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Contributins to the knowledge of the
Freshwater Entomostraca of South
America. Part 2. Copepoda - Ostracoda

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On a new South American Phyllopod,
Eulimnadia brasiliensis, G.O. Sars
raised from dried mud.

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**Contributions to the knowledge of the
Fresh-Water Entomostraca
of South America,**

as shown by artificial hatching from dried material

by

G. O. SARS.

Part II.

Introduction.

The present paper forms the continuation of the one inserted in the preceding number of this Journal, and having the same chief title. Whereas, however, the latter was wholly devoted to the *Cladocera*, the present one will deal with two very different groups of Entomostraca, viz., the *Copepoda* and *Ostracoda*, of which several forms have been reared in my aquaria, and subjected to a careful examination. Of the first-named order, as usual, only *Calanoid* forms were obtained, not a single *Cyclopoid* or *Harpactoid*, though both these groups are undoubtedly well represented in South America, as in all other parts of the world. Indeed, though I have made these experiments for a long series of years, I have never succeeded.

in obtaining any form of these two groups by artificial hatching, apparently owing to the circumstance that, as far as its yet known, no resting ova are produced by these forms, whereas probably all the fresh-water Calanoids at times produce such ova. It is, however, a very curious fact, that in spite of this absence of resting ova, the species of the genus *Cyclops*, at any rate, exhibit quite a perplexingly wide geographical distribution, some of them being met with in almost all parts of the world, whereas the *Calanoid* forms seem to have a much more limited range.

As to the *Ostracoda*, several interesting forms have been reared in my aquaria, to be described below, all of them belonging to the extensive family *Cyprididae*, and, on a closer examination, they have turned out to represent species quite peculiar to South America, not even a single one having proved to be common to the Old World.

On the whole, both the *Copepod* and *Ostracod* faunas of South America, as shown in the present paper, exhibit a very exclusive character in comparison with that of the *Cladocera*. It may, however, be observed, that of the genus *Cyclops* no less than 7 well-known European species have been recorded by other authors from South America.

the female, as also in the peculiar armature of the penultimate pedigerous segment, which latter character has given rise to the specific name here proposed.

Occurrence.—This form occurred not infrequently in some of my aquaria prepared with mud from São Paulo.

Ostracoda.

Tribe: Podocopa.

Fam. Cyprididæ.

Remarks.—The South American fresh-water Ostracoda have as yet been very little studied. In the year 1855¹ Mr. Lubbock enumerated the following 6 species, subjoining short diagnoses of each: *Cypris Donnetii* Baird, *C. speciosa* Dana, *C. chilensis* Dana, *C. australis* Lubbock, *C. brasiliensis* Lubbock, *Candona albida* Dana. None of these species admit of being identified with the ones recorded in the present paper, nor have I been able to identify the latter with any of the other known species, for which reason they are here all described as new to science. They number no less than 21 species belonging to 8 genera.

Gen. *Amphicypris*, n.

Generic Characters.—Shell more or less oblong in form, resembling that in the genus *Candonocypris*. Valves,

¹ Transactions of the Linnean Society of London. No. 5. Vol. III.

however, subequal and very thin, without any conspicuous sculpturing, and but slightly hairy. Propagation pronouncedly bisexual, males and female specimens occurring in about equal numbers. Natatory setæ of the superior antennæ well developed, those of the inferior antennæ, however, comparatively short, not nearly reaching to the end of the apical claws. First pair of maxillæ with the masticatory lobes comparatively short and thick, palp rather robust, with the terminal joint scarcely longer than it is broad, and armed at the tip with a limited number of strong, spiniform bristles. Second pair of maxillæ in female normal, prehensile palp in male distinctly cheliform, and very unequal on the two sides, the left one being much larger and stronger than the right. Copulative organs large, oblong pyriform in outline. Ejaculatory tubes well developed, with numerous verticils. Spermatie vessels arranged as usual. Caudal rami long and narrow, terminal claws slender, seta of dorsal edge well developed, apical one rather short. Animal adapted for swimming.

Remarks.—This new genus is nearly related to the two genera *Stenocypris* and *Candonocypris*, but markedly distinguished from any of them by the pronouncedly bisexual propagation, male and female specimens occurring at all times in about equal numbers. The generic name here proposed refers to this dimorphic character, by which also some other Cypridid genera are distinguished, in relation to the exclusively parthenogenetic forms. In some of the anatomical characters this genus would seem to approach somewhat nearer to *Candonocypris* than to *Stenocypris*; but the swimming power is much more fully developed than in that genus, apparently owing to the circumstance that

the natatory setæ of the inferior antennæ are distinctly plumous. Besides the type species described below, the West Australian form recorded by the present author as *Cypris oblongata* may perhaps also be referred to this genus.

1. *Amphicypris nobilis*, n. sp.

(Pl. IV.)

Specific Characters.—Female. Shell rather compressed, seen laterally, oblong oval in form, greatest height scarcely attaining half the length, and occurring somewhat behind the middle; dorsal margin but very slightly arched and joining the posterior edge by a perfectly even curve, ventral nearly straight, or very slightly concaved, anterior extremity obtusely rounded, posterior slightly deflexed and likewise well rounded off; seen dorsally narrow fusiform, greatest width scarcely exceeding $\frac{1}{3}$ of the length, both extremities acuminate. Valves very thin and pellucid, subequal, with the inner duplicatures not very broad; surface quite smooth, with only scattered small hairs at each extremity. Muscular impressions in the centre of each valve not very conspicuous, and, except the 2 lowermost, dissolved into numerous small facets. Caudal rami very slender, exceeding $\frac{1}{3}$ of the length of the shell, sublinear and nearly straight, dorsal edge clothed with a uniform row of very delicate spinules, terminal claws slender and minutely denticulate, the outer one about half the length of the ramus and much larger than the inner, apical seta scarcely half as long as the dorsal one.

Male. Shell resembling in shape that of female, though somewhat more dilated in its posterior part, and moreover

easily recognizable by the translucent spermatie vessels: Prehensile palp of left 2nd maxilla very large, hand considerably expanded distally, with the thumb triangularly produced, dactylus very strong, and abruptly curved at the base; that of right maxilla scarcely half as large, hand rather narrow, with the thumb exerted to an acute point, dactylus slender and but slightly curved.

Colour of adult female bright yellow, with a darker shadow in the middle caused by the translucent intestine, and sometimes with a brownish band across the back: ova contained in the body-cavity translucent through the shell with a bright orange hue; cœcal appendages of intestine very conspicuous and of a dark green tinge. Colour of male specimens, as a rule, more ochraceous. Length of adult female 3.20 mm., of male about the same.

Remarks.—This is a very beautiful form easily recognizable from any of the previously known *Cyprididae*, and also of rather considerable size, but yet so transparent that several of the inner organs may be observed rather distinctly through the shell.

On Plate IV exact figures of both sexes are given, as drawn from living specimens, and also a more highly magnified figure of a male specimen, in which the left valve has been removed in order to show the enclosed animal with its several appendages. Some detail figures of both sexes are moreover given, drawn to a still larger scale.

Biological Observations.—This form appeared rather abundantly in some of my aquaria, and was watched for 3 successive seasons. All through the season, male and female specimens were found in about equal numbers: and they were often seen in copulation. In spite of the

comparatively short natatory setæ of the inferior antennæ, the specimens were often seen to move rather quickly through the water in the usual manner, though they more frequently kept at the bottom. The ova were deposited in dense clusters on pieces of weed or other objects occurring in the aquaria, and in most cases immediately developed into young, though at the close of the season resting ova must also have been produced.

Occurrence.—The aquaria in which this form appeared, were all prepared with mud from Argentina.

Gen. *Cypris*, Müller.

Remarks.—To this genus, the type of which is the well-known European species *C. pubera* Müll., I refer 6 South American species reared in my aquaria, some of which are very conspicuous both in size and colour. It may, however, be observed that in some points, and especially as regards the structure of the 1st pair of maxillæ, these forms differ slightly from the European species, and should thus perhaps more properly be united in a nearly-allied genus. The general habitus, however, is that of the genus *Cypris*. In all these species the propagation is exclusively parthenogenetic.

2. *Cypris labiata*, n. sp.

(Pl. V, figs. 1-9.)

Specific Characters.—Shell moderately tumid, seen laterally, oval triangular in form, greatest height considerably exceeding half the length and occurring about in the

middle; dorsal margin boldly arched, almost angular in the middle, ventral nearly straight, anterior extremity broadly rounded, and produced below to a freely projecting rounded lobe defined from the ventral margin by an angular incision, posterior extremity obtusely and somewhat obliquely truncated—; seen dorsally ovate, greatest width scarcely attaining half the length, and occurring about in the middle, anterior extremity narrowed and acuminate, posterior obtusely rounded. Valves nearly equal, each with the anterior marginal area very sharply defined and projecting below in a rounded lobe, a little larger on the right than on the left valve; surface smooth and rather densely hairy at each extremity. Muscular impressions in centre of each valve rather conspicuous and normal. Caudal rami not attaining $\frac{1}{3}$ of the length of the shell, very narrow, linear and almost straight, dorsal edge fringed with very small, inconspicuous spinules, outer terminal claw fully twice as long as the inner, and about half the length of the ramus, dorsal and apical setæ nearly equal. Colour pale yellowish green, with a number of very strongly marked dark patches on each side, partly anastomosing, so as to form irregular meandric bands. Length of adult female about $2\frac{1}{2}$ mm.

Remarks.—Of the previously known species, *Cypris Herricki* of Turner, found in Ohio, North America, seems to be that which approached nearest to the present species, having a similar oval triangular form, and similar bandlike patches on the valves. It is, however, of larger size, and does not exhibit any trace of the peculiar lip-like expansions of the anterior area characteristic of the present species. It may, however, be observed, that in quite young specimens of the present species (see Pl. V, fig. 3) these expan-

sions are wholly wanting, and in such specimens, moreover, the hind edge of each valve (see fig. 3 a) exhibits a row of small denticles not found in the adult. A similar armature is also stated by Mr. Herrick to occur in young specimens of the North American species.

In the accompanying plate, besides habitus-figures of an adult specimen, drawn from life, another figure is given showing the animal with its appendages lying within the right valve, the left one having been removed. Some detail-figures, drawn to a larger scale, are moreover subjoined for comparison with the corresponding parts in the preceding form.

Biological Observations.—This form developed in great abundance in some of my aquaria, and was domesticated during 3 successive seasons, the bottom residue of the aquaria having been kept in a dry state during the winters. No males were ever found, though many hundreds of individuals were at different times taken up and subjected to a close examination, and I am therefore now fully assured, that this form is exclusively parthenogenetic, like many other *Cyprididae*.

In habits this form agrees with the European species of *Cypris*, being very well adapted for swimming. Indeed, the specimens were often seen moving rather quickly through the water in the usual manner, at times, however, attaching themselves to the walls of the aquarium, or to the plants growing in it. On the latter the ova, which are of a bright orange colour, were deposited, generally in long rows, and they were so firmly attached that it was only with difficulty that they could be loosened from their hold.

Occurrence.—This form developed in the very same aquaria in which the preceding species occurred, the aquaria having been prepared with mud from Argentina.

3. *Cypris arcuata*, n. sp.

(Pl. V. figs. 10-12.)

Specific Characters.—Shell rather tumid, seen laterally, oval semilunar in outline, greatest height considerably exceeding half the length and occurring about in the middle, dorsal margin forming a bold and quite even curve, ventral somewhat convex in the middle, and slightly sinuate both in front and behind, both extremities obliquely rounded, the anterior somewhat more deflexed than the posterior, without, however, forming any freely projecting lobe: seen dorsally broadly ovate, greatest width, which is almost equal to the height, somewhat behind the middle, anterior extremity narrowed, acuminate, posterior bluntly rounded. Valves slightly unequal, the right one somewhat overlapping the left both in front and behind; surface smooth, though rather densely hairy at each extremity. Caudal rami very slender and somewhat curved, otherwise resembling those in *C. labiata*. Colour light yellowish, with a number of dark, meandric patches on each side. Length of adult female 2.60 mm.

Remarks.—This species, though evidently congeneric with *C. labiata* and of about the same size, may easily be distinguished by the more tumid shell, the dorsal face of which is quite evenly vaulted. Moreover, the anterior area does not exhibit any freely projecting lobe below, and the ground-colour of the shell is much lighter.

Occurrence.—Of this species only a single, but fully adult, female specimen was secured. It was found in an aquarium prepared with mud from Itatiba.

4. *Cypris psittacea*, n. sp.

(Pl. V, figs. 13-15.)

Specific Characters.—Shell rather tumid, seen laterally, of oblong oval or elliptical form, greatest height but very slightly exceeding half the length, and occurring about in the middle, dorsal margin gently curved and joining the anterior and posterior ledges without any intervening angle, ventral slightly convex, anterior extremity broadly rounded and produced below to a beak-like projection, posterior considerably narrower and surmounted below by a posteriorly-pointing spiniform process—; seen dorsally, oval fusiform, greatest width about equalling half the length, and occurring somewhat in front of the middle, anterior extremity abruptly narrowed, posterior more obtuse. Valves somewhat unequal, the right overlapping the left both in front and behind, the beak-like anterior projection, as also the posterior spiniform process, belonging to this valve only; surface clothed everywhere with rather strong, generally recurved hairs. Caudal rami slender and nearly straight, resembling in structure those in the 2 preceding species. Colour pale yellowish green, generally with an ochraceous tinge at each extremity, and variegated on each side with a number of dark patches, partly confluent into irregular meandric bands. Length of adult female 1.50 mm.

Remarks.—This is an easily recognizable form, especially distinguished by the peculiar beak-like projection, which

the anterior extremity forms below; a character which has given rise to the specific name here proposed. The spiniform process of the hind extremity likewise distinguishes it from the 2 preceding species, whereas in this respect it agrees with the 3 succeeding forms. In size it is rather inferior to the former.

Occurrence.—This form developed in 2 of my aquaria, the one prepared with mud from São Paulo, the other with mud from Ipiranga. It did not multiply to any considerable extent in either of them.

5. *Cypris Iheringi*, n. sp.

(Pl. VI. figs. 1-4.)

Specific Characters.—Shell moderately tumid, seen laterally, irregularly oval in form, greatest height considerably exceeding half the length, and occurring somewhat behind the middle, dorsal margin nearly straight in the middle, and abruptly sloping both in front and behind, ventral nearly straight, or very slightly convex in its posterior part, anterior extremity obliquely rounded, posterior broader and more blunted, being surmounted below by an acute spiniform process pointing somewhat obliquely downwards—; seen dorsally, ovate, greatest width about equalling half the length, and occurring in the middle, anterior extremity narrowed, acuminate, posterior more obtuse. Valves nearly equal, right one, however, overlapping the left at the infero-posteal corner by the above-mentioned spiniform process; surface smooth and rather densely hairy at both extremities. Caudal rami very slender and somewhat flexuous, resembling in structure those in the preceding species.

Colour yellowish gray, with a number of very clearly marked dark patches on each side, partly anastomosing in meandric bands. Length of adult female 3.62 mm.

Remarks.—This is a very large-sized and handsome species, and I have much pleasure in dedicating it to the distinguished naturalist, Dr. H. v. Ihering, who indeed first found this form. As in the preceding species, the shell is variegated with sharply defined patches, which give it a rather dark hue, though the ground-colour is comparatively light. In the spiniform process issuing from the infero-posteal corner of the right valve it agrees with *C. psittacea*, but otherwise it is very different.

Occurrence.—A single well-preserved specimen of this form was kindly sent to me by Dr. v. Ihering, who procured it at Itatiba. I have myself succeeded in raising this beautiful species from dried mud taken in the very same locality; but the number of specimens obtained in this manner is rather a limited one.

6. *Cypris spectabilis*, n. sp.

(Pl. V, figs. 5-8.)

Specific Characters.—Shell somewhat compressed, seen laterally, oblong reniform, greatest height scarcely attaining half the length, and occurring rather behind the middle, dorsal margin nearly straight in the middle, and sloping rather steeply behind, more gently in front, ventral slightly concaved, anterior extremity evenly rounded, posterior considerably broader and somewhat deflexed, being surmounted by a triangular plate produced to a posteriorly-pointing spine—: seen dorsally, oblong fusiform, greatest

width not nearly attaining half the length, and occurring in the middle; both extremities acuminate. Valves somewhat unequal, the right one considerably overlapping the left at the infero-posteal corner, forming here the above-mentioned projecting triangular plate, its posterior edge above the terminal spine finely serrate: surface smooth and minutely hairy, especially at each extremity. Caudal rami very slender and elongated, nearly straight, apical claw scarcely exceeding $\frac{1}{3}$ of the length of the ramus. Colour yellowish green, with a limited number of dark green, meandric patches on each side. Length of adult female about 4 mm.

Remarks.—This is the largest of the South American species, and indeed one of the largest known Cypridids, being moreover easily recognizable by the oblong reniform shape of the shell, somewhat recalling that in the genus *Herpetocypris*. It is, however, a true *Cypris*, as shown by the full development of the natatory setæ of the inferior antennæ, which allow the animal to swim with great facility through the water in the usual manner.

Occurrence.—Some few specimens of this handsome form were raised in one of my aquaria prepared with mud from Itatiba.

7. *Cypris inornata*, n. sp.

(Pl. VI, figs. 9-12.)

Specific Characters.—Shell rather tumid, seen laterally, oval subclavate, greatest height considerably exceeding half the length, and occurring rather in front of the middle, dorsal margin boldly curved in front and sloping behind,

ventral almost straight, anterior extremity broadly rounded, and slightly angular below, posterior considerably narrower and somewhat blunted, being surmounted below by a small triangular plate produced in a minute posteriorly-pointing tooth—; seen dorsally, oval fusiform, greatest width about equalling half the length, and occurring in the middle, anterior extremity somewhat more pointed than the posterior. Valves but slightly unequal, though the right one projects somewhat beyond the left at the infero-posteal corner, where it forms the above-mentioned small dentiform projection; surface everywhere clothed with rather strong recurved hairs. Caudal rami moderately slender, and of the usual structure. Colour whitish pellucid, with a very faint yellowish gray tinge, and without any distinct darker patches on the sides. Length of adult female 1.50 mm.

Remarks.—This form differs conspicuously from the other species here recorded in the total absence of the dark meandric patches adorning the shell in the latter, and this absence has given rise to the specific name here proposed. It may also be easily distinguished by the shape of the shell and by the very coarse hairs clothing it everywhere.

Occurrence.—I found this form not unfrequently in some of my aquaria prepared with mud from São Paulo. In habits it agrees with the other species, being well fitted for swimming, though it dwells more frequently on the bottom among the aquatic plants.

Gen. *Neocypris*, n.

Generic Characters.—Shell of rather different shape in the several species, but, as a rule, less tumid and more oblong than in the genus *Cypris*. Left valve, as a rule, larger than right; muscular impressions in the centre of each valve normal. Natatory setæ of inferior antennæ well developed, reaching to the tip of the terminal claws. Masticatory lobes of anterior maxillæ narrow digitiform, palp likewise narrow, with the terminal joint longer than it is broad. Caudal rami very long and slender, dorsal edge minutely spinulose, the spinules being arranged in several successive sets, terminal claws likewise spinulose, apical seta much longer than the dorsal one. Propagation exclusively parthenogenetical.

Remarks.—This new genus in several points recalls the genus *Cypricercus* of the Old World. But whereas the species of the latter genus are pronouncedly bisexual, the propagation in the present genus is exclusively parthenogenetical, as in the genus *Cypris*. This I have been enabled to prove with full certainty in at least 4 of the 6 species described below.

8. *Neocypris gladiator*, n. sp.

(Pl. VI, figs. 13, 14; Pl. VII, figs. 1-7.)

Specific Characters.—Shell somewhat compressed, seen laterally, oblong oval in form, greatest height scarcely attaining half the length, dorsal margin nearly straight, though surmounted in the anterior half by a peculiar fin-like expansion issuing from the right valve and terminating in a posteriorly-pointing acute lappet, ventral scarcely

sinuate, both extremities obtusely rounded and nearly equal, or the anterior one a little broader—; seen dorsally oblong fusiform, greatest width about equalling $\frac{3}{4}$ of the length, and occurring somewhat in front of the middle, both extremities acuminate, the anterior abruptly narrowed, the posterior more gradually tapering. Valves very unequal, the left one overlapping the right both in front and behind, being, however, dorsally considerably surmounted by the above-mentioned fin-like expansion of the right valve; inner duplicatures comparatively narrow, those of left valve being edged inside by a continuous row of blunt denticles. Surface of shell smooth and minutely hairy at each extremity. Caudal rami exceedingly large and powerful, almost equalling in length half the shell, quite straight, sublinear in form, with the denticles of the dorsal edge very distinct and arranged in about 6 successive sets, terminal claws coarsely denticulate, the outer one scarcely exceeding $\frac{1}{3}$ of the length of the ramus, apical seta rather elongated, dorsal one very small, nearly obsolete. Colour more or less distinctly yellowish green, sometimes with an ochraceous tinge, but always variegated with a limited number of dark green patches on each side, partly confluent into irregular transverse bands. Length of adult female 2.30 mm.

Remarks.—This is a very distinct and easily recognizable form, being especially distinguished by the peculiar fin-like expansion issuing from the dorsal face of the right valve, a character which has given occasion to the specific name here proposed. This expansion, however, is only present in adult specimens; whereas in immature individuals no trace of it is to be found (see Pl. VII,

fig. 3), and in such individuals, moreover, the posterior edge of the valves exhibits a very distinct serration (see fig. 3 a) not found in adult specimens. In the latter, the right valve is sometimes found to project behind the dorsal expansion to a minute tooth-like projection (see Pl. VII, fig. 1); but in by far the greater number of specimens this projection is wanting or only very slightly indicated.

Biological Observations.—This peculiar form developed in great abundance in several of my aquaria, and has been domesticated during 3 successive seasons with good results. No males were ever found, though many hundreds of specimens were at different times taken up and subjected to a close examination, and it may thus be stated with full certainty, that this form propagates in an exclusively parthenogenetical manner.

In habits it agrees on the whole with the species of the genus *Cypris*, being, like the latter, well adapted for swimming. More frequently, however, the specimens are found clinging to the aquatic plants on the bottom, or to the walls of the aquarium; but at times they are also seen moving freely through the water with great rapidity. By a sudden extension of the powerful caudal rami, the animal is enabled to start away from any fixed point with great force, and this abrupt, jumping movement is often seen performed by the animal when disturbed.

Occurrence.—The aquaria in which this form developed, were prepared with mud partly from Itatiba, partly from Argentina.

9. *Neocypris mutica*, n. sp.

(Pl. VII, figs. 8-13.)

Specific Characters.—Shell compressed, seen laterally, of a rather regular oblong oval or elliptic form, greatest height about equalling half the length, and occurring in the middle, dorsal margin evenly curved, ventral slightly sinuated in front of the middle, and ascending behind in an even curve to the posterior extremity, the latter narrowly rounded, anterior extremity somewhat broader and likewise rounded—; seen dorsally or ventrally oblong, subcylindric, with the lateral contours but very slightly curved, greatest width not attaining half the length, both extremities obtusely truncated. Valves of rather firm consistency and somewhat unequal, the left overlapping the right both in front and behind, and moreover exhibiting ventrally a broad, sharply-defined rim turned inwards and partly overlapping the right valve in the middle; the latter exhibiting at each extremity, outside the edge, a sharply-defined rounded lobe. Surface of shell smooth and minutely hairy in front, posterior extremity clothed with scattered and rather long bristles; muscular impressions in the centre of each valve very conspicuous. Caudal rami rather strong, though less so than in the preceding species, and somewhat curved in their distal part. Colour dark olivaceous, with indistinctly defined shadows of a still darker hue. Length of adult female 1.60 mm.

Remarks.—This form is undoubtedly congeneric with the preceding species, though rather different in the form of the shell, which, especially in the dorsal or ventral aspect (see fig. 9), differs considerably from that usually met with in the *Cyprididae*, both extremities being, as

it were, bluntly truncated; hence the specific name here proposed.

Biological Observations.—In some of my aquaria this form proved to be present in great abundance. But, as the specimens generally kept themselves on the bottom, they were not easy to observe, the more so as their colour much agreed with that of the bottom-residue. However, on applying an ordinary dipping-tube, by the aid of which small quantities of mud were taken up from the bottom, I was always sure to get some specimens of this form. Although the latter accordingly seems to be a more pronounced bottom-form than *N. gladiator*, it is by no means devoid of swimming power. Sometimes, indeed, one or other specimen was seen leaving the bottom and moving rather rapidly through the water, at times attaching itself to the wall of the aquarium, and when disturbed, it jumped away in a similar abrupt manner to that of *N. gladiator*, by a sudden extension of the caudal rami.

Occurrence.—The aquaria in which this form developed, were chiefly prepared with mud from Itatiba. It was, however, also found occasionally in those prepared with mud from São Paulo.

10. *Neocypris variegata*, n. sp.

(Pl. VII, figs. 14-16.)

Specific Characters.—Shell considerably more tumid than in *N. mutica*, seen laterally, regularly oblong oval in form, greatest height slightly exceeding half the length, and occurring somewhat behind the middle, dorsal margin evenly curved, ventral likewise pronouncedly convex, and scarcely

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sinuated in front, both extremities rounded, the anterior one a little broader than the posterior—; seen dorsally, oblong oval, greatest width about equalling the height, and occurring behind the middle, both extremities obtusely rounded. Valves rather thin and pellucid, nearly equal, surface smooth and minutely hairy in front, carrying behind more scattered and longer bristles. Caudal rami about as in *N. mutica*, though comparatively a little longer and more straight. Colour very pale yellowish, with a number of well defined patches of a dark purple hue on each side. Length of adult female 1.45 mm.

Remarks.—Though closely allied to *N. mutica*, this species may be easily distinguished by the considerably more tumid shell, the thin and nearly equal valves, and the very different colour.

Occurrence.—This form was only found in the aquaria prepared with mud from São Paulo, but in some of them rather abundantly. In habits it agrees with *N. mutica*, though being rather more agile, apparently owing to the less heavy shell.

11. *Neocypris obtusata*, n. sp.

Specific Characters.—Shell moderately tumid, seen laterally, irregularly oval in form, greatest height considerably exceeding half the length, and occurring somewhat in front of the middle, dorsal margin boldly curved almost in a gibbous manner, ventral nearly straight, anterior extremity obliquely rounded, posterior somewhat narrower and blunted, though surmounted above by an obtuse projecting expansion—; seen dorsally, oblong oval in form, greatest

width slightly exceeding half the length, and occurring in the middle, both extremities obtuse. Valves rather thin and pellucid, slightly unequal, the left one somewhat overlapping the right in front, but being surmounted behind by the above-mentioned projecting expansion; surface smooth and covered with minute hairs. Colour whitish, with a faint yellowish green tinge, and variegated on each side with a number of darker patches, partly confluent into irregular wavy bands. Length of adult female 1.20 mm.

Remarks.—In the comparatively short and exceedingly vaulted shell this form differs conspicuously from the 3 preceding species, though undoubtedly congeneric with them, as proved by the structure of the several appendages.

Biological Observations.—In one of my aquaria, a comparatively small cylindric bottle, this form developed during the 1st season in great abundance, and was observed for a considerable time. It did not, however, reappear in the succeeding seasons, though the residue of the aquarium was employed for further hatching experiments. As compared with the other species, this form is rather more agile, and was often seen swimming quickly through the water, and at times clinging to the walls of the aquarium in great numbers.

Occurrence.—The aquarium containing this form was prepared with mud from Itatiba.

12. *Neocypris elliptica*, n. sp.

(Pl. VIII. figs. 3. 4.)

Specific Characters.—Shell somewhat compressed, seen laterally, of a rather regular elliptic shape, greatest

height somewhat exceeding half the length, and occurring about in the middle, dorsal margin quite evenly curved, ventral very slightly sinuated, both extremities rounded and nearly equal, the posterior one not being surmounted by any distinct expansion of the right valve; seen dorsally, oblong oval in form, greatest width about equalling half the length, both extremities slightly narrowed and obtuse at the tip. Valves nearly equal, thin and pellucid, surface smooth, with scattered hairs at each extremity. Colour whitish, with a few darker patches on each side. Length of adult female 0.90 mm.

Remarks.—This form is closely allied to *N. obtusata*, but of far inferior size, and moreover distinguished by the more regularly elliptical form of the shell, and the absence of the obtuse projection found in that species behind. The shell is also more compressed and of a paler colour, with only a very limited number of dark patches on each side.

Occurrence.—This form was found in another aquarium prepared with mud from Itatiba, but in less considerable numbers.

13. *Neocypris mucronata*,

(Pl. VIII, figs. 5, 6.)

Specific Characters.—Shell somewhat compressed, seen laterally, of oblong subclavate form, greatest height about equalling half the length, and occurring rather in front of the middle, dorsal margin but slightly curved and somewhat sloping behind, ventral scarcely sinuated at all, and ascending behind in an even curve, anterior extremity broadly rounded, posterior considerably narrower, and sur-

mounted by a strong mucroniform process pointing straight backwards; seen dorsally, oblong fusiform, greatest width not attaining half the length, both extremities obtusely pointed. Valves rather thin and pellucid, somewhat unequal, the right projecting considerably beyond the left at the hind extremity, where it forms the above-mentioned mucroniform process; surface smooth and covered with minute hairs at each extremity. Colour apparently as in *N. obtusata*, the sides of the shell being variegated with irregular dark patches. Length of adult female 1.20 mm.

Remarks.—This form is at once recognized by the strong mucroniform process issuing behind from the right valve. Otherwise it is closely allied to the 2 preceding species.

Occurrence.—Some well-preserved specimens of this form were kindly forwarded to me by Dr. v. Ihering, who procured them at Itatiba. I did not, however, myself succeed in raising this form in my aquaria, though a part of the mud was taken from the very same place.

Gen. *Cypria*, Zencker.

14. *Cypria pellucida*, n. sp.

(Pl. VIII, figs. 7, 8.)

Specific Characters.—Female. Shell considerably compressed, seen laterally, of a comparatively short, almost semicircular form, greatest height fully equalling $\frac{2}{3}$ of the length, and occurring rather behind the middle, dorsal margin continuous with the hind one, both together forming a bold and quite even curve, ventral margin straight, anterior

extremity somewhat obliquely blunted, posterior considerably broader and more deflexed; seen dorsally narrow oblong, greatest width scarcely half the length, and occurring considerably behind the middle, anterior extremity obtusely acuminate, posterior blunted. Valves exceedingly thin and pellucid, somewhat unequal, the left one overlapping the right along the anterior extremity by a broad hyaline rim, and at the infero-posteal corner by a similar, but shorter rim; surface perfectly smooth and shining, without any markings, and clothed at each extremity with very delicate and distant hairs. Eye exceedingly large and conspicuous. Colour whitish gray, pellucid, with a darker shadow in the middle, apparently caused by the translucent intestine. Length of adult female 0.60 mm.

Remarks.—Although, for want of sufficient material, I have not been able to examine the appendages of this form more closely, there cannot, I think, be any doubt that it is referable to Zencker's genus *Cypria*, agreeing, as it does, in the structure and general shape of the shell fairly well with the other known species of this genus, from which it differs, however, in the extreme thinness and pellucidity of the valves.

Occurrence.—Only 2 female specimens of this form were secured, being found in an aquarium prepared with mud from Itatiba. The specimens were exceedingly agile, swimming about with great speed, as is the case with the other known species of this genus. One of the specimens had numerous straw-coloured ova in the body-cavity.

Gen. Cypridopsis, Brady.

Remarks.—In accordance with the proposal set forth by Dr. Kaufman in his recent work on the Darwinulidæ and Cyprididæ of Switzerland, this genus is here restricted to the forms agreeing with *C. vidua* Müller, whereas those agreeing with *C. villosa* Jurine are comprised in the new genus *Cypridopsella* of Kaufmann. The generic name *Pionocypris* proposed by Norman and Brady may perhaps conveniently be transferred to the Australian and New Zealand species, previously regarded by the present author as congeneric with *C. vidua*, but in reality differing very essentially in the structure of the caudal rami. It may be observed here, that in all 3 South American species, I have found the caudal rami to be of the very same rudimentary appearance as that figured by Dr. Kaufman in the 2 European species *C. vidua* and *C. helvetica*.

15. Cypridopsis obscura, n. sp.

(Pl. VIII, figs. 9, 10.)

Specific Characters.—Shell not very tumid, seen laterally, oval or somewhat elliptical in form, greatest height but slightly exceeding half the length, and occurring somewhat in front of the middle, dorsal margin well curved, ventral nearly straight, both extremities obtusely rounded and nearly equal; seen dorsally, oval in form, greatest width scarcely exceeding the height, anterior extremity somewhat narrower than the posterior. Surface of shell smooth and covered with minute hairs. Colour very dark, greenish, with still darker shadows, which, however, do not form well-defined transverse bands. Length of adult female 0.70 mm.

Remarks.—This form is chiefly distinguished from the other known species by the less tumid and less high shell, as also by the very dark colour, which latter character has given rise to the specific name here proposed.

Occurrence.—I found this form not unfrequently in 2 of my aquaria prepared with mud from Argentina. In habits it exactly agrees with the European species.

16. *Cypridopsis flavescens*, n. sp.

(Pl. VIII, figs. 11, 12.)

Specific Characters.—Shell moderately tumid, seen laterally, rounded oval in form, greatest height considerably exceeding half the length, and occurring about in the middle, dorsal margin boldly curved, ventral nearly straight, anterior extremity obliquely rounded, posterior blunted—; seen dorsally, broadly oval in form, greatest width exceeding the height, and occurring about in the middle, both extremities obtuse, the anterior one a little narrower than the posterior. Surface of shell smooth and moderately hairy. Colour light yellowish, with 3 very dark and sharply defined patches on each side, forming as many irregular transverse bands, as in *C. vidua*. Length of adult female 0.63 mm.

Remarks.—In its general appearance this form so closely resembles the European species, *C. vidua*, that at first I was inclined to believe it to belong to the very same species. On a closer comparison, however, some differences in the shape of the shell may be found to exist; nor have I ever met with such a light ground-colour of the shell in the European form.

Occurrence.—This form was found rather abundantly in some of my aquaria prepared with mud from Itatiba.

17. *Cypridopsis pinguis*, n. sp.

(Pl. VIII, figs. 13, 14.)

Specific Characters.—Shell rather tumid and densely hairy all over, seen laterally, oval or broadly elliptical in form, greatest height considerably exceeding half the length, and occurring about in the middle, dorsal margin well curved, ventral nearly straight, both extremities rounded and almost equal; seen dorsally, broadly ovate, greatest width considerably exceeding the height, and occurring somewhat behind the middle, anterior extremity more pointed than the posterior. Colour dark greenish, with still darker shadows, which, however, are less distinctly defined, and do not form transverse bands. Length of adult female 0.80 mm.

Remarks.—This form may be distinguished from the 2 preceding species by the more tumid shell, the surface of which is more densely hairy. It is also of considerably larger size; being perhaps the largest of the known species.

Occurrence.—This form was only found in the aquaria prepared with mud from Argentina, but in some of them rather plentifully.

Gen. *Cypridopsella*, Kaufman.

Syn. *Potamocypris* G. O. Sars (not Brady).

Remarks.—I now fully agree with Dr. Kaufman, that the type of the genus *Potamocypris* (*P. fulva* Brady)

in some points—for instance the rudimentary condition of the natatory setæ of the inferior antennæ—so essentially differs from the several forms previously referred by the present author to this genus, that it is necessary to restrict this genus to the above-mentioned form, and to place the other species in another genus. For this Dr. Kaufman has proposed the above name, which, however, appears somewhat inappropriate, in as far as at least some of the species attain a larger size than do those of the genus *Cypridopsis*.

18. *Cypridopsella hispida*, n. sp.

(Pl. VIII. figs. 15. 16.)

Specific Characters.—Female. Shell comparatively more tumid than in the other species, and entirely covered with rather strong recurved hairs, seen laterally, oval trigonal in form, greatest height somewhat exceeding half the length, and occurring in front of the middle, dorsal margin boldly curved, ventral straight, both extremities rounded, the anterior one somewhat broader than the posterior; seen dorsally, oblong ovate in form, greatest width almost equalling the height, anterior extremity obtusely acuminate, posterior more blunted. Colour dark green, with indistinctly defined still darker shadows. Length of adult female 1.12 mm.

Remarks.—This is perhaps the largest known species of the genus, and for this reason and because of the less compressed form of the shell, it may easily be mistaken for a species of *Cypris*. I have, however, convinced myself that the caudal rami are of the peculiar rudimentary appearance characteristic of the present genus.

Occurrence.—Some few female specimens of this form were found in one of my aquaria prepared with mud from Itatiba. They were very agile, swimming about with great speed.

19. *Cypridopsella nana*, n. sp.

(Pl. VIII, figs. 17, 18.)

Specific Characters.—Female. Shell somewhat compressed, and but sparingly hairy, seen laterally, rounded oval in form, greatest height about equalling $\frac{2}{3}$ of the length, and occurring in the middle, dorsal margin well curved, ventral straight, both extremities rounded and nearly equal; seen dorsally, oblong oval in form, greatest width not nearly attaining the height, and but little exceeding half the length, anterior extremity narrower than posterior. Colour light yellowish gray, with an indistinctly defined darker shadow on each side. Length of adult female 0.44 mm.

Remarks.—Although, for want of sufficient material, I have not been able to examine the appendages of this form more closely, I think I am right in referring it to the genus *Cypridopsella*, as the characters of the shell on the whole agree with those in other species of this genus. It is a very small-sized species, perhaps one of the smallest known *Cyprididæ*.

Occurrence.—Only a solitary female specimen of this form has been secured. It was occasionally taken up in the dipping tube from one of my aquaria prepared with mud from Itatiba.

Gen. *Paracypridopsis*, Kaufman.

Remarks.—This genus has been recently established by Dr. Kaufman, to comprise some species of the older genus *Cypridopsis*, in which the natatory setæ of the inferior antennæ are rudimentary, and thus do not allow the animal to move freely through the water. The type of the genus is *Cypridopsis variegata* of Brady. Perhaps, however, this genus will prove to be identical with *Potamocypris* (sens. strict.). A very small Cypridid found in one of my aquaria, and described below, I refer provisionally to this genus.

20. *Paracypridopsis albida*, n. sp.

(Pl. VIII, figs. 19, 20.)

Specific Characters.—Female. Shell rather compressed, seen laterally, oval reniform, greatest height slightly exceeding half the length, dorsal margin almost straight in the middle, and sloping rather steeply behind, more gently in front, ventral slightly sinuated, anterior extremity obliquely rounded, posterior somewhat broader and more deflexed; seen dorsally, narrow oblong in form, greatest width not attaining half the length, anterior extremity narrower than posterior. Valves subequal, thin and pellucid, surface perfectly smooth and shining, with only slight traces of hairs at each extremity. Natatory setæ of superior antennæ very short spiniform, those of inferior antennæ apparently wholly absent. Caudal rami rudimentary, resembling in structure those in the 2 preceding genera. Colour whitish, pellucid. Length of adult female 0.50 mm.

Remarks.—It may be that this form should more properly be regarded as the type of a particular genus;

but for want of sufficient material, I have not been able to make out the anatomy satisfactorily enough to give a complete characterisation of the genus. In no other Cypridid have I found the setæ of the superior antennæ so much shortened, and I have been unable to detect the slightest trace of the usual bundle of setæ at the end of the antepenultimate joint of the inferior antennæ. The caudal rami, however, seem to agree perfectly in their structure with those in the genus *Paracypridopsis*, as figured by Dr. Kaufman.

Biological Observations.—This diminutive form was occasionally taken up in the dipping tube from one of my aquaria, but was not easy to detect even by the aid of a strong hand magnifier, owing to its small size and inconspicuous colouring. The animal is quite destitute of swimming power, and only creeps slowly up on the bottom in the manner of the *Candonæ*, which it resembles in the white colour and lustre of the shell.

Occurrence.—The aquarium in which this form occurred was prepared with mud from São Paulo.

Gen. *Candonopsis*, Vávra.

21. *Candonopsis brasiliensis*, n. sp.

(Pl. VIII, figs. 21, 22.)

Specific Characters.—Female. Shell exceedingly compressed, seen laterally, oblong reniform, with the posterior part somewhat expanded, greatest height scarcely exceeding half the length, and occurring far back, dorsal

margin nearly straight in the middle and somewhat ascending behind, then abruptly curving downwards, ventral deeply sinuated, anterior extremity evenly rounded, posterior rather broad and obliquely deflexed; seen dorsally, narrow lanceolate, greatest width scarcely exceeding half the height, anterior extremity acuminate, posterior more obtuse. Valves subequal, thin and pellucid, with the inner duplicatures very broad; especially the anterior one; surface smooth and shining, finely hairy at the anterior extremity, and clothed on the posterior one with scattered rather long bristles. Colour pure white. Length of adult female 0.78 mm.

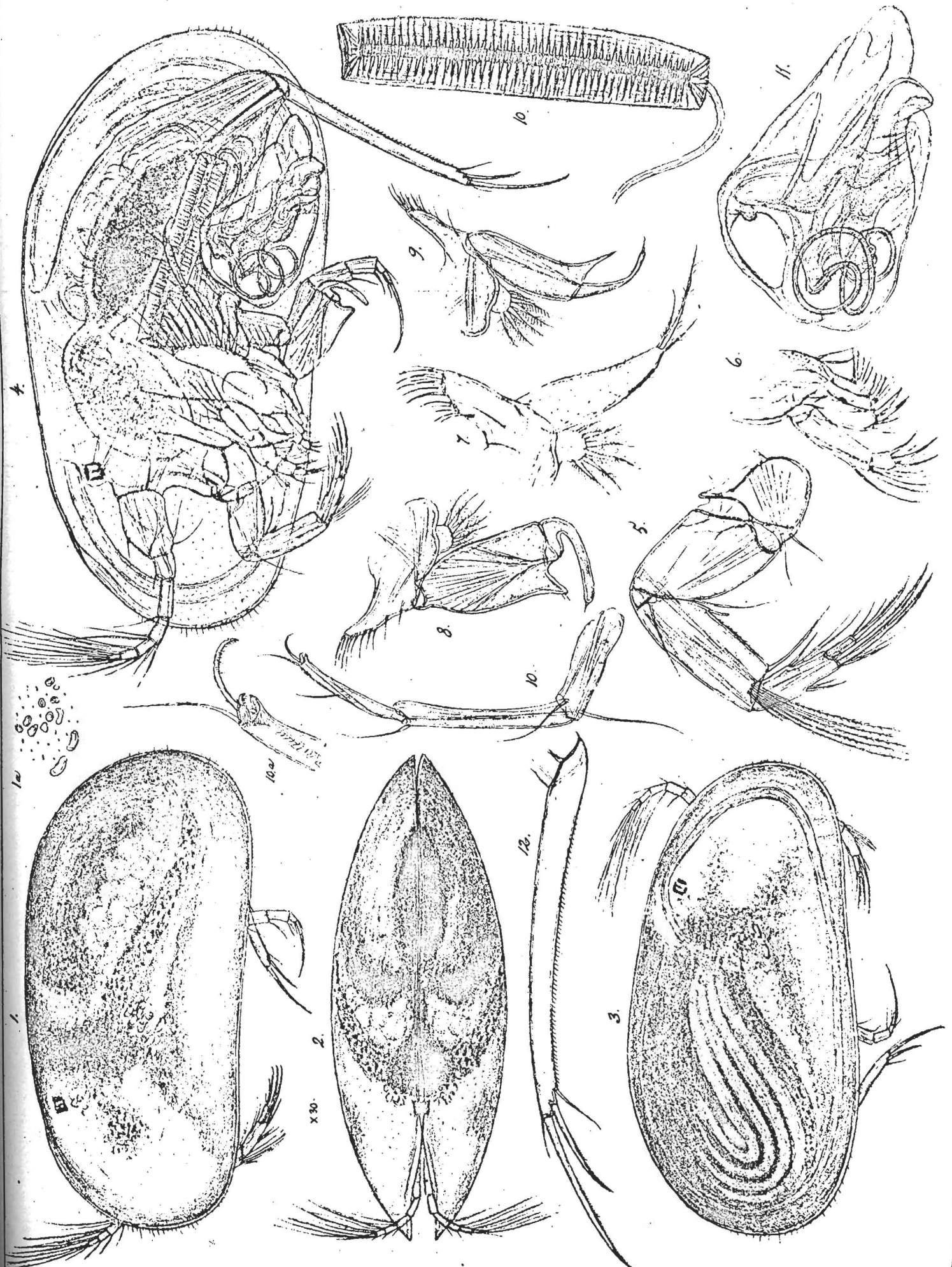
Remarks.—This form undoubtedly belongs to the genus *Candonopsis* as defined by Vávra. It is nearly allied both to the typical form *C. Kingsleyi* Brady and the Australian species *C. tenuis* Brady, though differing conspicuously from both in the shape of the shell.

Occurrence.—Only 2 female specimens of this form were secured. They were found in one of my aquaria prepared with mud from São Paulo.

P L A T E IV

Amphicypris nobilis, G. O. Sars.

- Fig. 1. Adult female, viewed from left side, magnified 30 diameters.
- " 1a. Muscular impressions of left valve, highly magnified.
- " 2. Female, viewed from the dorsal face.
- " 3. Adult male, viewed from right side.
- " 4. Another male specimen, in which the left valve has been removed, so as to show the enclosed animal with its several appendages, lateral view, magnified 40 diameters.
- " 5. Inferior antenna of female, Magnified 74 diameters,
- " 6. Masticatory part of anterior maxilla
- " 7. Posterior maxilla of female
- " 8. Left posterior maxilla of male
- " 9. Right posterior maxilla of same
- " 10. Posterior leg of female
- " 10a. Extremity of same, highly magnified
- " 10 (bis). One of the ejaculatory tubes of male
- " 11. Left copulative organ of same
- " 12. Caudal ramus.



P L A T E V

Cypris labiata, G. O. Sars.

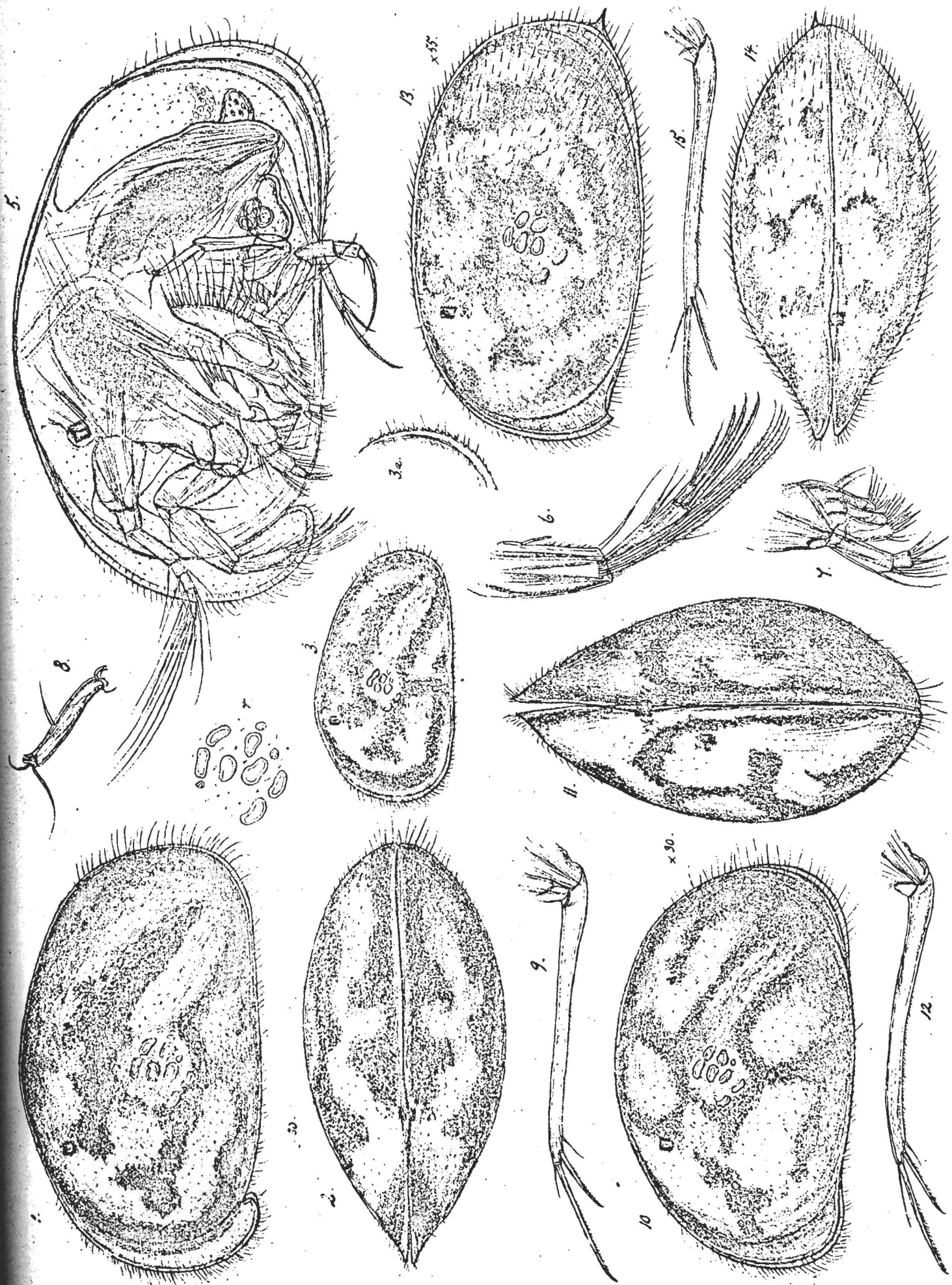
- Fig. 1. Adult female, viewed from left side, magnified 30 diameters.
" 2. Same, dorsal view.
" 3. Immature specimen, viewed from left side.
" 3a. Same, posterior extremity of shell, more highly magnified, showing the serration of the edge.
" 4. Muscular impressions from left valve.
" 5. Female specimen, in which the left valve has been removed, so as to show the enclosed animal, lateral view, magnified 90 diameters.
" 6. Outer part of inferior antenna.
" 7. Masticatory part of anterior maxilla
" 8. Extremity of posterior leg.
" 9. Caudal ramus.

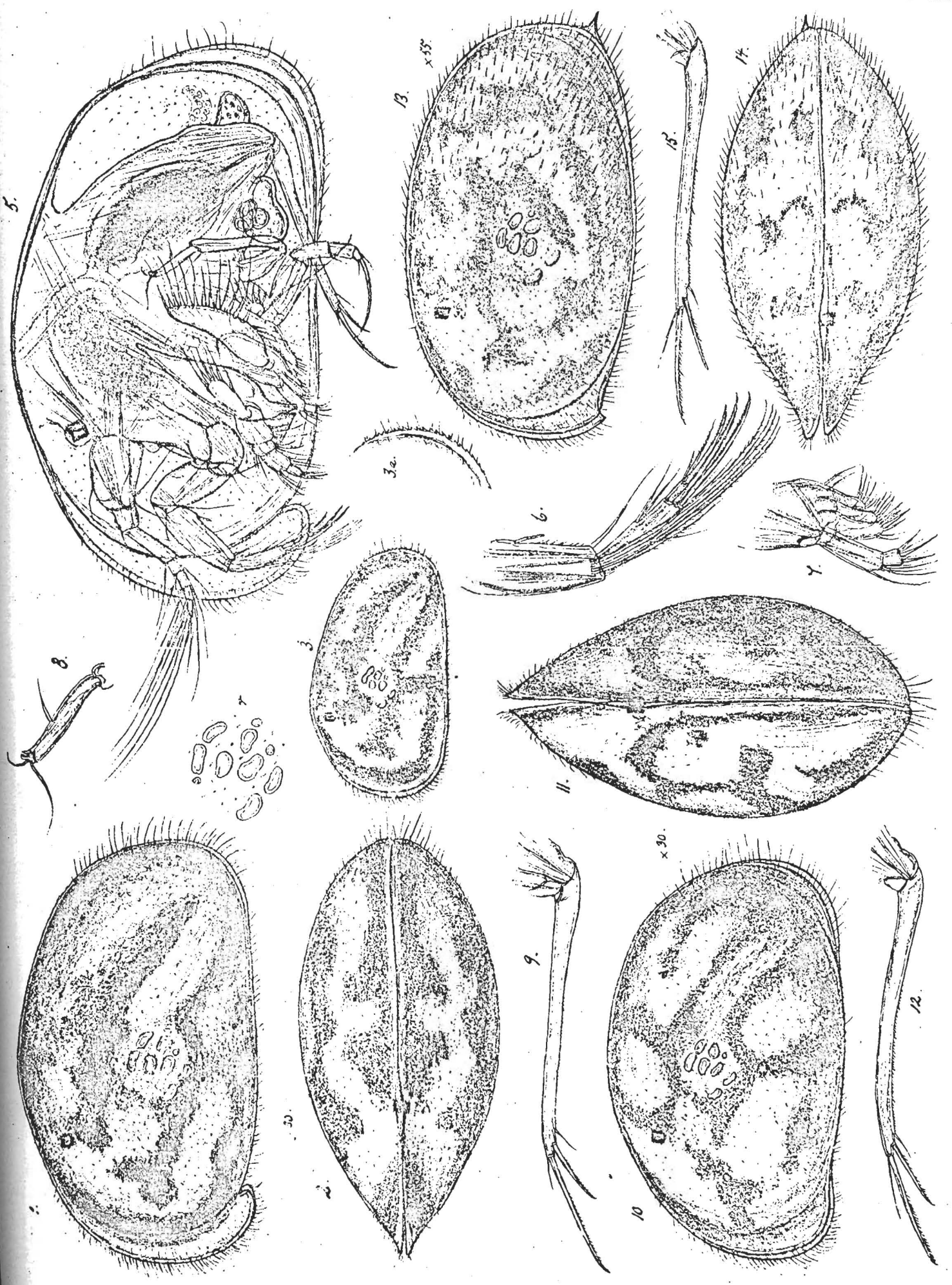
Cypris arcuata, G. O. Sars.

- Fig. 10. Adult female, viewed from left side, magnified 30 diameters.
" 11. Same, dorsal view.
" 12. Caudal ramus, magnified 90 diameters.

Cypris psittacea, G. O. Sars.

- Fig. 13. Adult female, viewed from left, side, magnified 55 diameters.
" 14. Same, dorsal view.
" 15. Caudal ramus, magnified 100 diameters.





P L A T E VI

Cypris Iheringi, G. O. Sars.

- Fig. 1. Adult female, viewed from left side,
magnified 24 diameters.
" 2. Same, dorsal view
" 3. Infero-posteal corner of right valve,
more highly magnified.
" 4. Caudal ramus, magnified 55 diameters.

Cypris spectabilis, G. O. Sars.

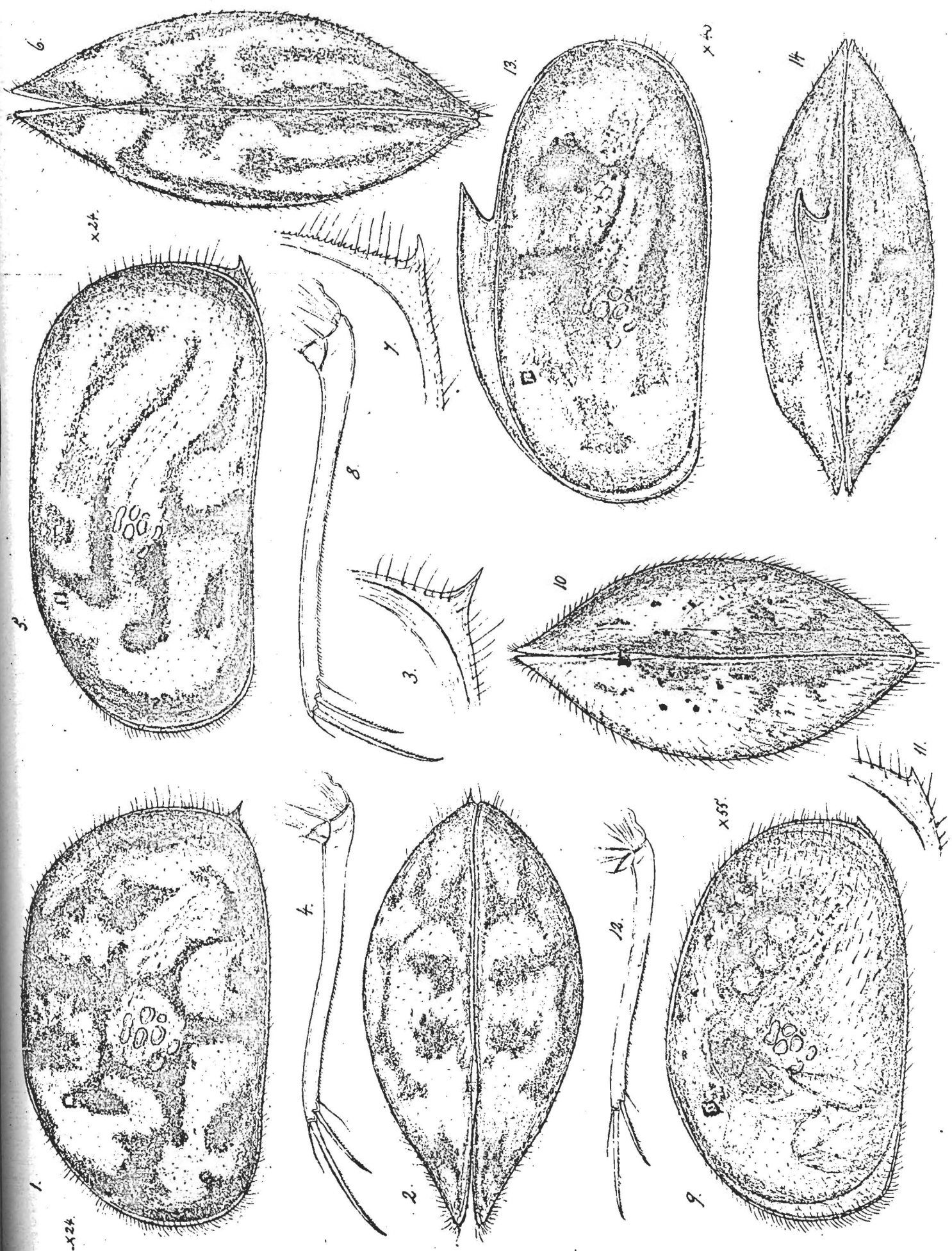
- Fig. 5. Adult female, viewed from left side,
magnified 24 diameters.
" 6. Same, dorsal view.
" 7. Infero-posteal corner of right valve,
more highly magnified.
" 8. Caudal ramus, magnified 55 diameters.

Cypris inornata, G. O. Sars.

- Fig. 9. Adult female, viewed from left side,
magnified 55 diameters.
" 10. Same, dorsal view.
" 11. Infero-posteal corner of right valve,
more highly magnified.
" 12. Caudal ramus.

Neocypris gladiator, G. O. Sars.

- Fig. 13. Adult female, viewed from left side,
magnified 40 diameters.
" 14. Same, dorsal view.



P L A T E VII

Neocypris gladiator, G. O. Sars.

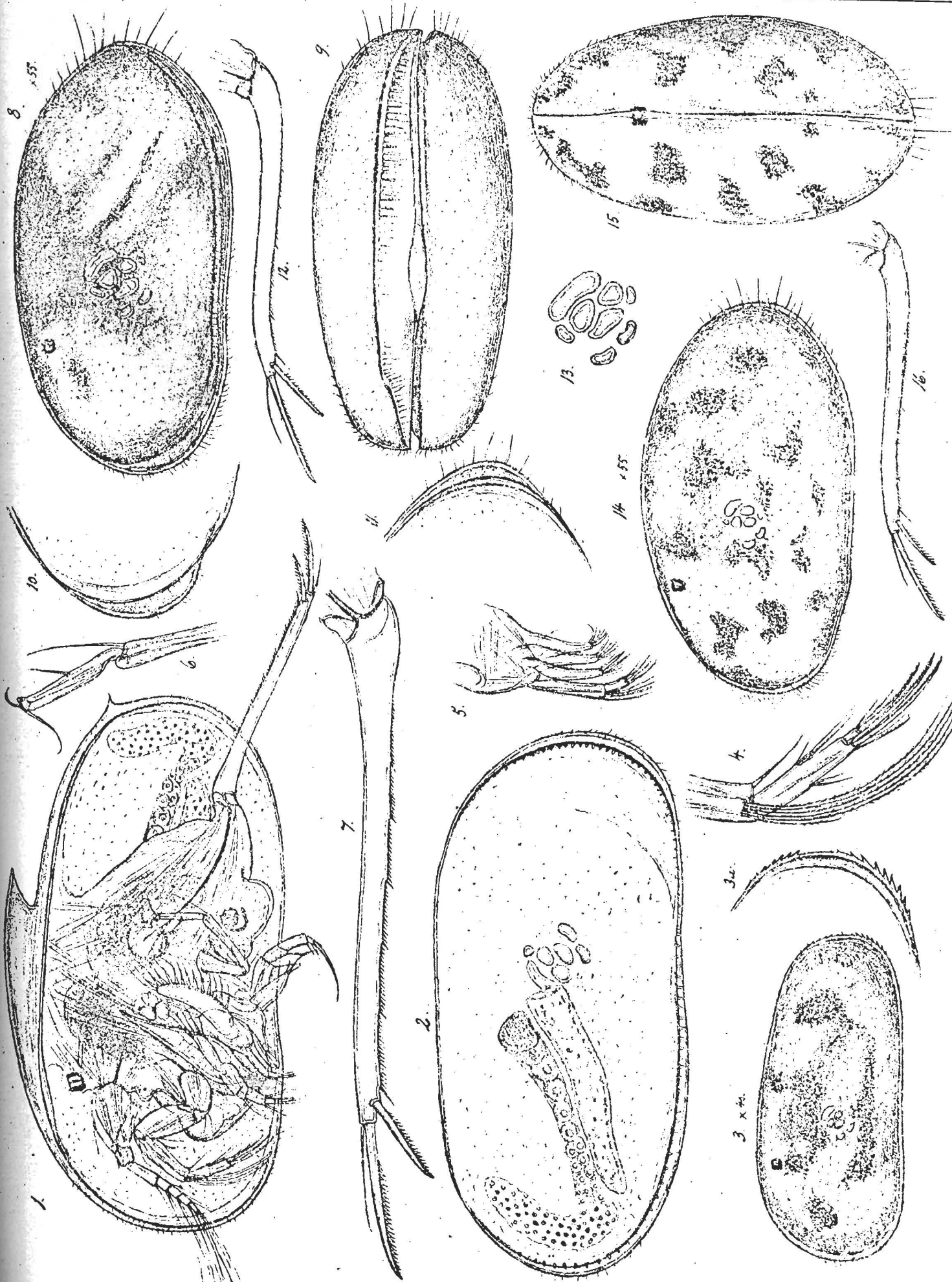
- Fig. 1..Adult female specimen, in which the left valve has been removed, so as to show the enclosed animal, lateral view, magnified 50 diameters.
- " 2. Left valve of same specimen, viewed from the inner face, and exhibiting the corresponding muscular impressions, coecal appendage and ovarial tube.
- " 3. Immature specimen, viewed from left side, magnified 40 diameters.
- " 3a. Same, posterior extremity of shell, more highly magnified, showing the serration of the edge.
- " 4. Outer part of inferior antenna from an adult specimen, magnified 90 diameters.
- " 5. Masticatory part of anterior maxilla.
- " 6. Outer part of posterior leg.
- " 7. Caudal ramus.

Neocypris mutica, G. O. Sars.

- Fig. 8. Adult female, viewed from left side, magnified 55 dm.
- " 9. Same, ventral view.
- " 10. Anterior extremity of right valve, viewed from the inner face, more highly magnified.
- " 11. Posterior extremity of same valve.
- " 12. Caudal ramus.
- " 13. Muscular impressions from left valve.

Neocypris variegata, G. O. Sars.

- Fig. 14. Adult female, viewed from left side, magnified 55 dm.
- " 15. Same, dorsal view.
- " 16. Caudal ramus.



P L A T E VIII

Neocypris obtusata, G. O. Sars

- Fig. 1. Adult female, viewed from left side, magnified 55 dm.
" 2. Same, dorsal view.

Neocypris elliptica, G. O. Sars

- Fig. 3. Adult female, viewed from left side, magnified 55 dm.
" 4. Same, dorsal view.

Neocypris mucronata, G. O. Sars.

- Fig. 5. Adult female, viewed from left side, magnified 55dm.
" 6. Same, dorsal view.

Cypria pellucida, G. O. Sars.

- Fig. 7. Adult female, viewed from left side, magnified 74 dm.
" 8. Same, dorsal view.

Cypridopsis obscura, G. O. Sars.

- Fig. 9. Adult female, viewed from left side, magnified 74 dm.
" 10. Same, dorsal view.

Cypridopsis flavescens, G. O. Sars.

- Fig. 11. Adult female, viewed from left side, magnified 74 dm.
" 12. Same, dorsal view.

Cypridopsis pinguis, G. O. Sars

- Fig. 13. Adult female, viewed from left side, magnified 74 dm.
" 14. Same, dorsal view.

Cypridopsella hispida, G. O. Sars

- Fig. 15. Adult female, viewed from left side, magnified 55 dm.
" 16. Same, dorsal view.

Cypridopsella nana, G. O. Sars

- Fig. 17. Adult female, viewed from left side, magnified 90 dm.
" 18. Same, dorsal view.

Paracypridopsis albida, G. O. Sars

- Fig. 19. Adult female, viewed from left side, magnified 90 dm.
" 20. Same, dorsal view.

Candonopsis brasiliensis, G. O. Sars

- Fig. 21. Adult female, viewed from left side, magnified 74 dm.
" 22. Same, dorsal view.

