitis, L. scobis* and *L. tudicola;* the form of the lorica and the dimensions show sufficient differences to preclude any confusion.

**LECANE TUDICOLA, Harring and Myers, new species**

Plate XI, figures 1, 2.

The outline of the lorica is very broadly ovate; its width is more than three fourths of the length. The anterior dorsal margin is straight; the ventral margin has a very shallow, V-shaped sinus. At the external angles are two small, stout anterior spines. The dorsal plate is very broadly ovate and broadly truncate posteriorly; it is as wide as the ventral plate at its widest point, but narrower both anteriorly and posteriorly. The ventral plate is very broadly ovate and slightly larger than the dorsal; both are without surface markings or facetting. The lateral sulci are shallow. The posterior segment is broadly rounded and projects somewhat beyond the dorsal plate; at the level of the coxal plates there are two small, but distinct marginal indentations. The coxal plates are small and rounded posteriorly. The first foot joint is fairly large and narrow, with a small, rounded median lobe overlapping the second joint, which is large and somewhat reniform and slightly in advance of the posterior margin. The toes are fairly long, about one fourth of the total length, parallel-sided for a little less than half their length and gradually tapering to acute points; the inner edges are straight.

Total length 145$\mu$; length of dorsal plate 105$\mu$, of ventral plate 110$\mu$; width of lorica 85$\mu$; width of anterior margin 60$\mu$; length of toes 37$\mu$.

*Lecane tudicola* was collected by Dr. G. H. Parker, of Harvard University, among algae in the "Ice House Pond" on St. Paul, Prybilof Islands, Alaska. It is related to *L. depressa,* but readily distinguished by the smaller dorsal plate, as well as its larger size and relatively greater width.

**LECANE MITIS Harring and Myers, new species**

**Plate XI, figures 3, 4.**

The outline of the lorica is broadly ovate; its width is about three fourths of the length. The anterior dorsal margin is straight medially, with a blunt angle at the external edges; the ventral margin is slightly lunate. At the external angles are two small, slightly incurved spines. The dorsal plate is broadly reversed-ovate and broadly truncate posteriorly; the ventral plate is elongate oval and considerably narrower than the dorsal; both are quite smooth, without surface markings. The lateral sulci are moderately deep. The posterior segment is large and rounded and projects far beyond the dorsal plate. The coxal plates are small and obtusely pointed; they do not project beyond the foot. The first foot joint is small and broadly ovate and its small, but very distinct median lobe almost reaches to the base of the toes; the second joint is subsquare, very broad and some distance from the posterior margin. The toes are fairly long, a little more than one fourth of the entire length, parallel-sided for fully half their length and taper to acute points; the inner edges are straight.

Total length 165$\mu$; length of dorsal plate 110$\mu$, of ventral plate 130$\mu$; width of dorsal plate 100$\mu$, of ventral plate 80$\mu$; width of anterior margin 60$\mu$; length of toes 45$\mu$.

*Lecane mitis* was collected among floating and partly submerged sphagnum at Gravelly Run, near Atlantic City, New Jersey. It is closely related to *L. depressa,* but differs in the form of the anterior dorsal and ventral margin, the posterior segment, the foot and the truncate dorsal plate, as well as in being consistently larger.

**LECANE SCOBIS Harring and Myers, new species**

**Plate XI, figures 5, 6.**

The outline of the lorica is very broadly ovate; its width is five sixths of the length. The anterior dorsal margin is straight

and the ventral margin slightly concave; at the external angles are two short, stout and slightly incurved spines. The dorsal plate is very broadly ovate, its width but little less than its length, and rounded posteriorly; the ventral plate is broadly oval and considerably narrower than the dorsal; both are without surface markings. The lateral sulci are moderately deep. The posterior segment is rounded and very broad; its projects somewhat beyond the dorsal plate. The coxal plates are large and rounded posteriorly. The first foot joint is large and pyriform, with a small median lobe overlapping the second joint which is rounded anteriorly and angulate posteriorly; it is slightly in advance of the posterior margin. The toes are fairly long, a little more than one fourth of the total length, parallel-sided for a little less than half their length and gradually tapering to acute points; the inner edges are straight.

Total length 160$\mu$; length of dorsal plate 114$\mu$ of ventral plate 122$\mu$; width of dorsal plate 102$\mu$, of ventral plate 88$\mu$; width of anterior margin 66$\mu$; length of toes 43$\mu$.

*Lecane scobis* was collected by Dr. Frits Johansen while serving as biologist on the Southern party of the Canadian Arctic Expedition, among algae growing on stones in the river bed at Bernard Harbour, North West Territories. It is related to *L. depressa,* but readily distinguished by its greater size, relatively greater width and the form of the foot.

**LECANE MUCRONATA Harring and Myers, new species.**

Plate XXIX, figures 3–5.

The lorica is broadly ovate; its width is about two thirds of the length. The anterior dorsal and ventral margins are coincident and straight. At the external angles are two pairs of anterior spines; one pair, on the dorsal plate, are very small. The second pair, attached to the membrane of the lateral sulci, are very long and stout, broad at the base and acutely pointed; when the animal is swimming, these spines point straight upwards, but in the extensive deformations taking place incident to the contraction and closure of the lorica they are bent outwards, as shown in the figure. The dorsal plate is very broadly oval and rounded posteriorly; its width is about four fifths of the length. The ventral plate is elongate pyriform and considerably narrower than the dorsal plate. The surface markings of the

lorica are a strong, V-shaped anterior fold on the dorsal plate, formed by the contraction of the lorica, and a transverse fold on the ventral plate, some distance in front of the foot. The lateral sulci are fairly deep. The posterior segment is semicircular and rather small; it projects far beyond the dorsal plate. The coxal plates are rather small and rounded posteriorly. The first foot joint is indistinct anteriorly and projects with a small median lobe over the large, subsquare second foot joint, which reaches almost to the posterior margin. The toes are long and slender, nearly one third of the total length, parallel-sided and approximately straight, with undulating edges. The claw is short and stout; at the base is a small spicule.

Total length 175$\mu$; length of lorica, including frontal spines, 140$\mu$; length of dorsal plate, without spines, 115$\mu$, of ventral plate 126$\mu$; width of dorsal plate 105$\mu$, of ventral plate 84$\mu$; length of anterior spines, from base to tip, 28$\mu$; length of toes without claw 48$\mu$; claw 6$\mu$.

*Lecane mucronata* has been collected in Oneida and Vilas Counties, Wisconsin, on Mount Desert Island, Maine, and in New Jersey around Atlantic City and at Batsto; it is usually rare, but at Batsto it was common in the gelatinous algal covering of a dwarf species of sphagnum growing in shallow water. The form of the swimming animal has but little resemblance to the contracted specimens; the body is very slender, the length of the lorica alone being equal to the entire length of the contracted animal, and the frontal spines are pressed towards the head and the anterior edge of the lorica, so that they are not seen unless carefully searched for.

### LECANE PYRRHA Harring and Myers, new species.

Plate XII, figures 3–6.

The outline of the lorica is a very elongate oval, the greatest width being only two thirds of the length, and the body is somewhat compressed dorso-ventrally. The anterior dorsal and ventral margins are coincident and concave; at the external angles are two stout, triangular cusps. The dorsal plate is elongate oval and slightly truncate posteriorly; the ventral plate is very nearly parallel-sided and both are without facetting. The lateral sulci are fairly deep. The posterior segment is somewhat irregular in outline and projects but little beyond the dorsal plate. The coxal plates are unusually small and obtusely point-

ed posteriorly. The first foot joint is narrow and wedge-shaped, the second subsquare and robust. The toes are long and slender, about one fourth of the total length, straight and parallel-sided, and end in acute points without claws.

Total length 280$\mu$; length of dorsal plate 193$\mu$, of ventral plate 210$\mu$; width of dorsal plate 135$\mu$, of ventral plate 125$\mu$; width of anterior points 80$\mu$; length of toes 75$\mu$.

*Lecane pyrrha* is common in weedy ponds with soft, acid water, but is never found in hard water regions. The entire body is, with rare exceptions, colored a deep reddish brown. An aberrant variety from Eagle River, Vilas County, Wisconsin, is shown in figures 5 and 6; the principal difference is in the greater width of the lorica. The typical form is abundant at Atlantic City, New Jersey, in Oneida and Vilas Counties, Wisconsin, and on Mount Desert Island, Maine.

### LECANE PLOENENSIS (Voigt).

Plate XIII, figures 5, 6.

*Distyla ploenensis* VOIGT, Zool. Anz., vol. 25, 1902, p. 679; Forschungsber. Biol. Stat. Plön, vol. 11, 1904, p. 71, pl. 4, fig. 39.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 177, fig. 350.—ROUSSELET, Proc. Royal Irish Acad., vol. 31, pt. 51, 1911, p. 10.

*Cathypna ploenensis* MURRAY, Journ. Royal Micr. Soc., 1913, p. 552, pl. 22, fig. 4.

*Lecane ploenensis* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 62; Proc. U. S. Nat. Mus., vol. 47, 1914, p. 536.

The outline of the lorica is elongate oval. The anterior margins are coincident and straight; at the external angles are two small, cusplike spines. The ovate dorsal plate is slightly truncate posteriorly and very firm; the surface markings are very prominent and constant. The pattern is rather complicated; the median portion is regularly facetted, but towards the margins the ridges become more complex, as shown in figure 5. The ventral plate follows the general outline of the dorsal, but is somewhat narrower, especially in front; the markings are less intricate than on the dorsal plate. The lateral sulci are moderately deep. The posterior segment is rather small and rounded, projecting but little beyond the dorsal plate; the coxal plates are large and rounded posteriorly. The first foot joint is

narrow and indistinct, the second large and pyriform or subtriangular. The toes are very long and slender, about one third of the total length, parallel-sided, straight on the inner edges and ending in acute points without claws.

Total length 260$\mu$; length of dorsal plate 170$\mu$, of ventral plate 185$\mu$; width of dorsal plate 112$\mu$, of ventral plate 105$\mu$; width of anterior points 84$\mu$; length of toes 86$\mu$.

*Lecane ploenensis* is abundant in weedy ponds everywhere in the United States. According to Rousselet, who collected it on Clare Island, it is a rare species, and European records are not numerous. It is quite likely that this may be Levander's *Cathypna affinis,* but his description is lacking in detail, and it is not now possible to decide among the large number of species which one was really meant. The only course open seems to be to drop it as unidentifiable.

**LECANE SIGNIFERA (Jennings).**

Plate XIII, figures 3, 4.

*Distyla signifera* JENNINGS, Bull. Michigan Fish Comm., No. 6, 1896, p. 92, figs. 1, 2.
*Cathypna signifera* MURRAY, Journ. Royal Micr. Soc., 1913, p. 552, pl. 23, fig. 13.
*Lecane signifera* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 62.

The outline of the lorica is elongate oval, and the anterior margins coincident and straight; at the external angles are two small, cusplike spines. The dorsal plate is slightly ovate and rounded posteriorly. The ventral plate is narrower than the dorsal, but of the same general outline. The surface markings of the lorica are of an unusual type; upon a pattern of elevated ridges, rounded at the top and of the design found in *L. ploenensis,* is superposed rows of small, closely spaced, hemispherical, beadlike elevations. These beads are on the slopes of the ridges, midway between the rounded tops and bottoms of the facets. The lateral sulci are moderately deep. The posterior segment is rounded and projects but slightly beyond the dorsal plate. The coxal plates are moderately large and rounded posteriorly. The first foot joint is long and narrow, the second short, broad and subsquare. The toes are long and slender, about one third of the total length, parallel-sided, straight on the inner edges and ending in acute points without claws.

Total length 200$\mu$; length of dorsal plate 135$\mu$, of ventral plate

148$\mu$; width of dorsal plate 90$\mu$, of ventral plate 82$\mu$; width of anterior points 68$\mu$; length of toes 60$\mu$.

*Lecane signifera* usually occurs in small numbers, but it is widely distributed in the United States. We have collected it in Wisconsin, Mount Desert Island, Maine, New Jersey, Maryland, the District of Columbia and Florida, and it also occurred in collections made by Dr. Jennings at Ann Arbor, Michigan.

**LECANE AQUILA Harring and Myers, new species.**

Plate XIII, figures 1, 2.

The outline of the lorica is reversed-ovate and fairly broad. The anterior margins are coincident and very nearly straight; at the external angles are two small cusplike spines. The ovate dorsal plate is slightly truncate posteriorly and rather flexible; the surface markings are very faint and differ from other species of the genus, as will be seen from figure 2. The ventral plate is oval and its anterior edges somewhat flexible and indistinct. The lateral sulci are moderately deep. The posterior segment is rounded and projects but very slightly beyond the dorsal plate; the coxal plates are moderately large and rounded posteriorly. The first foot joint is narrow and indistinct, the second large and subsquare. The toes are very long and slender, one third of the total length, parallel-sided and ending in acute points without claws.

Total length 300$\mu$; length of dorsal plate 190$\mu$, of ventral plate 202$\mu$; width of dorsal plate 148$\mu$, of ventral plate 125$\mu$; width of anterior points 95$\mu$; length of toes 100$\mu$.

*Lecane aquila* was first collected in a shallow, weedy pond at Eagle River, Vilas County, Wisconsin; it is common on Mount Desert Island, Maine. It is closely related to *L. ploenensis* and *L. signifera*, but is much larger and more robust than these two species; the toes are also relatively longer.

**LECANE LUNA (Müller)**

Plate XIV, figures 5, 6.

*Cercaria luna* MÜLLER, Zool. Danicae Prodr., 1776, p. 280; Animalcula Infusoria, 1786, p. 139, pl. 20, figs. 8, 9.

*Furcocerca luna* LAMARCK, Hist. Nat. Anim. sans Vert., vol. 1, 1815, p. 448.

*Trichocerca luna* BORY DE ST. VINCENT, Class. Anim. Micr., 1826, p. 42.

*Lecane luna* NITZSCH, Encycl. Wiss. u. Künste sect. 1, vol. 16, 1827, p. 68.—HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 61; Proc. U. S. Nat. Mus., vol. 47, 1914, p. 534; Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 9.—KOZAR, Zool. Anz., vol. 44, 1914, p. 420.—REZVOI, Trudy Borodinsk. Biol. Stants. Imp. Petrogradsk. Obshch. Estestvoisp., vol. 4, 1916, p. 180.—JAKUBSKI, Kosmos (Lwów), 1918–1919, p. 28.

*? Furcularia jobloti* BORY DE ST. VINCENT, Encycl. Méth., Zooph. (pt. 2), 1827, p. 425.

*Brachionus luna* BLAINVILLE, Dict. Sci. Nat., vol. 60, 1830, p. 148.

*Euchlanis luna* EHRENBERG, Abh. Akad. Wiss. Berlin (for 1831), 1832, p. 131; Infusionsthierchen, 1838, p. 462, pl. 57, fig. 10.—DUJARDIN, Hist. Nat. Zooph. Inf., 1841, p. 634.—PERTY, Zur Kenntn. kleinst. Lebensf., 1852, p. 41.—BARTSCH, Jahresh. Naturk. Württemberg, vol. 26, 1870, p. 357; Rotat. Hungariae, 1877, p. 45.—Eyferth, Mikr. Süsswasserbew., 1877, p. 54, fig. 92; Einf. Lebensformen, 1878, p. 89, pl. 5, fig. 37; ed. 2, 1885, p. 114, pl. 7, fig. 37.—PLATE, Jenaische Zeitschr. Naturw., vol. 19, 1885, p. 59.—DADAY, Termész. Füzetek, vol. 9, 1885, p. 127.

*Cathypna luna* GOSSE, in Hudson and Gosse, Rotifera, 1886, vol. 2, p. 94, pl. 24, fig. 4.—DADAY, Termész. Füzetek, vol. 15, 1892, p. 28; Math. Termész. Ertes., vol. 12, 1893, p. 31.—PETR, Sitzungsber. Böhm. Ges. Wiss. (for 1890), 1892, p. 233.—TERNETZ, Rotat. Umg. Basels, 1892, p. 17.—WIERZEJSKI, Rozpr. Akad. Umiej., Wydz. Mat. Przyr., Krakow, ser. 2, vol. 6, 1893, p. 242.—KERTESZ, Budapest Rotat. Faun., 1894, p. 39.—LEVANDER, Acta Soc. Fauna et Flora Fennica, vol. 12, No. 3, 1895, p. 49, pl. 3, fig. 29.—SKORIKOV, Trav. Soc. Nat. Kharkow, vol. 30, 1896, p. 319.—HEMPEL, Bull. Illinois State Lab. Nat. Hist., vol. 5, 1898, p. 374.—WEBER, Rev. Suisse Zool., vol. 5, 1898, p. 593, pl. 22, figs. 4, 5.—JENNINGS, Bull. U. S. Fish Comm, vol. 19 (for 1899), 1900, p. 91, pl. 19, figs. 28, 29.—Voronkov, Trudy Gidr. Stants. Glubokom Oz., vol. 2, 1907, pp. 109, 204, 283.—SCHLENKER, Mitt. Geol. Abt. Württemberg. Stat. Landesamt, No. 5, 1908, p. 249.—KOFOID, Bull. Illinois State Lab. Nat. Hist., vol. 8, No. 1, 1908, p. 198.—MEISSNER, Izv. Turkestansk. Otd. Imp. Russk. Geogr. Obshch., vol. 4, pt. 8, 1908, p. 20.—DE BEAUCHAMP, Arch. Zool. Expér., ser. 4, vol. 10, 1909, p. 210, fig. XXVI.—VON HOFSTEN, Arkiv Zool., Stockholm, vol. 6, No. 1, 1909, p. 56; Wiss. Unters. Sarekgeb., vol. 4, pt. 8, 1923, p. 860.—LIE PETTERSEN, Bergens Mus. Aarbog (for 1909), 1910, p. 63.—DADAY, Zoologica, pt. 59, 1910, p. 85.—LUCKS, Rotatorienfauna Westpreussens, 1912, p. 107.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 171, figs. 336–338.—MOLA, Ann. Biol. Lac., vol. 6, 1913, p. 259.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 345, pl. 13, fig. 19.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 30.—MONTET, Rev. Suisse Zool., vol. 23, 1915, p. 335.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 188.—BEHNING, Izv. Kaluzhsk.

Obshch. Izuch. Prir. Mestn. Kraia. vol. 3, 1918, p. 92.—MONARD, Rev. d'Hydrol., vol. 2, 1922, p. 13.—BRYCE, Journ. Quekett Micr. Club, ser. 2, vol. 15, 1924, p. 97.

The lorica is broadly pyriform or subcircular; its greatest width is nearly equal to the length. The dorsal and ventral plates have a deep, lunate anterior sinus. The dorsal plate is almost circular in outline and without any surface markings; the angles of the sinus are very blunt and without spines. A broad, median hump is formed by the excessive contraction of the anterior margin. The ventral plate is very little narrower than the dorsal and slightly more ovate in outline; the only surface marking present is a straight transverse fold immediately in front of the foot. The lunate anterior sinus is cuspidate at its external angles. The lateral sulci are unusually deep. The posterior segment of the body is very small and rounded, projecting very little beyond the dorsal plate; the coxal plates are bluntly pointed at their posterior, free ends. The first foot joint is small and indistinct, the second very large and subsquare. The toes are parallel-sided, about one third of the total length, and end in a distinct claw with a minute basal spicule.

Total length 180$\mu$; length of dorsal plate 125$\mu$, of ventral plate 135$\mu$; width of dorsal plate 125$\mu$, of ventral plate 115$\mu$; width of dorsal sinus 40$\mu$, of ventral sinus 65$\mu$; length of toe without claw 55$\mu$; claw 9$\mu$.

*Lecane luna* occurs in abundance in weedy ponds all over the world and is without doubt one of the commonest of all rotifers. It is readily recognized by its large size, nearly circular outline and deep anterior sinus.

### LECANE PAPUANA (Murray)

Plate XIV, figures 3, 4.

*Cathypna papuana* MURRAY, Journ. Royal Micr. Soc., 1913, p. 551, pl. 22, fig. 2.

*Lecane papuana* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 534.

The outline of the lorica is subcircular; its width is very nearly equal to the length. The anterior dorsal margin is nearly straight. The ventral margin has a broad, shallow, V-shaped anterior sinus between two rounded lobes projecting considerably beyond the dorsal plate; the sinus is rounded posteriorly and

its sides undulate. The dorsal plate is subcircular and rounded posteriorly. The ventral plate is slightly narrower than the dorsal and of the same outline; it has a transverse fold in front of the foot. The lateral sulci are moderately deep. The posterior segment is small and rounded; it projects slightly beyond the dorsal plate. The coxal plates are small and obtusely pointed. The first foot joint is pyriform and rounded posteriorly, the second joint robust and very broadly ovate. The toes are long and fairly slender, more than one fourth of the total length, nearly parallel-sided, straight on the inner margins and very slightly broadened externally in front of the stout, acutely pointed claw, which has two basal spicules.

Total length 160$\mu$; length of dorsal plate 102$\mu$, of ventral plate 115$\mu$; width of dorsal plate 102$\mu$, of ventral plate 98$\mu$; width of anterior dorsal margin 52$\mu$, of ventral margin 62$\mu$; length of toes without claw 38$\mu$; claw 9$\mu$.

*Lecane papuana* was described by Murray from a single specimen from New Guinea. It is common in the Panama Canal Zone and in material collected by Mr. Juday at Puerto Barrios, Guatemala; in the United States we have found it only in Polk County, Florida.

### LECANE BRACHYDACTYLA (Stenroos).

Plate XV, figures 5, 6.

*Cathypna brachydactyla* STENROOS, Acta Soc. Fauna et Flora Fennica, vol. 17, No. 1, 1898, p. 160, pl. 2, fig. 20.—ROUSSELET, Journ. Quekett Micr. Club, ser. 2, vol. 11, 1912, p. 372, pl. 13, fig. 3.—LUCKS, Rotatorienfauna Westpreussens, 1912, p. 108.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 554, pl. 23, fig. 15.—SACHSE, Arch. Hydrobiol., vol. 9, 1914, p. 68, fig. 8.—OPARINA-KHARITONOVA, Izv. Biol. Nauchno-Issl. Inst. Permsk. Univ., vol. 3, 1925, p. 439.

*Cathypna luna brachydactyla* SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 172.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 31.

*Distyla truncata* LEISSLING, Arch. Hydrobiol., vol. 9, 1914, p. 255, fig. 2.

*Lecane brachydactyla* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 60; Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 9, pl. 3, figs. 5, 6.

The outline of the lorica is ovate, truncate posteriorly and the anterior margin cuspidate. The dorsal plate is broadly oval,

truncate posteriorly and somewhat narrower than the ventral plate. The anterior margin of the dorsal plate is approximately straight and slightly wavy with prominent lateral cusps; the ventral margin has a median concavity. The lorica is strongly compressed dorso-ventrally and without surface markings; the lateral sulci are fairly deep. The posterior segment is very prominent and trapezoidal in outline, slightly rounded at the angles. The coxal plates are circular and fairly large. The first foot joint is somewhat elongate, widest posteriorly, and the second joint subsquare. The toes are short, straight on the inner edges, cylindrical at the base and end in long, conical points.

Total length 150$\mu$; length of dorsal plate 100$\mu$, of ventral plate 128$\mu$; width of dorsal plate 92$\mu$, of ventral plate 100$\mu$; anterior points 72$\mu$; length of toes 28$\mu$.

*Lecane brachydactyla* is fairly common among sphagnum in soft, acid water ponds; we have collected it in Vilas and Oneida Counties, Wisconsin, around Atlantic City, New Jersey, and on Mount Desert Island, Maine.

### LECANE JESSUPI Harring

Plate XV, figures 3, 4.

*Lecane jessupi* HARRING, Rep. Canadian Arctic Exp. 1913–18, vol 8, pt. E, 1921, p. 8, pl. 3, figs. 3, 4.

The outline of the lorica is slightly ovate, truncate posteriorly and the anterior margin cuspidate. The dorsal plate is ovate, rounded posteriorly and slightly narrower than the ventral plate, which is somewhat elliptic. The anterior margin of the dorsal plate is slightly convex for the greater portion of its width and excavate at the lateral cusps; the anterior margin of the ventral plate is lunate. There are no markings on either dorsal or ventral plate; the lateral sulci are deep. The lorica is strongly compressed dorso-ventrally. The posterior segment is roughly trapezoidal in outline and cuspidate at the external angles; the margin is convex in the median portion and has a slight concavity at the angles. There is a well marked constriction at the junction of the ventral plate and the posterior segment. The coaxal plates are semi-ovate. The first foot joint is well marked and widest posteriorly; the second joint is subsquare. The toes are short, cylindric for one half their length and end in acute, conical points, straight on their inner edges.

Total length 126$\mu$; length of dorsal plate 93$\mu$, of ventral plate 108$\mu$; width of dorsal plate 93$\mu$, of ventral plate 96$\mu$; anterior points 58$\mu$; length of toes 27$\mu$.

*Lecane jessupi* was collected by Mr. J. M. Jessup in lakes on Old Crow River flats, north of New Rampart House, Alaska, during the Alaskan Boundary Survey. It was not abundant and has not been found elsewhere.

### LECANE LIGONA (Dunlop)

Plate XVI, figures 3–6.

*Cathypna ligona* DUNLOP, Journ. Quekett Micr. Club, ser. 2, vol. 8, 1901, p. 29, pl. 2, figs. 4–6.—VOIGT, Forschungsber. Biol. Stat. Plön, vol. 11, 1904, p. 70, pl. 4, fig. 38.—Lie-Pettersen, Bergens Mus. Aarbog (for 1909), 1910, No. 15, p. 64, pl. 2, fig. 14.—LUCKS, Rotatorienfauna Westpreussens, 1912, p. 109.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 174, fig. 342.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 554, pl. 23, fig. 16.

*Lecane ligona* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 61; Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 8.

The outline of the lorica is a broad oval, squarely truncate posteriorly and convex anteriorly. The dorsal plate is slightly ovate, truncate posteriorly and narrower than the ventral plate. The anterior margin of the dorsal plate is distinctly convex with small lateral spines; the ventral margin is concave. The lorica is strongly compressed dorso-ventrally and without surface markings; the lateral sulci are deep. The posterior segment is short and very broad, produced laterally as two triangular cusps; its posterior margin is usually somewhat wavy. The coxal plates are semi-ovate and rather indistinct. The first foot joint is bluntly pointed; the second joint is rectangular. The toes are short, straight on their inner margins, cylindrical at the base and end in conical points.

Total length 92$\mu$; length of dorsal plate 66$\mu$, of ventral plate 80$\mu$; width of dorsal plate 60$\mu$, of ventral plate 70$\mu$; anterior points 42$\mu$; length of toes 18$\mu$.

*Lecane ligona* is not rare among sphagnum growing in soft, acid water ponds; strangely enough it occurs also in brackish ditches in the tide marshes around Atlantic City, New Jersey European records of its occurrence are not numerous, but this may possibly be accounted for by the fact that collections are generally from hard water regions. We have found it especially

abundant in Starvation Lake, Vilas County, Wisconsin, and common in ponds and lakes in the northern part of the state, as well as in New Jersey and on Mount Dessert Island, Maine. A variety with rounded posterior angles, shown in figures 5 and 6, is found in Bubble Pond and Long Pond, Mount Desert Island.

**LECANE PYCINA Harring and Myers, new species**

Plate XVII, figures 5, 6.

The outline of the lorica is broadly ovate; its width is about three-fourths of the length. The anterior dorsal margin is slightly convex and the ventral margin has a shallow sinus, rounded posteriorly; at the external angles are two acute spines. The dorsal plate is ovate and rounded posteriorly. The ventral plate is oval and slightly narrower than the dorsal. The lorica is strongly compressed dorso-ventrally and without surface markings; the lateral sulci are deep. The posterior segment is rather short and very broad with a short, relatively broad projection, slightly sinuate posteriorly and with small lateral, triangular cusps. The coxal plates are fairly large and rounded posteriorly. The first foot joint is hardly traceable, the second joint is small and subsquare. The toes are short, about one fifth of the total length, straight on their inner margins and convex externally, ending in acute points.

Total length 150$\mu$; length of dorsal plate 120$\mu$, of ventral plate 135$\mu$; width of dorsal plate 100$\mu$, of ventral plate 95$\mu$; width of anterior points 70$\mu$; length of toes 30$\mu$.

*Lecane pycina* was collected in Long Lake and Bubble Pond, Mount Desert Island, Maine. It is related to L. *ligona, L. brachydactyla* and *L. jessupi,* but differs from these species in having the dorsal plate wider than the ventral, as well as in the form of the posterior projection.

**LECANE PERTICA Harring and Myers, new species**

Plate XII, figures 1, 2.

The outline of the lorica is a very elongate oval, the greatest width being only two thirds of the length; the body is compressed dorso-ventrally. The anterior margins are very nearly coincident, the dorsal almost straight and the ventral slightly concave; at the external angles are two small, pointed spines. The dorsal plate is oval and squarely truncate posteriorly; the

facetting is very distinct and consists of the usual four rows, the first somewhat broken and irregular. The ventral plate is oval and somewhat narrower than the dorsal; the surface markings are prominent. The lateral sulci are deep. The posterior segment is nearly semicircular and projects considerably beyond the dorsal plate. The coxal plates are large and obtusely pointed posteriorly. The first foot joint is long and narrow, the second robust and subsquare, projecting the greater part of its length beyond the posterior segment. The toes are extremely long and very slender, about one third of the total length, parallel-sided and straight, and end in acute points without claws.

Total length 260$\mu$; length of dorsal plate 140$\mu$, of ventral plate 160$\mu$; width of dorsal plate 100$\mu$, of ventral plate 88$\mu$; width of anterior points 64$\mu$; length of toes 85$\mu$.

*Lecane pertica* is very common in weedy ponds with soft, acid water, but is never found in hard water. We have collected it in Oneida and Vilas Counties, Wisconsin, Polk County, Florida, Mount Desert Island, Maine, and at Atlantic City, New Jersey.

**LECANE EUTARSA Harring and Myers, new species.**

**Plate XVIII, figures 1, 2.**

The outline of the lorica is ovate and the body is compressed dorso-ventrally. The anterior margins are coincident and very slightly concave; at the external angles are two small spines. The dorsal plate is ovate, truncate posteriorly and narrow at the anterior margin. The surface markings consist of four transverse rows of not very prominent facets. The ventral plate is ovate and very slightly narrower than the dorsal; the markings consist of a number of rather indistinct longitudinal ridges as shown in figure 2. The posterior segment is narrow and rounded; it projects somewhat beyond the dorsal plate. The coxal plates are indistinct, closely appressed to the foot, and pointed posteriorly. The lateral sulci are fairly deep. The first foot joint is long and narrow, the second joint unusually large and somewhat angular. The toes are long and very slender, more than one fourth of the total length, straight and parallel-sided with a very long, spine-like claw with a small basal spicule.

Total length 45$\mu$; length of dorsal plate 95$\mu$, of ventral plate 102$\mu$; width of dorsal plate 64$\mu$, of ventral plate 60$\mu$; width of anterior points 44$\mu$; length of toe without claw 30$\mu$, claw 12$\mu$.

*Lecane eutarsa* was found in small numbers in material collected by Mr. Juday in ditches along the railroad, near Puerto Barrios, Guatemala. It has not been found elsewhere.

**LECANE PELATIS Harring and Myers, new species**

Plate XVIII, figures 3, 4.

The outline of the body is broadly oval or very slightly ovate. The anterior margins are coincident and somewhat concave; at the external angles are two distinct cusps. The ovate dorsal plate is truncate posteriorly; the surface markings are fairly prominent and consist of four rows of facets. The ventral plate is oval and considerably narrower than the dorsal; the markings are distinct and less simple than is usually the case. The posterior segment is rounded and fairly prominent; the coxal plates are large and pointed posteriorly. The lateral sulci are deep. The first foot joint is elongate oval and pointed posteriorly, the second joint large and robust, squarely truncate posteriorly, and rounded at the naterior end. The toes are long and slender, about one fourth of the total length, parallel-sided and terminate in acute claws.

Total length 160$\mu$; length of dorsal plate 110$\mu$, of ventral plate 122$\mu$; width of dorsal plate 92$\mu$, of ventral plate 70$\mu$; width of anterior points 53$\mu$; length of toe without claw 35$\mu$; claw 9$\mu$.

*Lecane pelatis* is common in weedy ponds around Minocqua, Wisconsin, at Atlantic City, New Jersey, and on Mount Desert Island, Maine.

**LECANE MIRA (Murray)**

Plate XVIII, figures 5, 6.

*Cathypna mira* MURRAY, Journ. Royal Micr. Soc., 1913, p. 553, pl. 22, fig. 3.

The outline of the lorica is oval and the body is quite deep. The anterior dorsal margin is nearly straight and the ventral slightly concave; at the external angles are two stout, triangular cusps. The dorsal plate is broadly oval or subcircular and slightly truncate posteriorly; the surface markings are not very prominent and differ somewhat from the usual pattern, as the anterior row of facets is incomplete. The ventral plate is broadly ovate and considerably narrower than the dorsal; it is not facetted. The lateral sulci are deep. The posterior segment is small and

truncate, projecting considerably beyond the dorsal plate. The coxal plates are fairly large and obtusely pointed posteriorly. The first foot joint is long and narrow, the second large and pyriform. The toes are long and slender, about one fourth of the total length, parallel-sided and straight, terminating in a stout claw with a minute basal spicule.

Total length 200$\mu$; length of dorsal plate 132$\mu$, of ventral plate 145$\mu$; width of dorsal plate 130$\mu$, of ventral plate 100$\mu$; width of anterior points 60$\mu$; length of toes without claw 40$\mu$; claw 9$\mu$.

*Lecane mira* is fairly common in weedy ponds with neutral or acid water. We have collected it in Oneida and Vilas Counties, Wisconsin, on Mount Desert Island, Maine, in New Jersey, District of Columbia and Florida; it occurs also in material collected by Dr. Birge and Mr. Juday in Arkansas, Louisiana and Texas. Murray's original description was based on material from Washington.

#### LECANE METHORIA Harring and Myers

Plate XIX, figures 1, 2.

The outline of the lorica is broadly ovate, the width about two thirds of the length. The anterior dorsal and ventral margins are coincident and very faintly convex; at the external angles are two stout, triangular spines. The dorsal plate is broadly ovate and very slightly truncate posteriorly; the facetting is of an unusual pattern and the separate facets are bounded by double lines, as in *L. haliclysta*. The ventral plate is considerably narrower than the dorsal; its margins are flexible and the outline consequently somewhat indefinite, but approximating an obtusely pointed triangle. The ventral markings are quite intricate and some of the lines are doubled, as on the dorsal plate. The lateral sulci are very indistinct. The posterior segment is very small and rounded and projects slightly beyond the dorsal plate. The coxal plates are fairly large and somewhat pointed at their posterior ends. The first foot joint is very narrow and elongate, its outlines merging gradually and without distinct separation with the markings of the ventral plate; its posterior, obtusely pointed termination projects over the robust, subsquare second foot joint. The toes are long and moderately slender, about one fourth of the total length, parallel-sided and very slightly incurved; the inner margins are excavate at the ends, but a true claw is not present.

Total length 102$\mu$; length of dorsal plate 70$\mu$, of ventral plate 75$\mu$; width of dorsal plate 54$\mu$, of ventral plate 45$\mu$; width of anterior points 50$\mu$; length of toes 24$\mu$.

*Lecane methoria* was collected in small numbers in weedy bays of Town Line Lake, at Three Lakes, Oneida County, Wisconsin. It has not been found elsewhere.

### LECANE STICHAEA Harring

Plate XIX, figures 3, 4.

*Lecane stichaea* HARRING, Proc. U. S. Nat. Mus., vol. 46, 1913, p. 397, pl. 35, figs. 4–6. — REZVOI, Trudy Borodinsk. Biol. Stants. Imp. Petrogradsk. Obshch. Estestvoisp., vol. 4, 1916, p. 180, pl. 1, figs. 11, 12.—FADEEV, Russk. Gidr. Zhurn., vol. 3, No. 3–5, 1924, p. 4.

The outline of the lorica is broadly ovate and the body is somewhat compressed dorso-ventrally. The anterior margins are coincident and slightly convex; at the external angles are two stout spines. The dorsal plate is ovate and truncate posteriorly. As shown in figure 3, the surface markings are of a rather aberrant pattern. The normal number of transverse rows of facets are present, but the first row is irregular and shows a tendency to subdivide; in the second to fourth row the facets are more numerous than in other species of the genus. The ventral plate is very nearly parallel-sided anteriorly and rounded posteriorly; the markings are fairly prominent and rather intricate. The coxal plates are large and somewhat indistinct, closely appressed to the foot and pointed posteriorly. The lateral sulci are moderately deep. The first foot joint is long and narrow, the second large and subsquare. The toes are long and slender, more than one fourth of the total length, straight and parallel-sided; the claw is fairly large, acutely pointed and without basal spicule.

Total length 145$\mu$; length of dorsal plate 92$\mu$, of ventral plate 105$\mu$; width of dorsal plate 76$\mu$, of ventral plate 58$\mu$; width of anterior points 64$\mu$; length of toes without claw 32$\mu$; claw 7$\mu$.

*Lecane stichaea* is common in wet sphagnum; we have collected it in Wisconsin, Mount Desert Island, Maine, New Jersey, Maryland, Virginia and Florida.

**LECANE SAGINATA Harring and Myers, new species**

**Plate XIX, figures 5, 6.**

The outline of the lorica is broadly ovate; the greatest width is about three fourths of the length. The anterior margins of the dorsal and ventral plates are coincident and straight, but slightly wavy; at the external angles are two short, stout spines. The dorsal plate is broadly ovate and rounded posteriorly. The facetting is well marked and differs, as may be seen from the figure, only in details from the usual pattern. The ventral plate is narrower than the dorsal, ovate in outline and the edges ill-defined and wavy. The surface markings are fairly prominent and more complex than the prevailing design. The posterior segment is small and rounded, with a very slight median concavity, and projects but little beyond the dorsal plate. The coxal plates are fairly large and obtusely pointed. The first foot joint is moderately large, pyriform and somewhat indistinct; the second joint is large and pyriform and projects very slightly beyond the posterior segment. The toes are long and slender, more than one fourth of the total length, parallel-sided and very slightly incurved; the tip is excavate on the inner margin, forming a pseudo-claw.

Total length 140$\mu$; length of dorsal plate 75$\mu$, of ventral plate 81$\mu$; width of dorsal plate 66$\mu$, of ventral plate 54$\mu$; width of anterior points 50$\mu$; length of toes without claw 33$\mu$; claw 7$\mu$.

*Lecane saginata* occurs in soft, acid water ponds in Oneida and and Vilas Counties, Wisconsin, on Mount Desert Island, Maine, and around Atlantic City, New Jersey; it is nowhere common. Its nearest relative is *L. intrasinuata;* this species is consistently larger, the lorica is relatively broader and oval in outline, without facetting, while the lorica of *L. saginata* is distinctly pyriform and the dorsal facetting prominent.

**LECANE ELASMA Harring and Myers, new species**

**Plate XX, figures 1, 2.**

The lorica is membranous and very flexible, but its form is quite constant; the outline is broadly ovate and rounded posteriorly. The anterior margins are coincident and straight; at the external angles are two small, but stout spines. The dorsal plate is broadly oval and rounded posteriorly; it is without

facetting or folds of any kind. The ventral plate is oval and slightly narrower than the dorsal plate; the surface markings are faint, but constant. The lateral sulci are moderately deep. The posterior segment is fairly large and rounded; it projects considerably beyond the dorsal plate. The coxal plates are small and pointed posteriorly. The first foot joint is pyriform and somewhat indistinct, lobate posteriorly, the second joint large and rounded anteriorly, abruptly reduced above the base of the toes and projecting half its length beyond the lorica. The toes are very long and slender, about one third of the total length, parallel-sided for half their length and somewhat abruptly reduced to long, excessively slender and acute points.

Total length 130$\mu$; length of dorsal plate 75$\mu$, of ventral plate 85$\mu$; width or dorsal plate 65$\mu$, of ventral plate 56$\mu$; width of anterior points 46$\mu$; length of toes 40$\mu$.

*Lecane elasma* is not rare in wet sphagnum; we have collected it around Washington, District of Columbia, at Tuckerton, New Jersey, and in Northern and Central Wisconsin.

**LECANE RHYTIDA Harring and Meyers, new species**

**Plate XX, figures 3, 4.**

The outline of the lorica is broadly ovate; the width is about two thirds of the length. The anterior dorsal and ventral margins are coincident and very slightly concave, produced at the external angles into two stout, triangular cusps. The dorsal plate is oval and very slightly truncate posteriorly. The facetting is prominent and does not depart very much from the usual pattern. The ventral plate is elongate ovate and considerably narrower than the dorsal; the surface markings are few in number, but prominent. The lateral margins of the ventral plate are somewhat wavy and indistinct and the lateral sulci ill-defined. The posterior segment is small and semicircular; it projects somewhat beyond the dorsal plate; the coxal plates are small and obtusely pointed posteriorly. The first foot joint is indistinct and elongate pyriform; the second joint is roughly hexagonal and quite robust, projecting fully half its length beyond the lorica. The toes are long and slender, about one fourth of the total length, parallel-sided for half their length and tapering to extremely long, acute points.

Total length 126$\mu$; length of dorsal plate 80$\mu$, of ventral plate

87$\mu$; width of dorsal plate 69$\mu$, of ventral plate 65$\mu$; width of anterior points 42$\mu$; length of toes 39$\mu$.

*Lecane rhytida* is not rare among floating sphagnum in soft, acid water ponds. We have collected it in a large pond at Gravelly Run, near Atlantic City, New Jersey, and in Upper Mill Meadow pond on Mount Desert Island, Maine.

### LECANE LAUTERBORNI Hauer

Plate XX, figures 5, 6.

*Lecane lauterborni* HAUER, Zool. Anz., vol. 61, 1924, p. 145, figs. 1–3.

The lorica is firm and its outline broadly reversed-ovate; its width is more than three fourths of the length. The anterior margins are coincident and slightly convex. At the external angles are two stout frontal spines. The dorsal plate is broadly ovate and indistinctly facetted. The ventral plate is nearly parallel-sided for half its length, obtusely triangular posteriorly and much narrower than the dorsal plate; its surface markings are of a very simple pattern. The lateral sulci are deep. The posterior segment is obtusely triangular and projects far beyond the dorsal plate. The coxal plates are indistinct, small and oval. The first foot joint is short, broad and somewhat ill-defined, the second joint long and narrow. The toes are long and slender, more than one fourth of the total length, straight, parallel-sided for about one third of their length, and taper to very acute points.

Total length 150$\mu$; length of dorsal plate 92$\mu$, of ventral plate 110$\mu$; width of dorsal plate 82$\mu$, of ventral plate 70$\mu$; width of anterior spines 65$\mu$; length of toes 42$\mu$.

*Lecane lauterborni* was described by Hauer from sphagnum bogs in the Schwarzwald, where it is common. We have collected this species in shallow, weedy areas of Witch Hole, Mount Desert Island, Maine. Material forwarded to us by Hauer shows the German form to be consistently smaller, about two-thirds the size of the Mount Desert specimens.

### LECANE COMPTA Harring

Plate XXI, figures 1, 2.

*Cathypna flexilis* MURRAY, Journ. Royal Micr. Soc., 1913, p. 351, pl. 14, fig. 27; not *Distyla flexilis* GOSSE.

*Lecane compta* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 540, pl. 20, figs. 1–3.

The outline of the lorica is a slightly elongate oval; the width of the body is three fourths of the total length. The anterior margins of the dorsal and ventral plates are coincident and straight; at the external angles are two short, robust spines. The dorsal plate is ovate and narrowly truncate posteriorly; the surface markings are fairly prominent and consist of the usual four rows of facets, the first row somewhat irregular. The ventral plate is narrower than the dorsal, parallel-sided anteriorly and rounded posteriorly; its surface markings are prominent and of an irregular pattern, as shown in figure 2. The lateral sulci are indistinct and the entire lorica very flexible. The posterior segment is large and bluntly pointed; it projects considerably beyond the dorsal plate. The coxal plates are small and rounded posteriorly. The first foot joint is oval and somewhat indistinct, the second joint large and subcircular. The toes are long and slender, more than one fourth of the entire length, straight and parallel-sided, with conical points ending in an acute spicule.

Total length 115$\mu$; length of dorsal plate 70$\mu$, of ventral plate 80$\mu$; width of dorsal plate 60$\mu$, of ventral plate 56$\mu$; width of anterior points 45$\mu$; length of toes 30$\mu$.

*Lecane compta* was originally described from material collected in the Panama Canal Zone; we have since found it in small numbers in Southern Wisconsin. It seems to be confined to moderately hard waters.

**LECANE HALICLYSTA Harring and Myers, new species**

**Plate XXI, figures 5, 6.**

The outline of the lorica is broadly ovate and the width of the body is nearly three fourths of the length. The anterior dorsal and ventral margins are coincident and straight; at the external angles are two very small spines. The dorsal plate is broadly ovate and slightly truncate posteriorly; the facetting is of an unusual pattern, the separate facets being bounded by double lines. The ventral plate is very slightly narrower than the dorsal and of the same general outline; the surface markings are irregular and the lines doubled; as on the dorsal plate. The lateral sulci are indistinct. The posterior segment is small and rounded and projects but little beyond the dorsal plate. The coxal plates are small and obtusely pointed posteriorly.

The first foot joint is elongate ovate, reaching down over the pyriform second joint with a lobate extension. The toes are long and slender, more than one fourth of the total length, straight and parallel-sided, and end in an indistinct, acute claw.

Total length 145$\mu$; length of dorsal plate 105$\mu$, of ventral plate 92$\mu$; width of dorsal plate 78$\mu$, of ventral plate 74$\mu$; width of anterior points 60$\mu$; length of toes with claw 42$\mu$.

*Lecane haliclysta* occurs in small numbers in weedy ponds with soft water; we have collected it in Oneida and Vilas counties, Wisconsin, around Atlantic City, New Jersey, on Mount Desert Island, Maine, and we have found it also in collections made by Dr. Birge in Hatchery Bay, South Bass Island, Lake Erie, during the Great Lakes Investigation by the United States Fish Commission in 1899.

#### LECANE ASPASIA Myers

*Lecane aspasia* MYERS, Proc. U. S. Nat. Mus., vol. 52, 1917, p. 476, pl. 40, figs. 6–8.

The lorica is very broad, nearly parallel-sided anteriorly and rounded posteriorly; the dorso-ventral depth of the body is somewhat greater than usual. The anterior margins of the dorsal and ventral plates are coincident and very slightly convex; at the external angles are two small spines. The dorsal plate is very broadly ovate and slightly truncate posteriorly; its surface markings are fairly prominent and consist of the usual four transverse rows of facets, in this instance somewhat larger than usual. The ventral plate is very broadly ovate and of the same width as the dorsal plate. The lateral sulci are moderately deep. The posterior segment is broadly rounded and projects considerably beyond the dorsal plate. The coxal plates are roughly triangular. The first foot joint is parallel-sided and rather small, the second joint short, broad and subrhomboid. The toes are long and slender, more than one fourth of the total length, straight and slightly tapering; the claw is long, slender and acutely pointed.

Total length 132$\mu$; length of dorsal plate 82$\mu$, of ventral plate 94$\mu$; width of lorica 75$\mu$; width of anterior points 63$\mu$; length of toes without claw 30$\mu$; claw 8$\mu$.

*Lecane aspasia* was described from material collected near Los Angeles, California; it has not been found elsewhere.

**LECANE LUDWIGII (Eckstein)**

Plate XXII, figures 5, 6.

*Distyla ludwigii* ECKSTEIN, Zeitschr. Wiss. Zool., vol. 39, 1883, p. 383, pl. 26, fig. 37.—BLOCHMANN, Mikr. Thierw. Süssw., 1886, p. 107.—HUDSON and GOSSE, Rotifera, Suppl., 1889, p. 43, pl. 33. fig. 36.—TERNETZ, Rotat. Umg. Basels, 1892, p. 18.—WIERZEJSKI, Rozpr. Akad. Umiej., Wydz. Mat.-Przyr., Krakow, ser. 2, vol. 6, 1893, p. 242.—SKORIKOV, Trav. Soc. Nat. Kharkow, vol. 30, 1896, p. 320.—WEBER, Rev. Suisse Zool., vol. 5, 1898, p. 602, pl. 22, figs. 9–11.—JENNINGS, Bull. U. S. Fish Comm., vol. 19 (for 1899), 1900, p. 92, pl. 20, fig. 32.—VOIGT, Forschungsber. Biol. Stat. Plön, vol. 11, 1904, p. 71.—DADAY, Zoologica, pt. 44, 1905, p. 108, pl. 6, fig. 11; pt. 59, 1910, p. 82.—VORONKOV, Trudy Gidr. Stants. Glubokom Oz., vol. 2, 1907, p. 204.—MEISSNER, Izv. Turkestansk. Otd. Imp. Russk. Geogr. Obshch., vol. 4, pt. 8, 1908, p. 21, pl. 1, fig. 2.—DE BEAUCHAMP, Arch. Zool. Expér., ser. 4, vol. 10, 1909, p. 161.—LIE-PETTERSEN, Bergens Mus. Aarbog (for 1909), 1910, No. 15, p. 65.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 176, figs. 348.—JAKUBSKI, Rozpr. Muz. Dzieduszyckich, vol. 1, 1914, p. 32.

*Distyla ornata* DADAY, Math. Termész. Ertes., vol. 15, 1897, p. 135, fig. 4; Termész. Füzetek, vol. 24, 1901, p. 18, fig. 2.

*Distyla oxycauda* STENROOS, Acta Soc. Pauna et Flora Fennica, vol. 17, No. 1, 1898, p. 162, pl. 2, figs. 23–25.

*Cathypna ludwigii* MURRAY, Journ. Royal Micr. Soc., 1913, p. 352, pl. 14, fig. 23.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 187.

*Lecane ludwigii* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 61; Proc. U. S. Nat. Mus., vol. 47, 1914, p. 537.—KOZAR, Zool Anz., vol. 44, 1914, p. 420.—REZVOI, Trudy Borodinsk. Biol. Stants. Imp. Petrogradsk. Obshch. Estestvoisp., vol. 4, 1916, p. 180.—JAKUBSKI, Kosmos (Lwów), 1918–1919, p. 28.

The outline of the lorica is oval and moderately broad. The anterior margins are coincident and slightly concave; at the external angles are two fairly long, stout spines. The dorsal plate is oval and truncate posteriorly; it is very firm and marked with four transverse rows of prominent, coarse tesselations. The ventral plate is slightly pyriform in outline and narrower than the dorsal; the surface markings consist of a few longitudinal ridges, as shown in the figure. The lateral sulci are very deep. The posterior segment is roughly semicircular and is produced as a long, triangular, pointed spine. The coxal plates are large and rounded posteriorly. The first foot joint is narrow and overlaps the trapezoidal second joint as a lobate projection. The toes

are long and slender, one fourth of the total length, parallel-sided and ending in acute conical points without claws.

Total length 165$\mu$; length of dorsal plate 120$\mu$, of ventral plate 162$\mu$; width of dorsal plate 77$\mu$, of ventral plate 68$\mu$; width of anterior points 45$\mu$; length of toes 45$\mu$.

*Lecane ludwigii* is very widely distributed, but seems not to occur in large numbers; we have collected it in weedy ponds in Wisconsin, New Jersey, Maine, District of Columbia, Virginia and Florida and have found it in material from many other localities in the United States.

*Lecane ludwigii, L. ohioensis, L. marshi, L. stokesii* and *L. ichthyoura* form a very closely related group. The form of the prolongation of the posterior segment is quite different in these species and the obvious character upon which they were established. Some other minor differences deserve notice. The form of the second foot joint is slightly different in all the species; likewise the outline of the coxal plates. The form and relative length of the toes also show small, but constant differences. The outline of the body, the dorsal plate, the very rigid lorica and the surface markings of both dorsal and ventral plates are virtually alike in all the species, and the same is true of the frontal spines, with the single exception of *L. marshi.* We have tried to reproduce all the similarities and all the differences as faithfully as possible in the figures; many of these are so slight that no word picture would describe them adequately and the figure must therefore be used as the final criterion.

### LECANE MARSHI Harring

Plate XXII, figures 1, 2.

*Lecane marshi* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 537, pl. 18, figs. 1–3.

*Lecane ercodes* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 537, pl. 18, figs. 4–6.

The outline of the lorica is broadly oval or very slightly pyriform. The anterior margins are coincident and somewhat concave; at the external angles are two fairly long, slender spines, usually with the point recurved as a conspicuous hook, semicircular in lateral view. The dorsal plate is oval and truncate posteriorly; it is very firm and marked with four transverse rows of prominent, coarse tesselations. The ventral plate is more elongate and somewhat narrower than the dorsal; the markings

consist of a few longitudinal ridges, as shown in the figure. The lateral sulci are fairly deep. The posterior segment is rather large and somewhat angulate, ending in an obtusely pointed, triangular lobe. The coxal plates are moderately large and rounded posteriorly. The first foot joint is indistinct and projects slightly over the subcircular second joint. The toes are about one fourth of the total length, straight, slender, parallel-sided and end in acute conical points without claws.

Total length 173$\mu$; length of dorsal plate 114$\mu$, of ventral plate 138$\mu$; width of dorsal plate 84$\mu$, of ventral plate 76$\mu$; width of anterior points 54$\mu$; height of hook 9$\mu$; length of toes 45$\mu$.

*Lecane marshi* was originally described from material collected in the Panama Canal Zone, the "hookless" form as a distinct species. Subsequent study of the collections demonstrated that they occur together and it is probable that they are only varieties of a single species. We have also found the hookless form in collections made by Dr. N. Gist Gee at Soochow, China; they agree in every way with the Panama specimens.

**LECANE ICHTHYORA (Anderson and Shephard)**

**Plate XXII, figures 3, 4.**

*Distyla ichthyoura* ANDERSON and SHEPHARD, Proc. Royal Soc. Victoria, new ser., vol. 4, 1892, p. 78, pl. 12, fig. 5.

*Cathypna appendiculata* LEVANDER, Acta Soc. Fauna et Flora Fennica, vol. 12, No. 3, 1895, p. 50, pl. 3, fig. 30.—? DADAY, Zoologica, pt. 44, 1905, p. 110 pl. 6, fig. 17.

*Lecane ichthyoura* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 61.—HAUER, Mitt. Geogr. Ges. u. Naturhist. Mus. Lübeck, ser. 2, No. 30, 1925, p. 166, fig. 7.

The outline of the lorica is oval and moderately broad. The anterior dorsal margin is slightly concave, the ventral somewhat more so; at the external angles are two stout, triangular spines. The dorsal plate is oval and truncate posteriorly; it is very firm and marked with four rows of prominent tesselations. The ventral plate is more elongate and narrower than the dorsal; it is marked with a few longitudinal ridges. The lateral sulci are very deep. The posterior segment is produced as a peculiar lobe, rounded behind and with two lateral, triangular points. The coxal plates are small and rounded posteriorly. The first foot joint is somewhat indistinct and overlaps the subsquare second joint with a small, rounded projection. The toes are long

and slender, more than one fourth of the total length, parallel-sided and end in acute, conical points without claws.

Total length 140$\mu$; length of dorsal plate 96$\mu$, of ventral plate 120$\mu$; width of dorsal plate 80$\mu$, of ventral plate 72$\mu$; width of anterior points 48$\mu$; length of toes 40$\mu$.

*Lecane ichthyoura* is rare; we have found it in Polk County, Florida, in small numbers. It is a question whether the form figured by Hauer should not be considered a variety of *L. ohioensis*.

### LECANE STOKESII (Pell)

Plate XXIII, figures 1–3.

*Cathypna stokesii* PELL, The Microscope, vol. 10, 1890, p. 144, text fig.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 553, pl. 23, fig. 12.
*Distyla stokesii* JENNINGS, Bull. Michigan Fish Comm., No. 3, 1894, p. 24; Bull. U. S. Fish Comm., vol. 29 (for 1899), 1900, p. 92, pl. 20, fig. 35.—HEMPEL, Bull. Illinois State Lab. Nat. Hist., vol. 5, 1898, p. 375.
*Lecane stokesii* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 62.

The outline of the lorica is oval and somewhat narrower than usual. The anterior dorsal and ventral margins are very nearly coincident and slightly concave; at the external angles are two stout, triangular spines. The dorsal plate is ovate and truncate posteriorly; it is very firm and marked with four rows of prominent tesselations. The ventral plate is more elongate and narrower than the dorsal; its markings consist of a few longitudinal ridges, constant in position, but not very conspicuous. The lateral sulci are deep. The posterior segment is semicircular and ends in two long spines, separated by a wide interspace, rounded anteriorly; the coxal plates are small and obtusely pointed. The first foot joint is fairly narrow and not very strongly marked, the second truncate pyriform. The toes are long, straight, slender and acutely pointed without any claw; their length is about one fifth of the total length.

Total length 155$\mu$; length of dorsal plate 98$\mu$, of ventral plate 130$\mu$; width of dorsal plate 83$\mu$, of ventral plate 77$\mu$; width of anterior points 50$\mu$; length of toes 48$\mu$.

*Lecane stokesii* occurs in weedy ponds and is widely distributed in the United States, but is seldom found in large numbers. The variety shown in figure 3 was figured by Murray as the "English form"; we have collected it among sphagnum at Hy-

attsville, near Washington, District of Columbia. It differs from the typical form mainly in the form of the posterior spines, which are stouter and much shorter; it is somewhat more robust and the lorica less oval. It is uncertain whether this should be considered a variety or an independent species; no transition forms between the two are known and the typical form does not appear to be variable. However, until more is known about the actual relationship between the members of this group within the genus, it is probably better to leave it provisionally as a "variety", even though this term as applied to rotifers is somewhat ambiguous.

**LECANE OHIOENSIS (Herrick)**

Plate XXIII, figures 4, 5.

*Distyla ohioensis* HERRICK, Bull. Denison Univ., vol. 1, 1885, p. 54, fig. 1 (on page preceding index).—HEMPEL, Bull. Illinois State Lab. Nat. Hist., vol. 5, 1898, p. 375.—JENNINGS, Bull. U. S. Fish Comm., vol 19 (for 1899), 1900, p. 91, 20, fig. 30.—IROSO, Mon. Zool. Ital., vol. 21, 1910, p. 302; Atti R. Ist. Incorr. Napoli, vol. 64 (for 1912), 1913, p. 467, figs. 9–12.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 32, pl. 1, fig. 8.

*Cathypna ohioensis* TURNER, Bull. Denison Univ., vol. 6, 1892, p. 61.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 552, pl. 23, fig. 14.

*Lecane ohioensis* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 62.—JAKUBSKI, Kosmos (Lwów), 1918–1919, p. 28.—FADEEV, Russk. Gidr. Zhurn., vol. 3, No. 3–5., 1924, p. 4.

The outline of the lorica is a moderately broad oval; the anterior margins are slightly concave and very nearly coincident, the ventral a trifle shorter. At the external angles are two fairly prominent, stout spines. The dorsal plate is broadly oval and truncate posteriorly; it is very firm and marked with four transverse rows of prominent, coarse tesselations. The ventral plate is somewhat ovate and narrower than the dorsal plate; the markings consist of a few folds or ridges, shown in the figure. The lateral sulci are deep. The posterior segment is approximately semicircular with a short, median, squarely truncate projection. The coxal plates are large and obtusely pointed posteriorly. The first foot joint is indistinct and overlaps the subsquare second joint as a lobate projection. The toes are long and slender, a little less than one fourth of the total length, parallel-sided and end in acute conical points without claws.

Total length 156$\mu$; length of dorsal plate 97$\mu$, of ventral plate

116$\mu$; width of doral plate 78$\mu$, of ventral plate 70$\mu$; width of anterior points 48$\mu$; length of toes 40$\mu$.

*Lecane ohioensis* is common everywhere in weedy ponds and frequently occurs in large numbers.

### LECANE ARCULA Harring

Plate XXIV, figures 1, 2.

*Cathypna aculeata* MURRAY, Journ. Royal Micr. Soc., 1913, p. 350, pl. 14, fig. 28; not *Distyla aculeata* JAKUBSKI.

*Lecane arcula* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 539, pl. 19, figs. 4–6.

The outline of the lorica is broadly ovate and it is but little longer than wide. The dorsal and ventral anterior margins are straight and parallel and nearly coincident; at the external angles are two moderately large spines, directed slightly upwards and outwards. The dorsal plate is ovate and rounded posteriorly. The dorsal markings are of the usual pattern and rather faint. The ventral plate is ovate and as wide as the dorsal; the surface markings are indicated in figure 2. The lateral sulci are moderately deep. The posterior segment is broad and rounded; it projects but slightly beyond the dorsal plate. The coxal plates are indistinct and rounded posteriorly. The first foot joint is large and elongate pyriform, the second joint also large and of irregular form. The toes are fairly long and slender, about one fourth of the total length, straight and parallel-sided; the claw is slender, acutely pointed and recurved.

Total length 96$\mu$; length of dorsal plate 63$\mu$, of ventral plate 68$\mu$, width of dorsal plate 55$\mu$, of ventral plate 55$\mu$; width of anterior spines 47$\mu$, length of toe without claw 18$\mu$; claw 5$\mu$.

*Lecane arcula* was first described from the Panama Canal Zone, and collected by Murray in South America and Australia. It is common in weedy ponds everywhere in the United States. *Distyla aculeata* Jakubski is, according to the description and figure, more elongate, strongly compressed dorso-ventrally and has much longer anterior spines.

### LECANE FLEXILIS (Gosse)

Plate XXIV, figures 3, 4.

*Distyla flexilis* GOSSE, in Hudson and Gosse, Rotifera, 1886, vol. 2, p. 97, pl. 24, fig. 7.—GLASSCOTT, Proc. Royal Dublin Soc., new ser., vol. 8, 1893, p. 72.—WEBER, Rev. Suisse Zool., vol. 5, 1898, p. 599,

pl. 22, fig. 8.—VORONKOV, Trudy Gidr. Stants. Glubokom Oz., vol. 2, 1907, p. 111.—VON HOFSTEN, Arkiv Zool., Stockholm, vol. 6, No. 1, 1909, p. 58, fig. 12.—LUCKS, Rotatorienfauna Westpreussens, 1912, p. 110.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 176, figs. 346, 347.—MONTET, Rev. Suisse Zool., vol. 23, 1915, p. 336.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 32.—OPARINA-KHARITONOVA, Izv. Biol. Nauchno-Issl. Inst. Permsk. Univ., vol. 3, 1925, p. 440.

*Cathypna flexilis* STENROOS, Acta Soc. Fauna et Flora Pennica, vol. 17, No. 1, 1898, p. 159, pl. 2, fig. 19.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 351, pl. 14, fig. 27.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 185.—VON HOFSTEN, Naturw. Unters. Sarekgeb., vol. 4, 1923, p. 861.

*Cathypna brevis* MURRAY, Journ. Royal Micr. Soc., 1913, p. 555, pl. 22, fig. 8.—OLOFSSON, Zool. Bidr. Uppsala, vol. 6, 1918, p. 592, fig. 52.

*Lecane flexilis* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 61; Proc. U. S. Nat. Mus., vol. 47, 1914, p. 538, pl. 19, figs. 1–3; Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 9.—JAKUBSKI, Kosmos (Lwów), 1918–1919, p. 28.

The outline of the lorica is subcircular and the body is strongly gibbous. The anterior dorsal and ventral margins are coincident and distinctly convex; at the external angles are two short, very stout, slightly incurved spines. The dorsal plate is subcircular and rounded posteriorly; the surface markings consist of the usual four transverse rows of facets, but the first row is somewhat irregular and the others have rather more than the usual number of facets. The lorica is quite firm and the facets prominent. The ventral plate is considerably narrower than the dorsal and its edges ill-defined; the markings are less distinct than on the dorsal plate. The lateral sulci are very indistinct. The posterior segment is small and rounded and projects but little beyond the dorsal plate; the coxal plates are semicircular. The foot does not project beyond the end of the lorica; the first joint is elongate oval, the second large and subrhomboid. The toes are fairly long and slender, about one fourth of the total length, straight and parallel-sided for the greater part of their length, thence tapering slightly to the small, acute, recurved claw, which has dorsally a small basal spicule.

Total length 96$\mu$; length of dorsal plate 72$\mu$, of ventral plate 76$\mu$; width of dorsal plate 66$\mu$, of ventral plate 50$\mu$; width of anterior points 55$\mu$; length of toes without claw 19$\mu$; claw 4$\mu$.

*Lecane flexilis* is common in weedy ponds everywhere in the United States; Mr. David Bryce and the late Mr. C. F. Rousse-

let have sent us specimens from England. Our identification of this species with Gosse's animal is based on the form of the animal when swimming; its length is then nearly twice as great, the body is slender and flattened dorso-ventrally and the dorsal markings much more prominent.

**LECANE INTRASINUATA (Olofsson)**

Plate XXIV, figures 5, 6.

*Cathypna intrasinuata* OLOFSSON, Zool. Bidr. Uppsala, vol. 5, 1917, p. 281, fig. 11.—IDELSON, Trudy Plovuch. Morsk. Nauchn. Inst., Moskva, pt. 12, 1925, p. 90.

*Lecane ephestra* HARRING, Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 7, pl. 3, figs. 1, 2.—HAUER, Zool. Anz., vol. 61, 1924, p. 149.

The outline of the lorica is broadly oval, the greatest width about three fifths of the length. The anterior margins of the dorsal and ventral plates are coincident and very slightly convex; at the external angles are two small, robust spines. The dorsal plate is subcircular, rounded posteriorly and without surface markings. The ventral plate is considerably narrower than the dorsal, nearly parallel-sided and rounded posteriorly; the margins are ill-defined and no lateral sulci are present. The surface markings are not prominent, but quite constant. The posterior segment is rounded and projects but little beyond the dorsal plate. The coxal plates are small and obtusely triangular. The first foot joint is long, wide anteriorly and sharply constricted immediately in front of the second joint; this is large and pyriform, projecting about half its length beyond the posterior segment. The toes are long and slender, about one fourth of the total length, parallel-sided and very faintly incurved; the tip is excavate on the inner margin, forming a pseudo-claw.

Total length 150$\mu$; length of dorsal plate 90$\mu$, of ventral plate 95$\mu$; width of dorsal plate 78$\mu$, of ventral plate 62$\mu$; width of anterior points 54$\mu$; length of toes without claw 34$\mu$, claw 6$\mu$.

*Lecane intrasinuata* was described by Olofsson from a few specimens collected in a pond near Alexandrovsk, on the Murman Coast, Russian Lapland. We believe this to be identical with *L. ephestra*, although the illustration accompanying the original description is lacking in detail. *L. intrasinuata* is common in soft, acid water ponds in Oneida and Vilas Counties,

Wisconsin, on Mount Desert Island, Maine, and around Atlantic City, New Jersey. It has recently been found by Hauer in the Schwarzwald, where it is not rare, and by Idelson on Novaja Zemlja.

**LECANE CLIMACOIS Harring and Myers, new species**

Plate XXV, figures 1, 2.

The outline of the lorica is broadly ovate; the width is about two thirds of the length. The anterior dorsal margin is straight and the ventral margin slightly concave; at the external angles are two small, acute spines. The dorsal plate is broadly ovate and slightly truncate posteriorly; the facetting is very regular and of the usual pattern, but very faint and distinctly visible only by turning the animal partly on its side. The ventral plate is somewhat elongate oval; the surface markings are fairly simple and not very distinct. The lateral sulci are deep. The posterior segment is fairly large and nearly semicircular. The coxal plates are small, broad at the base and acuminate posteriorly. The first foot joint is long, parallel-sided and pointed posteriorly; the second joint is robust and somewhat pyriform with two small, lateral knobs; it projects about two thirds of its length beyond the lorica. The toes are fairly long and robust, a little less than one fourth of the total length, parallel-sided and straight; the long, conical claw is sharply indented at its base.

Total length 95$\mu$; length of dorsal plate 64$\mu$, of ventral plate 70$\mu$; width of dorsal plate 51$\mu$, of ventral plate 45$\mu$; width of anterior points 34$\mu$; length of toes without claw 15$\mu$; claw 7$\mu$.

*Lecane climacois* occurs in wet sphagnum or sphagnum bogs; we have collected it at Glenburnie, near Baltimore, Maryland; in Polk County, Florida, and in "Annecta Pool", a very acid, roadside ditch not far from Atlantic City, New Jersey. Only at the last named location has it been found in large numbers.

**LECANE VERECUNDA Harring and Myers, new species**

Plate XXV, figures 3, 4.

The outline of the lorica is broadly ovate and somewhat pointed posteriorly. The anterior margin of the ventral plate is nearly straight; the dorsal margin is very slightly convex and projects a little beyond the ventral plate. At the external angles are two small, slightly incurved frontal spines. The dorsal plate

is ovate, somewhat pointed posteriorly and squarely truncate at the extreme end. The dorsal facetting is not very prominent and follows the prevailing pattern. The ventral plate is nearly parallel-sided anteriorly and rounded posteriorly; the margins are wavy and ill-defined, as are the lateral sulci; the surface markings are very simple. The posterior segment is small and rounded and projects but very little beyond the dorsal plate. The coxal plates are small and very obtusely pointed posteriorly. The first foot joint is ovate and the second joint large and rhomboid in outline, projecting slightly beyond the posterior segment. The toes are fairly long and slender, about one fourth of the total length, straight and very slightly tapering; the claw is moderately long, very slender, acutely pointed and spine-like.

Total length 105$\mu$; length of dorsal plate 72$\mu$, of ventral plate 76$\mu$; width of dorsal plate 60$\mu$, of ventral plate 50$\mu$; width of anterior points 45$\mu$; length of toe without claw 22$\mu$; claw 6$\mu$.

*Lecane verecunda* was collected in small numbers in weedy ponds at the State Fish Hatchery, near Madison, Wisconsin, and in Witch Hole, Mount Desert Island, Maine. Its nearest relative is probably *L. arcula*, from which it differs in the more ovate outline of the dorsal plate, slightly truncate posteriorly, the smaller posterior segment and the relatively narrower ventral plate.

#### LECANE MYLACRIS Harring and Myers, new species

Plate XXV, figures 5, 6.

The lorica is very firm and very broadly ovate; its width is three fourths of the length. The anterior margins are nearly coincident, the ventral almost straight and the dorsal slightly convex; at the external angles are two minute frontal spines. The dorsal plate is very broadly ovate and projects beyond the ventral plate both laterally and posteriorly. The ventral plate is nearly parallel-sided for about two thirds of its length and rounded posteriorly; surface markings are found only on the ventral plate and are limited to a few fairly distinct folds. The lateral sulci are deep. The coxal plates are very small and pointed posteriorly. The first foot joint is oval, somewhat indistinct and lobate posteriorly; the second joint is very large, robust and subsquare, projecting about one third of its length beyond the lorica. The toes are moderately long and slender,

about one fourth of the total length, straight on their inner edges and very faintly sigmoid externally, terminating in a small, pointed claw; they are inserted near mid-length of the second foot joint instead of on the posterior edge.

Total length 175$\mu$; length of dorsal plate 145$\mu$, of ventral plate 130$\mu$; width of dorsal plate 108$\mu$, of ventral plate 82$\mu$; width of anterior spines 70$\mu$; length of toes without claw 32$\mu$; claw 7$\mu$.

*Lecane mylacris* was collected in small numbers in Upper Mill Pond, Mount Desert Island, Maine, and is common in weedy areas of Lake Hartridge, Polk County, Florida.

**LECANE GLYPTA Harring and Myers, new species**

Plate XXVI, figures 1, 2.

The outline of the lorica is somewhat elongate ovate, nearly parallel-sided anteriorly and rounded posteriorly. The anterior margins are not coincident; the dorsal margin is convex and the ventral slightly concave. At the external angles are two very small frontal spines. The entire lorica is quite flexible. The dorsal plate is elongate ovate and slightly truncate posteriorly; the facetting is of an aberrant pattern, not found in any other species. The ventral plate is elongate ovate, rounded posteriorly and as wide as the dorsal plate; the surface markings are, as shown, unusually intricate. The lateral sulci are indistinct. The posterior segment is relatively small, nearly semicircular and projects slightly beyond the dorsal plate. The coxal plates are small and rounded posteriorly. The first foot joint is long and narrow, the second joint broadly pyriform and does not quite reach the posterior end of the lorica. The toes are fairly long and slender, about one fourth of the total length, nearly parallel-sided and with a very slight, sigmoid curvature; the claw is small, acute and slightly outcurved, with a distinct basal spicule.

Total length 110$\mu$; length of dorsal plate 80$\mu$, of ventral plate 86$\mu$; width of lorica 50$\mu$; width of anterior points 42$\mu$; length of toes without claw 22$\mu$; claw 5$\mu$.

*Lecane glypta* was collected in weedy ponds on the Pine Valley golf course, near Clementon, New Jersey. This is on the border line between the acid and alkaline waters of the state.

**LECANE TABIDA Harring and Myers, new species**

Plate XXVI, figures 3, 4.

The lorica is broadly ovate and nearly parallel-sided anteriorly; its width is about two thirds of the length. The anterior margins of the dorsal and ventral plates are coincident, very slightly convex and on account of the flexibility of the entire lorica, somewhat wavy. The dorsal plate is broadly ovate and its edges ill-defined; it is rounded posteriorly. The facetting is rather faint and the number of facets considerably greater than in the usual pattern. The ventral plate is nearly parallel-sided for the greater part of its length and rounded posteriorly; its markings are faint and depart somewhat from the usual design. The lateral sulci are rather shallow and ill-defined. The posterior segment is large and nearly semicircular; the coxal plates are rather small and very obtusely pointed. The first foot joint is narrow and elongate, lobate posteriorly, the second joint subsquare, somewhat narrower anteriorly, and projecting nearly half its length beyond the lorica. The toes are rather short and robust, less than one fourth of the total length, straight on their inner edges, parallel-sided for nearly three fourths of their length and terminate in gradually acuminating points.

Total length 130$\mu$; length of dorsal plate 94$\mu$, of ventral plate 98$\mu$; width of dorsal plate 65$\mu$, of ventral plate 60$\mu$; width of anterior points 55$\mu$; length of toes 30$\mu$.

*Lecane tabida* was collected in small numbers among Fontinalis in quiet pools along Trout Brook, on Mount Desert Island, Maine. It has not been found elsewhere.

**LECANE INFULA Harring and Myers, new species**

Plate XXVI, figures 5, 6.

The outline of the lorica is broadly oval; its width is about two thirds of the length. The anterior margins are nearly coincident and slightly concave; at the external angles are two very stout, slightly incurved spines. The dorsal plate is broadly oval and rounded posteriorly. The facetting is of a remarkably intricate and very irregular pattern; each facet is outlined by a double row of minute, raised dots or beads. On the posterior half of the dorsal plate there is near the margins a pair of incipient "dorsal sulci". The ventral plate is considerably narrower than the dorsal, nearly parallel-sided and its margins somewhat wavy; the surface markings are of a fairly simple pattern. The lateral sulci are moderately deep. The posterior

segment is large and very obtusely pointed; it projects somewhat beyond the dorsal plate. The coxal plates are obtusely triangular and their points some distance from the posterior end of the lorica. The first foot joint is rather indistinct and pointed posteriorly, the second joint large and pyriform and does not quite reach the margin of the posterior segment. The toes are long and slender, nearly one third of the total length, straight and parallel-sided; the claw is short and very slightly incurved.

Total length 160$\mu$; length of dorsal plate 105$\mu$, of ventral plate 120$\mu$; width of dorsal plate 80$\mu$, of ventral plate 65$\mu$; width of anterior spines 45$\mu$, length of toes without claw 40$\mu$; claw 6$\mu$.

*Lecane infula* was collected in Lower Breakneck Pond, on Mount Desert Island, Maine, in small numbers; it is not known from any other localities.

**LECANE SATYRUS Harring and Myers, new species**

Plate XXVII, figures 3, 4.

The outline of the lorica is broadly ovate; its width is about three fourths of the length. The median portion of the anterior dorsal margin forms a sort of guard for the opening of the lorica; it occupies about half the width of the dorsal plate and is limited externally by two small, incurved spines; outside of these spines there is on each side a distinct, small sinus. As a result of the general deformation of the dorsal plate taking place when the head is retracted, this lobe bends down over the anterior edge of the ventral plate, thus affording additional protection for the delicate corona. At the external angles of the lorica are two very large, antler-like frontal spines; these are normally at right angles to the ventral plate and, when thus turned up, serve to protect the corona when the animal is swimming; in retraction they turn outwards so that they are substantially in the plane of the ventral plate. Although very irregular in outline and slightly variable in details of the denticulation, they may be described as rather slender, acutely pointed spines with a sigmoid curvature, directed forward and outwards; on the external edge there is near the base a single large tooth, and on the internal edge four or five teeth, varying slightly in size and location in different individuals, but limited to the basal half of the spine; the terminal portion is always slender, acutely pointed and slightly incurved. The anterior

margin of the ventral plate is slightly convex. The dorsal plate is broadly ovate and slightly truncate posteriorly. The surface ornamentation of both dorsal and ventral plate is unique and very intricate and must be studied from the figures; it consists of a system of elevated ridges, rounded at the top and with very closely spaced, hemispherical beads on the sloping sides. Similar "secondary markings" are found in *L. signifera,* but the general pattern is quite different. The ventral plate is broadly ovate and somewhat angular posteriorly, slightly truncate at the extreme end. The posterior segment is fairly large and projects considerably beyond the dorsal plate. The coxal plates are small and narrowly oval. The first foot joint is narrow, elongate and pointed posteriorly, second joint large and pyriform, projecting about half its length beyond the lorica. The toes are long and slender, about one fourth of the total length, straight and parallel-sided, terminating in acutely pointed claws with a small basal spicule.

Total length 175$\mu$; length of dorsal plate without anterior spines 95$\mu$, of ventral plate 105$\mu$; width of dorsal plate 78$\mu$, of ventral plate 72$\mu$; width of anterior margin at base of spines 65$\mu$; width over spines 75$\mu$; length of spines 25$\mu$; length of toe without claw 34$\mu$; claw 7$\mu$.

*Lecane satyrus* is usually, if not exclusively, found in wet sphagnum. We have collected it at Glenburnie, near Baltimore, Maryland; on Mount Desert Island, Maine; in Polk County, Florida; around Atlantic City, New Jersey, and in Vilas County, Wisconsin, where it was abundant in a small pool near Bent's resort on Mamie Lake; it is usually found only in small numbers. It is perhaps the most remarkable species of the genus; the rotatable, protective anterior spines are found in *Lecane mucronata,* but in a much simpler form, and the surface markings are far more elaborate than in any other species.

### LECANE HASTATA (Murray)

Plate XXVIII, figures 5, 6.

*Cathypna hastata* MURRAY, Journ. Royal Micr. Soc., 1913, p. 348, pl. 14, fig. 25.

The lorica is very broadly ovate and somewhat flexible. The anterior dorsal margin is very slightly convex and the ventral margin straight; at the external angles are two small anterior spines. The dorsal plate is broadly ovate and slightly truncate

posteriorly; it is much smaller than the ventral plate. The ventral plate is very broadly ovate; its surface markings consist of a transverse fold and two faint, longitudinal ridges. Lateral sulci are not present; the section of the lorica connecting the dorsal and ventral plates is very slightly concave. The posterior segment is relatively small and rounded; the coxal plates are apparently absent. The first foot joint is large and indistinct, the second subsquare, projecting beyond the posterior end of the lorica. The toes are long and slender, more than one fourth of the total length, straight, parallel-sided with a bulbous enlargement near the posterior end, and terminating in a long, slender, acutely pointed claw.

Total length 150$\mu$; length of dorsal plate 95$\mu$, of ventral plate 110$\mu$; width of dorsal plate 75$\mu$, of ventral plate 90$\mu$; width of anterior points 70$\mu$; length of toe without claw 25$\mu$; claw 15$\mu$.

*Lecane hastata* was described by Murray from a brackish pond at Rio de Janeiro, Brazil. We have found this species in abundance in brackish ditches at Port Republic, New Jersey, in perfectly fresh water at Barrows, Virginia, near Washington, and in collections from Baton Rouge, Louisiana. In the Port Republic material the dorsal plate is smooth; the specimens from Barrows show a very faint tesselation towards the anterior edge of the dorsal plate. *L. hastata* is probably related to *L. crepida;* they agree in the peculiar structure of the lorica and the posterior segment and foot joints.

### LECANE CREPIDA Harring

Plate XXVIII, figures 1, 2.

*Distyla gissensis* JENNINGS, Bull. U. S. Fish Comm., vol. 19 (for 1899), 1900, p. 91, pl. 20, figs. 33, 34; not *Distyla gissensis* ECKSTEIN.

*Lecane crepida* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 533, pl. 22, figs. 4–7.

The lorica is very flexible, parallel-sided for one half of its length and tapers rapidly to the foot; it is strongly gibbous posteriorly. The anterior dorsal margin is slightly convex and the ventral a trifle concave; at the external angles are two very stout, curved anterior spines. The dorsal plate is strongly convex and much smaller than the ventral; the edges are rather indistinct and the surface markings limited to three pairs of divergent, wavy ridges, beginning near the anterior margin.

The ventral plate is moderately convex and has two interrupted series of ridges extending the greater part of its length; there is a well marked transverse fold immediately in front of the foot. Lateral sulci are not present; the section of the lorica connecting the dorsal and ventral plates is very slightly concave. The posterior segment merges without definite anterior limit with the body; ventrally it has a large, circular opening for the foot. The coxal plates are very indistinct. The first foot joint is large and bulbous, the second joint is subsquare and projects with more than half its length beyond the lorica. The toes are very long and slender, more than one fourth of the total length, straight and slightly tapering, terminating in a long, slender, acutely pointed claw, sharply constricted at the base.

Total length 135$\mu$; length of dorsal plate 75$\mu$, of ventral plate 90$\mu$; width of dorsal plate 45$\mu$, of ventral plate 60$\mu$; width of anterior spines 52$\mu$; length of toe without claw 30$\mu$; claw 9$\mu$.

*Lecane crepida* was described from material collected in the Panama Canal Zone, where it is common; we have since found it at Oconomowoc, Wisconsin, and on Mount Desert Island, Maine. Jennings records it from South Bass Island, Lake Erie. We are unable to see any resemblance between this species and Eckstein's *Distyla gissensis;* this is said to have two anterior spines on one side and one on the other and, apart from this evident error, bears little resemblance to *L. crepida.* It was evidently one of the smaller Lecanes, but the original description is so lacking in detail, and so many species have later been listed under this name that it is now apparently hopeless to attempt to identify it.

### LECANE SAGULA Harring and Myers, new species

Plate XXVIII, figures 3, 4.

The outline of the lorica is very broadly ovate; the width is nearly equal to the length. The anterior margins are coincident and form a somewhat wavy, straight line; frontal spines are not present. The entire lorica is semi-flexible and its margins somewhat indefinite; the dorso-ventral depth of the body is unusually great. The dorsal plate is very broadly ovate and rounded posteriorly; the facetting is rather faint and of an unusual pattern. The ventral plate is nearly parallel-sided ante-

riorly and very obtusely triangular posteriorly; it is a little narrower than the dorsal plate. The ventral surface markings are very intricate and must be studied from the figure. The lateral sulci are indistinct. The posterior segment is rather small and broadly rounded; its entire length projects beyond the dorsal plate. The coxal plates are large and rounded posteriorly. The first foot joint is short and pyriform with a bluntly pointed posterior lobe; the second joint is huge, nearly circular and projects about half its length beyond the lorica. The toes are rather short and straight, a little less than one fourth of the total length, parallel-sided for the greater part of their length and slightly reduced at the base of the small, acute claw.

Total length 95$\mu$; length of dorsal plate 48$\mu$, of ventral plate 60$\mu$; width of dorsal plate 48$\mu$, of ventral plate 45$\mu$; width of anterior margin 38$\mu$; length of toes without claw 19$\mu$; claw 4$\mu$.

*Lecane sagula* was collected in small numbers in a weedy pond at Minocqua, Wisconsin, and in Witch Hole, Mount Desert Island, Maine.

**LECANE FORMOSA Harring and Myers, new species**

Plate XXIX, figures 1, 2.

The lorica is very broadly ovate, almost parallel-sided anteriorly and rounded posteriorly; it is moderately flexible. The anterior margins of the dorsal and ventral plates are coincident and straight; no anterior spines are present. The dorsal plate is very broadly ovate and slightly truncate posteriorly; the anterior margin is considerably narrower than the ventral plate and surface markings are entirely absent. The ventral plate is nearly parallel-sided anteriorly, somewhat triangular posteriorly and broadly rounded at the extreme end; it is as wide as the dorsal plate and its surface markings are limited to a transverse fold in front of the foot and two longitudinal lines diverging towards the anterior margin. The lateral sulci are fairly deep. The posterior segment is broadly rounded and projects slightly beyond the dorsal plate; the coxal plates are very indistinct and pointed posteriorly. The first foot joint is widest anteriorly and lobate posteriorly; the second joint robust and broadly pyriform. The toes are long and slender; about one third of the total length, straight and slightly tapering; the claw is long, very slender and acutely pointed.

Total length 110$\mu$; length of dorsal plate 74$\mu$, of ventral plate 80$\mu$ width of lorica 68$\mu$; width of anterior margin 60$\mu$; length of toes without claw 25$\mu$; claw 7$\mu$.

*Lecane formosa* has been found only in Lac Vieux Desert, Vilas County, Wisconsin, in shallow, weedy indentations near the outlet.

### LECANE AEGAENA Harring

Plate XXVII, figures 1, 2.

*Lecane aeganea* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 542, pl. 21, figs. 1–3. —FADEEV, Russk. Gidr. Zhur., vol. 3, No. 3–5, 1924, p. 5, fig. 1.

The outline of the lorica is broadly ovate and the dorso-ventral depth less than usual. The anterior dorsal margin is slightly convex and the ventral margin straight; they do not meet when the head is retracted, but leave the lorica partly open; no anterior spines are present. The dorsal plate is oval and rounded posteriorly; the facetting is fairly regular and not very conspicuous. The ventral plate is longer and wider than the dorsal; its markings are prominent, especially on the posterior half. The lateral sulci are not very deep and the entire lorica is quite flexible. The posterior segment is small and rounded; it projects somewhat beyond the dorsal plate. The coxal plates are very small and rounded posteriorly. The first foot joint is very long, but almost obliterated near the middle; the second joint is large and subrhomboid. The toes are long and slender, about one third of the total length, straight and very slightly conical, terminating in a long, slender, acute claw with a small basal spicule.

Total length 110$\mu$; length of dorsal plate 70$\mu$, of ventral plate 76$\mu$; width of dorsal plate 56$\mu$, of ventral plate 60$\mu$; width of anterior margin 50$\mu$; length of toes without claw 24$\mu$; claw 10$\mu$.

*Lecane aeganea* was described from material collected in the Panama Canal Zone; we have since found it around Atlantic City, New Jersey, but never in large numbers. Fadeev reports it from the gouvernments Kharkov and Tamboy, European Russia.

**LECANE VENUSTA Harring and Myers, new species**

Plate XXVII, figures 5, 6.

The outline of the lorica is very broadly ovate; its width is about seven eighths of the length. The anterior dorsal margin is very slightly convex and the ventral nearly straight; no anterior spines are present. The dorsal plate is broadly ovate and rounded posteriorly; the facetting follows in general the usual pattern and is not especially prominent. The ventral plate is almost parallel-sided anteriorly and broadly rounded posteriorly; the surface markings are fairly complex. The lateral sulci are not very deep. The posterior segment is broadly rounded and projects only slightly beyond the dorsal plate, but it is unusually distinct. The coxal plates are almost as large as the posterior segment and of the same general form. The first foot joint is pyriform and lobate posteriorly, the second joint large and subsquare. The toes are long and slender, nearly one-third of the total length, very slightly incurved, parallel-sided and terminating in moderately acute points, but not forming a claw.

Total length 130$\mu$; length of dorsal plate 86$\mu$, of ventral plate 84$\mu$; width of dorsal plate 75$\mu$, of ventral plate 70$\mu$; width of anterior margin 62$\mu$; length of toes 42$\mu$.

*Lecane venusta* has been found only in small numbers in Ottman Lake, near Waupaca, Wisconsin.

**LECANE CANDIDA Harring and Myers, new species**

Plate XIV, figures 1, 2.

The outline of the lorica is broadly ovate; its width is about two thirds of the length. The anterior margins are coincident and very slightly convex; no anterior spines are present. The dorsal plate is broadly ovate and very obtusely pointed posteriorly; it is without markings of any kind. The ventral plate is nearly parallel-sided anteriorly and rounded posteriorly; its markings are confined to a few folds on the posterior half. The lateral sulci are fairly deep. The posterior segment is large and rounded; it projects somewhat beyond the dorsal plate. The first foot joint is somewhat indistinct and lobate posteriorly, the second joint nearly circular. The toes are long, about one third of the total length, straight and slender, terminating in an acutely pointed claw, very slightly outcurved at the tip, and with distinct basal spicule.

Total length 100$\mu$; length of dorsal plate 65$\mu$. of ventral plate 72$\mu$; width of dorsal plate 56$\mu$, of ventral plate 48$\mu$; width of anterior margin 48$\mu$; length of toes without claw 22$\mu$, claw 7$\mu$.

*Lecane candida* was collected in small numbers among sphagnum growing on the margins of Loon Lake, near Eagle River, Vilas County, Wisconsin. It has not been found elsewhere.

### LECANE PUSILLA Harring

Plate XXX, figures 1, 2.

*Lecane pusilla* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 541, pl. 20, figs. 4–6.—FADEEV, Russk. Gidr. Zhurn., vol. 3, No. 3–5, 1924, p. 6.

The lorica is very broadly ovate and the dorso-ventral depth of the body is greater than usual. The anterior margins are straight and the dorsal plate projects somewhat beyond the ventral, so that the lorica is not closed when the head is completely retracted. No anterior spines are present. The dorsal plate is subcircular and slightly truncate posteriorly. The facetting is fairly distinct and does not differ widely from the usual pattern. The ventral plate is parallel-sided in its anterior half and very obtusely triangular posteriorly; the surface markings are conspicuous only on the median portion of the pattern. The lateral sulci are deep. The rounded posterior segment projects considerably beyond the dorsal plate; the coxal plates are rather small and rounded posteriorly. The first foot joint is indistinct, the second large and nearly circular. The toes are long and slender, more than one fourth of the entire length, straight and slightly tapering, terminating in a long, recurved, very slender and acute claw.

Total length 75$\mu$; length of dorsal plate 54$\mu$, of ventral plate 60$\mu$; width of dorsal plate 52$\mu$, of ventral plate 45$\mu$; width of anterior margin 50$\mu$; length of toes without claw 15$\mu$; claw 5$\mu$.

*Lecane pusilla* was described from material collected in the Panama Canal Zone, where it is locally common; Fadeev reports finding it at Kharkov, Russia.

### LECANE ASTHENA Harring and Myers, new species

Plate XXX, figures 3, 4.

The outline of the lorica is very broadly ovate and the dorso-ventral depth of the body is somewhat greater than usual. The

anterior margins of the dorsal and ventral plates are coincident and slightly convex; no anterior spines are present. The dorsal plate is approximately circular and very slightly truncate posteriorly; the facetting follows in general the usual pattern. The ventral plate is very slightly narrower than the dorsal, almost parallel-sided anteriorly and semicircular posteriorly; the surface markings are somewhat more intricate than is usually the case. The lateral sulci are fairly deep. The posterior segment is short and very broadly rounded; it projects somewhat beyond the dorsal plate. The coxal plates are obtusely truncate at their posterior, free ends. The first foot joint is narrow and nearly parallel-sided, the second joint is nearly hemispherical, very short and very broad. The toes are long and slender, more than one fourth of the entire length, straight and slightly tapering, terminating in a long, slender, acute claw of such form that its external edge is a continuation of the external edge of the toe and a slight excavation formed on the inner edge.

Total length 80$\mu$; length of dorsal plate 54$\mu$, of ventral plate 60$\mu$; width of dorsal plate 54$\mu$, of ventral plate 50$\mu$; width of anterior margin 48$\mu$; length of toes without claw 17$\mu$; claw 6$\mu$.

*Lecane asthena* was collected in a shallow, dead bay of Lake Kawaguesauga at Minocqua, Wisconsin; only a few specimens were present, and it has not been found elsewhere.

### LECANE SUBTILIS Harring and Myers, new species

**Plate XXX, figures 5, 6.**

The anterior portion of the lorica is roughly parallel-sided and the posterior portion sub-triangular and rounded at the apex. The anterior dorsal and ventral margins are coincident and very slightly convex; no anterior spines are present. The dorsal plate is parallel-sided anteriorly and obtusely rounded posteriorly; its surface markings are of a very intricate and unusual pattern. The ventral plate is as wide as the dorsal, parallel-sided anteriorly and obtusely triangular posteriorly; its surface markings are even more unusual than the dorsal and have no counterpart in the genus. The lateral sulci are evanescent and the entire lorica is quite flexible. The posterior segment is small and nearly semicircular. The coxal plates are rudimentary. The first foot joint is very indistinct and its outlines confluent with the central portion of the ventral markings; the sec-

ond joint is subsquare and projects slightly beyond the lorica. The toes are very long and slender, about one third of the total length, straight, very slightly conical and terminate in a long, slender, acutely pointed claw, sharply constricted at the base.

Total length 110$\mu$; length of dorsal plate 70$\mu$, of ventral plate 75$\mu$; width of lorica 60$\mu$; width of anterior margin 56$\mu$; length of toe without claw 24$\mu$; claw 8$\mu$.

*Lecane subtilis* was collected in a very shallow bay of Arbor Vitae Lake, near Minocqua, Wisconsin; it has not been found elsewhere.

### LECANE ELEGANS Harring

**Plate XV, figures 1, 2.**

*Lecane elegans* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 544, pl. 23, figs. 1, 2.

The body is elongate, slender and parallel-sided. The dorsal plate is very flexible, the ventral much less so. The anterior margin of the ventral plate is nearly straight and of fairly constant form; the dorsal margin is irregularly puckered by the inversion of the head. The dorsal plate is strongly convex, nearly semicircular in cross section. The lateral sulci are barely indicated on the posterior third of the body, the ventral plate may be said to be joined directly to the dorsal; it has prominent longitudinal ridges. The posterior segment of the body is very large and unusually prominent; it may be considered as beginning near the middle of the ventral plate and its outline is ovate, broadest posteriorly. Coxal plates are not present. The first foot joint is extremely long, tapering posteriorly to half its anterior width; the second joint is large and subsquare and projects with its entire length beyond the lorica. The toes are very long and slender, about one third of the total length, and slightly recurved in the posterior third; the claw is nearly half as long as the toe, outcurved and slightly recurved, with a conspicuous, laterally directed basal spine.

Total length 170$\mu$, length of lorica 108$\mu$, width 45$\mu$; toe without claw 36$\mu$; claw 15$\mu$.

*Lecane elegans* was described from material collected in the Panama Canal Zone; only a few specimens were collected and it has not been found elsewhere.

**LECANE ELONGATA Harring and Myers, new species**

Plate XXXI, figures 1, 2.

The outline of the lorica is elongate reversed-ovate; its width is only three fifths of the length. The anterior margin of the dorsal and ventral plates is slightly convex and the lorica is widely open in front when the head is fully retracted; no anterior spines are present. The dorsal plate is elongate oval and squarely truncate posteriorly; the pattern of the dorsal and ventral surface markings is unlike that of any other species of the genus and must be studied from the figures. The ventral plate is elongate reversed-ovate and as wide as the dorsal plate. The lateral sulci are fully developed only on the posterior half, disappearing gradually towards the anterior margin. The posterior segment is very large, obtusely pointed and projects far beyond the dorsal plate. The coxal plates are somewhat obscure and bluntly pointed posteriorly. The first foot joint is very long and has a circular enlargement near its anterior end; the second joint is subsquare and projects nearly its length beyond the lorica. The toes are very long and very slender, nearly one third of the total length, straight, slightly tapering and rounded at the ends; the claw is extremely long, slender and acutely pointed.

Total length 220$\mu$; length of dorsal plate 120$\mu$, of ventral plate 145$\mu$; width of lorica 84$\mu$; width of anterior margin 60$\mu$; toes without claw 38$\mu$; claw 20$\mu$.

*Lecane elongata* was collected among the leaves of a species of sphagnum growing on the bottom in shallow bays of Doughty Mill pond, near Atlantic City, New Jersey. It has not been found elsewhere.

**LECANE TENUISETA**

Plate XXXI, figures 3, 4.

*Lecane tenuiseta* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 543, pl. 22, figs. 1–3.—FADEEV, Russk. Gidr. Zhurn., vol. 3, No. 3–5, 1924, p. 5; Raboti Sev.-Kavkazhsk. Gidrobiol. Stants., vol. 1, 1925, p. 23, pl. 5, fig. 2—HAUER, Zool. Anz., vol. 61, 1924, p. 149.

The lorica is membranous and very flexible; its outline is elongate oval and the body is fairly thick. The anterior dorsal and ventral margins are parallel and usually slightly convex

in the median half of their width; they do not quite meet and the lorica is left partly open in retraction. The dorsal plate is oval, rounded posteriorly and without facetting; it is strongly gibbous and bends down considerably even in front. The ventral plate is as wide as the dorsal and more elongate oval; its markings consist of a few slightly elevated ridges, as shown in figure 4. The lateral sulci are very shallow. The posterior segment of the body is broad and rounded and projects considerably beyond the dorsal plate. The coxal plates are large and semicircular. The first foot joint is narrow and parallel-sided and overlaps the second joint as a rounded lobe with a small median projection; the second joint is short and broad, rounded anteriorly and constricted immediately in front of the toes; it does not project beyond the posterior segment. The toes are long and slender, about one third of the total length, slightly conical and terminate in an extremely long, spinelike claw, very slender and very acute, its inner edge a continuation of the toe and a distinct shoulder on the outer edge at the junction of toe and claw.

Total length 106$\mu$; length of dorsal plate 64$\mu$, of ventral plate 73$\mu$; width of lorica 56$\mu$; width of anterior margin 45$\mu$; length of toe without claw 20$\mu$; claw 13$\mu$.

*Lecane tenuiseta* is common in wet sphagnum and in weedy, soft water ponds, apparently all over the United States. Fadeev reports it from Kharkov and Lake Madatapin in the Kaukasus, and Hauer from bogs in the Schwarzwald.

### LECANE DORYSSA Harring

Plate XXXI, figures 5, 6.

*Lecane doryssa* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 542, pl. 21, figs. 4–6.

The lorica is very broadly pyriform and its consistency leathery, so that the boundaries of the plates are not very distinct, but the general outline is nevertheless quite constant. The dorso-ventral depth of the body is unusually great. The anterior margin of the dorsal plate is slightly convex and sinuate, as the ridges of the plate are continued up to the edge; the ventral margin is almost straight and frontal spines are not present. The dorsal plate is subcircular and slightly truncate posteriorly; the facetting is very prominent and deviates somewhat from the regular pattern, especially towards the

margins. The ventral plate is slightly narrower than the dorsal, approximately parallel-sided anteriorly and narrows somewhat abruptly to the posterior segment; the surface markings are prominent and their pattern quite complex, as shown in figure 6. The lateral sulci are shallow and much wrinkled. The posterior segment is large and projects considerably beyond the dorsal plate; the coxal plates are large and rounded. The first foot joint is large and prominent, strongly constricted near the middle and overlaps the large, subsquare second joint as a broad, bluntly pointed lobe; the second joint projects beyond the lorica for more than half its length. The toes are very long and slender, about one third of the total length, straight and very slightly tapering for a little more than half their length; at this point they are abruptly reduced to a clawlike terminal spine, straight, very slender and very acutely pointed.

Total length 106$\mu$; length of dorsal plate 58$\mu$, of ventral plate 58$\mu$; width of dorsal plate 60$\mu$, of ventral plate 58$\mu$; width of anterior margin 52$\mu$; length of toe without terminal spine 17$\mu$, of spine 13$\mu$.

*Lecane doryssa* was described from material collected in the Panama Canal Zone; it also occurred in collections made by Mr. Juday in ditches along the Ferrocarril Central de Guatemala at Puerto Barrios, Guatemala. It was not numerous at either location. The nearest relative of this species is probably *L. hornemanni*, which rivals it in thickness of the body and also resembles it in general appearance. The lorica of *L. hornemanni* has surface markings of quite a different pattern; the toes are without any claw and the peculiar coxal plates, ending in points close to the foot, also distinguish it from *L. doryssa*.

**LECANE INOPINATA Harring and Myers, new species**

Plate XXXII, figures 5, 6.

The lorica is broadly ovate; its width is about two thirds of the length. The anterior dorsal and ventral margins are coincident and very slightly convex; no anterior spines are present. The dorsal plate is broadly oval and slightly truncate posteriorly; it is not facetted. The ventral plate is broadly ovate and very slightly narrower than the dorsal; its surface markings consist of two transverse and several longitudinal ridges. The lateral sulci are fairly deep. The posterior segment is small and rounded and projects somewhat beyond the dorsal plate. The

coxal plates are small and rounded posteriorly. The first foot joint is fairly large and pyriform, lobate posteriorly, the second joint subsquare and robust. The toes are long and slender, about one fourth of the entire length, straight and parallel-sided, terminating in a fairly large, acute claw; they are fused for one third of their length and consequently immovable.

Total length 110$\mu$; length of dorsal plate 75$\mu$, of ventral plate 80$\mu$; width of dorsal plate 62$\mu$, of ventral plate 58$\mu$; width of anterior margin 52$\mu$; length of toes without claw 26$\mu$; claw 5$\mu$.

*Lecane inopinata* was found in small numbers in weedy ponds near Minocqua, Wisconsin. It may with seemingly equal justification be called a Lecane with fused toes or a Monostyla with a divided toe; as Monostylas are unquestionably Lecanes with fused toes, it seems advisable to give preference to *Lecane* where the fusion is incomplete.

### LECANE NANA (Murray)

Plate XXXIV, figures 1, 2.

*Cathypna nana*, MURRAY, Journ. Royal Micr. Soc., 1913, p. 353, pl. 14, fig. 29.

*Lecane nana* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 536. —HAUER, Zool. Anz., vol. 61, 1924, p. 149; Mitt. Geogr. Ges u. Naturhist. Mus. Lübeck, ser. 2, No. 30, 1925, p. 168, fig. 8.

The outline of the lorica is roughly subcircular. The anterior margins of the dorsal and ventral plates are coincident and slightly convex; no anterior spines are present. The dorsal plate is subcircular and very slightly pointed posteriorly; it is without surface markings. The ventral plate is considerably narrower than the dorsal, nearly parallel-sided anteriorly and obtusely pointed posteriorly. The surface markings consist of a few broken lines, as shown in figure 2. The lateral sulci are deep. The posterior segment is small and obtusely pointed and projects somewhat beyond the dorsal plate. The coxal plates are small and rounded posteriorly. The first foot joint is obtusely conical and widest in front, the second joint irregularly subsquare and does not project beyond the posterior segment. The toes are long and fairly slender, about one fourth of the total length, acuminate and straight on their inner edges.

Total length 85$\mu$, length of dorsal plate 56$\mu$, of ventral plate 64$\mu$; width of dorsal plate 54$\mu$, of ventral plate 48$\mu$; width of anterior margin 45$\mu$; length of toes 21$\mu$.

*Lecane nana* was described by Murray from Lake Titicaca, Bolivia. It occurs also in the Panama Canal Zone, and we have collected it in wet sphagnum from many localities in the United States: Central and Northern Wisconsin; Mount Desert Island, Maine; around Atlantic City, New Jersey; Maryland and the District of Columbia and in Polk County, Florida. It has a superficial resemblance to *L. tryphema,* but the outline of the lorica and the relative proportions of the dorsal and ventral plates are quite different.

**LECANE TRYPHEMA Harring and Myers, new species**

**Plate XXXIV, figures 5, 6.**

The outline of the lorica is very broadly oval. The anterior margin of the dorsal plate is approximately straight, but on account of the flexibility of the entire lorica it is somewhat wavy and irregular; the ventral margin is slightly concave and no anterior spines are present. The dorsal plate is subcircular and truncate posteriorly; it is without permanent markings. The ventral plate is very broadly ovate and rounded posteriorly; its markings are limited to a transverse fold in front of the foot. The lateral sulci are deep. The posterior segment is small, rounded and its anterior limits obscure; it projects considerably beyond the dorsal plate and slightly beyond the second foot joint. The coxal plates are small and rounded posteriorly. The first foot joint overlaps the second with nearly half its length and is lobate posteriorly; the second foot joint is very robust and roughly subsquare. The toes are slender and fairly long, about one fourth of the total length, straight on their inner edges and tapering at the extreme ends to conical points without claws.

Total length 104$\mu$; length of dorsal plate 70$\mu$, of ventral plate 78$\mu$; width of dorsal plate 70$\mu$, of ventral plate 66$\mu$; width of anterior margin 53$\mu$; length of toes 27$\mu$.

*Lecane tryphema* was first collected in a cranberry bog at Mather, Wisconsin. It is fairly common in bog pools and ponds among algae and mosses around Atlantic City, New Jersey, and also on Mount Desert Island, Maine.

**LECANE HORNEMANNI (Ehrenberg)**

Plate XXXIV, figures 3, 4.

*Euchlanis hornemanni* EHRENBERG, Abh. Akad. Wiss. Berlin (for 1833) 1834, pp. 206, 220; Infusionsthierchen, 1838, p. 462, pl. 57, fig. 9.

*Distyla hornemanni* HUDSON and GOSSE, Rotifera, Suppl., 1889, p. 42, pl. 33, fig. 37.—BILFINGER, Jahresh. Naturk. Württemberg, vol. 50, 1894, p. 58.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 175, fig. 345.

*Cathypna hornemanni* MURRAY, Journ. Royal Micr. Soc., 1913, p. 349, pl. 14, fig. 26.

*Lecane hornemanni* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 543; Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 8.

The lorica is very broadly ovate; its width is greater than the length and the dorso-ventral depth when fully contracted is unusually great. The anterior dorsal margins are coincident and decidedly convex; no anterior spines are present. The dorsal plate is very broadly oval and rounded posteriorly; its width is considerably greater than the length. The surface markings consist of hemispherical bosses, apparently corresponding in number and position to the usual facets, and separated by wide depressions of approximately semicircular cross section; there are no sharp lines of demarcation anywhere, the bosses merging gradually with the dividing grooves and it is extremely difficult to determine their respective locations with any accuracy and for this reason they have been omitted from the figure. The ventral plate is very broadly pyriform, considerably narrower than the dorsal plate, and its edges wavy and somewhat ill-defined; the surface markings consist of a few longtiudinal and transverse folds. The lateral sulci are deep. The posterior segment is short, broad and semicircular; it projects somewhat beyond the dorsal plate. The coxal plates are obtusely pointed. The first foot joint is fairly large and roughly parallel-sided; the second joint is very large, somewhat elongate, rounded anteriorly and projects considerably beyond the lorica. The toes are long and fairly stout, one fourth of the total length, very slightly tapering for about two thirds of their length, terminating in long, conical, acute points, very slightly outcurved and without any claw.

Total length 120$\mu$, length of dorsal plate 72$\mu$, of ventral plate

84$\mu$; width of dorsal plate 87$\mu$, of ventral plate 72$\mu$; width of anterior margin 63$\mu$; length of toes 30$\mu$.

*Lecane hornemanni* is fairly common in weedy ponds; we have collected it at Washington, District of Columbia; around Atlantic City, New Jersey; in northern and central Wisconsin and on Mount Desert Island, Maine; it occurred also in collections made by Dr. H. S. Jennings at Ann Arbor, Michigan.

**LECANE CLARA (Bryce)**

Plate XVII, figures 3, 4.

? *Diaschiza cupha* GOSSE, Journ. Royal Micr. Soc., 1887, p. 3, pl. 1, fig. 6.—HUDSON and GOSSE, Rotifera, Suppl., 1889, p. 38, pl. 31. fig. 31.

*Distyla clara* BRYCE, Science Gossip, vol. 28, 1892, p. 271, text fig.

*Cathypna clara* MURRAY, Journ. Royal Micr. Soc., 1913, p. 556, pl. 22, fig. 6.

*Cathypna sulcata* MURRAY, Journ. Royal Micr. Soc., 1913, p. 557, pl. 22, fig. 5; not *Cathypna sulcata* GOSSE.

*Lecane clara* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 60; Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 9.

*Diglena beauchampi* VON HOFSTEN, Naturw. Unters. Sarekgeb., vol. 4, 1923, p. 851, fig. 5.

The lorica is membranous, very flexible and its outline variable in the living animal; it is difficult to obtain fully contracted specimens, even with strong preservatives, and they are in the nature of accidents. The following description is based on such contracted specimens, in order to make comparison possible with other species of the genus.

The outline of the contracted lorica is broadly oval and rounded posteriorly. The anterior margins are not coincident and complete closure of the lorica appears to be impossible; the dorsal margin is slightly convex and the ventral slightly concave. Anterior spines are not present. The dorsal plate is oval and rounded posteriorly; no permanent folds or other markings are present. The ventral plate is oval, rounded posteriorly and somewhat narrower than the dorsal plate. The lateral sulci are evanescent. The rounded posterior segment has no definite anterior limit; the coxal plates are fairly large and obtusely pointed posteriorly. The first foot joint is elongate pyriform and somewhat indistinct, the second joint very broadly pyriform. The toes are long and robust, about one third of the total length, broadly lancet-shaped and terminate in a bristle-like spicule.

Total length of contracted specimen 120$\mu$; length of dorsal plate 80$\mu$, of ventral plate 82$\mu$, width of dorsal plate 62$\mu$, of ventral plate 55$\mu$; width of anterior margin 55$\mu$; length of toes, 38$\mu$.

*Lecane clara* was found by Bryce in sphagnum; we have found it in weedy ponds at Kenilworth and Hyattsville, near Washington, District of Columbia, and at Oceanville, near Atlantic City, New Jersey.

### LECANE RHACOIS Harring and Myers, new species

Plate XVII, figures 1, 2.

The integument is so flexible that there is no justification for calling it a lorica. As in the case of *L. clara* fully contracted specimens are seldom obtained and even then they are virtually shapeless balls. The characteristic features are the posterior segment, foot and toes. The posterior segment is limited anteriorly by a distinct fold, representing the termination of the dorsal plate; it is rounded posteriorly and projects slightly beyond the dorsal plate. The coxal plates are small and very obtusely pointed posteriorly. The first foot joint is pyriform and somewhat indistinct, the second joint short, broad and squarish, projecting about half its length beyond the posterior segment. The toes are long, stout, straight and nearly parallel-sided; the edges are not true straight lines, but very slightly wavy and irregular, varying individually, the points are blunt and have a minute terminal spicule.

Total length, extended 140$\mu$, contracted 100$\mu$; length of toes 40$\mu$.

*Lecane rhacois* is common in wet sphagnum growing in an old gravel pit at Hyattsville, near Washington, District of Columbia, and under similar conditions in Oneida and Vilas Counties, Wisconsin.

### LECANE INERMIS (Bryce)

Plate XXXIII, figures 1, 2.

*Distyla inermis* BRYCE, Science Gossip, vol. 28, 1892, p. 274, text fig.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 32.—MONTET, Rev. Suisse Zool., vol. 23, 1915, p. 336.

*Cathypna inermis* MURRAY, Journ. Royal Micr. Soc., 1913, p. 556, pl. 22, fig. 7.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 187.

*Lecane inermis* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 61.—BRYCE, Journ. Quekett Micr. Club, ser. 2, vol. 15, 1924, p. 97.
*Lecane amorpha* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 544, pl. 23, figs. 1, 2.—HAUER, Zool. Anz., vol. 61, 1924, p. 148.

The lorica is membranous and very flexible and the outlines of the dorsal and ventral plates somewhat variable, but nevertheless fairly constant. The outline of the fully contracted lorica is broadly pyriform and rounded posteriorly. The anterior margins are coincident and usually straight, dependent somewhat on the degree of contraction; the lorica is widely open in front, even when fully contracted. The dorsal plate is approximately parallel-sided anteriorly and rounded posteriorly. The ventral plate is broadly ovate and considerably wider than the dorsal plate; both are without permanent surface markings. The lateral sulci are represented by the very flexible and slightly concave membrane connecting the dorsal and ventral plates. The posterior segment is small and rounded, projecting nearly its entire length beyond the dorsal plate. The coxal plates are small and obtusely pointed. The first foot joint is somewhat wedge-shaped and pointed posteriorly, the second joint large and subsquare, projecting slightly beyond the lorica. The toes are relatively short, straight and slightly tapering, rounded at the ends and terminate in a very slender, acutely pointed, slightly recurved claw, nearly as long as the toe itself.

Total length 115$\mu$; length of dorsal plate 80$\mu$, of ventral plate 86$\mu$; width of dorsal plate 42$\mu$, of ventral plate 48$\mu$; width of anterior margin 40$\mu$; length of toes without claw 16$\mu$; claw 12$\mu$.

*Lecane inermis* is common everywhere in wet sphagnum. It is the best known representative of a peculiar group within the genus of virtually illoricate species, composed of *L. inermis, L. clara, L. rhacois, L. agilis, L. palinacis* and *L. calcaria.* Their similarity may, however, be a result of simple convergence rather than an indication of any actual relationship.

**LECANE PALINACIS Harring and Myers, new species**

Plate XXXII, figures 3, 4.

The integument is very flexible and shows no trace of a true lorica. The animal contracts very readily and the body assumes an almost spherical form without indictions of either a dorsal or ventral plate. The posterior segment is, however, distinctly separated from the body, short and very broad; at its external angles are two prominent, curved, acute spines, probably repre-

senting rudimentary coxal plates. The first foot joint is elongate and somewhat pyriform, lobate posteriorly; the second joint is very large, broadly elliptic anteriorly and sharply indented immediately in front of the toes, projecting beyond the posterior segment nearly two thirds of its length. The toes are fairly long and stout, about one fourth of the total length, straight and very slightly tapering; they terminate in a small, acute, slightly outcurved claw.

Total length, extended 120$\mu$, contracted 75$\mu$; length of body, contracted 60$\mu$; width 47$\mu$; coxal spines 4$\mu$; length of toes without claw 14$\mu$; claw 4$\mu$.

*Lecane palinacis* is fairly common in wet sphagnum in various localities around Washington, District of Columbia, and also in moss forwarded from Massachusetts by Mrs. A. C. Clarke, of the Quekett Microscopical Club.

**LECANE CALCARIA Harring and Myers, new species**

Plate XXXIII, figures 3, 4.

The integument is very flexible and shows but slight traces of a lorica, but the form is fairly constant; the outline is very broadly reversed-ovate. The anterior margin is approximately straight; no anterior spines are present and the lorica is widely open in front when fully contracted. The posterior segment is limited anteriorly by a distinct fold indicating the posterior end of a dorsal plate; the segment is nearly semicircular and projects far beyond the dorsal fold. No lateral sulci are present. The coxal plates are very firm, extremely large, curved and pointed posteriorly and project considerably beyond the posterior segment. The first foot joint is elongate, rather narrow and somewhat indistinct, the second joint very large and broadly ovate, projecting about one third of its length belond the body. The toes are fairly long and very stout, about one fourth of the total length, strongly outcurved, broad at the base and taper rapidly to very acute points.

Total length 65$\mu$; length of body 50$\mu$, width 41$\mu$; width of anterior margin 42$\mu$; toes 15$\mu$.

*Lecane calcaria* was collected in large numbers in a swamp at Oceanville, near Atlantic City, New Jersey, some four years ago; it has not occurred elsewhere.

**LECANE NIOTHIS Harring and Myers, new species**

**Plate XXXIII, figures 5, 6.**

The outline of the lorica is broadly ovate and somewhat irregular. The integument is quite flexible and the anterior margins variable, but usually strongly convex and coincident. The dorsal plate is subcircular and rounded posteriorly; the facetting is rather faint, but the pattern is quite constant and somewhat unusual. The ventral plate is of the same width and length as the dorsal; its surface markings also differ slightly from the normal pattern. The lateral sulci are indistinct. The posterior segment is short, broad and rounded; it projects slightly beyond the dorsal plate. The coxal plates are very small, rounded and indistinct. The first foot joint is indistinct and ovate, the second large and broadly pyriform. The toes are fairly long and stout, slightly less than one third of the total length, parallel-sided at the base and taper gradually to acute points without any claw.

Total length 70$\mu$; length of lorica 50$\mu$, width 48$\mu$; length of toes 20$\mu$.

*Lecane niothis* was collected among the leaves of a species of sphagnum growing on the bottom of some shallow, artificial ponds at Manset, on Mount Desert Island, Maine; it has not been found elsewhere. It is one of the very small, soft-bodied Lecanes, but readily recognized by the well marked lorica.

**LECANE AGILIS (Bryce)**

**Plate XXXII, figures 1, 2.**

*Distyla agilis* BRYCE, Science Gossip, vol. 28, 1892, p. 273, text figures.

*Lecane agilis* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 60.

The lorica is very soft and flexible and therefore somewhat indefinite in outline; the more usual form is a moderately elongate oval, squarly truncate anteriorly. The lateral edges of the dorsal plate are ill-defined and wavy, the anterior margin straight. The ventral plate is slightly wider than the dorsal and its straight anterior margin projects somewhat beyond the anterior margin of the dorsal plate. Both plates are marked with very faint, irregular ridges in a definite pattern. The posterior segment projects slightly beyond the dorsal plate; the indistinct coxal plates are rounded at the posterior angles. The

first foot joint is very obscure, the second small and pyriform. The toes are very short and blade-shaped with acute, outcurved points; they appear to be fused anteriorly for nearly half of their length.

Total length 55$\mu$; length of dorsal plate 38$\mu$, of ventral plate 45$\mu$; width of dorsal plate 25$\mu$, of ventral plate 30$\mu$; width of anterior dorsal margin 14$\mu$, ventral margin 20$\mu$; toes 12$\mu$.

*Lecane agilis* seems to be found only in wet sphagnum; it appears to be rare, but this may be on account of its minute size and excessive transparency. It moves about among the debris with a peculiar jerky motion, but never swims.

### Genus MONOSTYLA Ehrenberg

Euchlanid rotifers with illoricate, retractile head and loricate body, strongly compressed dorso-ventrally and oval or ovate in outline; dorsal and ventral plates connected by a flexible membrane, forming lateral and posterior sulci; foot with two extremely short, rudimentary joints, of which only the posterior is movable; toe single; corona of family type; mastax modified malleate, with a piston attached to its ventral wall; eyespot single and at the posterior end of ganglion; retrocerebral sac usually present, but no subcerebral glands.

*Type of the genus.—Monostyla cornuta* (Müller)=*Trichoda cornuta* Müller.

The following species have not been studied. We may say that the specimen from which Murray described his *Monostyla cochlearis* was sent to us by the late Mr. Rousselet; it was in such poor condition that we consider it a very doubtful species.

*Monostyla amazonica* MURRAY, Journ. Royal Micr. Soc., 1913, p. 354, pl. 15, fig. 34.

*Monostyla asymmetrica* MURRAY, Journ. Royal Micr. Soc., 1913, p. 361, pl. 15, fig. 44.

*Monostyla cochlearis*, MURRAY, Journ. Royal Micr. Soc., 1913, p. 361, pl. 15, fig. 45.

*Monostyla cornuta anglica* BRYCE, Journ. Quekett Micr. Club, ser. 2, vol. 15, 1924, p. 98.

*Monostyla dentiserratus* MOLA, Zool. Anz., vol. 42, 1913, p. 122, figs. 16, 17; Ann. Biol. Lac., vol. 6, 1913, p. 265.

*Monostyla falcata* MURRAY, Journ. Royal Micr. Soc., 1913, p. 558, pl. 22, fig. 9.

*Monostyla lordii* GOSSE, in Hudson and Gosse, Rotifera, 1886, vol. 2, p. 99, pl. 25, fig. 5.

*Monostyla lunaris aperta* STEINECKE, Schriften Phys.-ökon. Ges. Königsberg i. P., vol. 57, 1916, p. 96, figs. 2c, 2e; vol. 64, 1924, p. 41.

*Monostyla macrognatha* SCHMARDA, Neue wirbellose Thiere, 1859, vol. 1, p. 59, pl. 14, fig. 134.

*Monostyla öophthalma* SCHMARDA, Neue wirbellose Thiere, 1859, vol. 1. p. 59, pl. 14, fig. 126.

*Monostyla ovalis* JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 34, pl. 1, fig. 11.

*Monostyla ovata* FORBES, Bull. U. S. Fish Comm., vol. 11 (for 1891), 1893, p. 256.

*Monostyla paradoxa* STEINECKE.

*Monostyla lunaris paradoxa* STEINECKE, Schriften Phys.-ökon. Ges Königsberg i. P., vol. 57, 1916, p. 97, fig. 3.

*Monostyla paradoxa* STEINECKE, Schriften Phys.-ökon. Ges Königsberg i. P., vol. 64, 1924, p. 41.

*Monostyla tentaculata* COSMOVICI, Naturaliste (Paris), vol. 14, 1892, p. 70; Anal. Acad. Romana, ser. 2, vol. 28, 1906, p. 44, fig. 29; not a *Monostyla.*

*Monostyla testudinea* MOLA, Zool. Anz., vol. 42, 1913, p. 120, fig. 13; Ann. Biol. Lac., vol 6, 1913, p. 263.

*Monostyla unguitata* FADEEV, Trudy Kharkovsk. Obshch. Isp. Prir., vol. 50, pt. 1, 1925, p. 9, pl. 1, fig. 7.

*Monostyla ungulata* MOLA, Zool. Anz., vol. 42, 1913, p. 122, figs. 14, 15; Ann. Biol. Lac., vol. 6, 1913, p. 264.

### MONOSTYLA LUNARIS (Ehrenberg)

Plate XXXV, figures 1–6.

*Lepadella lunaris* EHRENBERG, Abh. Akad. Wiss. Berlin (for 1831), 1832, p. 127.

*Monostyla lunaris* EHRENBERG, Infusionsthierchen, 1838, p. 460, pl. 57, fig. 6.—DUJARDIN, Hist. Nat. Zooph., Inf., 1841, p. 635.—DADAY, Természz. Füzetek, vol. 9, 1885, p. 127; vol. 19, 1892, p. 28; Math. Természz. Ertes., vol. 12, 1893, p. 19; Zoologica, pt. 44, 1905, p. 113; pt. 59, 1910, p. 85.—HUDSON and GOSSE, Rotifera, 1886, vol. 2, p. 98, pl. 25, fig. 2.—LEVANDER, Acta Soc. Fauna et Flora Fennica, vol. 12, No. 3, 1895, p. 50, pl. 3, fig. 32.—SKORIKOV, Trav. Soc. Nat. Kharkow, vol. 30, 1896, p. 321.—JENNINGS, Bull. Michigan Fish Comm., No. 3, 1896, p. 93; Bull. U. S. Fish Comm., vol. 19 (for 1899), 1900, p. 92, pl. 21, fig. 41.—HEMPEL, Bull. Illinois State Lab. Nat. Hist., vol. 5, 1898, p. 375—VOIGT, Forschungsber. Biol. Stat. Plön, vol. 11, 1904, p. 72.—VORONKOV, Trudy Gidr. Stants. Glubokom Oz., vol. 2, 1907, pp. 110, 205, 284.—KOFOID, Bull. Illinois State Lab. Nat. Hist., vol. 8, No. 1, 1908, p. 201.—MEISSNER, Izv. Turkestansk. Otd. Imp. Russk. Geogr. Obshch., vol. 4, pt. 8, 1908, p. 22.—SCHLENKER, Mitt. Gool. Abt. Württemberg. Stat. Landesamt, No. 5, 1908, p. 249.—RUNNSTROM, Zool. Anz., vol. 34, 1909, p. 271.—VON HOFSTEN, Arkiv Zool., Stockholm, vol. 6, No. 1, 1909, p. 59; Naturw. Unters. Sarekgeb.,

vol. 4, 1923, p. 861.—LIE-PETTERSEN, Bergens Mus. Aarbog (for 1909), 1910, No. 15, p. 66.—LUCKS, Rotatorienfauna Westpreussens, 1912, p. 112.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 179, fig. 355.—MOLA, Ann. Biol. Lac., vol. 6, 1913, p. 263.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 353, pl. 15, fig. 31.—KOZAR, Zool. Anz., vol. 44, 1914, p. 420.—MONTET, Rev. Suisse Zool., vol. 23, 1915, p. 335.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 34, pl. 1, fig. 12; Kosmos (Lwów), 1918–1919, p. 28.—REZVOI, Trudy Borodinsk. Biol. Stants. Imp. Petrogradsk. Obshch. Estestvoisp., vol. 4, 1916, p. 181.—STEINECKE, Schriften Phys.-ökon. Ges. Königsberg i. P., vol. 57, 1916, p. 89, fig. 2; vol. 64, 1924, p. 41.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 193.—OLOFSSON, Zool. Bidr. Uppsala, vol. 6, 1918, p. 594, fig. 54.—HARRING, Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 10.—BRYCE, Journ. Quekett Micr. Club, ser. 2, vol. 14, 1922, p. 313.—IDELSON, Trudy Plovuch. Morsk. Nauchn. Inst., Moskva, pt. 12, 1925, p. 90.

*Monostyla quennerstedti* BERGENDAL, Acta Univ. Lundensis, vol. 28, 1892, sect. 2, No. 4, p. 118, pl. 6, fig. 39.

*Monostyla constricta* MURRAY, Journ. Royal Micr. Soc. 1913, p. 557, pl. 22, fig. 10.

*Monostyla virga* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 546, pl. 24, figs. 1–3.—FADEEV, Russk. Gidr. Zhurn., vol. 3, No. 3–5, 1924, p. 6, fig. 1.—OPARINA-KHARITONOVA, Izv, Biol. Nauchno-Issl. Inst. Permsk. Univ., vol. 3, 1925, p. 440.

The outline of the lorica is broadly ovate; its width is about two thirds of the length. The anterior margin of the dorsal plate is narrow and has a V-shaped sinus, broadly rounded at the posterior angle; the ventral margin is wide and the sinus deep, occasionally with minute, lateral cusps opposite the anterior points of the dorsal plate. The dorsal plate is very broadly ovate and rounded posteriorly. The ventral plate is somewhat narrower than the dorsal and broadly oval. The surface markings consist of a transverse dorsal fold at the base of the anterior sinus and a transverse ventral fold a short distance in front of the foot. The lateral sulci are fairly deep. The posterior segment is large and rounded; it projects considerably beyond the dorsal plate. The coxal plates are rather small and obtusely pointed posteriorly. The first foot joint is short, parallel-sided and somewhat indistinct, the second joint subsquare and robust. The toe is very long and slender, more than one third of the total length, straight and parallel-sided; it has two faint annular constructions, dividing it into three nearly equal sections. The claw is long, slender and acutely pointed; at the base are two minute spicules.

Total length 165$\mu$; length of dorsal plate 100$\mu$, of ventral plate 118$\mu$; width of dorsal plate 86$\mu$, of ventral plate 80$\mu$; width of anterior dorsal margin 30$\mu$, ventral margin 43$\mu$; toe without claw 58$\mu$; claw 8$\mu$.

*Monostyla* lunaris is abundant in weedy ponds all over the world. The outline of the anterior margin varies considerably according to the degree of contraction; the form of figures 1 and 2 is what may be expected in collections preserved in alcoholic mixtures and should be considered fully contracted. Figures 3 and 4 represent the normal form, with a shallower anterior sinus and broader anterior margin. At English Creek and in a cranberry bog near Egg Harbor, New Jersey, occurs a peculiar variety, shown in figures 5 and 6; the lorica is much broader than in the normal form and the posterior segment is angular and squarely truncate; the claw has a distinct median line, but is not actually double.

*Monostyla virga* Harring, described from the Isthmus of Panama, appears to be a form of *M. lunaris*, the differences noted being probably due to the preservative used.

### MONOSTYLA CRENATA Harring

Plate XXXVI, figures 5, 6.

*Monostyla crenata* HARRING, Proc U. S. Nat. Mus., vol. 46, 1913, p. 399, pl. 36, figs. 4–6.

The outline of the lorica is broadly ovate; its width is about two thirds of the length. The anterior dorsal margin is very slightly concave; the ventral plate has a deep anterior sinus, rounded at the bottom and with curved, convex sides. The dorsal plate is broadly ovate and slightly truncate posteriorly. The ventral plate is broadly oval and somewhat narrower than the dorsal plate. The surface markings are limited to a transverse ventral fold a short distance in front of the foot. The lateral sulci are deep. The posterior segment is small and rounded; it projects slightly beyond the dorsal plate. The coxal plates are rather small and obtusely pointed; they do not reach beyond the first foot joint. This is oval; the second joint is robust and somewhat elongate reniform. The toe is extremely long and slender, a little less than half the total length, straight and parallel-sided, terminating in a short claw with two minute basal spicules.

Total length 200$\mu$; length of dorsal plate 108$\mu$, of ventral plate

116$\mu$; width of dorsal plate 92$\mu$, of ventral plate 82$\mu$; width of anterior dorsal margin 38$\mu$, of ventral margin 42$\mu$; toe without claw 84$\mu$; claw 8$\mu$.

*Monostyla crenata* is widely distributed in weedy ponds; we have collected it around Washington, District of Columbia; Polk County, Florida; at Atlantic City, New Jersey; in Oneida and Vilas Counties, Wisconsin, and on Mount Desert Island, Maine; it was common in collections made by Dr. Birge during the Great Lakes Biological Investigations in 1899, and by Dr. Birge and Mr. Juday in Texas, Arkansas, Mississippi and Louisiana in 1903. James Murray found it at Sydney, Australia, and in New Zealand.

### MONOSTYLA ACUS Harring

Plate XXXVI, figures 3, 4.

*Monostyla acus* HARRING, Proc. U. S. Nat. Mus., vol. 46, 1913, p. 398, pl. 36, figs. 1–3.—HAUER, Zool. Anz., vol. 61, 1924, p. 147.

? *Monostyla lunaris obserata* STEINECKE, Schriften Phys.-ökon. Ges. Königsberg i. P., vol. 57, 1916, p. 97, fig. 2, e, f; vol. 64, 1924, p. 41.

The outline of the lorica is broadly ovate; its width is more than four fifths of the length. The anterior margins of the dorsal and ventral plates are identical in outline, with a shallow, broadly V-shaped sinus; the ventral margin projects very slightly beyond the dorsal. No anterior spines are present. The dorsal plate is broadly oval and truncate posteriorly. The ventral plate is somewhat narrower than the dorsal and oval in outline; there is a transverse ventral fold in front of the foot. The lateral sulci are deep. The posterior segment is truncate and very large, projecting its entire length beyond the dorsal plate. The coxal plates are small and rounded. The first foot joint is parallel-sided and rounded anteriorly; the second joint is large and slightly angular. The toe is extremely long and slender, nearly half the entire length, parallel-sided and straight, with three internal annular constructions, equally spaced from the foot; the claw is long and slender and has two minute, basal spicules

Total length 180$\mu$; length of dorsal plate 85$\mu$, of ventral plate 100$\mu$; width of dorsal plate 82$\mu$, of ventral plate 72$\mu$; width of anterior dorsal margin 40$\mu$, of ventral margin 44$\mu$; length of toe without claw 70$\mu$; claw 10$\mu$.

*Monostyla acus* is common in wet sphagnum in the United States wherever we have made collections. Hauer reports it as common in the Schwarzwald.

### MONOSTYLA BULLA Gosse

Plate XXXVII, figures 1, 2.

*Monostyla bulla* GOSSE, Ann. Mag. Nat. Hist., ser. 2, vol. 8, 1851, p. 200.—HUDSON and GOSSE, Rotifera, 1886, vol. 2, p. 99, pl. 25, fig. 4.—TERNETZ, Rotat. Umg. Basels, 1892, p. 17.—WIERZEJSKI, Rozpr. Akad. Umiej., Wydz. Mat.-Przyr., Krakow, ser. 2, vol. 6, 1893, p. 243.—SKORIKOV, Trav. Soc. Nat. Kharkow, vol. 30, 1896, p. 321.—HEMPEL, Bull. Illinois State Lab. Nat. Hist., vol. 5, 1898, p. 375.—STENROOS, Acta Soc. Fauna et Flora Fennica, vol. 17, No. 1, 1898, p. 163, pl. 3, fig. 9.—JENNINGS, Bull. U. S. Fish Comm., vol. 19 (for 1899), 1900, p. 93, pl. 21, figs. 37–39.—DADAY, Zoologica, pt. 44, 1905, p. 112; pt. 59, 1910, p. 84.—VORONKOV, Trudy Gidr. Stants. Glubokom Oz., vol. 2, 1907, pp. 110, 205, 284.—KOFOID, Bull. Illinois State Lab. Nat. Hist., vol. 8, No. 1, 1908, p. 201.—MEISSNER, Izv. Turkestansk. Otd. Imp. Russk. Geogr. Obshch. vol. 4, No. 8, 1908, p. 22.—SCHLENKER, Mitt. Geol. Abt. Württemberg. Stat. Landesamt, No. 5, 1908, p. 249.—DE BEAUCHAMP, Arch Zool. Expér., ser. 4, vol. 10, 1909, p. 161.—RUNNSTROM, Zool. Anz., vol. 34, 1909, p. 271.—VON HOFSTEN, Arkiv. Zool., Stockholm, vol. 6, No. 1, 1909, p. 61; Naturw. Unters. Sarekgeb., vol. 4, 1923, p. 861.—LIE-PETTERSEN, Bergens Mus. Aarbog (for 1909), 1910, No. 15, p. 67.—LUCKS, Rotatorienfauna Westpreussens, 1912, p. 112.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 179, fig. 356.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 353, pl. 15, fig. 33.—MOLA, Ann. Biol. Lac., vol. 6, 1913, p. 262.—KOZAR, Zool. Anz., vol. 44, 1914, p. 420.—HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 547; Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 10.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 32; Kosmos (Lwów), 1918–1919, p. 28.—REZVOI, Trudy Borodinsk. Biol. Stants. Imp. Petrogradsk. Obshch. Estestvoisp., vol. 4, 1916, p. 181.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 194.—BRYCE, Journ. Quekett Micr. Club, ser. 2, vol. 15, 1924, p. 98.

*Monostyla lunaris* PERTY, Zur Kenntn. kleinst. Lebensf., 1852, p. 41, pl. 1, fig. 4.—ECKSTEIN, Zeitschr. Wiss. Zool., vol. 39, 1883, p. 381, pl. 27, figs. 47–49.—BLOCHMANN, Mikr. Tierw. Süssw., 1886, p. 107, pl. 7, fig. 241.—WEBER, Rev. Suisse Zool., vol. 5, 1898, p. 608, pl. 22, figs. 12, 13. Not *Monostyla lunaris* EHRENBERG.

*Monostyla bipes* STOKES, Ann. Mag. Nat. Hist., ser. 6, vol. 18, 1896, p. 23, pl. 8, figs. 11–13.

*Monostyla incisa* DADAY, Math. Termész. Ertes., vol. 15, 1897, p. 137, fig. 5; Termész. Füzetek, vol. 24, 1901, p. 22, fig. 5.

The outline of the very firm lorica is somewhat elongate ovate; its width is about three fifths of the length. The anterior dorsal margin has a shallow, V-shaped anterior sinus with a large, median notch for the protrusion of the dorsal antenna. The ventral margin has a very deep anterior sinus, rounded at the posterior end and with a very slight cusp near the front. The dorsal plate is slightly elongate ovate and rounded posteriously; the ventral plate is virtually identical in outline and of the same width. Surface markings are limited to a transverse, ventral fold in front of the foot. The lateral sulci are deep. The posterior segment is small and rounded; it projects slightly beyond the dorsal plate. The coxal plates are very small and rounded posteriorly. The first foot joint is short, broad and somewhat indistinct, the second joint large and somewhat triangular, narrowed posteriorly. The toe is very long and slender, about one third of the total length, slightly enlarged in the middle, and ends in a long, slender, acute claw with distinct basal spicules. The claw has a distinct median line, but is not divided.

Total length 170$\mu$; length of dorsal plate 112$\mu$, of ventral plate 118$\mu$; width of lorica 76$\mu$; width of anterior margin 36$\mu$; length of toe without claw 46$\mu$; claw 12$\mu$.

*Monostyla bulla* is abundant everywhere in weedy ponds all over the world. The form of the anterior margin is somewhat dependent on the degree of contraction of the lorica.

**MONOSTYLA STYRAX Harring and Myers, new species**

Plate XXXVII, figures 3, 4.

The lorica is very firm and its outline broadly ovate; its width is about three fourths of the length. The anterior margin is narrow and has a wide, median, elliptic notch for the protrusion of the dorsal antenna. The ventral margin has a deep, straight-sided anterior sinus, rounded postriorly. The dorsal plate is broadly ovate and rounded posteriorly; the ventral plate is nearly identical in outline and of the same width. No surface markings are present except a ventral, transverse fold in front of the foot. The lateral sulci are very deep. The posterior segment is very short and rounded; it projects very slightly beyond the dorsal plate. The coxal plates are very small and obtusely pointed posteriorly. The first foot joint is very short, broad and somewhat indistinct, the second joint large and slightly hexa-

gonal. The toe is very long and slender, more than one third of the total length, and is narrowed at one third of its length; from this point it increases slightly in width and finally tapers to a blunt, obscurely wrinkled point. The claw is extremely long, slender and acutely pointed.

Total length 200$\mu$; length of dorsal plate 124$\mu$, of ventral plate 128$\mu$; width of lorica 90$\mu$; width of anterior margin 32$\mu$; length of toe without claw 52$\mu$; claw 24$\mu$.

*Monostyla styrax* is not rare in soft water ponds; we have collected it in Oneida and Vilas counties, Wisconsin, on Mount Desert Island, Maine, and at Atlantic City, New Jersey. It is related to *M. bulla,* but differs considerably in the form of the anterior margin, the foot and the toe; the long, needle-like claw is without a parallel in the genus.

**MONOSTYLA GONIATA Harring and Myers, new species.**

Plate XXXVII, figures 5, 6.

The outline of the lorica is very broadly ovate and somewhat angular; its width is about four fifths of the length. The anterior dorsal margin has a very shallow, V-shaped sinus with a broad, nearly semicircular excision for the dorsal antenna; the ventral sinus is very deep, narrow and rounded posteriorly with a minute cusp near the front. The dorsal plate is very broadly ovate-angular and sharply pointed posteriorly. The ventral plate is of approximately the same width and outline as the dorsal plate, but distinctly narrowed in front of the foot. No surface markings are present. The lateral sulci are fairly deep, but not visible in either the dorsal or ventral view. The posterior segment is rather small, somewhat angular and slightly concave terminally. The coxal plates are small and obtusely rounded. The first foot joint is short, very broad and somewhat indistinct, the second joint large and roughly trapezoidal, projecting slightly beyond the lorica. The toe is very long, about one third of the total length, stout and spindle-shaped; it is distinctly enlarged near mid-length and terminates in a very acute, conical point resembling a claw and having a median line, which does not indicate a division, but possibly the opening of the mucus duct.

Total length 200$\mu$; length of lorica 145$\mu$; width of lorica 115$\mu$; width of anterior margin 40$\mu$; length of toe 65$\mu$.

*Monostyla goniata* has been collected in large numbers in a shallow pond at Eagle River, Vilas County, Wisconsin, and in a cranberry bog at English Creek, near Atlantic City, New Jersey. It is closely related to *M. bulla,* but differs in so many details that it seems advisable to list it as a distinct species.

### MONOSTYLA QUADRIDENTATA, Ehrenberg

Plate XXXVIII, figures 3–5.

*Monostyla quadridentata* EHRENBERG, Abh. Akad. Wiss. Berlin (for 1831), 1832, p. 130; Infusionsthierchen, 1838, p. 459, pl. 57, fig. 5.—DUJARDIN, Hist. Nat. Zooph., Inf., 1841, p. 635.—BARTSCH, Jahresh. Naturk. Württemberg, vol. 26, 1870, p. 358; Rotat. Hungariae, 1877, p. 47.—EYFERTH, Einf. Lebensformen, 1878, p. 88; ed. 2, 1885, p. 113.—HUDSON and GOSSE, Rotifera, 1886, vol. 2, p. 100, pl. 25, fig. 3.—ANDERSON, Journ. Asiatic Soc. Bengal, vol. 58, pt. 2, 1889, p. 355.—TERNETZ, Rotat. Umg. Basels, 1892, p. 18.—WIERZEJSKI, Rozpr. Akad. Umiej., Wydz. Mat.-Pryzyr., Krakow, ser. 2, vol. 6, 1893, p. 243.—GLASSCOTT, Proc. Royal Dublin Soc., new ser., vol. 8, 1893, p. 73.—KERTESZ, Budapest Rotat. Faun., 1894, p. 40.—SKORIKOV, Trav. Soc. Nat. Kharkow, vol. 30, 1896, p. 322.—HEMPEL, Bull. Illinois State Lab. Nat. Hist., vol. 5, 1898, p. 376.—JENNINGS, Bull. U. S. Fish Comm., vol. 19 (for 1899), 1900, p. 92, pl. 21, fig. 40.—DADAY, Zoologica, pt. 44, 1905, p. 113; pt. 59, 1910, p. 85.—VORONKOV, Trudy Gidr. Stants. Glubokom Oz., vol. 2, 1907, p. 110.—KOFOID, Bull. Illinois State Lab. Nat. Hist., vol. 8, No. 1, 1908, p. 201.—MEISSNER, Izv. Turkestansk. Otd. Imp. Russk. Geogr. Obshch., vol. 4, pt. 8, 1908, p. 21.—LUCKS, Rotatorienfauna Westpreussens, 1912, p. 111.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 181, fig. 358.—MOLA, Ann. Biol. Lac., vol. 6, 1913, p. 264.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 354, pl. 15, fig. 34.—HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 547.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 35; Kosmos (Lwów), 1918–1919, p. 28.—REZVOI, Trudy Borodinsk. Biol. Stants. Imp. Petrogradsk. Obshch. Estestvoisp., vol. 4, 1916, p. 181.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 195.—BRYCE, Journ. Quekett Micr. Club, ser. 2, vol. 15, 1924, p. 99.

*Lepadella cornuta* SCHMARDA, Neue wirbellose Thiere, 1859, vol. 1, p. 58, pl. 14, fig. 122; not *Lepadella cornuta* (MULLER) of Bory de St. Vincent, 1826.

*Metopidia cornuta* HUDSON and GOSSE, Rotifera, Suppl., 1889, p. 47, pl. 34, fig. 3.

*Monostyla bicornis* DADAY, Math. Termész. Ertes., vol. 15, 1897, p. 139, text fig ; Termész. Füzetek, vol. 24, 1901, p. 23, fig. 6.

The outline of the lorica is very broadly ovate; its width is about three fourths of the total length. The anterior margin is relatively narrow; the dorsal plate has a very deep and narrow,

pyriform median sinus for the protrusion of the dorsal antenna; the sinus is flanked by two stout, outcurved and decurved spines. The ventral plate has a deep, sharply pointed V-shaped sinus, its sides very slightly convex near the front; two minute frontal spines are present. The dorsal plate is very broadly ovate, slightly truncate posteriorly; the anterior margin is but one-half of the greatest width. The ventral plate is of approximately the same outline as the dorsal and somewhat narrower. Surface markings are limited to two divergent dorsal folds or ribs, originating on the anterior spines, and a ventral transverse fold in front of the foot. The posterior segment is small and rounded; it is not covered by the dorsal plate. The lateral sulci are deep. The coxal plates are small and obtusely rounded posteriorly. The first foot joint is elongate oval and rather narrow, the second joint elongate, narrow and subcylindric. The toe is very long, about one third of the total length, slender, parallel-sided and has a faint annular constriction near the posterior end; the claw has two small basal spicules and is very long, slender and acutely pointed.

Total length 225$\mu$; length of dorsal plate 130$\mu$, of ventral plate 142$\mu$; width of dorsal plate 96$\mu$, of ventral plate 110$\mu$; width of anterior dorsal margin 30$\mu$, of ventral margin 50$\mu$; length of toe without claw 52$\mu$; claw 16$\mu$.

*Monostyla quadridentata* is one of the commonest rotifers in weedy ponds in the United States and is apparently widely distributed on other continents; according to Bryce it is, strangely enough, rare in Great Britain.

The male is shown in figure 5; we believe this is the only male *Monostyla* known or identified. Unfortunately there is very little to add to the figure; the lorica is fairly rigid and so deeply colored with the characteristic yellowish-brown tint so conspicuous in the female that it is impossible to make out the internal anatomy. Its length is 100$\mu$; toe 23$\mu$.

### MONOSTYLA LAMELLATA Daday

Plate XXXIX, figures 5, 6.

*Monostyla lamellata* DADAY, Math. Termész. Ertes., vol. 12, 1893, p. 40, pl. 2, figs. 1, 2; Math. Naturw. Ber. Ungarn, vol. 11, 1894, p. 319, pl. 24, figs. 1, 2.—ROUSSELET, Zool. Anz., vol. 21, 1898, p. 595.—ZERNOV, Izv. Turkestansk. Otd. Imp. Russk. Geogr. Obshch., vol. 4, pt. 3, 1903, p. 9, pl. 1, fig. 34.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 458, pl. 19, fig. 1.—BRYCE, Journ. Quekett Micr.

Club, ser. 2, vol. 15, 1924, p. 98.—FADEEV, Raboti Sev.-Kavkazhsk. Gidrobiol. Stants., vol. 1, pt. 1, 1925, p. 23, pl. 5, fig. 3.

*Monostyla appendiculata* SKORIKOV, Zool. Anz., vol. 21, 1898, p. 556, text fig.

The outline of the lorica is broadly ovate; its width is about three fourths of the length. The anterior dorsal margin has a moderately deep sinus with sinuate sides and rounded posteriorly; the ventral sinus is lunate and slightly deeper than the dorsal sinus. At the external angles are two very large, acutely triangular spines or cusps. The dorsal plate is broadly ovate and rounded posteriorly. The ventral plate is very slightly narrower than the dorsal and the outline nearly identical; it is marked with a distinct transverse ventral fold in front of the foot. The lateral sulci are fairly deep and terminate at a considerable distance from the anterior spines, nearly at the level of the anterior sinus. The posterior segment is short, rounded posteriorly and produced laterally as two acute, triangular cusps; it projects in its entire length beyond the dorsal plate. The coxal plates are large and obtusely pointed posteriorly. The first foot joint is small and parallel-sided, the second joint small and rounded. The toe is long and stout, more than one fourth of the entire length, slightly enlarged beyond mid-length; it terminates in a large, acute claw with basal spicules and a median mucus groove.

Total length 260$\mu$; length of dorsal plate 168$\mu$, of ventral plate 190$\mu$; width of dorsal plate 128$\mu$, of ventral plate 120$\mu$; width of anterior spines 72$\mu$; width of posterior segment 70$\mu$; length of toe without claw 58$\mu$; claw 17$\mu$.

*Monostyla lamellata* was described by Daday from a slightly alkaline lake in the Hungarian Alföld at Halas, in the county Pest-Pilis-Solt-Kiskun between the Danube and the Theiss, Skorikov found it in "salt" lakes near Kharkov, Russia. Bryce records this species from Devils Lake, North Dakota, and we have found it in collections made by Mr. Juday in alkaline waters at San Cristóbal, near Mexico City. As far as now known, it is confined to alkaline waters and has never been found in strictly fresh water.

**MONOSTYLA THALERA Harring and Myers, new species**

**Plate XXXIX, figures 3, 4.**

The outline of the lorica is broadly oval; its width is about three fourths of the length. The anterior dorsal margin is con-

cave and sinuate; the ventral margin has a moderately deep, V-shaped sinus, slightly rounded at the apex. At the external angles are two small anterior spines. The dorsal plate is subrhomboid and rounded posteriorly; the ventral plate is of approximately the same outline and a little narrower than the dorsal plate; it is marked with a transverse fold in front of the foot. The lateral sulci are fairly deep and do not quite reach the anterior margin. The posterior segment is large and somewhat angular, truncate posteriorly, and projects considerably beyond the dorsal plate. The coxal plates are large and obtusely pointed posteriorly. The first foot joint is elongate ovate, the second joint very large and somewhat prismatic. The toe is long and stout, a little less than one third of the total length, spindle-shaped and enlarged near the middle; the claw is long, stout and acutely pointed and has small, basal spicules and a median mucus groove.

Total length 240$\mu$; length of dorsal plate 150$\mu$, of ventral plate 160$\mu$; width of dorsal plate 128$\mu$, of ventral plate 115$\mu$; width of anterior dorsal margin 60$\mu$, of ventral margin 75$\mu$; length of toe without claw 58$\mu$; claw 18$\mu$.

*Monostyla thalera* was first found in material collected by Mr. Juday in alkaline ditches draining into the large, very shallow Lago de San Cristóbal, near Mexico City. It was abundant in collections made by Dr. W. E. Allen in sloughs of the San Joaquin River, at Stockton, California; here the water is probably slightly brackish, rather than alkaline, as there is a tide of 3 feet and the gradient of the river is very slight between Stockton and the Bay of San Francisco. This is probably the species listed by Bryce as *Monostyla lamellata var.* from Devils Lake, South Dakota. Although there is, perhaps, a certain superficial similiarity between these two forms, they differ so much in detail that there can be no doubt of their being specifically distinct, even though they are the two largest species of the genus and sometimes occur together.

**MONOSTYLA STENROOSI Meissner**

Plate XXXIX, figures 1, 2.

*Monostyla bicornis* STENROOS, Acta Soc. Fauna et Flora Fennica, vol. 17, No. 1, 1898, p. 164, pl. 2, fig. 26; not *Monostyla bicornis* DADAY, 1897.—? VORONKOV, Trudy Gidr. Stants. Glubokom Oz., vol. 2, 1907, p. 285, pl. 6, figs. 6–8.—MURRAY, Journ. Royal Micr.

Soc., 1913, p. 355, pl. 15, fig. 35.—SACHSE, Arch. Hydr., vol. 10, 1914, p. 71, fig. 11.

*Monostyla stenroosi* MEISSNER, Izv. Turkestansk. Otd. Imp. Russk. Geogr. Obshch., vol. 4, pt. 8, 1908, p. 22, pl. 1, fig. 8.—MYERS, Proc. U. S. Nat. Mus., vol. 52, 1917, p. 476.

The outline of the lorica is very broadly oval; its width is about five sixths of the length. The anterior dorsal margin is straight and narrow, the lateral sulci reducing its width somewhat. The ventral margin has a shallow, rounded sinus with strongly convex sides and externally two short, stout, incurved, hooklike frontal spines. The dorsal plate is oval and narrowed anteriorly. The ventral plate is very broadly oval and in its posterior half projects beyond the dorsal plate, both laterally and posteriorly. The surface markings consist of a transverse ventral fold in front of the foot and two pairs of short ridges directed outwards and backwards. The lateral sulci are deep, especially so in the anterior half, where they produce the peculiar indentation shown on the ventral plate and terminating rather abruptly, to reappear on the dorsal side; this accounts for the distinct angle at the edges of both plates. The posterior segment is very broad and rounded, its limits ill-defined. The coxal plates are large and semielliptic. The first foot joint is oval and somewhat indistinct, the second joint robust and rhomboid. The toe is long and stout, about one third of the total length, slightly tapering and very slightly enlarged near the middle; the claw is short, stout, acutely pointed and has two distinct basal spicules.

Total length 175$\mu$; length of dorsal plate 105$\mu$, of ventral plate 118$\mu$; width of lorica 96$\mu$; width of anterior dorsal margin, less exposed part of lateral sulci, 44$\mu$, of ventral margin over spines 38$\mu$; length of toe without claw 40$\mu$; claw 11$\mu$.

*Monostyla stenroosi* is not common; Stenroos found it in Finland, Voronkov in collections made on the Shat-el-Arab, Murray at Rio de Janeiro, Sachse at Trachenberg in Schlesien and Meissner on the shores of the Amu-Darja. We have collected it at Los Angeles, California, in small numbers; it was fairly common in material forwarded by Dr. N. Gist Gee from Soochow, in Kiang-su, China.

**MONOSTYLA CORNUTA (Müller).**

Plate XL, figures 5, 6.

*Trichoda cornuta* MULLER, Animalcula Infusoria, 1786, p. 208, pl. 30, figs. 1–3.

*Lepadella cornuta* BORY DE ST. VINCENT, Dict. Class. Hist. Nat., vol. 9, 1826, p. 285.—EHRENBERG, Isis (Oken), vol. 26, 1833, col. 246.

*Lepadella glumiformis* BORY DE ST. VINCENT, Encycl. Méth., Zooph. (pt. 2), 1827, p. 484 = *Trichoda cornuta* renamed.

*Notommata cornuta* EHRENBERG, Isis (Oken), vol. 23, 1830, col. 767.

*Monostyla cornuta* EHRENBERG, Abh. Akad. Wiss. Berlin, 1830, p. 46; ibid., 1831, p. 130; Infusionsthierchen, 1838, p. 459, pl. 57, fig. 4.—PERTY, Zur Kenntn. kleinst. Lebensf., 1852, p. 41.—BARTSCH, Jahresh. Naturk. Würtemberg, vol. 26, 1870, p. 358.—EYFERTH, Mikr. Süsswasserbew., 1877, p. 54; Einf. Lebensformen, 1878, p. 88, pl. 5, fig. 29; ibid., 1885, p. 113, pl. 7, fig. 29.—ECKSTEIN, Zeitschr. Wiss. Zool., vol. 39, 1883, p. 382, pl. 27, fig. 50.—BLOCHMANN, Mikr. Thierw. Süssw., 1886, p. 107.—HUDSON and GOSSE, Rotifera, 1886, vol. 2, p. 98, pl. 25, fig. 1.—BERGENDAL, Acta Univ. Lundensis, vol. 28, 1892, sect. 2, No. 4, p. 119.—TERNETZ, Rotat. Umg. Bassels, 1892, p. 17.—LEVANDER, Acta Soc. Fauna et Flora Fennica, vol. 12, No. 3, 1895, p. 51, pl. 3, fig. 32a.—HEMPEL, Bull. Illinois State Lab. Nat. Hist., vol. 5, 1898, p. 375.—JENNINGS, Bull. U. S. Fish Comm., vol. 19 (for 1899), 1900, p. 92, pl. 20, figs. 35, 36.—VORONKOV, Trudy Gidr. Stants. Glubokom Oz., vol. 2, 1907, pp. 110, 284.—SCHLENKER, Mitt. Geol. Abt. Württemberg. Stat. Landesamt, No. 5, 1908, p. 249.—VON HOFSTEN, Arkiv Zool., Stockholm, vol. 6, No. 1, 1909, p. 60.—RUNNSTRÖM, Zool. Anz., vol. 34, 1909, p. 271.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 178, figs. 352–354.—MOLA, Ann. Biol. Lac., vol. 6, 1913, p. 265.—KOZAR, Zool. Anz., vol. 44, 1914, p. 420.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 33; Kosmos (Lwów), 1918–1919, p. 28.—MONTET, Rev. Suisse Zool., vol. 23, 1915, p. 336.—REZVOI, Trudy Borodinsk, Biol. Stants. Imp. Petrogradsk. Obshch. Estestvoisp., vol. 4, 1916, p. 181.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 191.—OLOFSSON, Zool. Bidr. Uppsala, vol. 6, 1918, p. 594, fig. 55.—HARRING, Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 10.—BRYCE, Journ. Quekett Micr. Club, ser. 2, vol. 14, 1922, pp. 313, 314.

*Trichocerca cornuta* GRAVENHORST, Nova Acta Acad. Caes. Leop.-Carol. Nat. Cur., Bonn, vol. 16, 1832, p. 870.

*Dicerratella cornuta* DESHAYES and MILNE EDWARDS, in Lamarck, Hist. Nat. Anim. sans Vert., ed. 2, vol. 1, 1835, p. 431; not *Diceratella triangularis* BORY DE ST. VINCENT 1826 (= *Leucophra cornuta* MÜLLER renamed).

*Monostyla truncata* TURNER, Bull. Denison Univ., vol. 6, 1892, p. 62, pl. 1, fig. 11.

*Monostyla robusta* STOKES, Ann. Mag. Nat. Hist., ser. 6, vol. 18, 1896, p. 22, pl. 7, figs. 6–8.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 557 pl. 23, fig. 21.

*Monostyla rotundata* JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 34, pl. 1, fig. 6.

The lorica is almost circular or very slightly elliptic. The dorsal and ventral plates have a fairly deep, lunate anterior sinus. The dorsal plate is circular in outline and without any surface markings; the angles of the anterior sinus are somewhat obtuse and without spines; a curved fold, starting at the bottom of the dorsal sinus and joining the external edges some distance from the anterior points, is formed when the head is completely retracted. The ventral plate is as wide as the dorsal plate and nearly identical in outline, very slightly narrower in the posterior half. The lateral sulci are very deep. The posterior segment of the body is short, very broad and somewhat indistinct, projecting very little beyond the dorsal plate; the coxal plates are broad, bluntly pointed and not very prominent. The first foot joint is moderately large and rather obscure, the second reniform and well marked; in front of the foot is a well marked transverse fold, indicating the limits of the body proper and the foot. The toe is parallel-sided, about one fourth of the total length, and ends in a large claw with a median groove and two distinct basal spicules; in some specimens the claw appears to be double.

Total length 190$\mu$; length of dorsal plate 134$\mu$, of ventral plate 138$\mu$; width of lorica 132$\mu$; width of anterior sinus 65$\mu$, depth 13$\mu$; length of toe without claw 45$\mu$; claw 12$\mu$.

*Monostyla cornuta* is abundant in weedy ponds everywhere in the United States; there is very little reliable information on its occurrence elsewhere, as existing descriptions are unsatisfactory and somewhat contradictory. We have followed Jennings in accepting this form as the animal identified by Ehrenberg with Müller's description; it also agrees fairly well with the description and figures of Hudson and Gosse.

A diminutive form of this species is found in collections from the Isthmus of Panama, which measures: total length 120$\mu$; length of lorica 85$\mu$; length of toe without claw 23$\mu$, claw 9$\mu$. With the exception of its small size and the relatively much longer claw it agrees in other respects with the normal form, which is abundant on the Isthmus.

**MONOSTYLA SYLVATICA Harring**

**Plate XL, figures 3, 4.**

*Monostyla sylvatica* HARRING, Proc. U. S. Nat. Mus., vol. 46, 1913, p. 399, pl. 35, figs. 1–3.

The lorica is subcircular in outline; its width is equal to the length. The anterior margin of the dorsal plate is very narrow and concave; the ventral margin is much wider and has a shallow, V-shaped sinus with flaring sides; no anterior spines are present. The dorsal plate is subcircular and truncate posteriorly. The ventral plate is broadly oval and only four fifths of the width of the dorsal plate. A well marked transverse fold on the ventral plate, a short distance in front of the foot, is the only surface marking present. There are no lateral sulci in the contracted animals; the dorsal and ventral plates are joined by a virtually flat, unbroken membrane. The posterior segment is small and rounded; it projects but little beyond the posterior plate. The coxal plates are rather small and obtusely pointed. The first foot joint is somewhat indistinct, the second short, broad and reniform. The toe is very long and slender, about one third of the total length, parallel-sided and slightly decurved. The claw is short and acute; it has a distinct median line, but does not appear to be actually divided.

Total length 150$\mu$; length of dorsal plate 96$\mu$, of ventral plate 100$\mu$; width of dorsal plate 100$\mu$, of ventral plate 82$\mu$; width of anterior dorsal margin 32$\mu$, ventral margin 53$\mu$; length of toe without claw 44$\mu$; claw 8$\mu$.

*Monostyla sylvatica* was quite common among mosses and hepatics growing on rocks in the bed of a gently flowing stream in the woods north of the Bureau of Standards, in Washington, District of Columbia; the little stream is now polluted and uninhabitable for rotifers. No other localities are known for this species.

**MONOSTYLA COPEIS Harring and Myers, new species.**

**Plate XLI, figures 1, 2.**

The outline of the lorica is very broadly ovate; its width is more than four fifths of the length. The anterior margins are coincident and very slightly concave. The dorsal plate is subcircular and rounded posteriorly. The ventral plate is nearly parallel-sided anteriorly and rounded posteriorly; it is consid-

erably narrower than the dorsal plate and its margins ill-defined and wavy. Surface markings consist of a transverse ventral fold in front of the foot and some short, curved folds on each side of the foot. The lateral sulci are indistinct and shallow. The posterior segment is fairly large and rounded; it projects slightly beyond the dorsal plate. The coxal plates are small and rounded posteriorly. The first foot joint is parallel-sided and squarely truncate posteriorly, the second joint heart-shaped. The toe is spindle-shaped and much enlarged in the middle, ending in a stout, acute claw; its length is slightly less than one fourth of the total length.

Total length 130$\mu$; length of dorsal plate 88$\mu$, of ventral plate 94$\mu$; width of dorsal plate 80$\mu$, of ventral plate 65$\mu$; width of anterior dorsal margin 50$\mu$, of ventral margin 58$\mu$; length of toe without claw 33$\mu$; claw 5$\mu$.

*Monostyla copeïs* was collected by Dr. H. L. Shantz in Prospect Lake, on the slopes of Pikes Peak, Colorado, at an altitude of 1830 meters, and by Dr. Paul Galtsoff in Lake Pepin, Wisconsin. The specimens from Colorado are slightly smaller and the claw relatively longer; the toe is also somewhat broader, but there is no doubt of their specific identity.

**MONOSTYLA RHOPALURA Harring and Myers, new species.**

Plate XLI, figures 3, 4.

*Monostyla closterocerca* JENNINGS, Bull. Michigan Fish Comm. No. 3, 1894, p. 25, fig. 9.—HEMPEL, Bull. Illinois State Lab. Nat. Hist. vol. 5, 1898, p. 376; not *Monostyla closterocerca* SCHMARDA.

The outline of the lorica is broadly oval; its width is four fifths of the length. The anterior dorsal margin is very narrow and has a rather shallow, V-shaped sinus, rounded posteriorly; the ventral margin is crescentic; the external angles are moderately acute, both dorsally and ventrally. The dorsal plate is broadly oval and rounded posteriorly. The ventral plate is oval and slightly narrower than the dorsal; it has a transverse fold in front of the foot. The lateral sulci are fairly deep. The posterior segment is large and rounded and protrudes nearly full length beyond the dorsal plate. The coxal plates are large and obtusely pointed. The first foot joint is semi-elliptic; the second joint is large and pyriform. The toe is long and stout, nearly one third of the total length, fusiform and much en-

larged in the middle; the claw is long, slender and acutely pointed, with a median line or indistinct groove.

Total length 180$\mu$; length of dorsal plate 115$\mu$, of ventral plate 130$\mu$; width of dorsal plate 98$\mu$, of ventral plate 90$\mu$; width of anterior dorsal margin 36$\mu$, of ventral margin 50$\mu$; length of toe without claw 46$\mu$; claw 8$\mu$.

*Monostyla rhopalura* is locally common; we have collected it around Atlantic City, New Jersey; at Eagle River, Vilas County, Wisconsin, and on Mount Desert Island, Maine. Jennings collected it in ponds on the shores of Lake Erie and in inland lakes in Michigan.

**MONOSTYLA PIDEIS Harring and Myers, new species.**

**Plate XLI, figures 5, 6.**

The outline of the lorica is nearly circular; its width is equal to the length. The dorsal plate is subcircular, with very slight, lateral indentations near the posterior end. The ventral plate is somewhat narrower than the dorsal and obtusely pointed posteriorly. The anterior dorsal margin is very narrow and cuspidate, with a deep, V-shaped sinus, which has, for the protrusion of the dorsal antenna, a large, median notch, squarely truncate posteriorly. The ventral sinus is deeply lunate. Surface markings are limited to the usual transverse fold in front of the foot and two dorsal transverse lines, one at the bottom of the anterior sinus and another near the end of the dorsal plate. The lateral sulci are deep. The posterior segment is short and does not project beyond the dorsal plate. The coxal plates are minute and scale-like; they are smaller than in any other species of this group and do not extend beyond the first foot joint. The foot is unusually robust and both joints very broad and short. The toe is long, about one third of the total length, extremely broad and parallel-sided, narrowed at the base and rounded posteriorly; it is compressed dorso-ventrally and oval in cross section. The claw is short and triangular.

Total length 160$\mu$; length of dorsal plate 122$\mu$, of ventral plate 122$\mu$; width of dorsal plate 108$\mu$, of ventral plate 100$\mu$; width of anterior margin 32$\mu$; length of toe without claw 45$\mu$; claw 6$\mu$.

*Monostyla pideis* was collected among submerged mosses in Bubble Pond, Mount Desert Island, Maine. Its nearest relatives are probably *M. cornuta and M. rhopalura.*

**MONOSTYLA SCUTATA Harring and Myers, new species**

Plate XL, figures 1, 2.

The outline of the lorica is subcircular; its width is nearly equal to the length. The anterior margins are coincident and very slightly concave, the dorsal margin slightly narrower than the ventral; anterior spines are not present. The dorsal plate is subcircular and rounded posteriorly; the ventral plate is parallel-sided anteriorly and rounded posteriorly. Surface markings are limited to a transverse fold on the ventral plate, in front of the foot. The lateral sulci are rather shallow and indistinct. The posterior segment is broad and rounded and projects somewhat beyond the dorsal plate. The coxal plates are fairly large and obtusely rounded posteriorly. The first foot joint is pyriform and rounded posteriorly, the second joint short and very broadly elliptic. The toe is long and fairly stout, about one third of the total length, parallel-sided for about three fourths of its length and tapering to the long, slender and acute claw.

Total length 100$\mu$; length of dorsal plate 62$\mu$, of ventral plate 70$\mu$; width of dorsal plate 65$\mu$, of ventral plate 50$\mu$; width of anterior dorsal margin 44$\mu$, ventral margin 48$\mu$; length of toe without claw 28$\mu$; claw 5$\mu$.

*Monostyla scutata* was collected in small numbers in Ottman Lake, near Waupaca, Wisconsin. No other localities are known for this species.

**MONOSTYLA PYGMAEA Daday**

Plate XLII, figures 1, 2.

*Monostyla pygmaea* DADAY, Math. Termész. Ertes., vol. 15, 1897, p. 139, fig. 7; Termész. Füzetek, vol. 24, 1901, p. 21, fig. 4.—HARRING and MYERS, Trans. Wisconsin Acad. Sci., vol. 20, 1922, p. 557.—HAUER, Zool. Anz., vol. 61, 1924, p. 149.

*Monostyla turbo* MURRAY, Journ. Royal Micr. Soc., 1913, p. 558, pl. 22, fig. 11.

The outline of the lorica is broadly ovate; its width is about three fourths of the length. The anterior dorsal margin is straight, the ventral margin convex with a small, shallow, rounded median sinus; this species shares with *M. obtusa* the peculiarity of having the anterior dorsal margin wider than the ventral. The dorsal plate is broadly ovate and rounded pos-

teriorly. The ventral plate is ovate and somewhat narrower than the dorsal plate, especially in front. There is a fairly prominent transverse ventral fold above the foot. The lateral sulci are fairly deep. The posterior segment is large and rounded; it projects somewhat beyond the dorsal plate. The coxal plates are small and obtusely pointed posteriorly. The first foot joint is somewhat indistinct and widest anteriorly, the second joint roughly hexagonal and slightly inside the posterior edge of the lorica. The toe is long and straight, about one fourth of the total length, and ends in a small, acute claw with median dividing line and without basal spicules.

Total length 125$\mu$; length of dorsal plate 80$\mu$, of ventral plate 88$\mu$; width of dorsal plate 72$\mu$, of ventral plate 65$\mu$; width of anterior dorsal margin 58$\mu$, of ventral margin 48$\mu$; length of toe without claw 37$\mu$; claw 5$\mu$.

*Monostyla pygmaea* is common in wet sphagnum; we have collected it around Washington, District of Columbia; at Atlantic City, New Jersey; in Polk County, Florida; in Oneida and Vilas Counties, Wisconsin and on Mount Desert Island, Maine. Hauer reports it from the Schwarzwald. Murray found it among Rousselet's collections from Clare Island, Ireland.

**MONOSTYLA ORNATA Harring and Myers, new species**

**Plate XXXVI, figures 1, 2.**

The lorica is broadly ovate; its width is about three fourths of the length. The anterior dorsal margin is slightly convex; the ventral has a small median sinus, broadly rounded at the bottom and with convex sides. The dorsal plate is broadly oval and rounded posteriorly. The ventral plate is nearly parallel-sided for half its length and very bluntly triangular posteriorly. The surface markings are unique and must be studied from the figures; they consist of a system of raised ridges with lateral buttresses or branches at close intervals, but the usual pattern of facets is not traceable. The lateral sulci are shallow and the margins of the ventral plate somewhat undulate. The posterior segment is narrow and rounded posteriorly; it projects slightly beyond the dorsal plate. The coxal plates are very small and obtusely pointed. The first foot joint is large and conical, the second subcircular, slightly reduced in front of the toe and well within the posterior segment. The toe is long and slender,

about one third of the total length, straight and parallel-sided with a distinct annular constriction near the posterior end; the claw is long, fairly stout and acutely pointed.

Total length 130$\mu$; length of dorsal plate 82$\mu$, of ventral plate 87$\mu$; width of dorsal plate 68$\mu$, of ventral plate 60$\mu$; width of anterior margin 55$\mu$; length of toe without claw 38$\mu$; claw 7$\mu$.

*Monostyla ornata* was collected in large numbers in a swamp at Oceanville, near Atlantic City, New Jersey. No other localities are known for this very interesting species.

### MONOSTYLA OBTUSA Murray

Plate XLII, figures 5, 6.

*Monostyla obtusa* MURRAY, Journ. Royal Micr. Soc., 1913, p. 357, pl. 15, fig. 37.—HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 548.—HAUER, Zool. Anz., vol. 61, 1924, p. 147.

? *Monostyla lunaris aperta* STEINECKE, Schriften Phys.-ökon. Ges. Königsberg i. Pr., vol. 57, 1916, p. 89, fig. 2, c, d; vol. 64, 1924, p. 41.

The outline of the lorica is broadly oval; its width is three fourths of the length. The anterior margins of the dorsal and ventral plates are coincident and straight; at the external angles are two minute frontal spines. The dorsal plate is broadly oval and rounded posteriorly. The ventral plate is considerably narrower than the dorsal plate and broadly oval; it is somewhat flexible and its margins rather indefinite. The lorica is without any surface markings. The lateral sulci are shallow and ill-defined. The posterior segment is small and rounded, projecting very little beyond the dorsal plate. The coxal plates are moderately large and obtusely rounded posteriorly. The first foot joint is parallel-sided and indistinct, the second joint fairly large and subsquare, projecting slightly beyond the lorica. The toe is fairly long and straight, about one fourth of the total length, spindle-shaped, narrow at the base and slightly enlarged towards the posterior end; the claw is fairly long, acutely pointed and has a median dividing line without being double; two basal spicules are present.

Total length 115$\mu$; length of dorsal plate 76$\mu$, of ventral plate 80$\mu$; width of dorsal plate 70$\mu$, of ventral plate 58$\mu$; width of anterior dorsal margin 58$\mu$, of ventral margin 48$\mu$; length of toe without claw 32$\mu$; claw 7$\mu$.

*Monostyla obtusa* was collected by Murray at Rio de Janeiro. It seems to be rare; we have found it common in collections from the Panama Canal Zone, and a few specimens in material from Audubon Park, in New Orleans, Louisiana, collected by Dr. Birge and Mr. Juday in 1903 and also in Sphagnum forwarded from Hubbardstown, Massachusetts, by Mrs. A. C. Clarke. Hauer reports it common in sphagnum bogs in the Schwarzwald and apparently this is the animal found by Steinecke in the Zehlaubruch near Königsberg.

**MONOSTYLA VASTITA Harring and Myers, new species**
**Plate XLII, figures 3, 4.**

The outline of the lorica is very broadly reversed-ovate; its width is but little less than the length. The anterior margins are nearly coincident; the dorsal is very slightly concave and the ventral straight. The dorsal plate is very broadly oval and rounded posteriorly; the ventral plate is much narrower and oval in outline; it has a transverse and two longitudinal folds. The lateral sulci are shallow and ill-defined. The posterior segment is large and rounded; it projects with its entire length beyond the dorsal plate. The coxal plates are large and obtusely pointed. The first foot joint is very long, constricted near the posterior, lobate end; the second joint is robust, very broad and roughly pentagonal in outline. The toe is long and slender, about one third of the total length, parallel-sided and obtuse posteriorly; the claw is long, slender and acutely pointed with a median mucus groove.

Total length 130$\mu$; length of dorsal plate 78$\mu$, of ventral plate 90$\mu$; width of dorsal plate 78$\mu$, of ventral plate 62$\mu$; width of anterior dorsal margin 65$\mu$, of ventral margin 50$\mu$; length of toe without claw 35$\mu$; claw 7$\mu$.

*Monostyla vastita* was collected in Round Pond, on Mount Desert Island, Maine; this is the only location known for this species. It resembles *M. obtusa* in having the dorsal anterior margin wider than the ventral, but differs in nearly every other respect, and there can be no confusion between these two species.

**MONOSTYLA TETHIS Harring and Myers, new species**

**Plate XXXVIII, figures 1, 2.**

The outline of the lorica is very broadly oval; its width is but little less than the length. The anterior margins of the dorsal and ventral plates are coincident and straight. The dorsal plate is very broadly ovate and narrowly truncate posteriorly. The ventral plate is as wide as the dorsal and very broadly oval. The dorsal facetting is of an unusual pattern and very regular; each facet is bounded by double longitudinal lines. The surface markings of the ventral plate are also somewhat aberrant, as shown in figure 2. The lateral sulci are moderately deep. The posterior segment is very short and broadly rounded; it projects very slightly beyond the dorsal plate. The coxal plates are large and nearly semicircular. The first foot joint is rudimentary and indistinct, the second joint large and subcircular. The toe is long, nearly one third of the total length, straight and very slightly tapering; the claw is fairly long, slender and acutely pointed.

Total length 100$\mu$; length of dorsal plate 70$\mu$, of ventral plate 74$\mu$; width of lorica 62$\mu$; width of anterior dorsal margin 42$\mu$, of ventral margin 53$\mu$; length of toe without claw 24$\mu$; claw 6$\mu$.

*Monostyla tethis* was collected in small numbers among sphagnum from Aunt Bettys Pond, Mount Desert Island, Maine. No other localities for this species are known.

**MONOSTYLA RUGOSA Harring**

**Plate XLIII, figures 3, 4.**

*Monostyla rugosa* HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 548, pl. 24, figs. 4–6.—FADEEV, Russk. Gidr. Zhurn., vol. 3, No. 3–5, 1924, p. 6.

The outline of the lorica is very broadly ovate; its width is slightly greater than the length. The anterior margins are nearly coincident, the dorsal slightly convex and the ventral straight. The dorsal plate is very broadly ovate and narrowly truncate posteriorly; the facetting resembles closely the usual pattern except in the anterior row, which is irregular. The ventral plate is flexible and its margins somewhat indefinite, but it is roughly subsquare and rounded posteriorly; the pattern of the surface markings is fairly complex. The lateral sulci are indistinct

and shallow. The posterior segment is very short and broad; it is almost completely covered by the dorsal plate. The coxal plates are fairly large and semicircular. The toe is long, about one third of the total length, robust and parallel-sided; the long claw is distinctly double, but the two parts are rarely separated.

Total length 84$\mu$; length of dorsal plate 54$\mu$, of ventral plate 57$\mu$; width of dorsal plate 62$\mu$, of ventral plate 56$\mu$; width of anterior dorsal margin 34$\mu$, of ventral margin 45$\mu$; length of toe without claw 21$\mu$; claw 6$\mu$.

*Monostyla rugosa* is common in the Panama Canal Zone; we have not found it in the United States. Fadeev records it from Kharkov, Russia.

**MONOSTYLA ELACHIS Harring and Myers, new species**

Plate XLIII, figures 1, 2.

The outline of the lorica is subcircular; its width is nearly equal to the length. The anterior dorsal margin is slightly convex; the ventral margin has a shallow median concavity and is convex towards the external angles; no frontal spines are present. The dorsal plate is subcircular and rounded posteriorly. The ventral plate is nearly parallel-sided anteriorly and rounded posteriorly; it is narrower than the dorsal plate. The anterior row of facets on the dorsal plate is very regular; the rest of the facetting is of the usual pattern; the ventral plate has a fairly prominent transverse fold in front of the foot. The lateral sulci are deep. The posterior segment is moderately large and rounded; it projects somewhat beyond the dorsal plate. The coxal plates are small and obtusely rounded posteriorly. The first foot joint is short and rather indistinct, the second joint is large and heartshaped. The toe is fairly long, more than one fourth of the total length, straight and parallel-sided, terminating in a short, acutely pointed claw.

Total length 90$\mu$; length of dorsal plate 62$\mu$, of ventral plate 68$\mu$; width of dorsal plate 62$\mu$, of ventral plate 54$\mu$; width of anterior dorsal margin 40$\mu$, of ventral margin 50$\mu$; toe without claw 20$\mu$; claw 4$\mu$.

*Monostyla elachis* is common in weedy ponds in the United States; whether it occurs elsewhere is as yet unknown. It has considerable resemblance to other small species of the genus, but is one of the few with dorsal facetting, which, if not very prominent, is at least very constant.

### MONOSTYLA FURCATA Murray

Plate XLIII, figures 5, 6.

*Monostyla furcata* MURRAY, Journ. Royal Micr. Soc., 1913, p. 358, pl. 15, fig. 40.—HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p 548.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 35.—FADEEV, Russk. Gidr. Zhurn., vol. 3, No. 3–5, 1924, p. 6.

The outline of the lorica is broadly ovate or subcircular; its width is but little less than the length, and the integument is semi-flexible. The anterior margins of the dorsal and ventral plates are wide, straight and coincident. The dorsal plate is subcircular and without posterior truncation. The ventral plate is roughly parallel-sided anteriorly and rounded posteriorly. Surface markings are limited to a transverse fold on the ventral plate in front of the foot. The lateral sulci are fairly deep, the posterior segment is rounded and almost completely covered by the dorsal plate. The coxal plates are small and rounded posteriorly. The first foot joint is parallel-sided and somewhat indistinct, the second joint nearly spherical. The toe is short and stout, about one fourth of the total length, straight and parallel-sided, terminating in two very distinct claws, immobile and separated by a V-shaped notch.

Total length 100$\mu$; length of dorsal plate 75$\mu$, of ventral plate 78$\mu$; width of dorsal plate 70$\mu$, of ventral plate 60$\mu$; width of anterior dorsal margin 43$\mu$, of ventral margin 58$\mu$; length of toe without claws 22$\mu$; claws 5$\mu$.

*Monostyla furcata* is probably widely distributed, but has no doubt often been confused with other small species of the genus. Murray found it at Rio de Janeiro; it was common in the collections of the Panama Biological Survey and we have found it at Washington, District of Columbia; around Atlantic City, New Jersey; in Oneida and Vilas Counties, Wisconsin, and on Mount Desert Island, Maine, as well as in collections made by Mr. Juday at Puerto Barrios, Guatemala.

### MONOSTYLA PUNCTATA Murray

Plate XLIV, figures 3, 4.

*Monostyla punctata* MURRAY, Journ. Royal Micr. Soc., 1913, p. 355, pl. 15, fig. 36.

The outline of the lorica is very broadly ovate; its width is nearly equal to the length. The anterior dorsal margin is very slightly convex and very much narrower than the ventral mar-

gin, so that a part of the integument belonging to the lateral sulcus is prominently in view from the dorsal side and equalizes the difference in width between the two plates; the ventral margin is slightly concave opposite the dorsal plate and from this point recedes at an obtuse angle to the external edge. The dorsal plate is very broadly ovate and rounded posteriorly. The ventral plate is considerably narrower than the dorsal, widest anteriorly and tapers gradually towards the rounded posterior end; it is quite flexible and the edges somewhat ill-defined. The lateral sulci are shallow except at the front, where they make up for the difference in width between the dorsal and ventral plates. The posterior segment is small and rounded; it projects but little beyond the dorsal plate. The coxal plates are small and obtusely pointed. The first foot joint is very large, but somewhat indistinct; the second joint is large and rounded. The toe is long and slender, more than one fourth of the total length, very slightly enlarged near mid-length and blunted posteriorly; the claw is fairly long, slender and acutely pointed, with a median mucus groove.

Total length 110$\mu$; length of dorsal plate 76$\mu$, of ventral plate 80$\mu$; width of dorsal plate 70$\mu$, of ventral plate 55$\mu$; width of anterior dorsal margin 36$\mu$, of ventral margin 58$\mu$; length of toe without claw 24$\mu$; claw 6$\mu$.

*Monostyla punctata* was described by Murray from material collected in a brackish lagoon at Rio de Janeiro. We find it abundant in salt ponds and tide pools around Atlantic City, New Jersey. The structure as described by Murray seems very complex; this is evidently due to poor and incompletely retracted material; there is nothing especially remarkable about *M. punctata* except the great difference between the dorsal and ventral anterior margins.

### MONOSTYLA CLOSTEROCERCA Schmarda

Plate XLIV, figures 5, 6.

*Monostyla closterocerca* SCHMARDA, Neue wirbellose Thiere, 1859, vol. 1, p. 59, pl. 14, fig. 125.—MURRAY, Journ Royal Micr. Soc., 1913, p. 357, pl. 15, fig. 39.—HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 548; Rep. Canadian Arctic Exp. 1913–1918, vol. 8, pt. E, 1921, p. 10.—JAKUBSKI, Rozpr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 32, pl. 1, fig. 4; Kosmos (Lwów), 1918–1919, p. 26.

? *Monostyla truncata* TURNER, Bull. Denison Univ., vol. 6. 1892, p. 62, pl. 1, fig. 11.

? *Monostyla cornuta* OLOFSSON, Zool. Bidr. Uppsala, vol. 6, 1918, p. 594, fig. 55.—HAUER, Mitt. Geogr. Ges. u. Naturhist. Mus. Lübeck, ser. 2, No. 30, 1925, p. 170, fig. 9.

The outline of the lorica is subcircular; its width is virtually equal to the length. The anterior dorsal and ventral margins are coincident and form a shallow, broadly V-shaped sinus with widely flaring, convex sides. The dorsal plate is nearly circular, rounded posteriorly and its anterior edges curving inwards without actually reaching the anterior margin. The ventral plate is very broadly oval and considerably narrower than the dorsal plate. The surface markings are a faint dorsal fold, originating near the apex of the anterior sinus, and a transverse ventral fold in front of the foot. The lateral sulci are shallow. The posterior segment is very broad and semicircular, and projects slightly beyond the dorsal plate. The coxal plates are large and rounded posteriorly, terminating slightly beyond the first foot joint; this is indistinct, rather narrow and parallel-sided, the second joint large and varying from subcircular to subsquare. The toe is long, a little less than one third of the total length, parallel-sided for half its length and tapering to a slender, acute point.

Total length, 110$\mu$; length of dorsal plate 72$\mu$, of ventral plate 78$\mu$; width of dorsal plate 75$\mu$, of ventral plate 5$\mu$; width of anterior margin 44$\mu$; length of toe 33$\mu$.

*Monostyla closterocerca* is abundant everywhere in weedy ponds. Murray's figure shows the toe reduced at the base; this is an error; it is always parallel-sided.

### MONOSTYLA PYRIFORMIS Daday.

Plate XLV, figures 1, 2.

*Monostyla pyriformis* DADAY, Math. Termész. Ertes., vol. 23, 1905, p. 330; Zoologica, pt. 44, 1905, p. 112, pl. 7, fig. 16.—HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 547.

*Monostyla truncata* MURRAY, Journ. Royal Micr. Soc., 1913, p. 358, pl. 15, fig. 38; not *Monostyla truncata* TURNER.

The outline of the lorica is very broadly ovate; its width is four fifths of the length. The anterior margins are coincident, straight for the greater part of their length and strongly rounded towards the edges of the lorica. The dorsal plate is very broadly ovate and rounded posteriorly. The ventral plate is ovate and considerably narrower than the dorsal. The lateral sulci are

rudimentary. The posterior segment is small and rounded; it projects somewhat beyond the dorsal plate. The coxal plates are small and obtusely pointed. The first foot joint is semi-elliptic; the second joint is robust and subsquare. The toe is very long, about one third of the total length, parallel-sided for one half its length and tapering gradually to a slender, bristle-like point.

Total length 80$\mu$; length of dorsal plate 55$\mu$, of ventral plate 58$\mu$; width of dorsal plate 48$\mu$, of ventral plate 40$\mu$; length of toe 24$\mu$.

*Monostyla pyriformis* is not rare in wet sphagnum. We have used Daday's name for this species, as partly contracted specimens agree perfectly with his figure. Turner's *M. truncata* is figured with a straight, acute angled anterior margin, which this species never has; his animal may have been any one of the smaller Monostylas; the details given are insufficient to decide which one and his figure does not inspire much confidence in its accuracy.

**MONOSTYLA SUBULATA Harring and Myers, new species.**

Plate XLV, figures 3, 4.

The outline of the lorica is very broadly ovate; its width is virtually equal to the length. The anterior margins of the dorsal and ventral plates are coincident and straight; two minute indentations are usually present near the external angles. The dorsal plate is very broadly ovate and rounded posteriorly. The ventral plate is reduced considerably in width anteriorly and the posterior portion is consequently nearly circular in outline; it is much narrower than the dorsal plate. No surface markings are present on either dorsal or ventral plates. The lateral sulci are somewhat indistinct. The posterior segment is very small and rounded; it projects considerably beyond the dorsal plate. The coxal plates are rather small and obtusely pointed. The first foot joint is semi-elliptic; the second joint is heart-shaped and projects about two thirds of its length beyond the posterior segment. The toe is long and stout, about one fourth of the total length, tapering and has a median line or indistinct groove.

Total length 100$\mu$; length of dorsal plate 64$\mu$, of ventral plate 68$\mu$; width of dorsal plate 65$\mu$, of ventral plate 52$\mu$; width of anterior margin 50$\mu$; length of toe without claw 16$\mu$; claw 10$\mu$.

*Monostyla subulata* is fairly common in wet sphagnum and is not infrequently found in weedy ponds in the United States; we have found it in sphagnum from Epping Forest, sent to us by Mr. David Bryce.

**MONOSTYLA OPIAS Harring and Myers, new species.**

**Plate XLV, figures 5, 6.**

The outline of the lorica is very broadly ovate; its width is five sixths of the length. The anterior margins are coincident and straight; at the external angles are two very small, acute frontal spines. The dorsal plate is very broadly ovate and rounded posteriorly. The ventral plate is broadly ovate and slightly narrower than the dorsal plate; in front of the foot is a fairly conspicuous transverse fold. The lateral sulci are moderately deep. The posterior segment is fairly large and rounded; it projects somewhat beyond the dorsal plate. The coxal plates are small and obtusely pointed. The first foot joint is small and indistinct; the second is large and rounded. The toe is long, more than one fourth of the total length, and tapers gradually to a slender, bristle-like point.

Total length 100$\mu$; length of dorsal plate 66$\mu$, of ventral plate 72$\mu$; width of dorsal plate 60$\mu$, of ventral plate 55$\mu$; width of anterior spines 45$\mu$; length of toe 28$\mu$.

*Monostyla opias* is rare; we have found it in wet sphagnum from Hyattsville, near Washington, District of Columbia, and from Squirrel Lake, about 15 miles west of Minocqua, Oneida County, Wisconsin; only a few specimens were collected at each station.

**MONOSTYLA MONOSTYLA (Daday).**

**Plate XLVI, figures 1, 2.**

*Diarthra monostyla* DADAY, Math. Termész. Ertes., vol. 15, 1897, p. 143, fig. 10; Termész. Füzetek, vol. 24, 1901, p. 26, fig. 9; Zoologica, pt. 44, 1905, p. 127, pl. 7, fig. 17.

*Monostyla monostyla* HARRING, Proc. U. S. Nat. Mus., vol. 46, 1913, p. 390.—HARRING and MYERS, Trans. Wisconsin Acad. Sci., vol. 20, 1922, p. 537.—IDELSON, Trudy Kosinsk. Biol. Stants., pt. 2, 1925, p. 72, fig. 1.

*Monostyla spinifera* IDELSON, Russk. Gidr. Zhurn., vol. 3, 1924, p. 224, text fig.

The lorica is oval in outline; the anterior margins of dorsal and ventral plates are straight and coincident; at the external

angles are two very small spines. The dorsal plate is very slightly narrower than the ventral and rounded posteriorly; it is very flexible and without facetting. The ventral plate is evenly rounded posteriorly and without evident markings; the coxal plates are small and rounded posteriorly. The lateral sulci are fairly deep; hinged to the margin of the dorsal plate is a curved spine, which may be swung outward and folded back into the lateral sulcus. The process of withdrawing the spine from the position shown in the figure is accomplished by a rotation downwards and inwards through an angle of 180 degrees; when the animal is swimming, there is no sign of the spine, concealed in the lateral sulcus with its "posterior" edge turned outwards and conforming to the outer edge of the dorsal plate. The first foot joint is large, the second small and inverted pyriform. The toe is about one fourth the total length, parallel-sided for one half its length and ending in a conical point without claw.

Total length 90$\mu$; length of dorsal plate 58$\mu$, of ventral plate 65$\mu$; width of dorsal plate 47$\mu$, of ventral plate 50$\mu$; anterior points 38$\mu$; toe 25$\mu$.

*Monostyla monostyla* was first found by Daday in material from New Guinea and later in South American collections. We have found this species in numerous localities in the United States: at Washington; around Atlantic City, New Jersey; in Polk county, Florida; numerous places in Wisconsin and on Mt. Desert Island, Maine. It seems confined to wet sphagnum.

**MONOSTYLA ARCUATA Bryce.**

Plate XLVII, figures 3, 4.

*Monostyla arcuata* BRYCE, Science Gossip, vol. 27, 1891, p. 206, text fig.—MURRAY, Journ. Royal Micr. Soc., 1913, p. 360, pl. 15, fig. 42.—HAUER, Zool. Anz., vol. 61, 1924, p. 148.

The outline of the lorica is broadly oval; its width is about four fifths of the length. The anterior dorsal margin is slightly concave; the ventral margin has a shallow median sinus flanked by two straight sections. The dorsal plate is broadly oval and rounded posteriorly. The ventral plate is elongate oval and considerably narrower than the dorsal plate; it has a transverse ventral fold in front of the foot and two longitudinal folds. The lateral sulci are fairly deep, especially near the anterior margin, where they compensate the difference in width between the dorsal and ventral plate. The posterior segment is

large and rounded; it projects slightly beyond the dorsal plate. The coxal plates are small and obtusely pointed posteriorly. The first foot joint is small and nearly parallel-sided; the second joint is large and rounded. The toe is long and fairly stout, more than one fourth of the total length, nearly parallel-sided for half its length and tapering gradually to a moderately acute point. In some specimens the toe is very slightly broader in the middle than at the base.

Total length 90$\mu$; length of dorsal plate 60$\mu$, of ventral plate 68$\mu$; width of dorsal plate 54$\mu$, of ventral plate 44$\mu$; width of anterior dorsal margin 24$\mu$, of ventral margin 36$\mu$; length of toe 24$\mu$.

*Monostyla arcuata* is fairly common in wet sphagnum. It has a certain resemblance to *M. closterocerca*, but differs considerably in details, as well as in general proportions.

### MONOSTYLA DECIPIENS Murray

Plate XLVII, figures 5, 6.

*Monostyla decipiens* MURRAY, Journ. Royal Micr. Soc., 1913, p. 360, pl. 15, fig. 43.—HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 548.

The outline of the lorica is broadly ovate; its width is about four fifths of the length. The anterior margins are coincident and the sinus very deep and V-shaped, rounded posteriorly and with a slight cusp opposite the incurved edges of the dorsal plate; no frontal spines are present, but two triangular, acute cusps are formed between the anterior sinus and the edges of the lorica. The dorsal plate is broadly ovate and rounded posteriorly. The ventral plate is ovate and slightly narrower than the dorsal plate; the lorica is without surface markings. The lateral sulci are deep, especially at the anterior margin; the dorsal plate terminates opposite the cusps on the sides of the sinus and a large, triangular area belonging to the sulcus completes it anteriorly. The posterior segment is rather small and very obtusely pointed; it projects considerably beyond the dorsal plate. The first foot joint is narrowly semi-elliptic and somewhat indistinct; the second joint is broadly ovate and widest posteriorly. The toe is long and slender, nearly one third of the total length, parallel-sided for half its length and tapering gradually to an acute point; in some specimens the toe is very slightly wider at mid-length than it is at the base.

Total length 175$\mu$; length of dorsal plate 116$\mu$, of ventral plate 128$\mu$; width of dorsal plate 98$\mu$, of ventral plate 78$\mu$; width of anterior cusps 44$\mu$; length of toe 48$\mu$.

*Monostyla decipiens* was collected by Murray at Rio de Janeiro; our specimens are from the Panama Canal Zone and uniformly larger than Murray's material. This species has a superficial resemblance to *M. hamata,* but differs in nearly every detail and, as it is quite rare, there is little danger of confusing the two species.

**MONOSTYLA HAMATA Stokes.**

**Plate XLVII, figures 1, 2.**

*Monostyla hamata* STOKES, Ann. Mag. Nat. Hist., ser. 6, vol. 18, 1896, p. 21, pl. 7, figs. 6–8.—JENNINGS, Bull. U. S. Fish Comm., vol. 19 (for 1899), 1900, p. 94, pl. 22, figs. 42–44.—VORONKOV, Trudy Gidr. Stants. Glubokom Oz., vol. 2, 1907, pp. 110, 284, pl. 6, figs. 2–5.—RUNNSTRÖM, Zool. Anz., vol. 34, 1909, p. 271, fig. 3.—DADAY, Zoologica, pt. 59, 1910, p. 84.—SACHSE, Süsswasserfauna Deutschlands, pt. 14, 1912, p. 180, figs. 351, 357.—MURRAY, Journ. Royal Micr. Soc., 1913, pp. 359, 458, pl. 15, fig. 41.—KOZAR, Zool. Anz., vol. 44, 1914, p. 421.—HARRING, Proc. U. S. Nat. Mus., vol. 47, 1914, p. 548; Rep. Canadian Arctic Exp. 1913–18, vol. 8, pt. E, 1921, p. 10.—JAKUBSKI, Rospr. Wiad. Muz. Dzieduszyckich, vol. 1, 1914, p. 33; Kosmos (Lwów), 1918–1919, p. 10.—MONTET, Rev. Suisse Zool., vol. 23, 1915, p. 336.—REZVOI, Trudy Borodinsk. Biol. Stants. Imp. Petrogradsk. Obshch. Estestvoisp., vol. 4, 1916, p. 181, pl. 1, figs. 13, 14.—WEBER and MONTET, Cat. Invert. Suisse, pt. 11, 1918, p. 192.—CHUGUNOV, Raboti Volzhskoi Biol. Stants., vol. 6, 1921, p. 116.

The outline of the lorica is elongate oval; its width is about two thirds of the length. The anterior margins are not coincident; the dorsal margin is very narrow and deeply lunate; the ventral margin has a very deep, V-shaped sinus, rounded posteriorly and with two prominent cusps near the middle of the sides. No frontal spines are present, but two acute-angled cusps are formed between the external edges of the ventral plate and anterior sinus. The dorsal plate is oval and rounded posteriorly; the dorsal facetting is well marked and very regular. The ventral plate is elongate oval and slightly narrower than the dorsal; its surface markings consist of a transverse fold in front of the foot and a few longitudinal folds. The lateral sulci are fairly deep, especially so at the front, where the difference in the widths of the anterior margins is compensated by the exposure of a large, triangular area of the sulcus. The posterior

segment is large and very obtusely pointed; it projects somewhat beyond the dorsal plate. The coxal plates are small and obtusely pointed posteriorly. The first foot joint is small, oval and distinct, the second joint large and subsquare. The foot is long and slender, more than one fourth of the total length, parallel-sided for half its length and tapers gradually to an acute point without claw.

Total length 120$\mu$; length of dorsal plate 78$\mu$, of ventral plate 92$\mu$; width of dorsal plate 58$\mu$, of ventral plate 53$\mu$; width of anterior dorsal margin 18$\mu$, of ventral margin 30$\mu$; length of toe 33$\mu$.

*Monostyla hamata* is common in weedy ponds everywhere.

**MONOSTYLA BATILLIFER Murray.**

Plate XLVI, figures 3, 4.

*Monostyla batillifer* MURRAY, Journ Royal Micr. Soc., 1913, p. 458, pl. 19, fig. 2.

The outline of the lorica is elongate ovate; its width is about two thirds of the length. The anterior margins of the dorsal and ventral plates are not coincident; the margin of the dorsal plate is deeply lunate and very narrow; the ventral margin has a very deep, obtusely V-shaped sinus with two very large, lateral, almost spine-like cusps. The dorsal plate is ovate and rounded posteriorly. The ventral plate is oval, constricted anteriorly and somewhat narrower than the dorsal plate; its surface markings consist of a transverse fold in front of the foot and two longitudinal folds. The lateral sulci are fairly deep; the difference in the width of the anterior margins is made up by exposure of a triangular portion of the sulcus. The posterior segment is small, narrow, slightly undulate posteriorly and has two laterally projecting, acutely triangular cusps; the segment is only partly covered by the dorsal plate. The coxal plates are small and rounded posteriorly. The first foot joint is small and slightly conical, the second joint large, transversely oval and some distance from the posterior margin. The toe is fairly long, about one fourth of the total length, parallel-sided for nearly three fourths of its length, conical posteriorly and ends in a bristle-like point.

Total length 120$\mu$; length of dorsal plate 85$\mu$, of ventral plate 95$\mu$; width of dorsal plate 62$\mu$, of ventral plate 55$\mu$; width of anterior dorsal margin 17$\mu$, of ventral margin 26$\mu$; length of toe 30$\mu$.

*Monostyla batillifer* was collected by Murray in a pond at Sydney, Australia; our description is taken from his material. No other localities are known for this interesting species. Murray's figures are slightly incorrect in some details, especially the anterior margin and the form of the toe.

**MONOSTYLA BIFURCA Bryce**

**Plate XLIV, figures 1, 2.**

*Monostyla bifurca* BRYCE, Science Gossip, vol. 28, 1892, p. 274, text fig.

*Notommata monostylaeformis* STENROOS, Acta Soc. Fauna et Flora Fennica, vol. 17, No. 1, 1898, p. 126, pl. 1, fig. 25.—VON HOFSTEN, Arkiv Zool., Stockholm, vol. 6, No. 1, 1909, p. 34.

*Monostyla monostylaeformis* IROSO, Mon. Zool. Italiano, vol. 21, 1910, p. 303; Atti R. Ist. d'Incorr. di Napoli, vol. 64 (for 1912), 1913, p. 471, figs. 3, 4.—FADEEV, Raboti Sev.-Kavkazhsk. Gidrobiol. Stants., vol. 1, pt. 1, 1925, p. 23, pl. 4, fig. 8.

Although the integument of this species is very flexible and can not by any stretch of the imagination be called a lorica, it is nevertheless sufficiently firm to assume a fairly definite form when completely contracted. The outline of the body is very broadly oval; its width is nearly equal to the length. The anterior margin is straight and the dorsal and ventral edges fail to meet in complete retraction. No lateral sulci are present and the limits of the dorsal plate are distinguishable posteriorly where it leaves the small posterior segment protruding slightly. This bears at the sides of the foot two small, slightly curved spines, which are probably to be interpreted as rudimentary coxal plates, as in *Lecane palinacis*. The foot joints are very large; the first joint is ovate and has a small, median, posterior lobe; the second joint is heart-shaped. The toe is fairly long, more than one fourth of the entire length, widest at the base and tapering gradually towards the posterior end; the claw is double, its two parts spread wide apart and immovable.

Total length of contracted animal 75$\mu$; length of dorsal plate 54$\mu$, of ventral plate 58$\mu$; width of anterior margin 35$\mu$; length of toe without claws 15$\mu$; claws; 4$\mu$.

*Monostyla bifurca* is not rare in wet sphagnum; the paucity of records is probably due to its small size rather than to any actual rarity.

## EXPLANATION OF PLATES.

**All figures are highly magnified. For actual measurements see text.**

### PLATE VIII.

**Fig. 1.** *Lecane curvicornis*, dorsal view, p. 321.
**Fig. 2.** *Lecane curvicornis*, ventral view.
**Fig. 3.** *Lecane acronycha*, dorsal view, p. 322.
**Fig. 4.** *Lecane acronycha*, ventral view.

### PLATE IX.

**Fig. 1.** *Lecane sibina*, dorsal view, p. 324.
**Fig. 2.** *Lecane sibina*, ventral view.
**Fig. 3.** *Lecane ungulata*, dorsal view, p. 323.
**Fig. 4.** *Lecane ungulata*, ventral view.

### PLATE X.

**Fig. 1.** *Lecane grandis*, dorsal view, p. 325.
**Fig. 2.** *Lecane grandis*, ventral view.
**Fig. 3.** *Lecane leontina*, dorsal view, p. 326.
**Fig. 4.** *Lecane leontina*, ventral view.
**Fig. 5.** *Lecane leontina*, dorsal view.

### PLATE XI.

**Fig. 1.** *Lecane tudicola*, dorsal view, p. 328.
**Fig. 2.** *Lecane tudicola*, ventral view.
**Fig. 3.** *Lecane mitis*, dorsal view, p. 329.
**Fig. 4.** *Lecane mitis*, ventral view.
**Fig. 5.** *Lecane scobis*, dorsal view, p. 329.
**Fig. 6.** *Lecane scobis*, ventral view.

### PLATE XII.

**Fig. 1.** *Lecane pertica*, dorsal view, p. 340.
**Fig. 2.** *Lecane pertica*, ventral view.
**Fig. 3.** *Lecane pyrrha*, dorsal view, p. 331.
**Fig. 4.** *Lecane pyrrha*, ventral view.
**Fig. 5.** *Lecane pyrrha*, dorsal view.
**Fig. 6.** *Lecane pyrrha*, dorsal view.

### PLATE XIII.

**Fig. 1.** *Lecane aquila*, dorsal view, p. 334.
**Fig. 2.** *Lecane aquila*, ventral view.
**Fig. 3.** *Lecane signifera*, dorsal view, p. 333.
**Fig. 4.** *Lecane signifera*, ventral view.
**Fig. 5.** *Lecane ploenensis*, dorsal view, p. 332.
**Fig. 6.** *Lecane ploenensis*, ventral view.

## PLATE XIV.

Fig. 1. *Lecane candida*, dorsal view, p. 368.
Fig. 2. *Lecane candida*, ventral view.
Fig. 3. *Lecane papuana*, dorsal view, p. 336.
Fig. 4. *Lecane papuana*, ventral view.
Fig. 5. *Lecane luna*, dorsal view, p. 334.
Fig. 6. *Lecane luna*, ventral view.

## PLATE XV.

Fig. 1. *Lecane elegans*, dorsal view, p. 371.
Fig. 2. *Lecane elegans*, ventral view.
Fig. 3. *Lecane jessupi*, dorsal view, p. 338.
Fig. 4. *Lecane jessupi*, ventral view.
Fig. 5. *Lecane brachydactyla*, dorsal view, p. 337.
Fig. 6. *Lecane brachydactyla*, ventral view.

## PLATE XVI.

Fig. 1. *Lecane depressa*, dorsal view, p. 327.
Fig. 2. *Lecane depressa*, ventral view.
Fig. 3. *Lecane ligona*, dorsal view, p. 339.
Fig. 4. *Lecane ligona*, ventral view.
Fig. 5. *Lecane ligona*, dorsal view.
Fig. 6. *Lecane ligona*, ventral view.

## PLATE XVII.

Fig. 1. *Lecane rhacois*, dorsal view, p. 379.
Fig. 2. *Lecane rhacois*, ventral view.
Fig. 3. *Lecane clara*, dorsal view, p. 378.
Fig. 4. *Lecane clara*, ventral view.
Fig. 5. *Lecane pycina*, dorsal view, p. 340.
Fig. 6. *Lecane pycina*, ventral view.

## PLATE XVIII.

Fig. 1. *Lecane eutarsa*, dorsal view, p. 341.
Fig. 2. *Lecane eutarsa*, ventral view.
Fig. 3. *Lecane pelatis*, dorsal view, p. 342.
Fig. 4. *Lecane pelatis*, ventral view.
Fig. 5. *Lecane mira*, dorsal view, p. 342.
Fig. 6. *Lecane mira*, ventral view.

## PLATE XIX.

Fig. 1. *Lecane methoria*, dorsal view, p. 343.
Fig. 2. *Lecane methoria*, ventral view.
Fig. 3. *Lecane stichaea*, dorsal view, p. 344.
Fig. 4. *Lecane stichaea*, ventral view.
Fig. 5. *Lecane saginata*, dorsal view, p. 345.
Fig. 6. *Lecane saginata*, ventral view.

PLATE XX.

Fig. 1. *Lecane elasma*, dorsal view, p. 345.
Fig. 2. *Lecane elasma*, ventral view.
Fig. 3. *Lecane rhytida*, dorsal view, p. 346.
Fig. 4. *Lecane rhytida*, ventral view.
Fig. 5. *Lecane lauterborni*, dorsal view, p. 347.
Fig. 6. *Lecane lauterborni*, ventral view.

PLATE XXI.

Fig. 1. *Lecane compta*, dorsal view, p. 347.
Fig. 2. *Lecane compta*, ventral view.
Fig. 3. *Lecane haliclysta*, dorsal view, p. 348.
Fig. 4. *Lecane haliclysta*, ventral view.
Fig. 5. *Lecane aspasia*, dorsal view, p. 349.
Fig. 6. *Lecane aspasia*, ventral view.

PLATE XXII.

Fig. 1. *Lecane marshi*, dorsal view, p. 351.
Fig. 2. *Lecane marshi*, ventral view.
Fig. 3. *Lecane ichthyoura*, dorsal view, p. 352.
Fig. 4. *Lecane ichthyoura*, ventral view.
Fig. 5. *Lecane ludwigii*, dorsal view, p. 350.
Fig. 6. *Lecane ludwigii*, ventral view.

PLATE XXIII

Fig. 1. *Lecane stokesii*, dorsal view, p. 353.
Fig. 2. *Lecane stokesii*, ventral view.
Fig. 3. *Lecane stokesii*, dorsal view.
Fig. 4. *Lecane ohioensis*, dorsal view, p. 354.
Fig. 5. *Lecane ohioensis*, ventral view.

PLATE XXIV.

Fig. 1. *Lecane arcula*, dorsal view, p. 355.
Fig. 2. *Lecane arcula*, ventral view.
Fig. 3. *Lecane flexilis*, dorsal view, p. 355.
Fig. 4. *Lecane flexilis*, ventral view.
Fig. 5. *Lecane intrasinuata*, dorsal view, p. 357.
Fig. 6. *Lecane intrasinuata*, ventral view.

PLATE XXV.

Fig. 1. *Lecane climacois*, dorsal view, p. 358.
Fig. 2. *Lecane climacois*, ventral view.
Fig. 3. *Lecane verecunda*, dorsal view, p. 358.
Fig. 4. *Lecane verecunda*, ventral view.
Fig. 5. *Lecane mylacris*, dorsal view, p. 359.
Fig. 6. *Lecane mylacris*, ventral view.

## PLATE XXVI.

Fig. 1. *Lecane glypta,* dorsal view, p. 360.
Fig. 2. *Lecane glypta,* ventral view.
Fig. 3. *Lecane tabida,* dorsal view, p. 361.
Fig. 4. *Lecane tabida,* ventral view.
Fig. 5. *Lecane infula,* dorsal view, p. 361.
Fig. 6. *Lecane infula,* ventral view.

## PLATE XXVII.

Fig. 1. *Lecane aeganea,* dorsal view, p. 367.
Fig. 2. *Lecane aeganea,* ventral view.
Fig. 3. *Lecane satyrus,* dorsal view, p. 362.
Fig. 4. *Lecane satyrus,* ventral view.
Fig. 5. *Lecane venusta,* dorsal view, p. 368.
Fig. 6. *Lecane venusta,* ventral view.

## PLATE XXVIII.

Fig. 1. *Lecane crepida,* dorsal view, p. 364.
Fig. 2. *Lecane crepida,* ventral view.
Fig. 3. *Lecane sagula,* dorsal view, p. 365.
Fig. 4. *Lecane sagula,* ventral view.
Fig. 5. *Lecane hastata,* dorsal view, p. 363.
Fig. 6. *Lecane hastata,* ventral view.

## PLATE XXIX.

Fig. 1. *Lecane formosa,* dorsal view, p. 366.
Fig. 2. *Lecane formosa,* ventral view.
Fig. 3. *Lecane mucronata,* dorsal view, p. 330.
Fig. 4. *Lecane mucronata,* ventral view.
Fig. 5. *Lecane mucronata,* lateral view.

## PLATE XXX.

Fig. 1. *Lecane pusilla,* dorsal view, p. 369.
Fig. 2. *Lecane pusilla,* ventral view.
Fig. 3. *Lecane asthena,* dorsal view, p. 369.
Fig. 4. *Lecane asthena,* ventral view.
Fig. 5. *Lecane subtilis,* dorsal view, p. 370.
Fig. 6. *Lecane subtilis,* ventral view.

## PLATE XXXI.

Fig. 1. *Lecane elongata,* dorsal view, p. 372.
Fig. 2. *Lecane elongata,* ventral view.
Fig. 3. *Lecane tenuiseta,* dorsal view, p. 372.
Fig. 4. *Lecane tenuiseta,* ventral view.
Fig. 5. *Lecane doryssa,* dorsal view, p. 373.
Fig. 6. *Lecane doryssa,* ventral view.

## PLATE XXXII.

Fig. 1. *Lecane agilis*, dorsal view, p. 382.
Fig. 2. *Lecane agilis*, ventral view.
Fig. 3. *Lecane palinacis*, dorsal view, p. 380.
Fig. 4. *Lecane palinacis*, ventral view.
Fig. 5. *Lecane inopinata*, dorsal view, p. 374.
Fig. 6. *Lecane inopinata*, ventral view.

## PLATE XXXIII.

Fig. 1. *Lecane inermis*, dorsal view, p. 379.
Fig. 2. *Lecane inermis*, ventral view.
Fig. 3. *Lecane calcaria*, dorsal view, p. 381.
Fig. 4. *Lecane calcaria*, ventral view.
Fig. 5. *Lecane niothis*, dorsal view, p. 382.
Fig. 6. *Lecane niothis*, ventral view.

## PLATE XXXIV.

Fig. 1. *Lecane nana*, dorsal view, p. 375.
Fig. 2. *Lecane nana*, ventral view.
Fig. 3. *Lecane hornemanni*, dorsal view, p. 377.
Fig. 4. *Lecane hornemanni*, ventral view.
Fig. 5. *Lecane tryphema*, dorsal view, p. 376.
Fig. 6. *Lecane tryphema*, ventral view.

## PLATE XXXV.

Fig. 1. *Monostyla lunaris*, dorsal view, p. 384.
Fig. 2. *Monostyla lunaris*, ventral view.
Fig. 3. *Monostyla lunaris*, dorsal view.
Fig. 4. *Monostyla lunaris*, ventral view.
Fig. 5. *Monostyla lunaris*, dorsal view.
Fig. 6. *Monostyla lunaris*, ventral view.

## PLATE XXXVI.

Fig. 1. *Monostyla ornata*, dorsal view, p. 402.
Fig. 2. *Monostyla ornata*, ventral view.
Fig. 3. *Monostyla acus*, dorsal view, p. 387.
Fig. 4. *Monostyla acus*, ventral view.
Fig. 5. *Monostyla crenata*, dorsal view, p. 386.
Fig. 6. *Monostyla crenata*, ventral view.

## PLATE XXXVII.

Fig. 1. *Monostyla bulla*, dorsal view, p. 388.
Fig. 2. *Monostyla bulla*, ventral view.
Fig. 3. *Monostyla styrax*, dorsal view, p. 389.
Fig. 4. *Monostyla styrax*, ventral view.
Fig. 5. *Monostyla goniata*, dorsal view, p. 390.
Fig. 6. *Monostyla goniata*, ventral view.

## PLATE XXXVIII.

Fig. 1. *Monostyla tethis*, dorsal view, p. 405.
Fig. 2. *Monostyla tethis*, ventral view.
Fig. 3. *Monostyla quadridentata*, dorsal view, p. 391.
Fig. 4. *Monostyla quadridentata*, ventral view.
Fig. 5. *Monostyla quadridentata*, male, dorsal view.

## PLATE XXXIX.

Fig. 1. *Monostyla stenroosi*, dorsal view, p. 394.
Fig. 2. *Monostyla stenroosi*, ventral view.
Fig. 3. *Monostyla thalera*, dorsal view, p. 393.
Fig. 4. *Monostyla thalera*, ventral view.
Fig. 5. *Monostyla lamellata*, dorsal view, p. 392.
Fig. 6. *Monostyla lamellata*, ventral view.

## PLATE XL.

Fig. 1. *Monostyla scutata*, dorsal view, p. 401.
Fig. 2. *Monostyla scutata*, ventral view.
Fig. 3. *Monostyla sylvatica*, dorsal view, p. 398.
Fig. 4. *Monostyla sylvatica*, ventral view.
Fig. 5. *Monostyla cornuta*, dorsal view, p. 396.
Fig. 6. *Monostyla cornuta*, ventral view.

## PLATE XLI.

Fig. 1. *Monostyla copeis*, dorsal view, p. 398.
Fig. 2. *Monostyla copeis*, ventral view.
Fig. 3. *Monostyla rhopalura*, dorsal view, p. 399.
Fig. 4. *Monostyla rhopalura*, ventral view.
Fig. 5. *Monostyla pideis*, dorsal view, p. 400.
Fig. 6. *Monostyla pideis*, ventral view.

## PLATE XLII.

Fig. 1. *Monostyla pygmaea*, dorsal view, p. 401.
Fig. 2. *Monostyla pygmaea*, ventral view.
Fig. 3. *Monostyla vastita*, dorsal view, p. 404.
Fig. 4. *Monostyla vastita*, ventral view.
Fig. 5. *Monostyla obtusa*, dorsal view, p. 403.
Fig. 6. *Monostyla obtusa*, ventral view.

## PLATE XLIII.

Fig. 1. *Monostyla elachis*, dorsal view, p. 406.
Fig. 2. *Monostyla elachis*, ventral view.
Fig. 3. *Monostyla rugosa*, dorsal view, p. 405.
Fig. 4. *Monostyla rugosa*, ventral view.
Fig. 5. *Monostyla furcata*, dorsal view, p. 407.
Fig. 6. *Monostyla furcata*, ventral view.

## PLATE XLIV.

Fig. 1. *Monostyla bifurca*, dorsal view, p. 416.
Fig. 2. *Monostyla bifurca*, ventral view.
Fig. 3. *Monostyla punctata*, dorsal view, p. 407.
Fig. 4. *Monostyla punctata*, ventral view.
Fig. 5. *Monostyla closterocerca*, dorsal view, p. 408.
Fig. 6. *Monostyla closterocerca*, ventral view.

## PLATE XLV.

Fig. 1. *Monostyla pyriformis*, dorsal view, p. 409.
Fig. 2. *Monostyla pyriformis*, ventral view.
Fig. 3. *Monostyla subulata*, dorsal view, p. 410.
Fig. 4. *Monostyla subulata*, ventral view.
Fig. 5. *Monostyla opias*, dorsal view, p. 411.
Fig. 6. *Monostyla opias*, ventral view.

## PLATE XLVI.

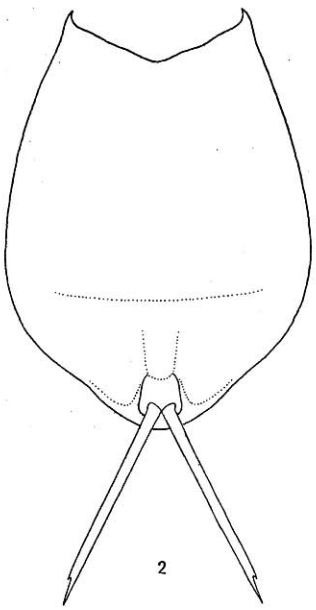
Fig. 1. *Monostyla monostyla*, dorsal view, p. 411.
Fig. 2. *Monostyla monostyla*, ventral view.
Fig. 3. *Monostyla batillifer*, dorsal view, p. 415.
Fig. 4. *Monostyla batillifer*, ventral view.

## PLATE XLVII.

Fig. 1. *Monostyla hamata*, dorsal view, p. 414.
Fig. 2. *Monostyla hamata*, ventral view.
Fig. 3. *Monostyla arcuata*, dorsal view, p. 412.
Fig. 4. *Monostyla arcuata*, ventral view.
Fig. 5. *Monostyla decipiens*, dorsal view, p. 413.
Fig. 6. *Monostyla decipiens*, ventral view.

### CORRECTIONS TO PART II, VOLUME XXI.

Pp. 488 and 546: for *Cephalodella piulca* read *C. hiulca*. P. 501: *Cephalodella collactea* has a cervical eyespot. P. 505: *Cephalodella cuneata* also has a cervical eyespot.



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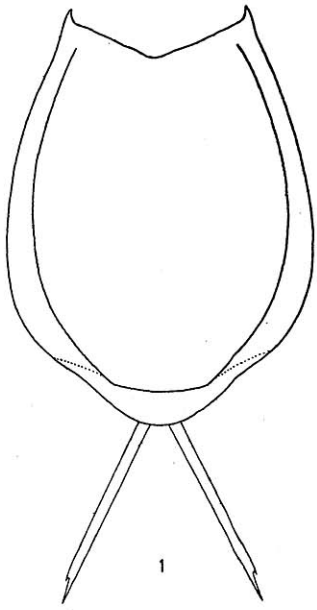

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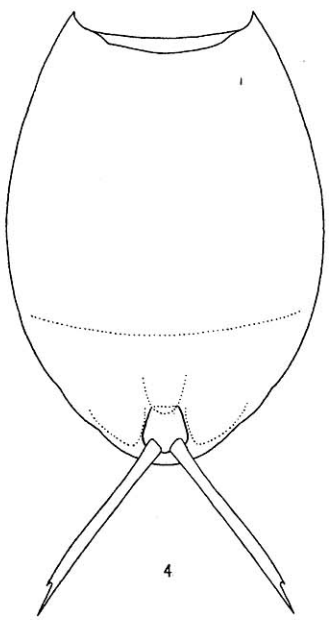

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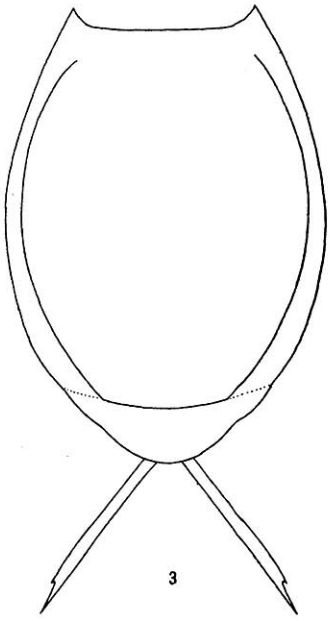

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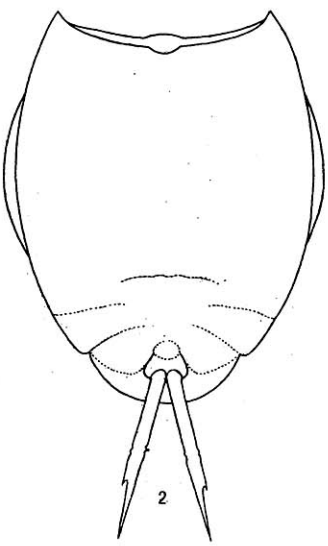
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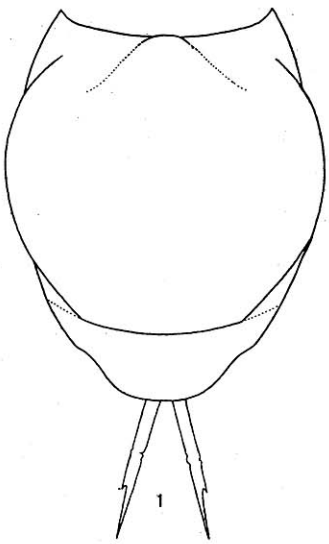
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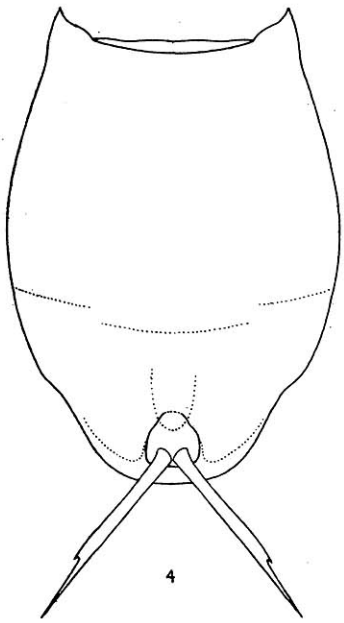
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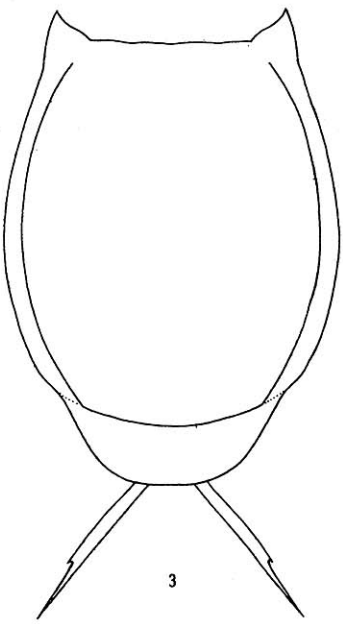
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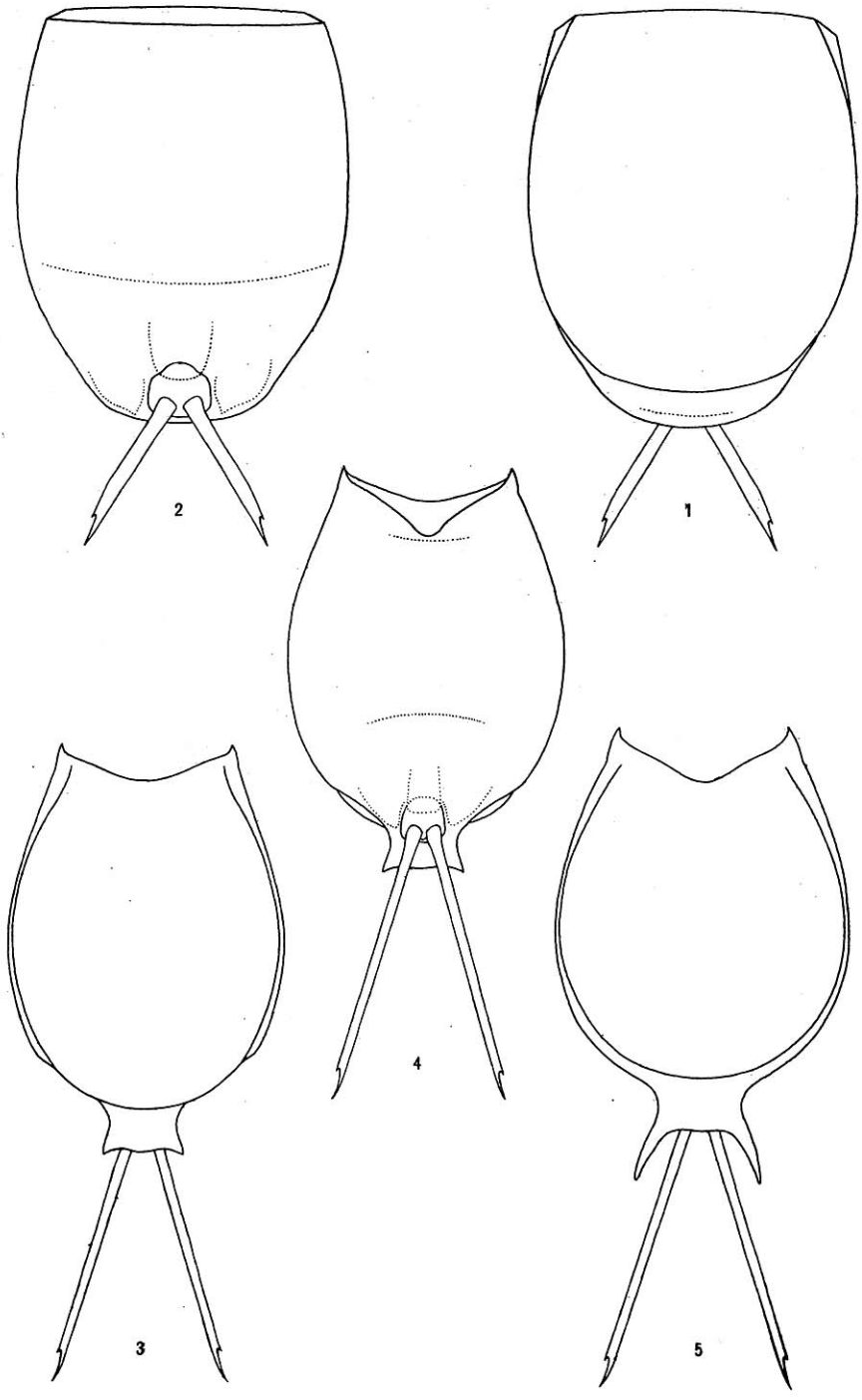
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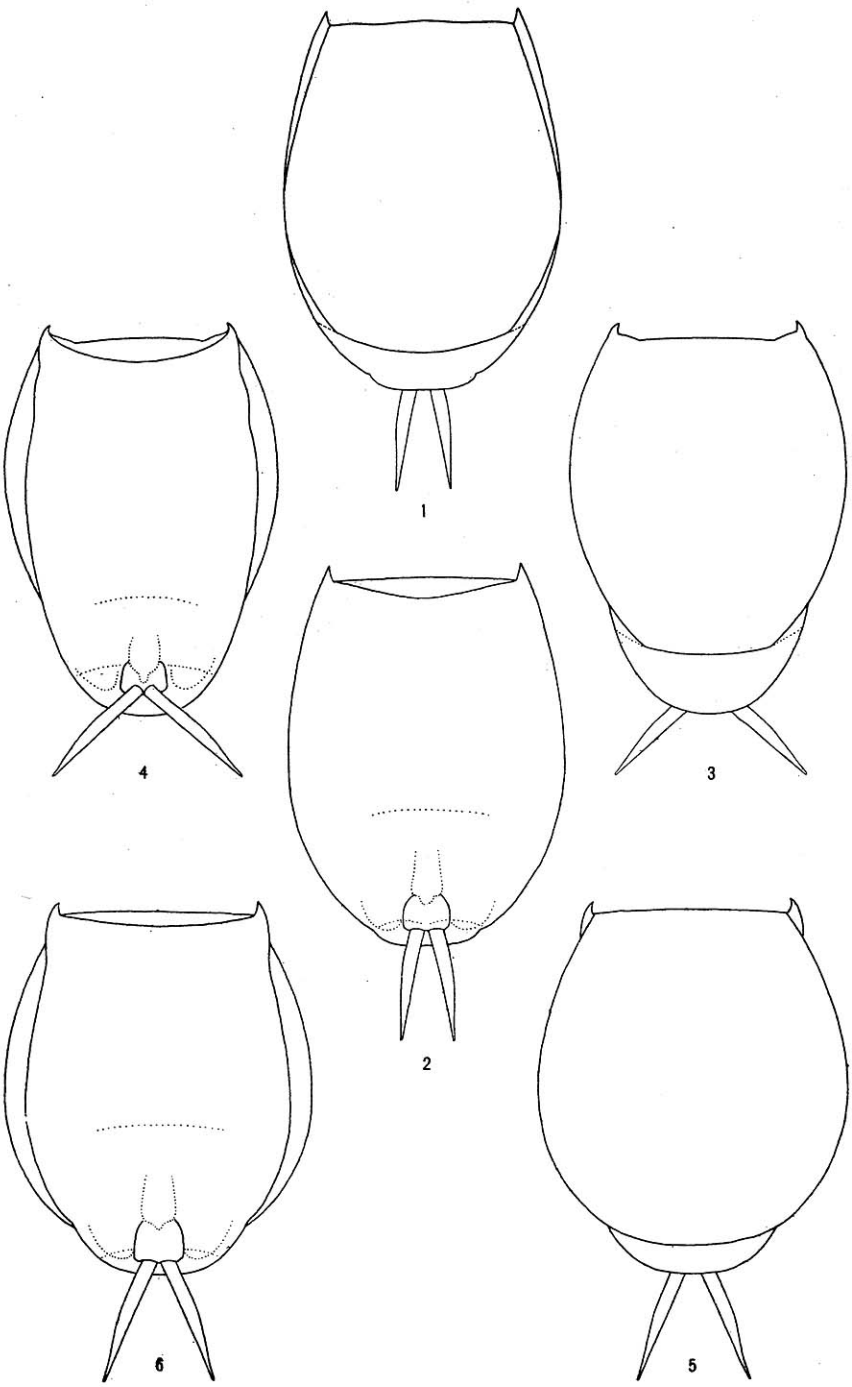
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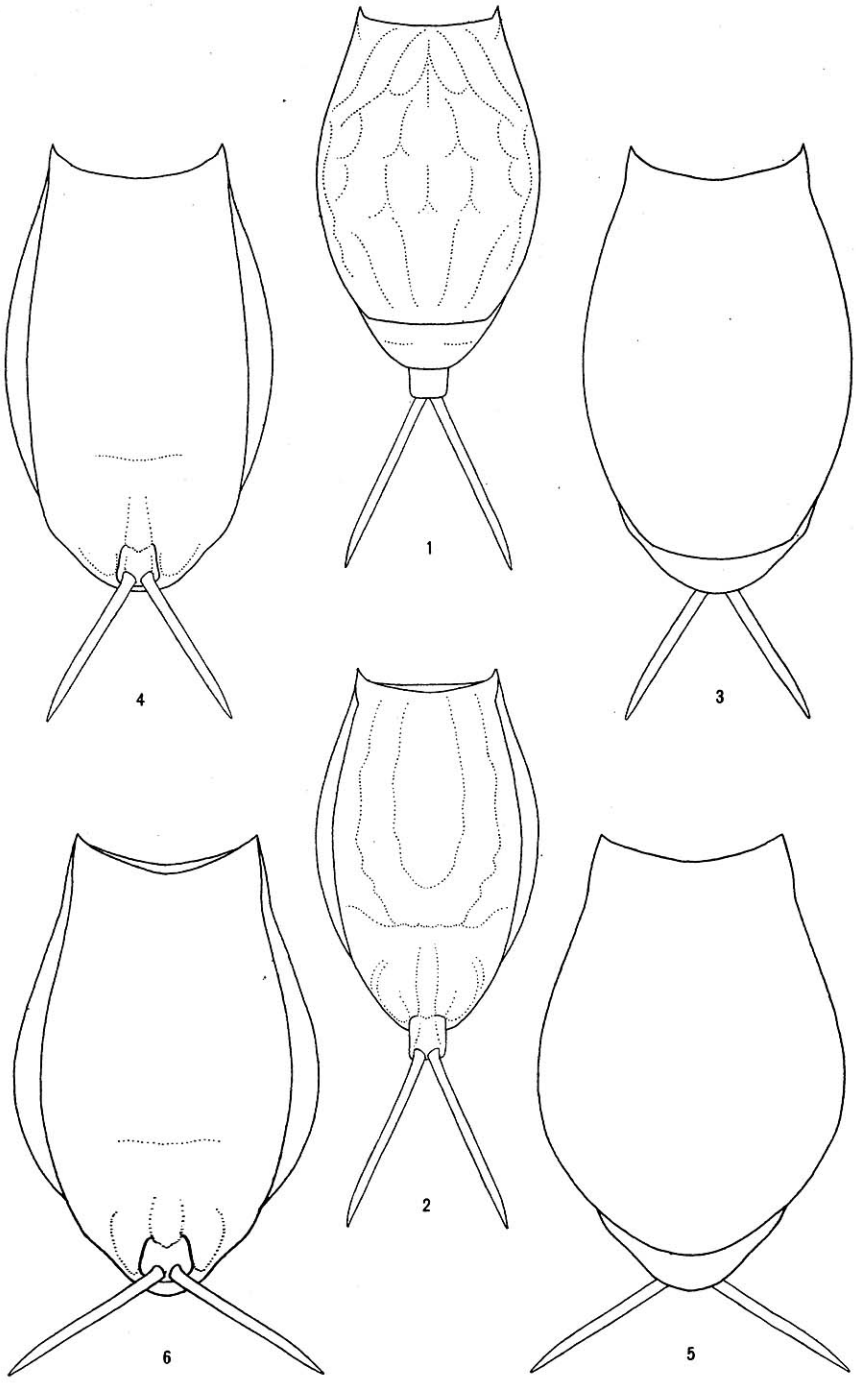
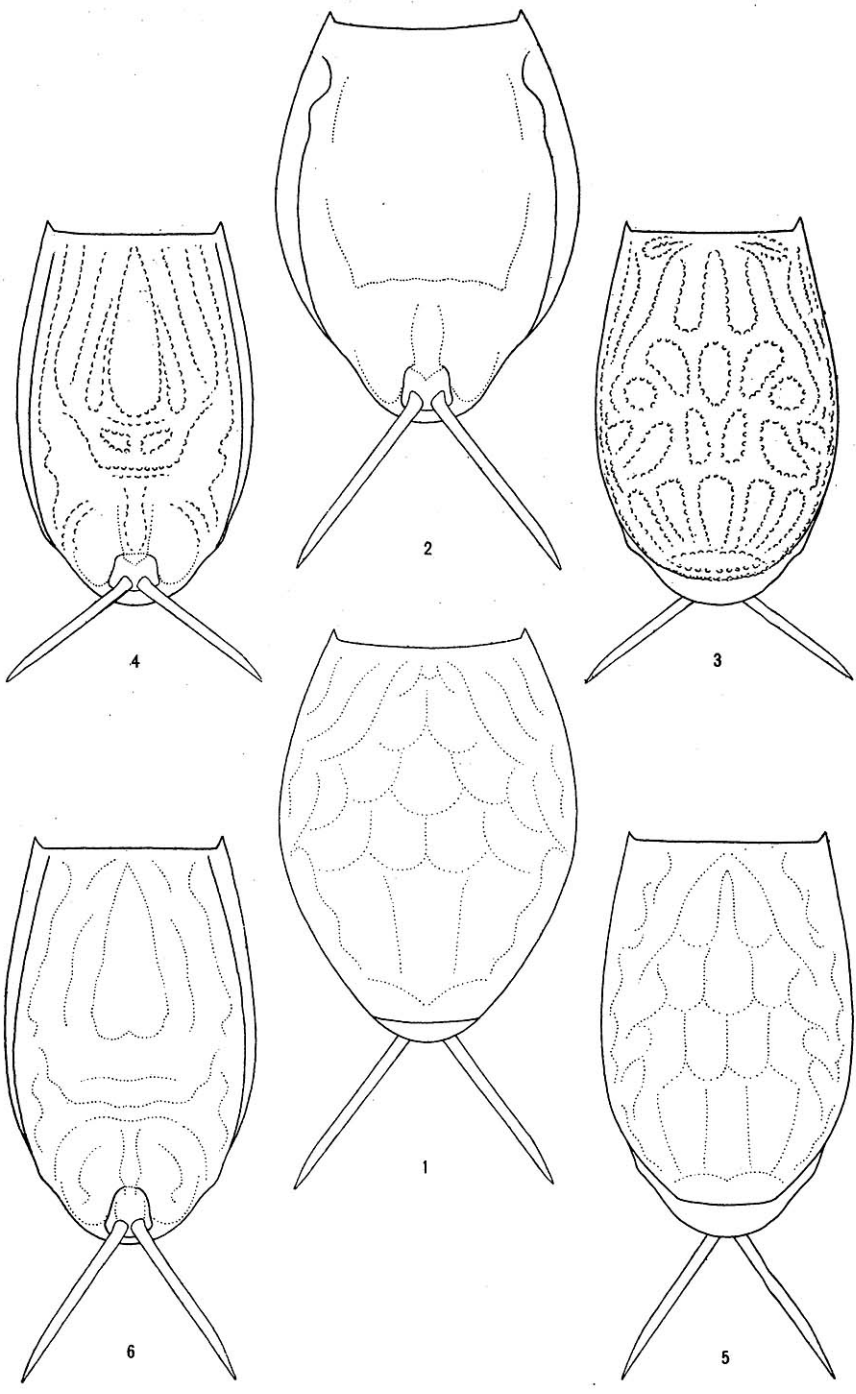



HARRING AND MYERS - LECANE

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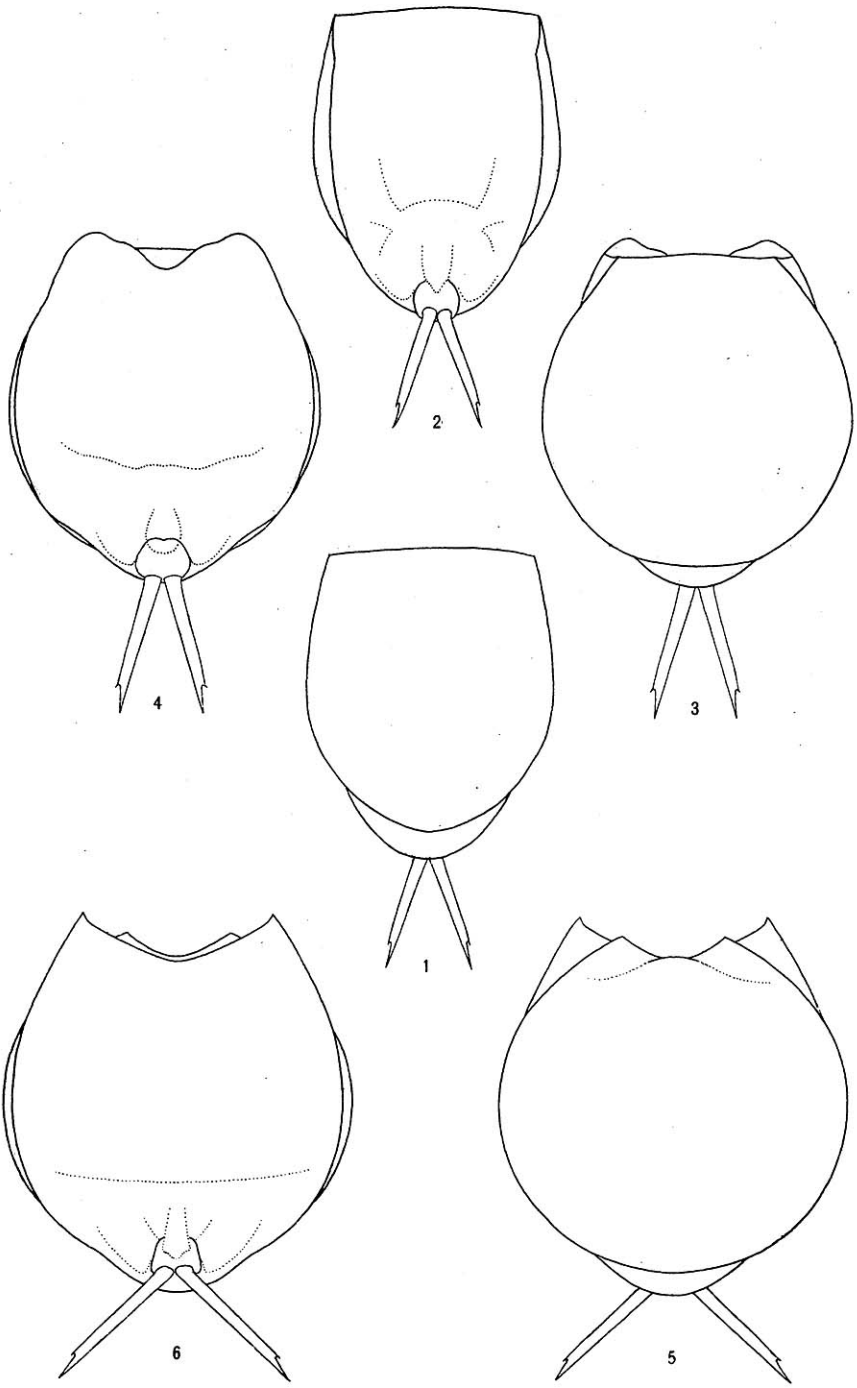
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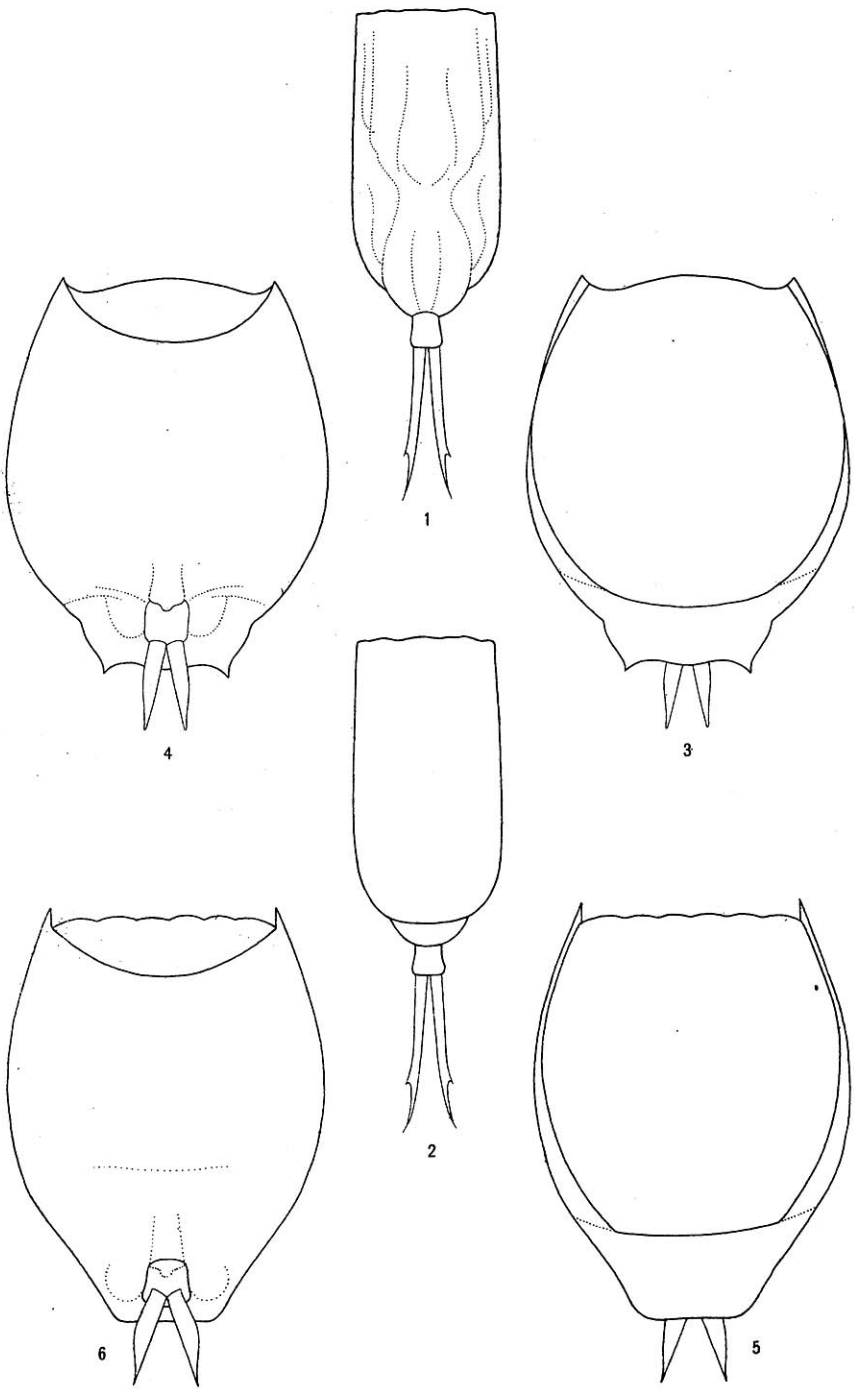
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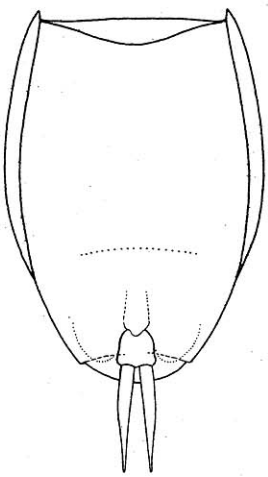

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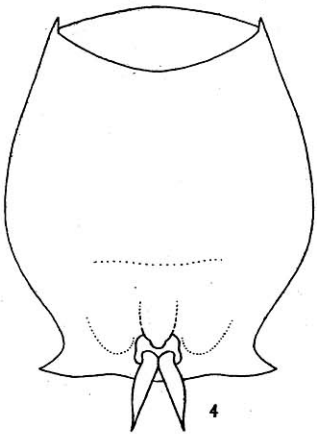

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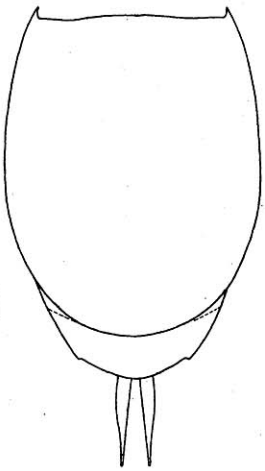

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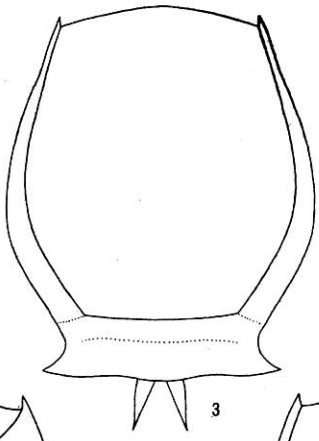

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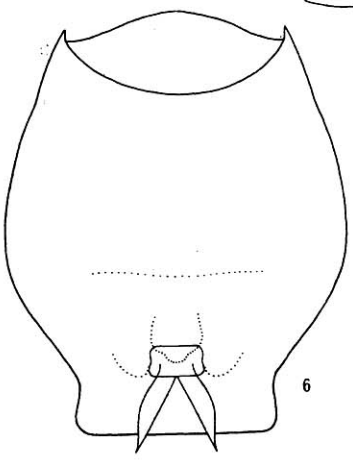

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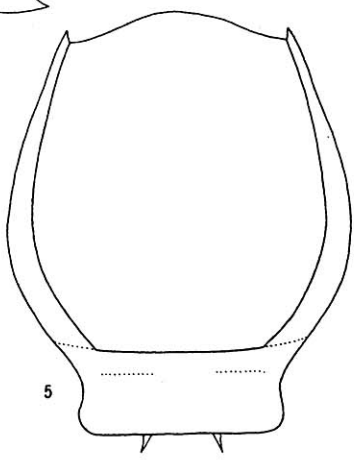

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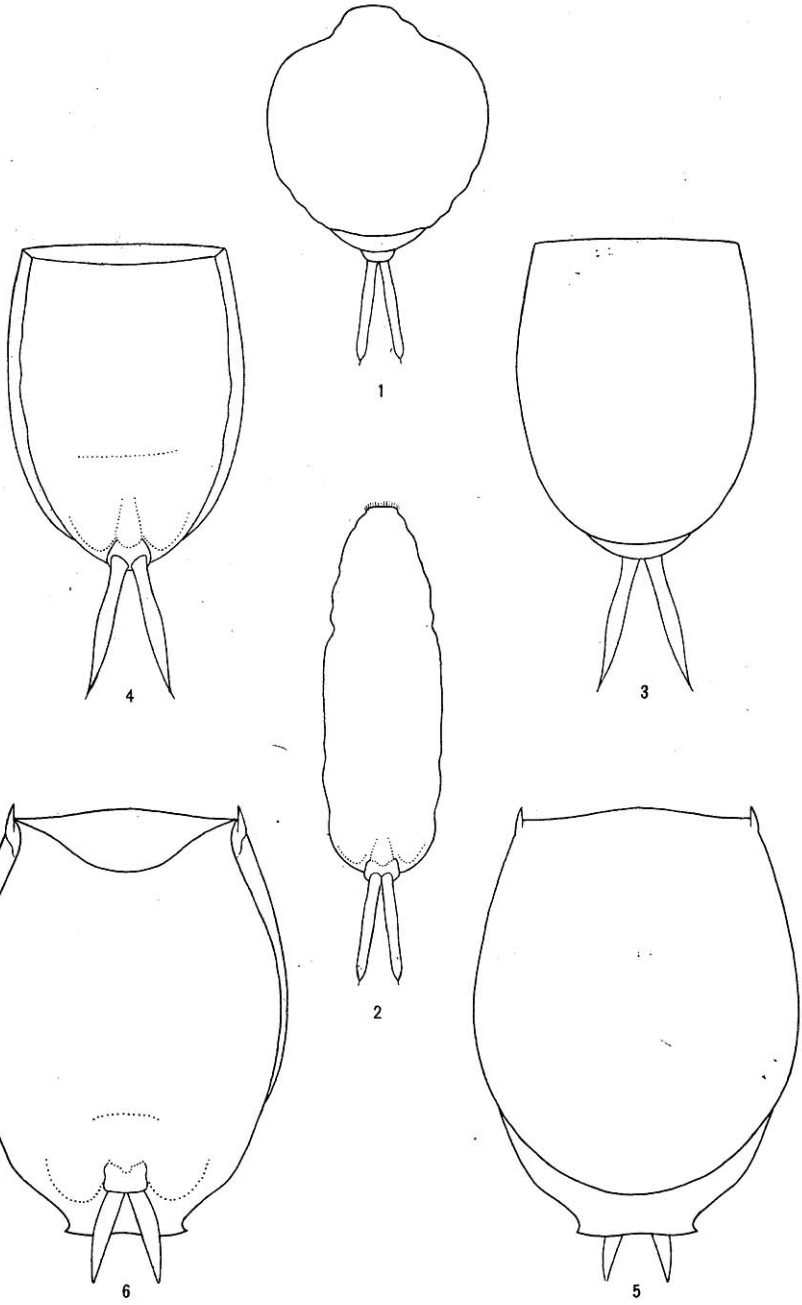
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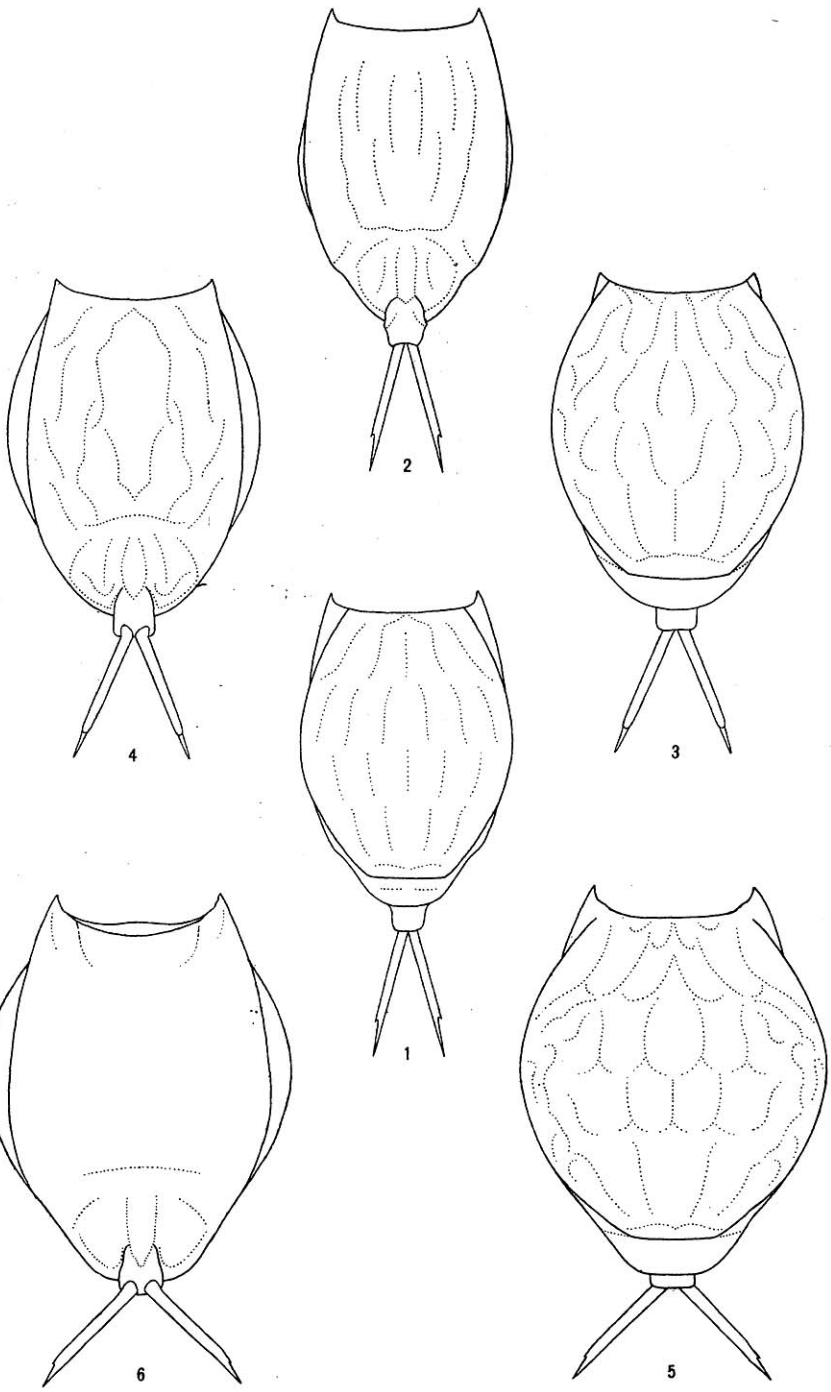
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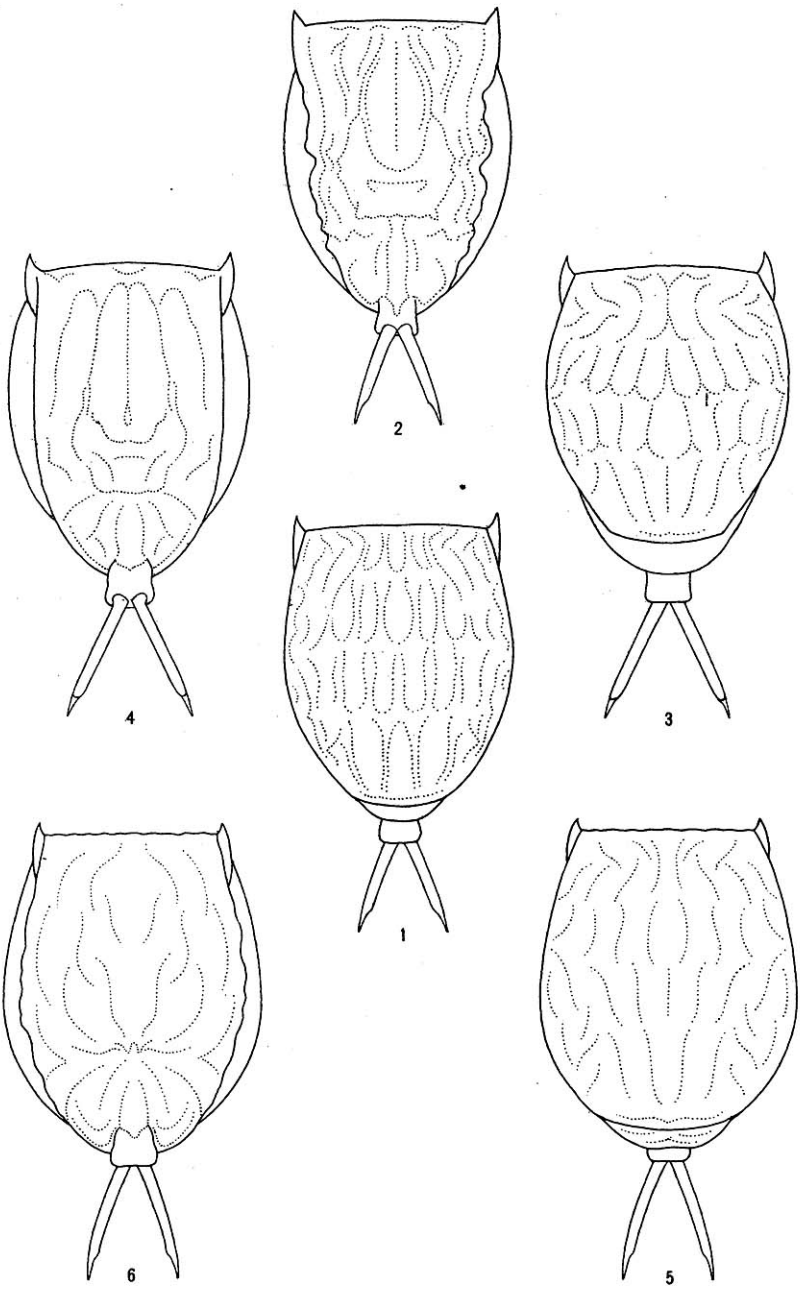
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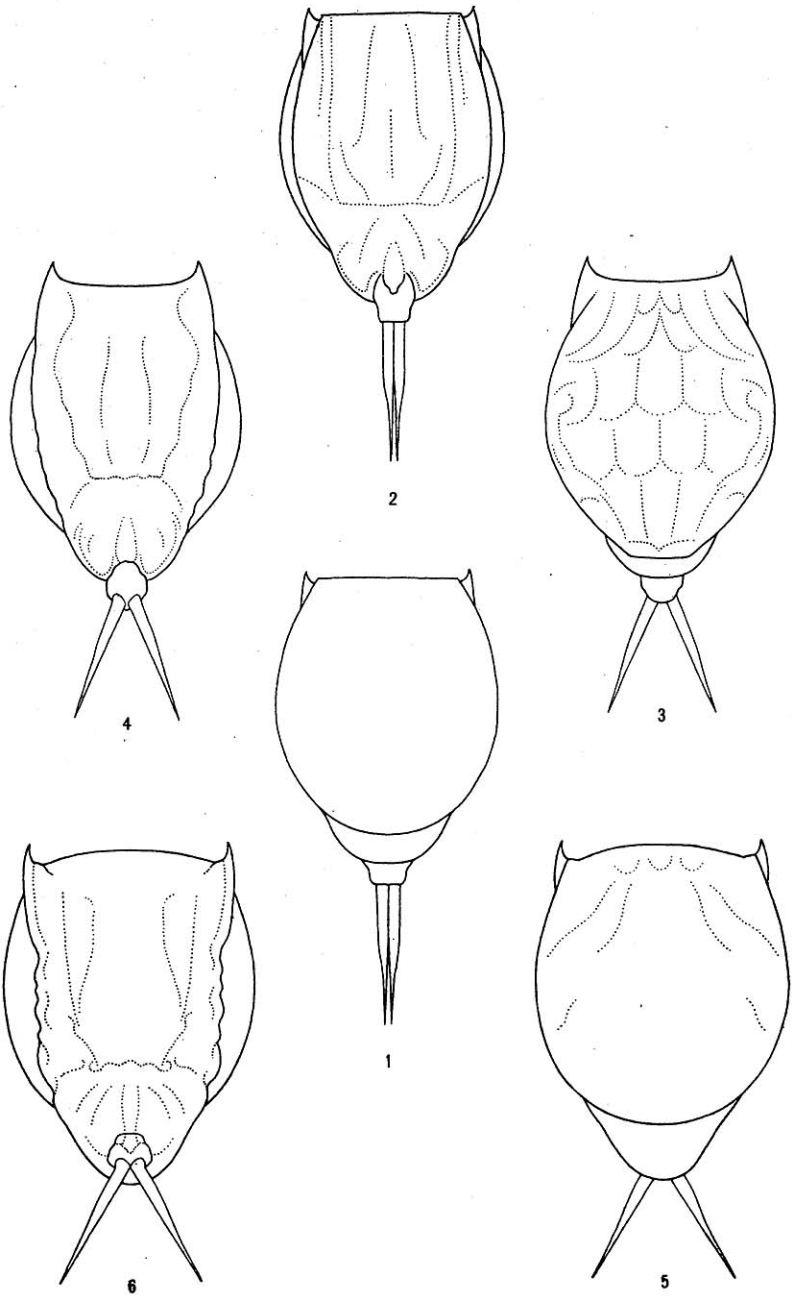
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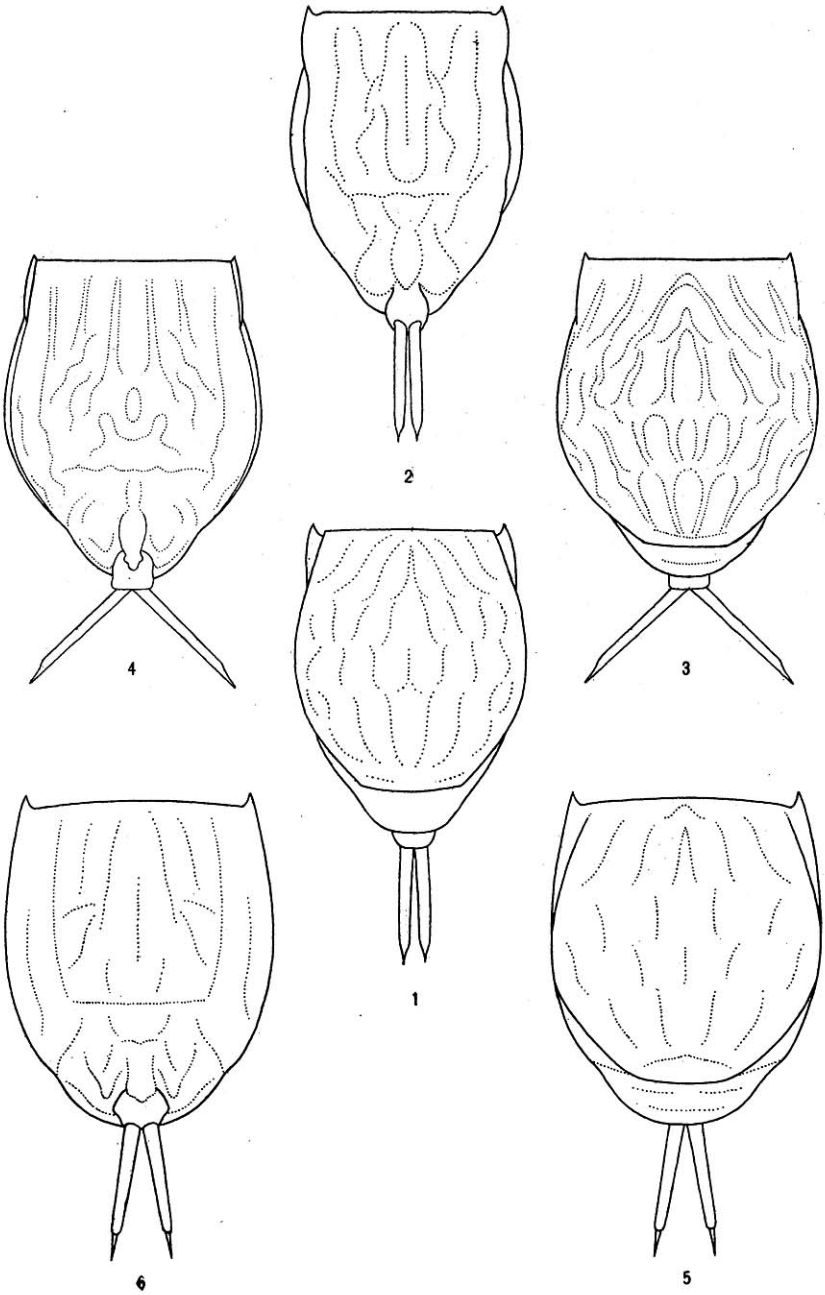
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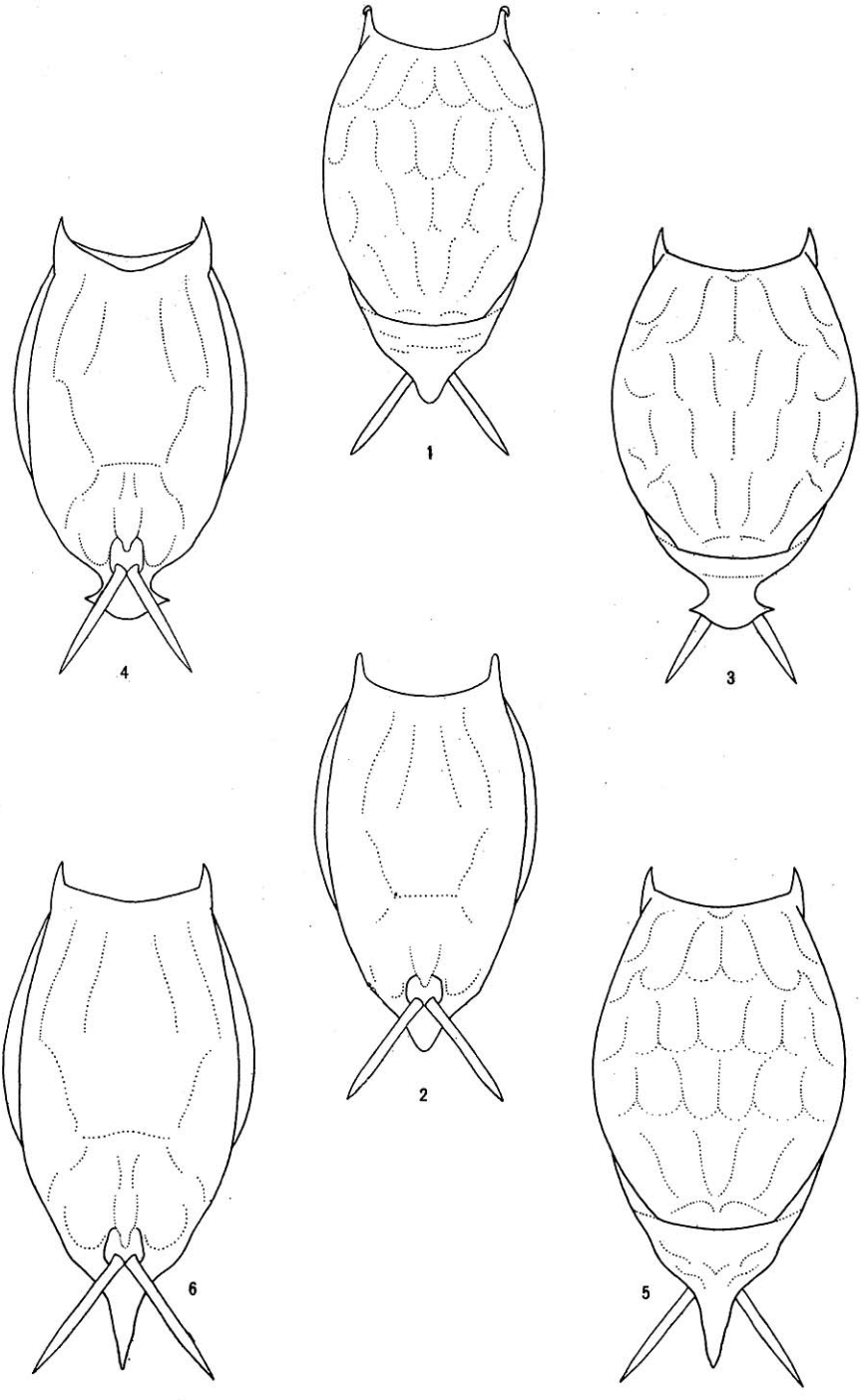
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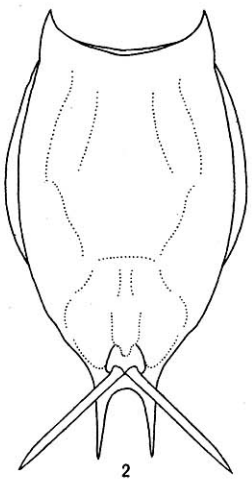
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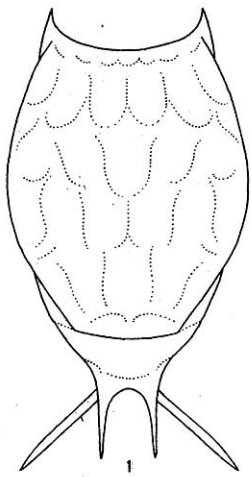
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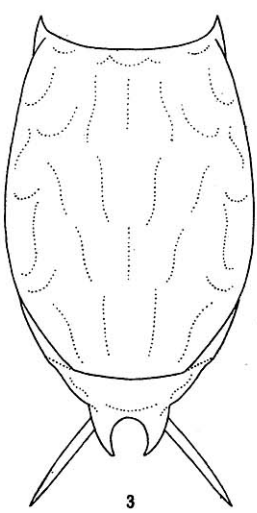
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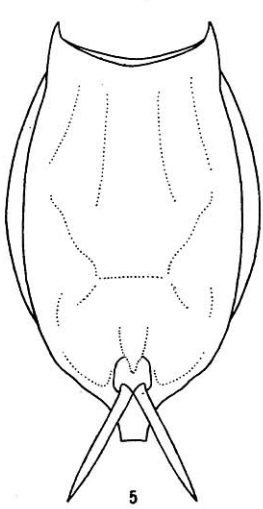
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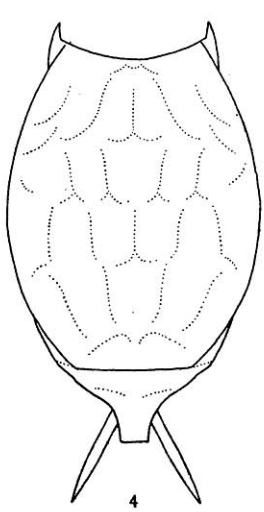
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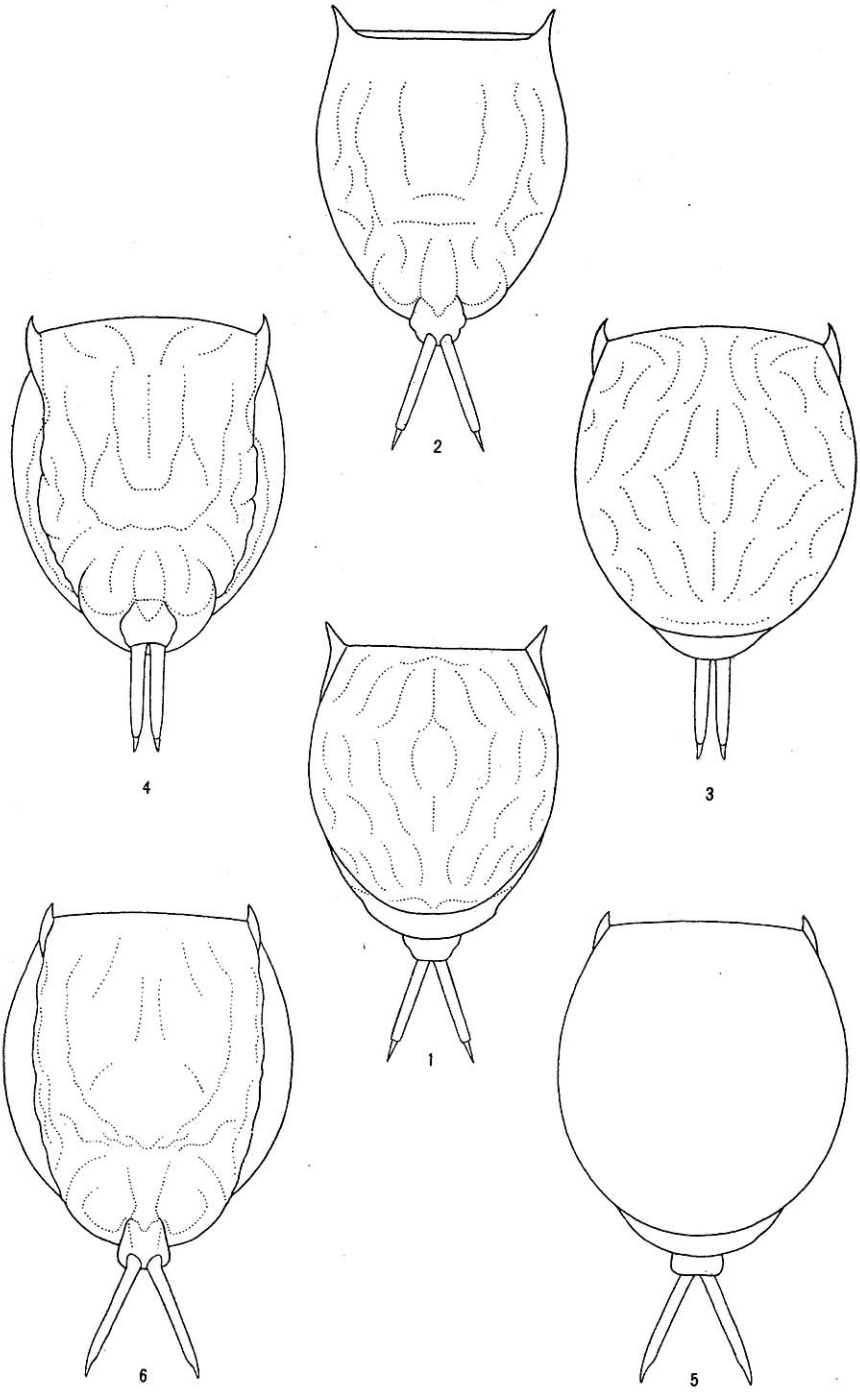
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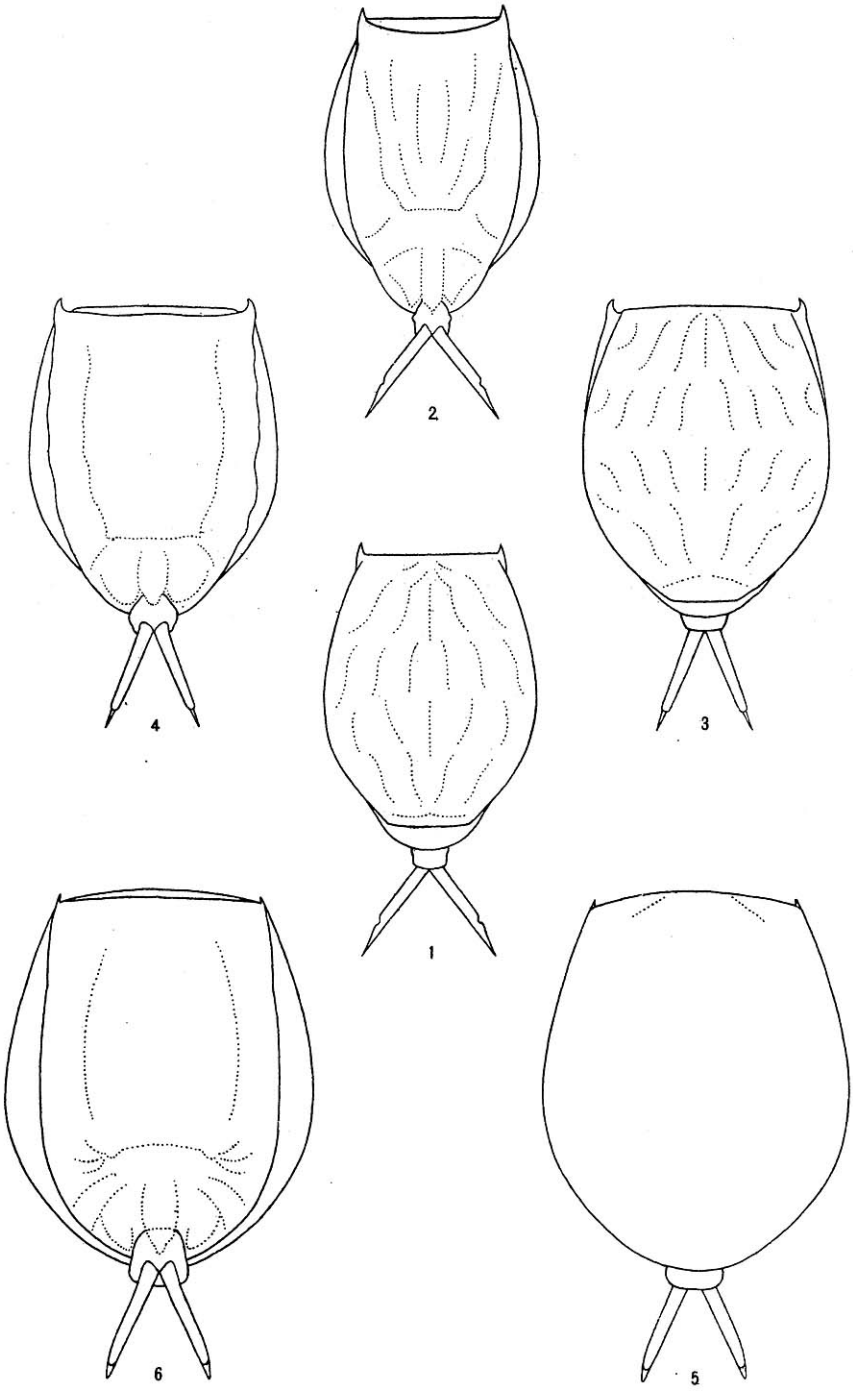
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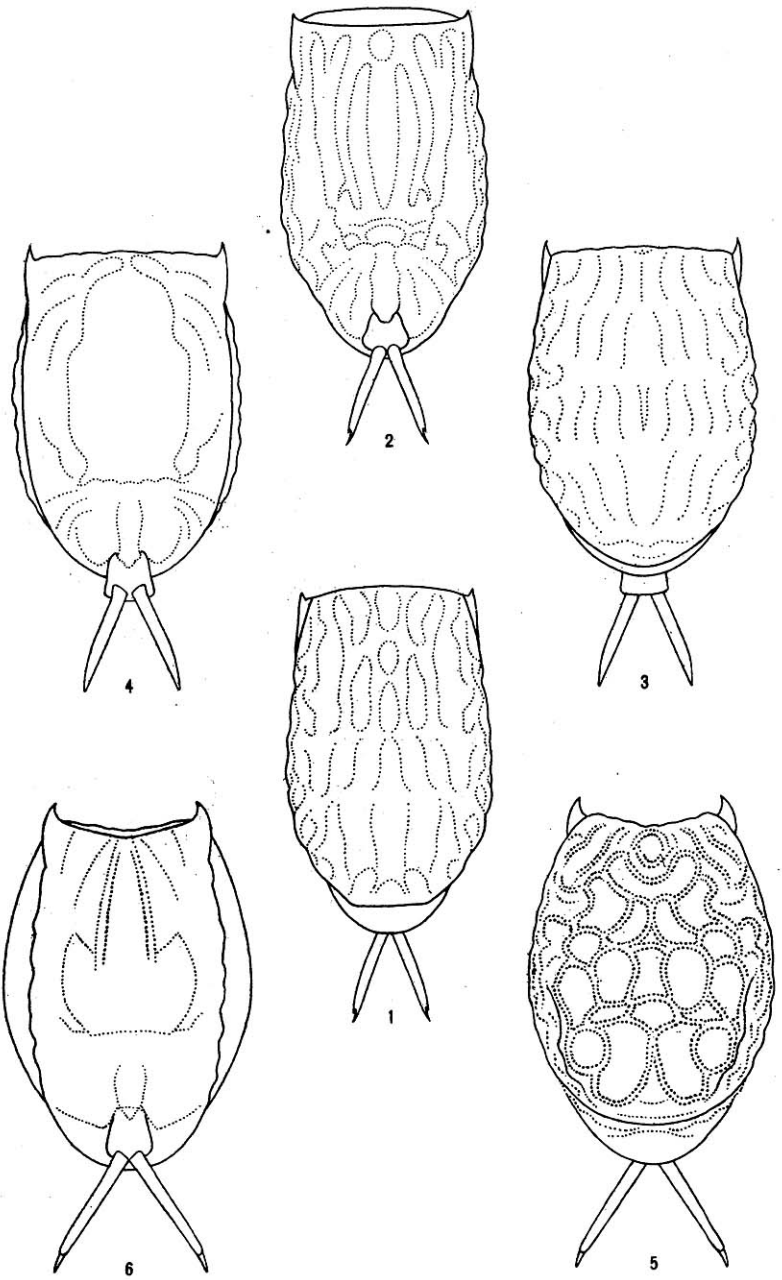
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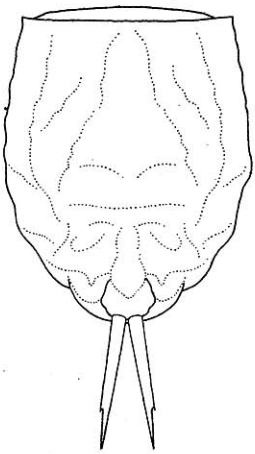

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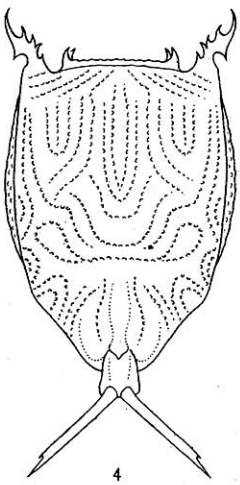

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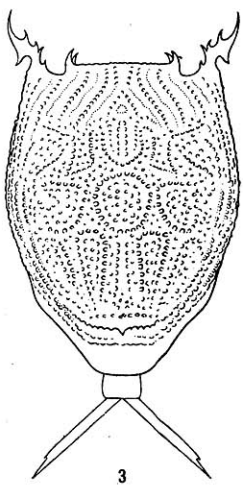

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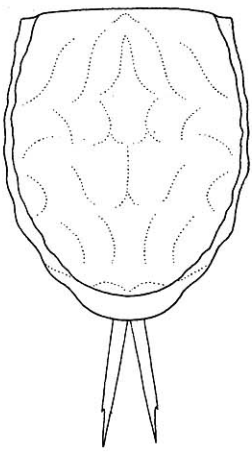

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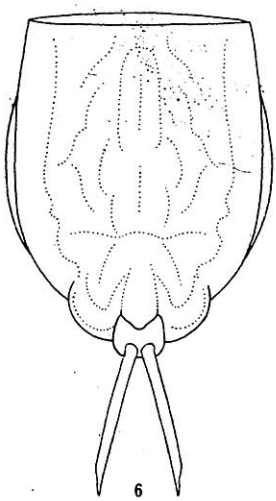

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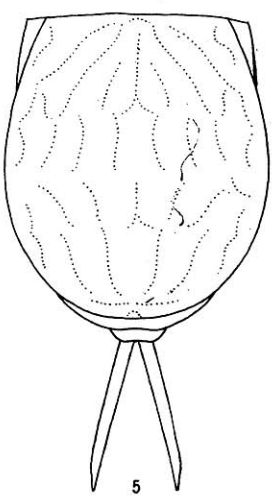

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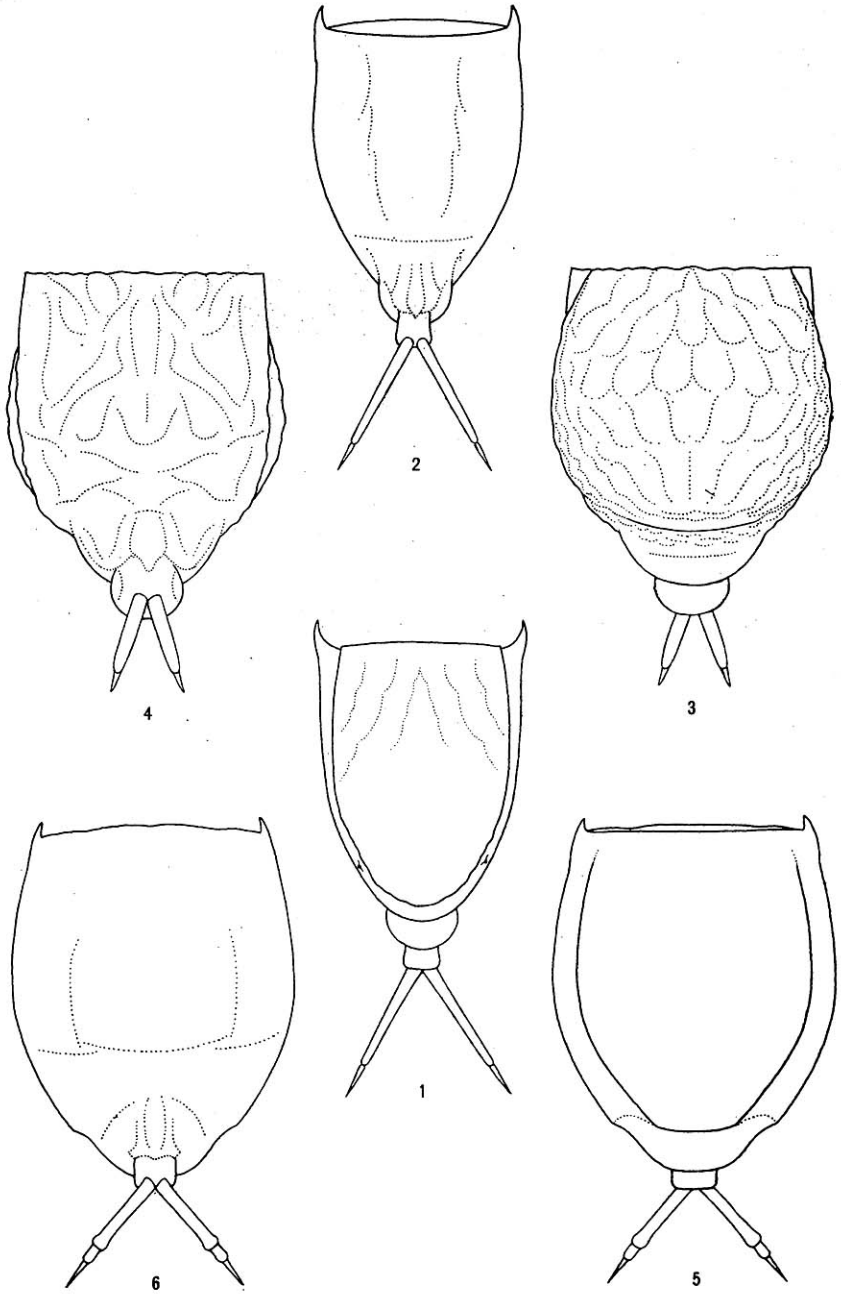
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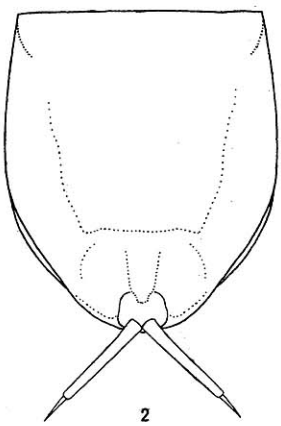

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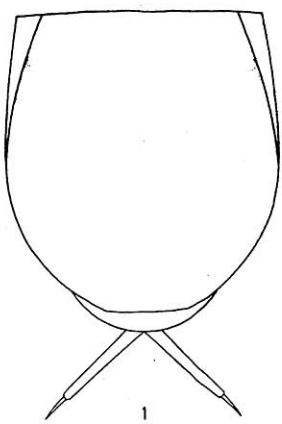

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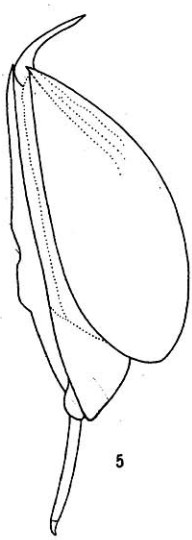

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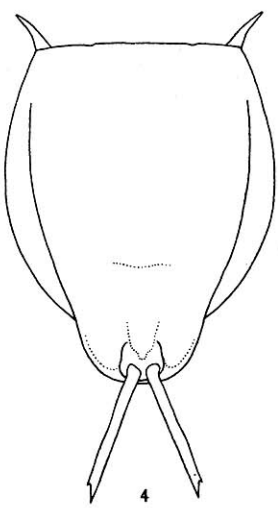

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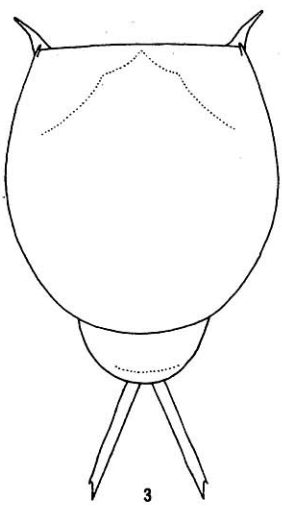

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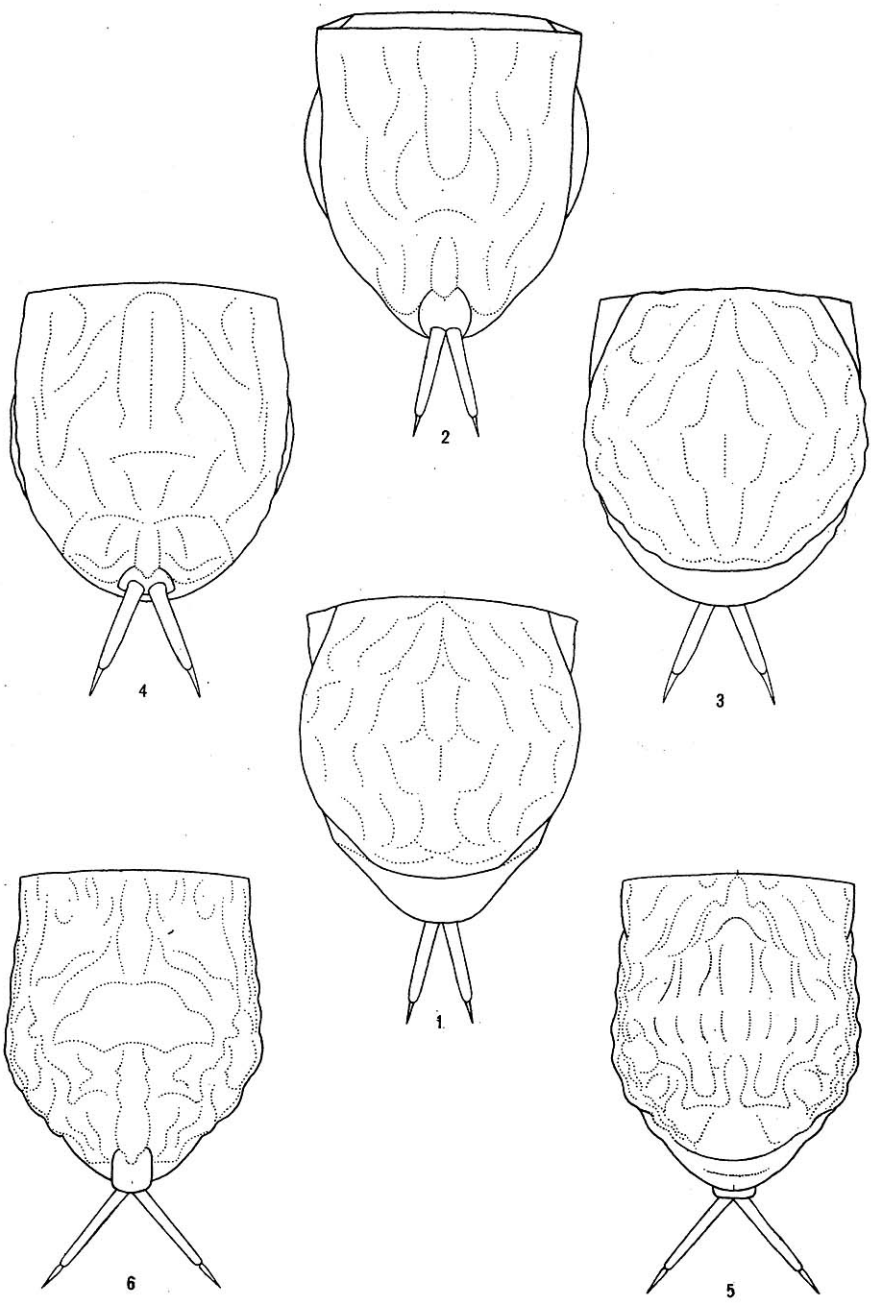
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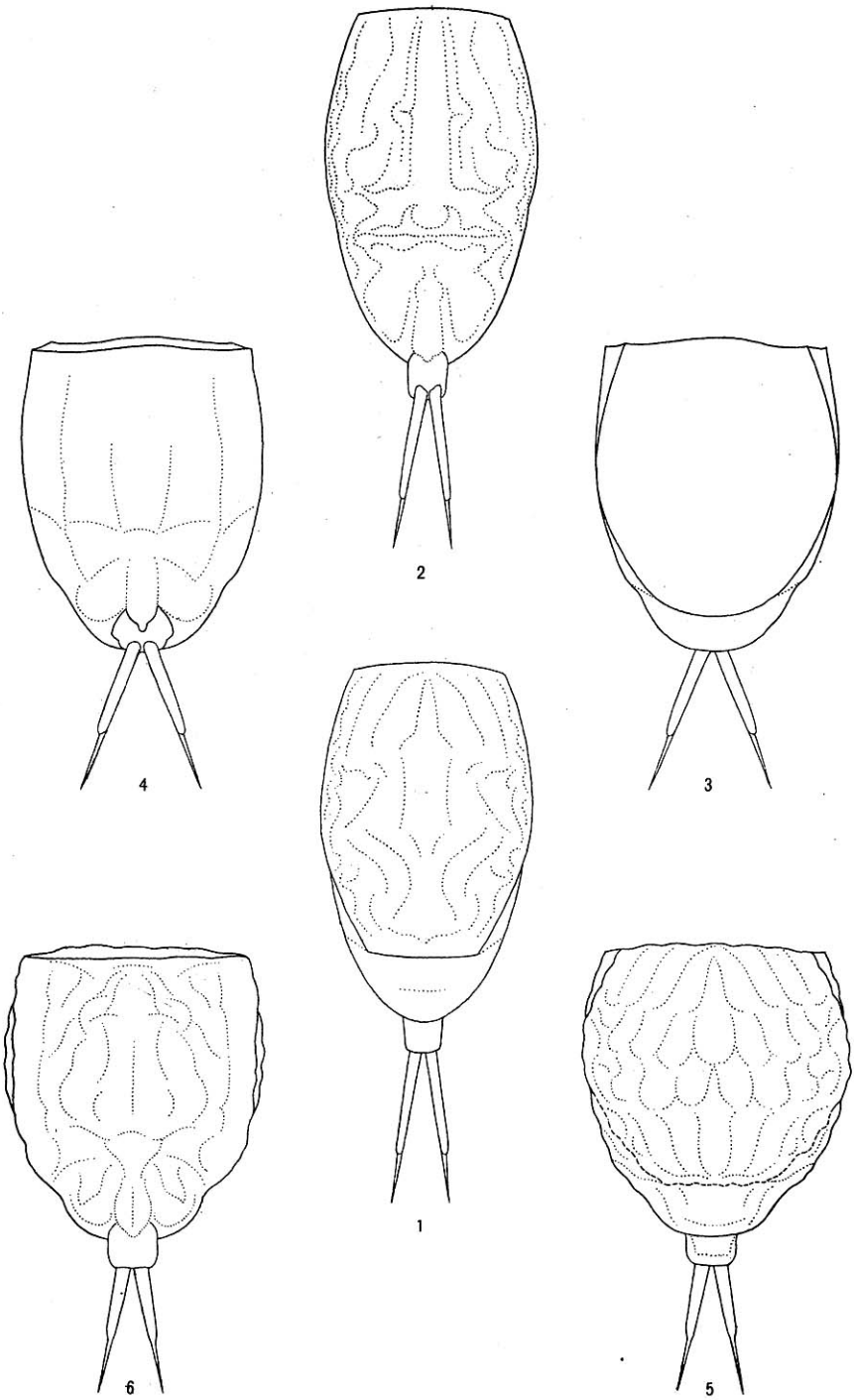
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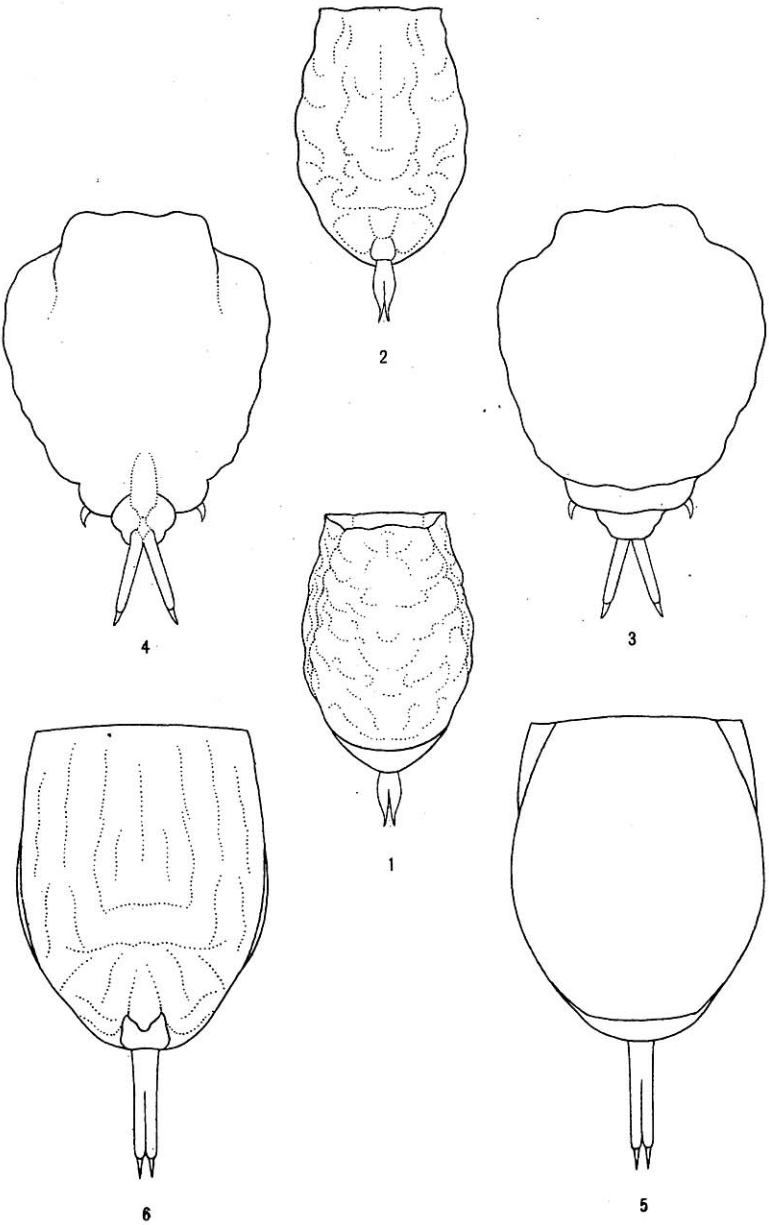
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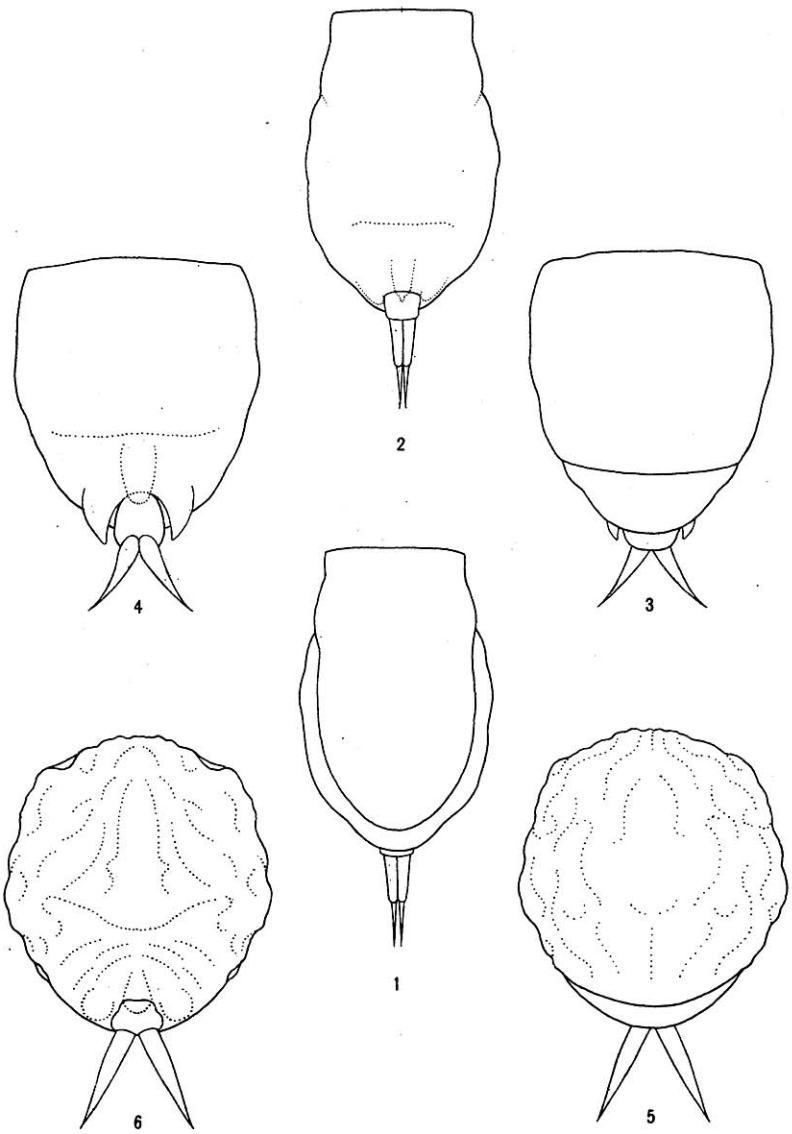
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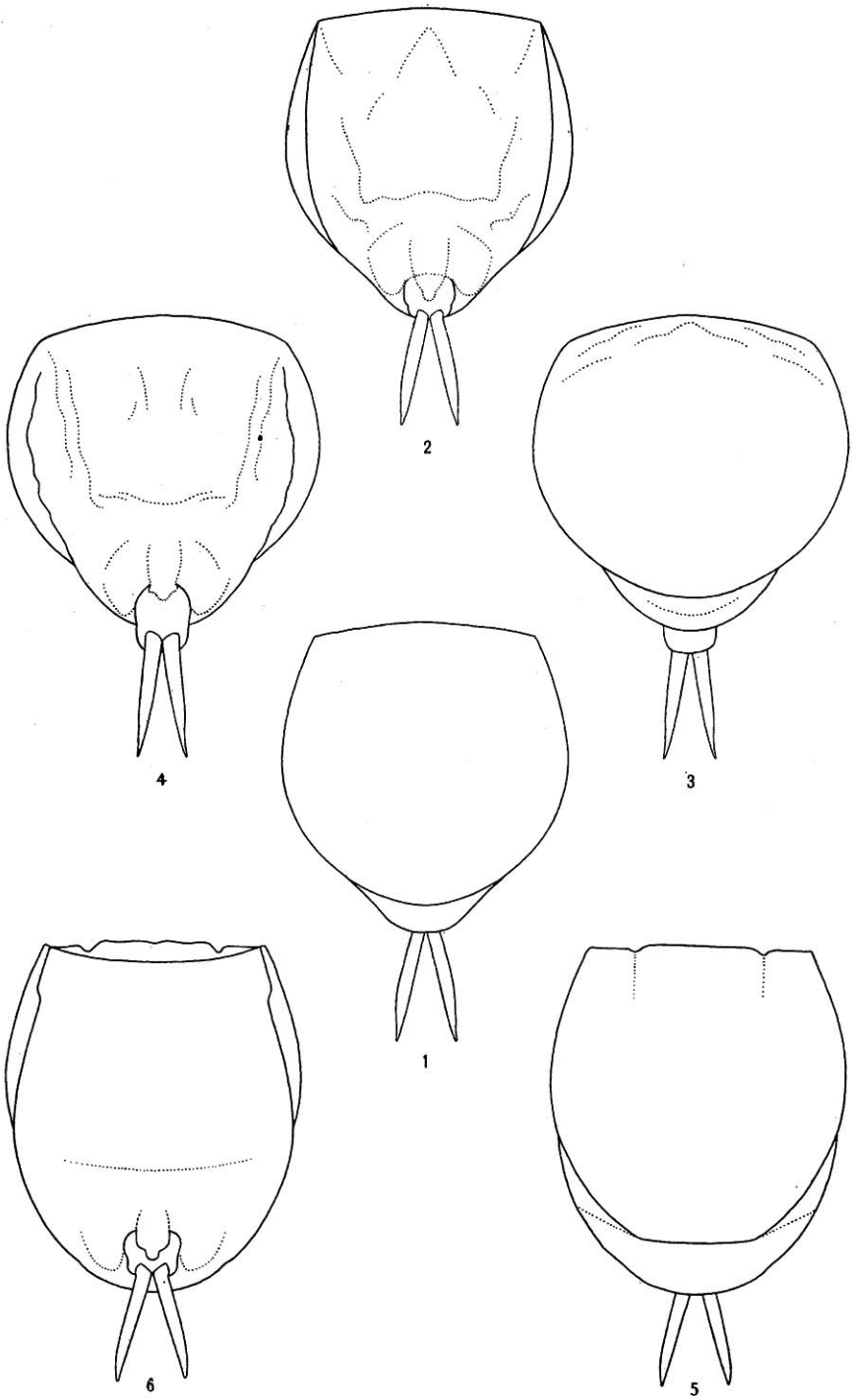


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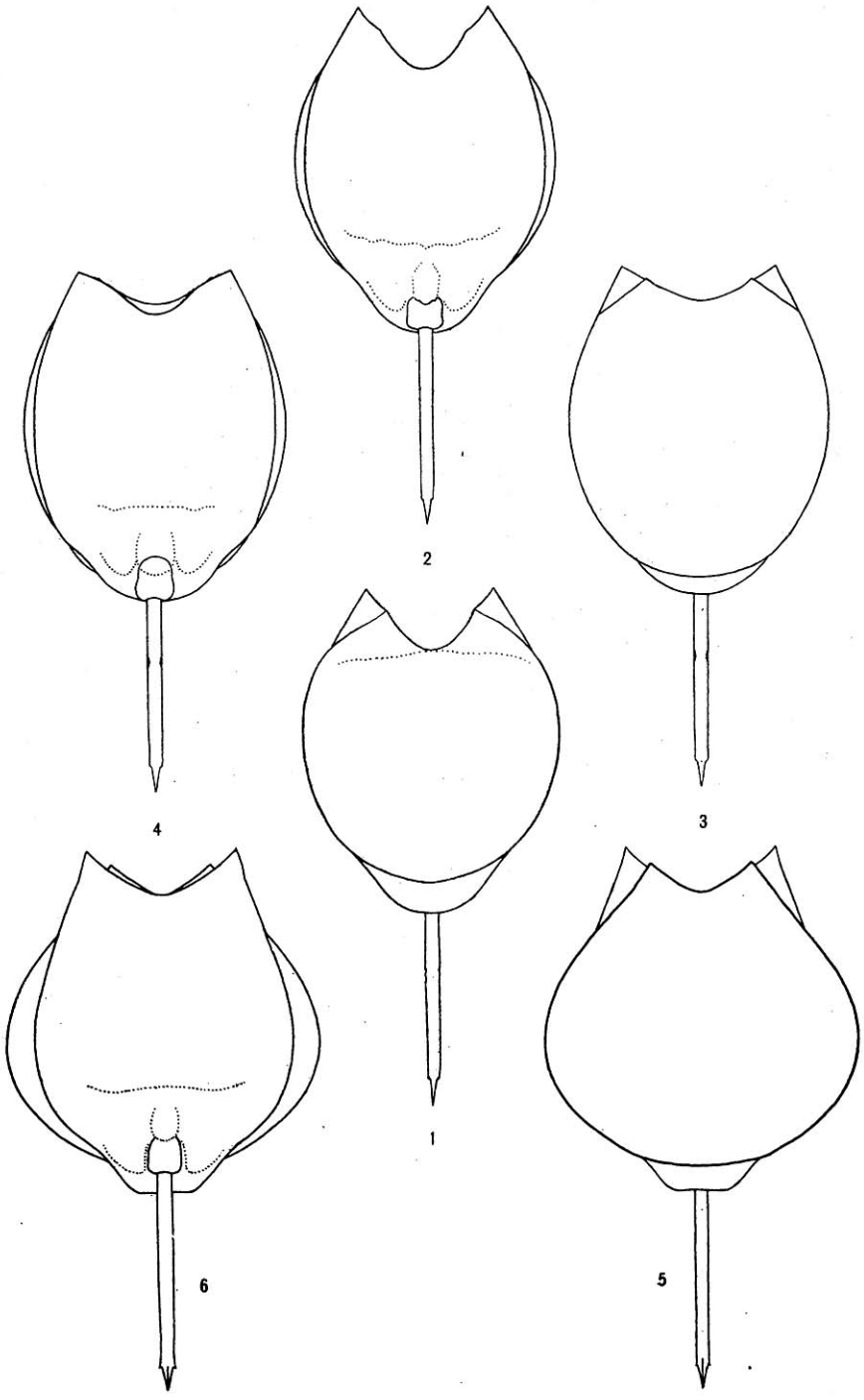
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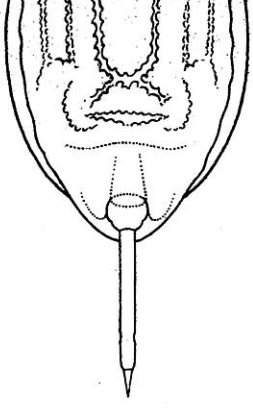

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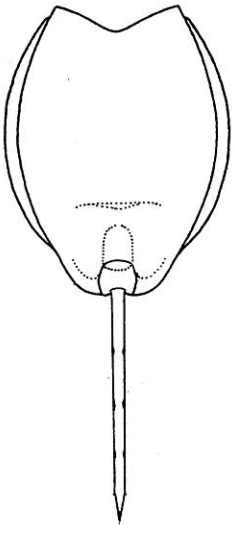

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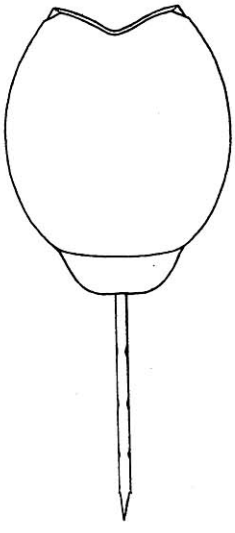

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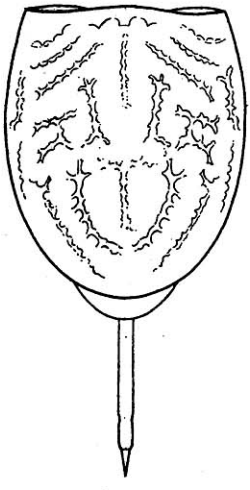

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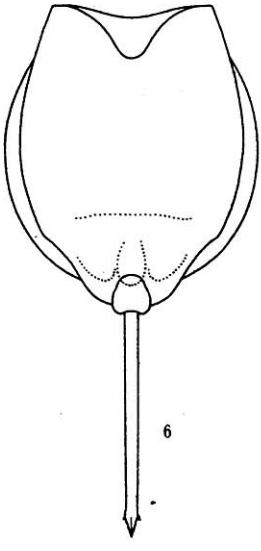

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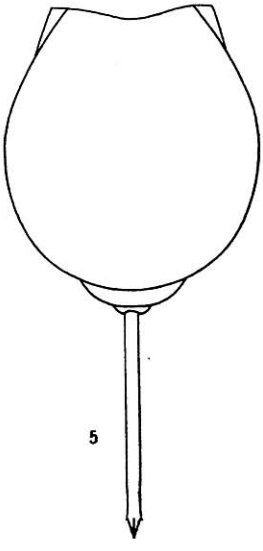

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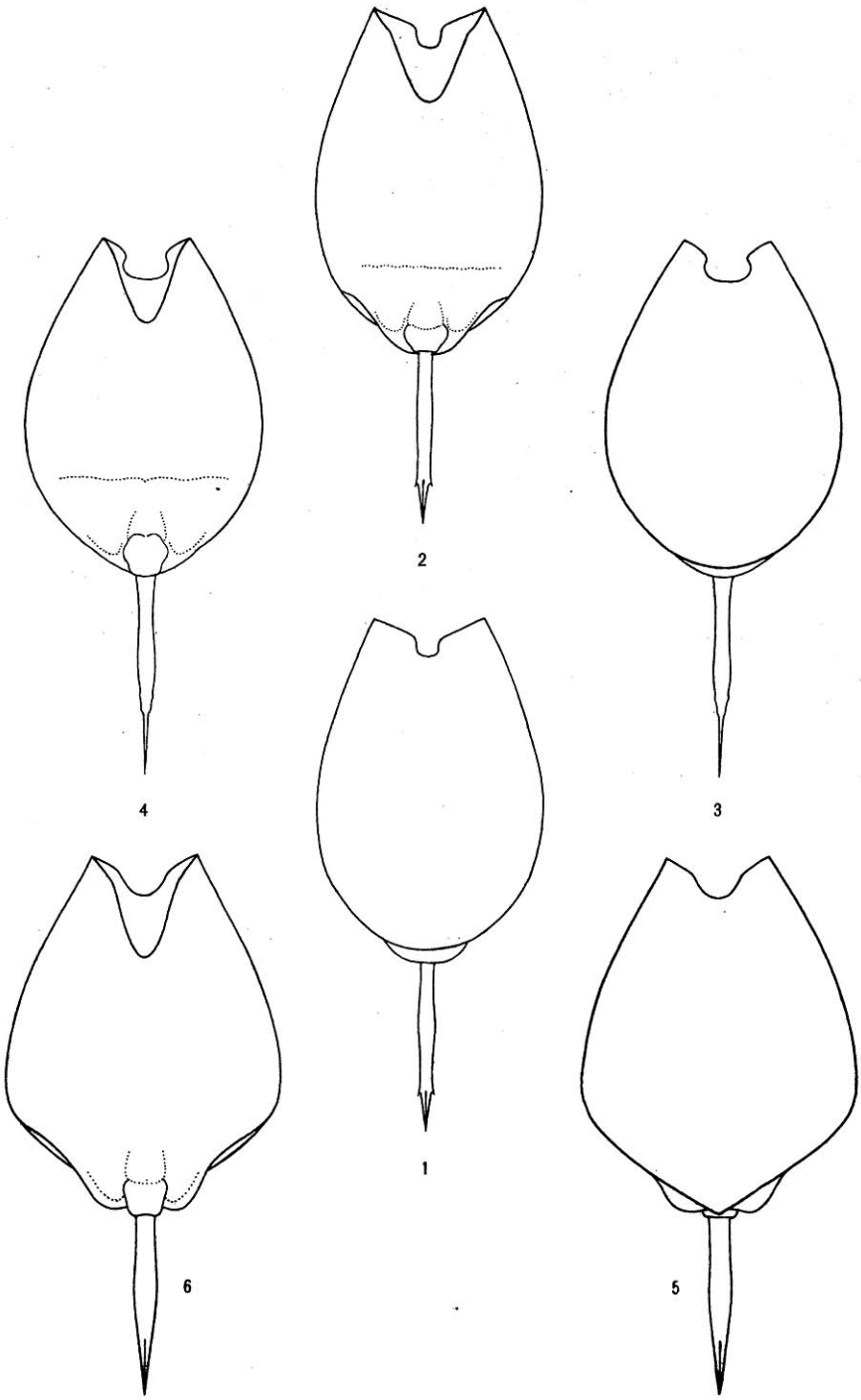
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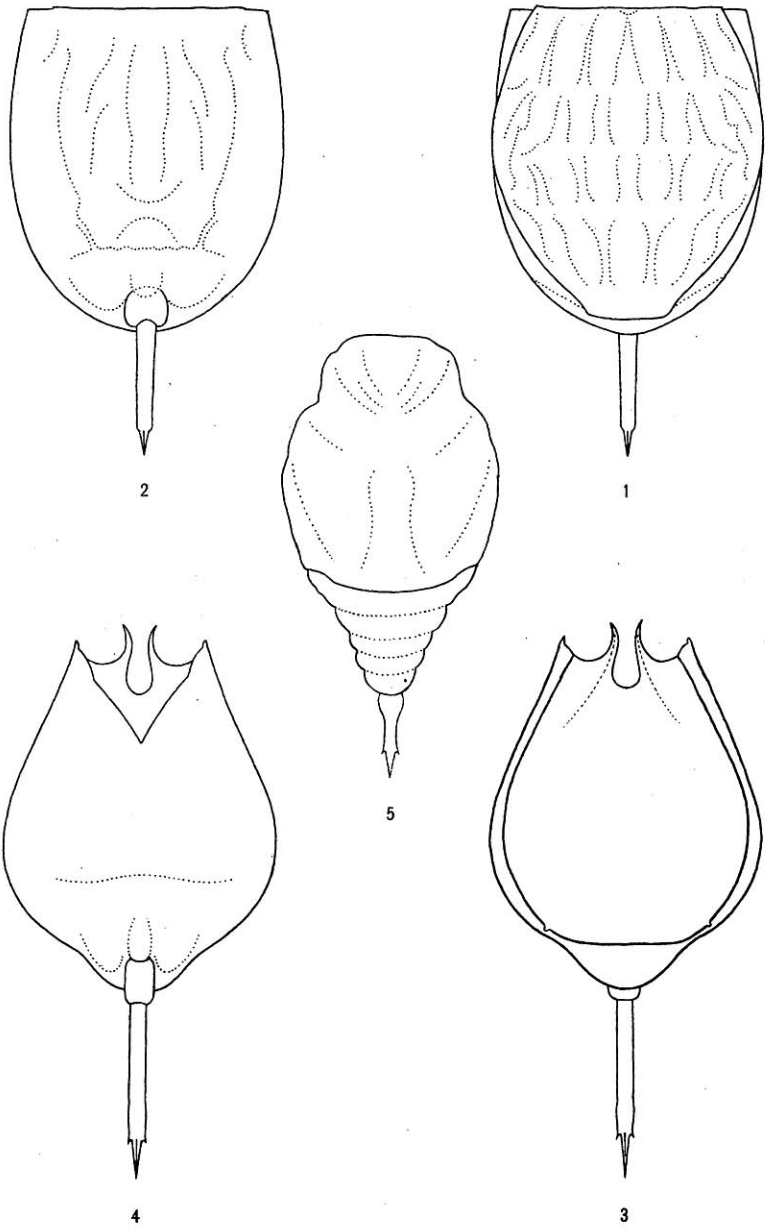
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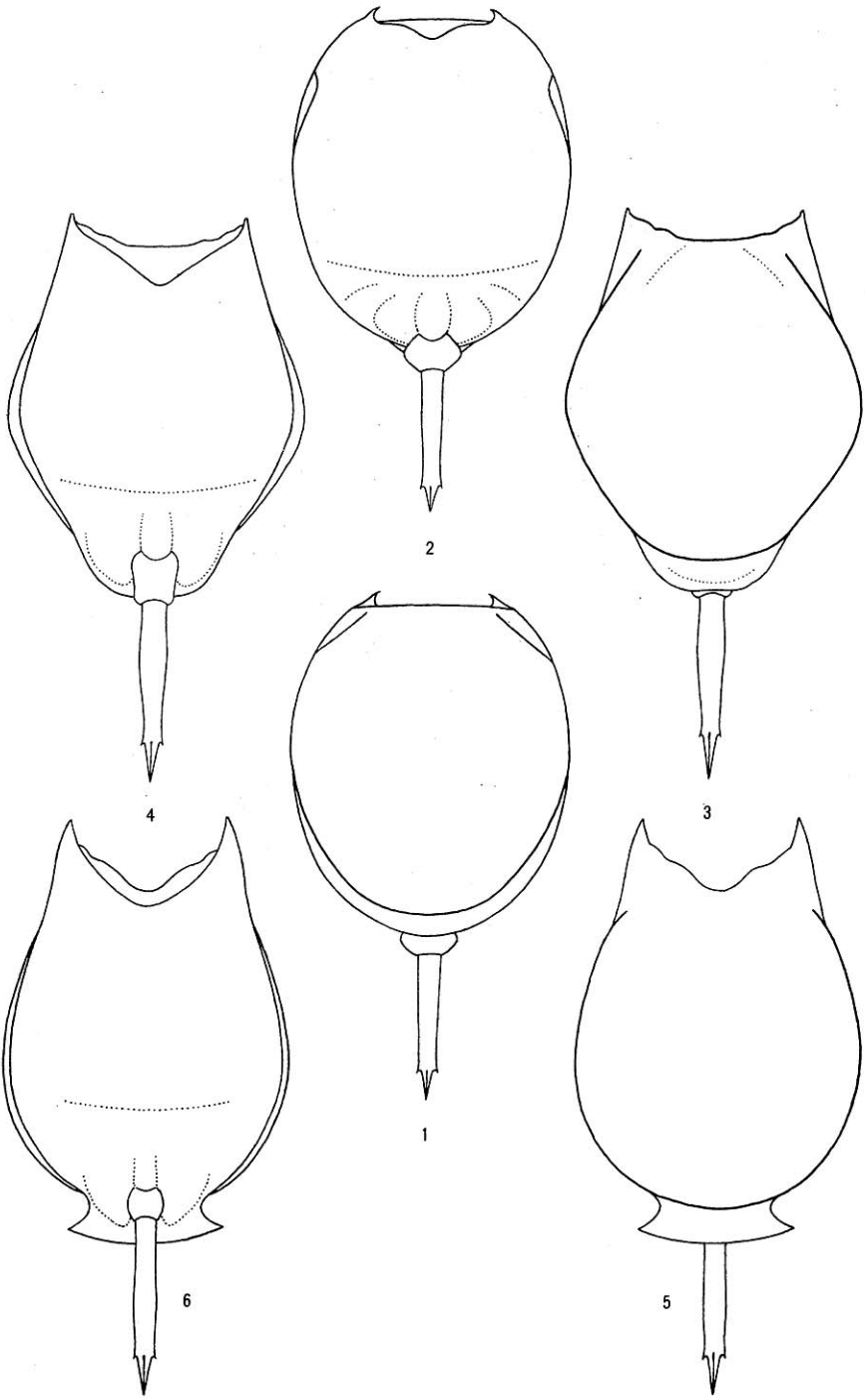
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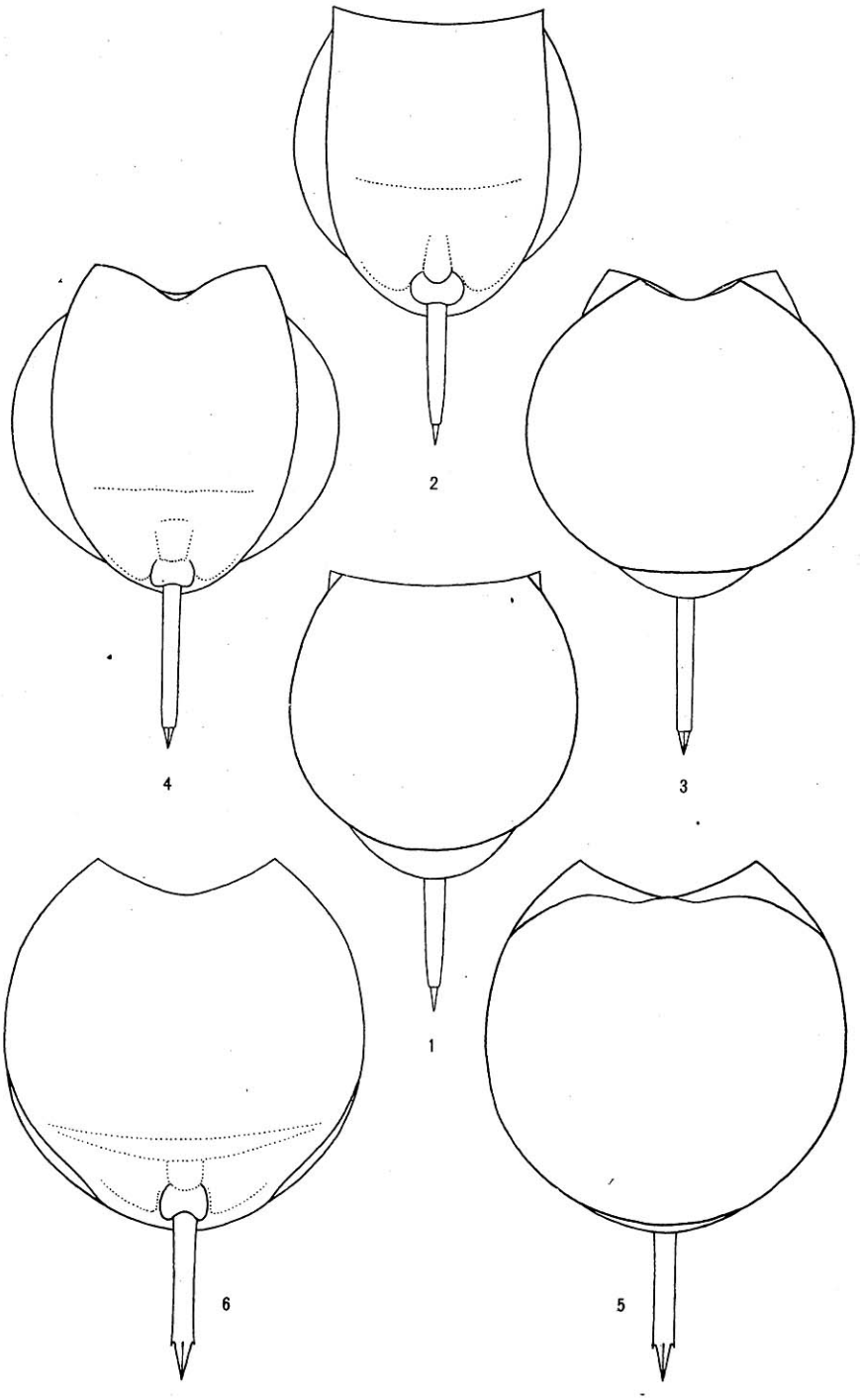
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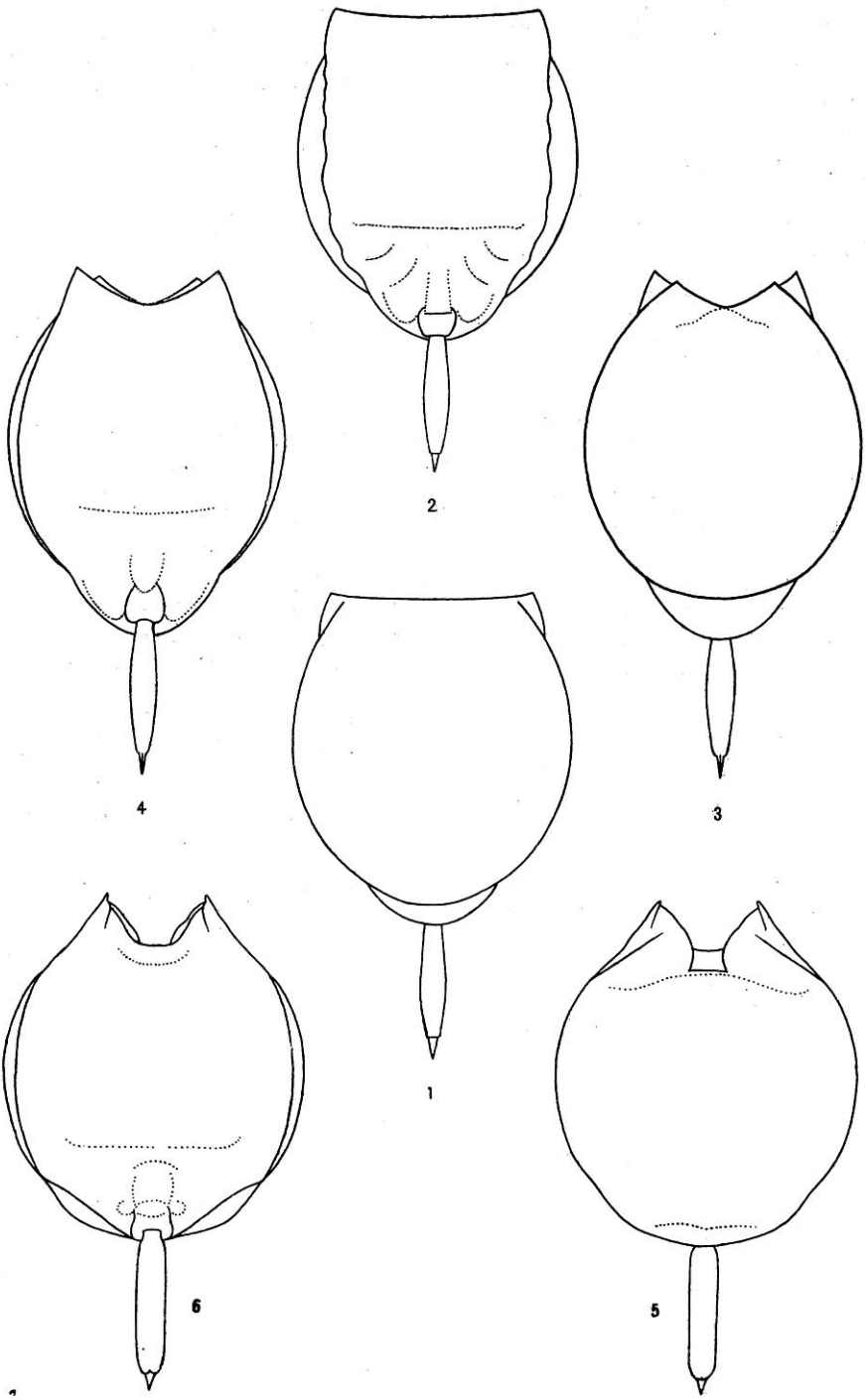
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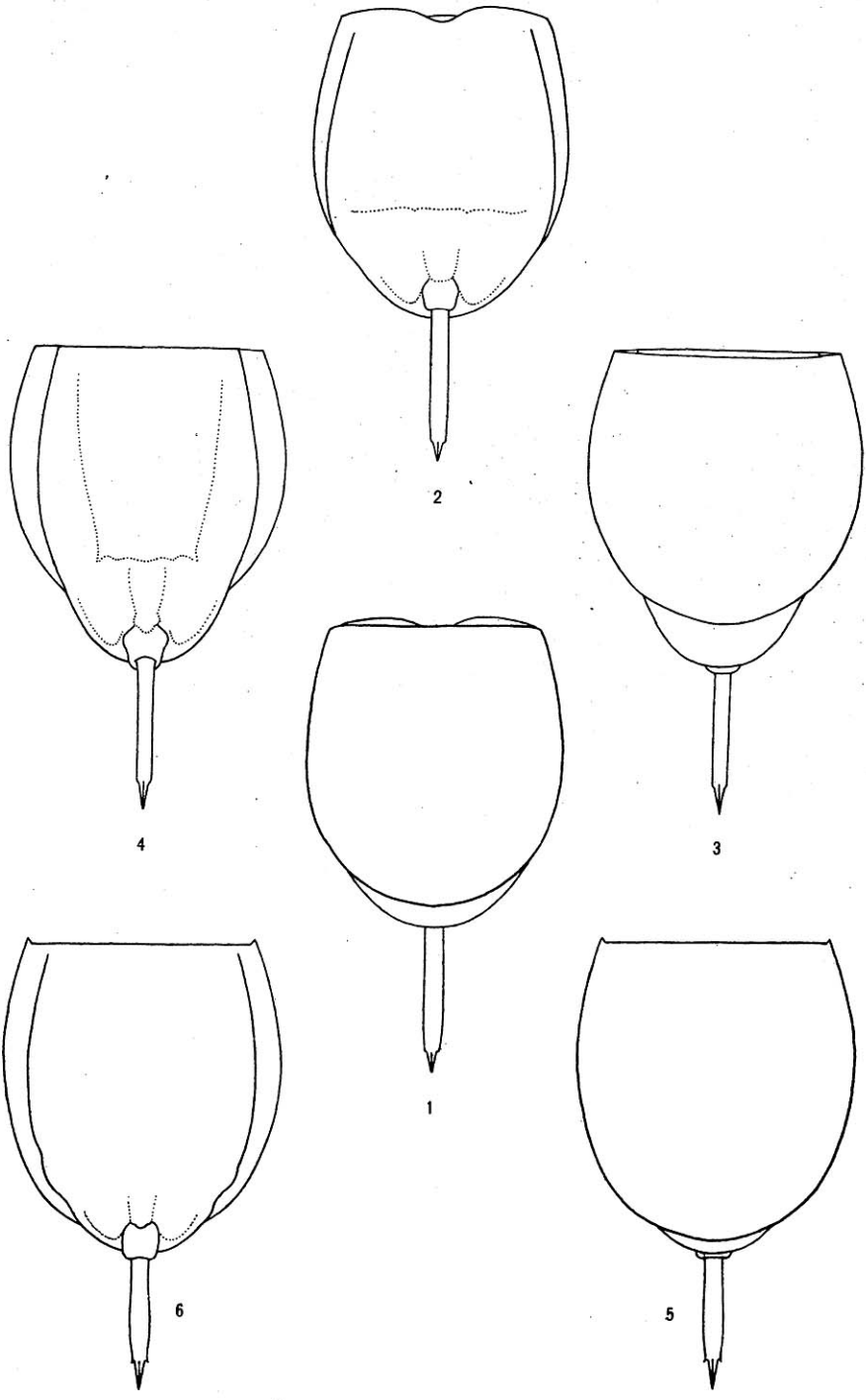
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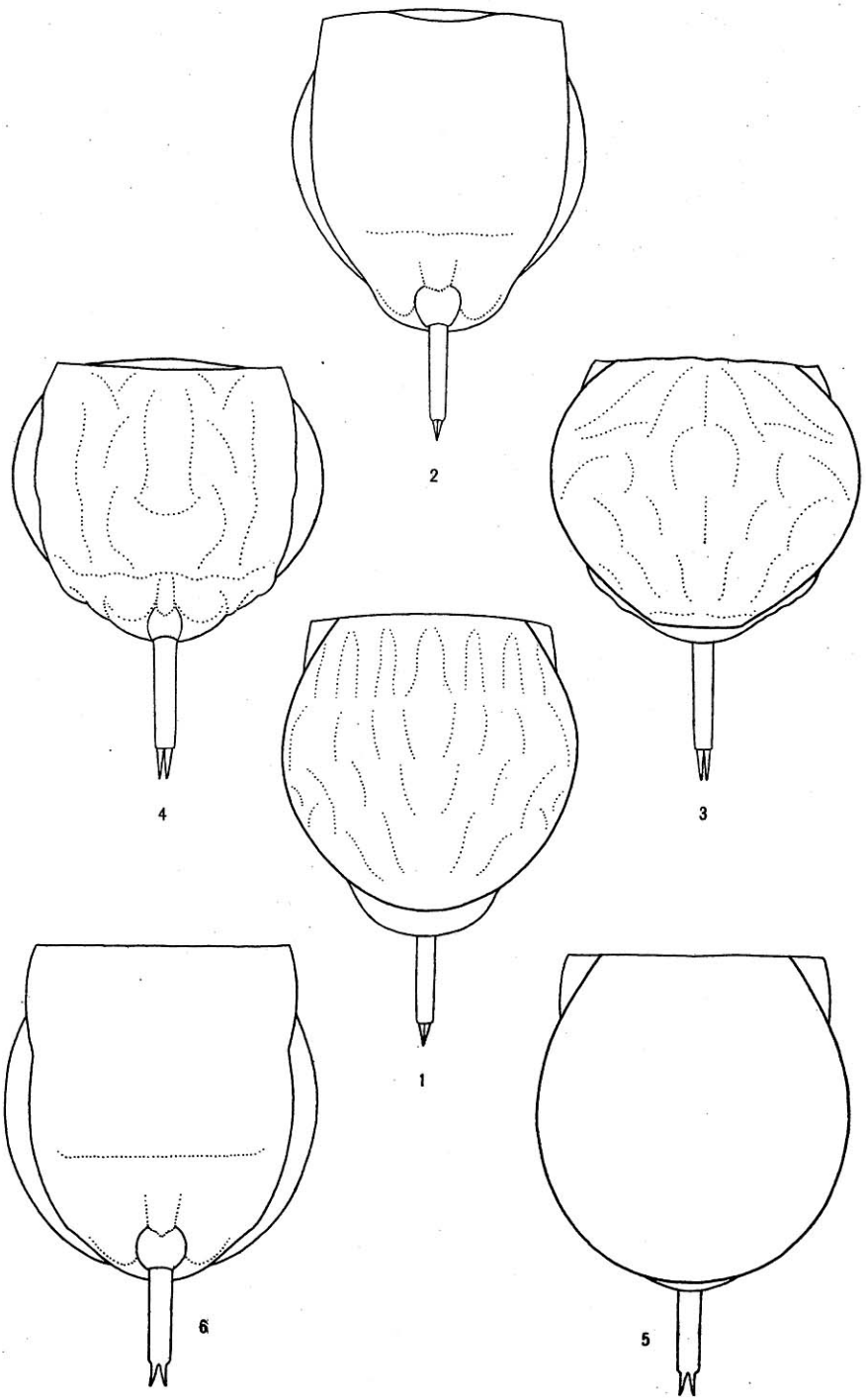
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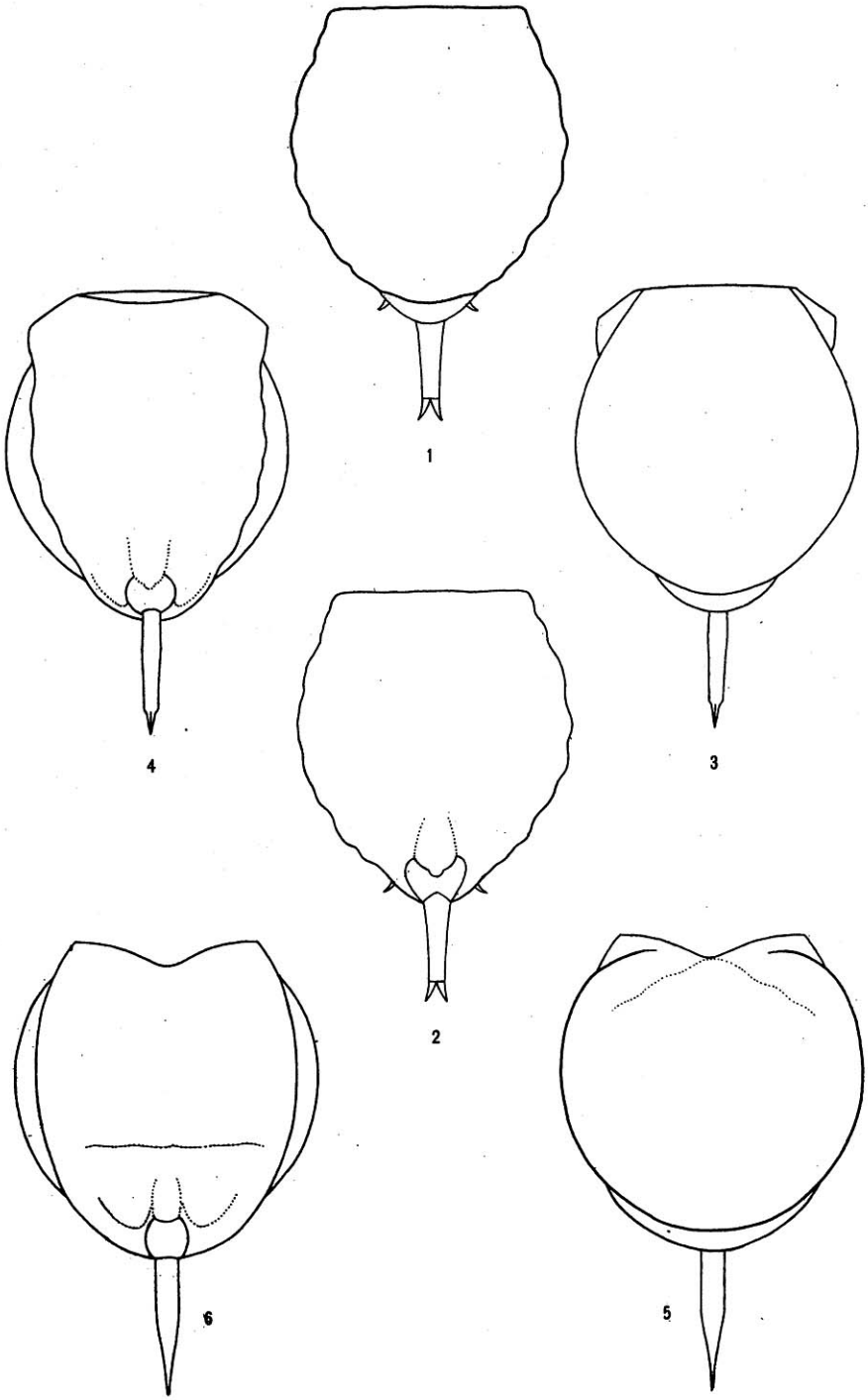
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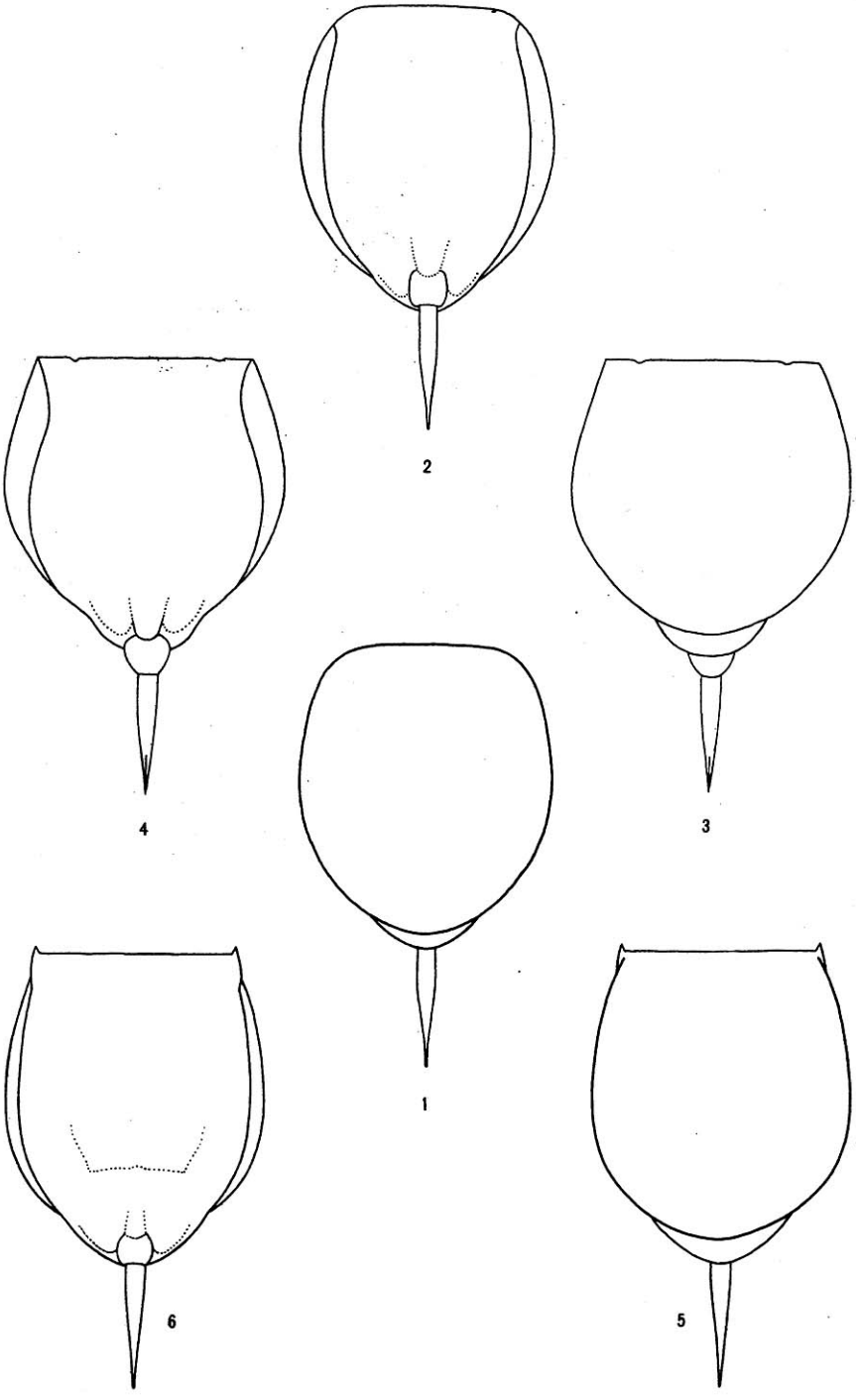
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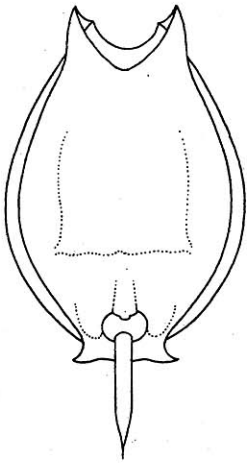

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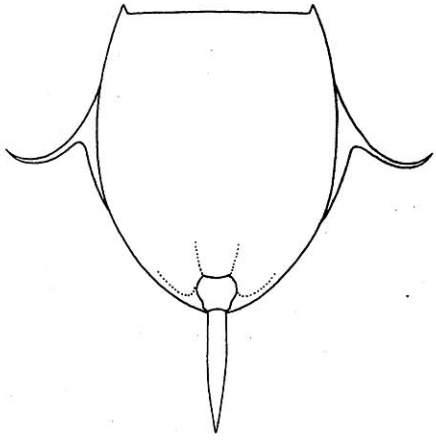

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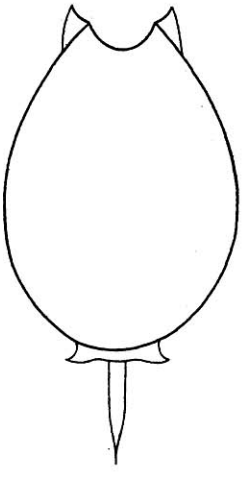

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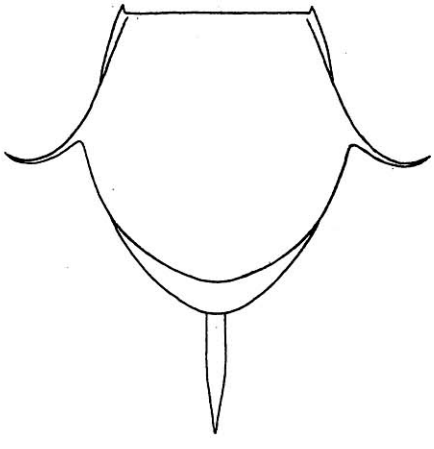

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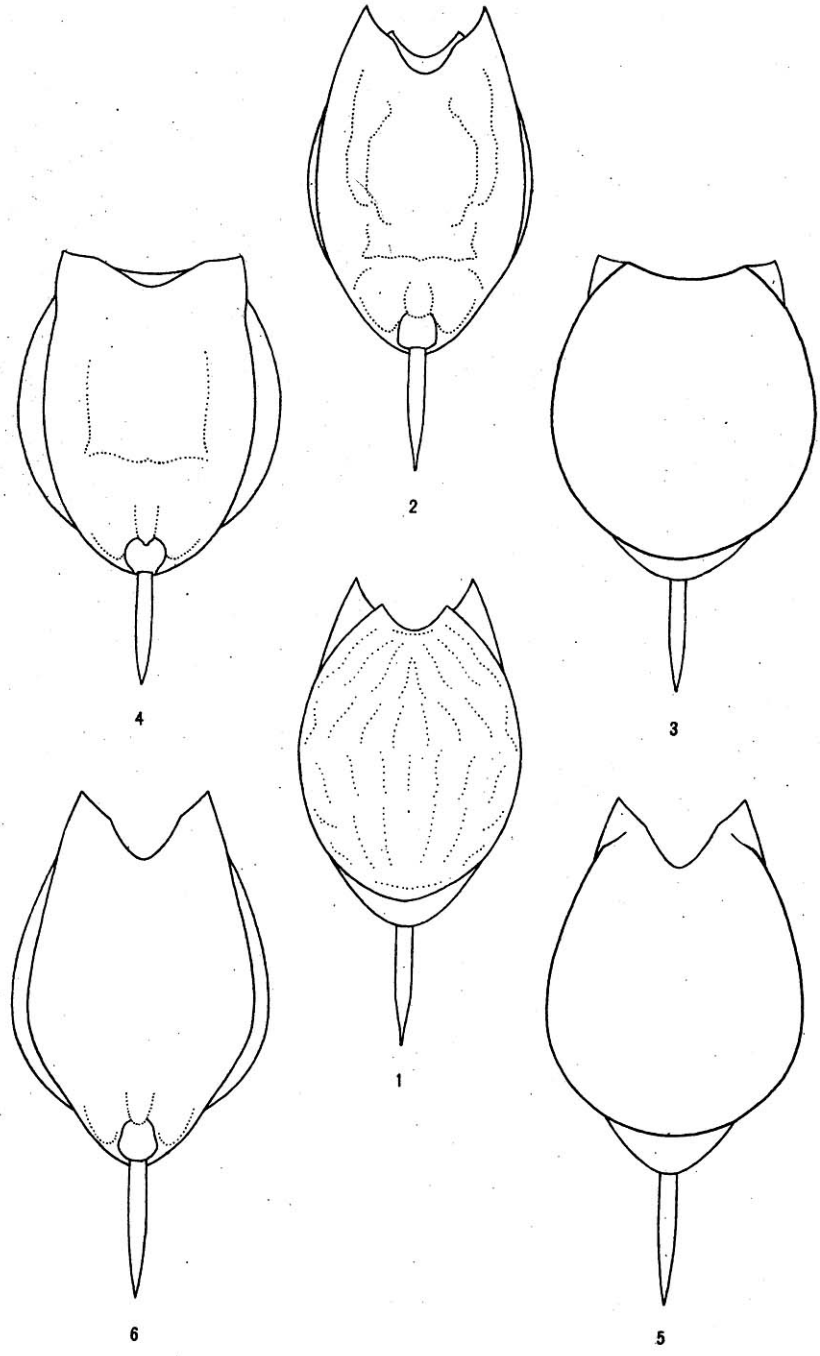
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