

## Crustacea caspia.

### Contributions to the knowledge of the Carcinological Fauna of the Caspian Sea.

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Part III.

## AMPHIPODA.

Second Article:

**Gammaridæ** (continued);

with 8 autographic plates.

(Lu le 28 septembre 1894).

8. *Gammarus Warpachowskyi*, G. O. Sars, n. sp.

(Pl. IX).

*Specific Characters.* — Body comparatively slender and compressed, with the back perfectly smooth. Lateral lobes of cephalon forming in front a distinct angle, and being defined behind by a very slight emargination. Anterior pairs of coxal plates of moderate size, and edged distally with short, scattered bristles; 1st pair scarcely expanded in their outer part; 4th pair not as broad as they are deep. The last 2 pairs of epimeral plates of metasome slightly produced at the lateral corners. Urosome without any dorsal projections, but having on each of the segments dorsally a fascicle of delicate hairs, from among which, in the 2nd segment, rise 2 small spinules, the last 2 segments being moreover armed on each side of the dorsal face with 2 or 3 juxtaposed spines. Eyes of moderate size, and oblong oval in form. Superior antennæ scarcely exceeding in length  $\frac{1}{3}$  of the body, joints of the peduncle successively diminishing in size, flagellum somewhat longer than the peduncle, accessory appendage small, biarticulate. Inferior antennæ shorter than the superior, and in male provided with a very conspicuous clothing of extremely delicate and slender sensory hairs. Gnathopoda in fe-

male comparatively feeble, in male much stronger and nearly equal-sized, with the propodos subclavate in form. Anterior pairs of pereiopoda rather narrow; the 3 posterior pairs comparatively strongly built and but little elongated, with the carpal joint rather short; basal joint of last pair slightly expanded, with the posterior edge almost angularly bent below the middle. Last pair of uropoda scarcely as long as the urosome, inner ramus very small, outer one somewhat flattened, with several fascicles of spines, but without ciliated setæ, terminal joint small. Telson short and broad, nearly semicircular in outline, each half armed with 3 slender lateral spines and a single apical one, cleft very narrow. Length of adult female 6 mm., of male 7 mm.

*Remarks.* — The present new species, which I have much pleasure in dedicating to the diligent explorer of the North Caspian Sea, Mr. Warpachowsky, is easily distinguishable from the other species here described by the angularly produced lateral lobes of the cephalon, the dense hairy clothing of the inferior antennæ in the male, and the structure of the gnathopoda in that sex, and finally, by the comparatively short and stout posterior pairs of pereiopoda, and more particularly the peculiar shape of the basal joint in the last pair.

#### Description of the female.

The length of fully adult, ovigerous specimens scarcely exceeds 6 mm., and this form accordingly belongs to the smaller species of the genus.

The form of the body (see fig. 1) is rather slender and compressed, and the back perfectly smooth, without any trace of dorsal projections.

The cephalon (fig. 2) about equals in length the first 2 segments of mesosome combined, and is but very slightly produced in front. The lateral lobes are not very prominent, and terminate anteriorly in an acutangular corner, they being defined behind by a very slight emargination.

The anterior pairs of coxal plates are of moderate size, and fringed on their distal edge with scattered bristles. The 1st pair (see fig. 5) are scarcely expanded distally, being obtusely truncated at the tip. The 3 succeeding pairs (see fig. 6) are but little broader, and have the extremity somewhat obliquely truncated. The 4th pair (see fig. 7) are, as usual, the largest, though not nearly as broad as they are deep, and have the posterior expansion vertically truncated and edged with 4 bristles.

The 3 posterior pairs of coxal plates (see figs. 8—10) exhibit the usual shape.

The epimeral plates of the metasome are well developed, the 1st pair being rounded, whereas the other 2 have the lateral corners slightly produced.

The urosome (comp. fig. 19) does not exhibit any distinct dorsal projections; but each segment has, in the middle of the dorsal face, a fascicle of fine hairs. In the 2nd segment 2 small spinules are found among the hairs, and this segment has moreover on each side of the dorsal face an obliquely transverse row of 3 somewhat stronger spines accompanied by 2 or 3 small hairs. In the last segment occurs a similar row of lateral spines, but their number is here only 2 on each side.

The eyes (see fig. 2) are of moderate size and oblong oval in form, being placed close to the anterior edges of the cephalon, and extending below nearly to the inferior edge of the lateral lobes. They have the visual elements well developed and the pigment dark.

The superior antennæ (fig. 3) are not very much elongated, scarcely exceeding in length  $\frac{1}{8}$  of the body, and but sparingly supplied with short bristles. The joints of the peduncle successively diminish in size, the last one being about half the length of the 1st. The flagellum somewhat exceeds the peduncle in length, and is composed of only 9 articulations. The accessory appendage is very small, considerably shorter than the last peduncular joint, and is composed of only 2 articulations, the last of which is extremely minute.

The inferior antennæ (fig. 4) are considerably shorter than the superior, and have the last 2 joints of the peduncle nearly of same length, and provided with scattered fascicles of slender bristles. The flagellum is about half the length of the peduncle, and composed of 5 articulations.

The anterior gnathopoda (fig. 5) are comparatively small, with the carpus rather short and expanded below to a rounded setiferous lobe. The propodus is oval quadrangular in form, with about 3 fascicles of bristles below, and a single one above, near the tip. The palm is short and almost transverse, being defined below by an obtuse angle carrying a few slender spines and several bristles. The dactylus is not very strong.

The posterior gnathopoda (fig. 6) are not at all stronger than the anterior, but a little more slender, with the carpus somewhat larger, and the propodus longer in proportion to its breadth.

The 2 anterior pairs of pereopoda (fig. 7) are rather narrow and edged with fascicles of slender spines.

The 3 posterior pairs of pereopoda (figs. 8—10) are on the whole comparatively short and stout, and have their outer part edged with fascicles of slender spines. The last 2 pairs are about same length, whereas the antepenultimate pair are, as usual, somewhat shorter. In all pairs the carpal joint is comparatively short and thick, not nearly attaining to the length of the propodal one. The basal joint of the antepenultimate pair (fig. 8) is subquadrangular in form, with the posterior edge nearly straight, and the infero-posteal corner

somewhat produced; that of the penultimate pair (fig. 9) is considerably broader in its proximal part than at the end, being expanded above to a rounded lobe edged with about 4 bristles. The basal joint of the last pair (fig. 10) is considerably broader than that of the 2 preceding pairs, being greatly expanded posteriorly, with the edge of the expansion fringed with several strong bristles, and almost angularly bent below the middle.

The 2 anterior pairs of uropoda (figs. 11, 12) have the rami subequal and linear in form, each being tipped by a number of spines, one of which is more elongated than the others. The inner ramus has besides a small lateral spine about in the middle of the upper edge; otherwise the rami are quite smooth.

The last pair of uropoda (fig. 13) do not attain the length of the urosome, and have the inner ramus very small, with a minute apical spine accompanied by 2 small hairs. The outer ramus is comparatively broad and flattened, though tapering distally. It is devoid of ciliated setæ, but has on the outer edge 3 fascicles of spines accompanied by a few simple bristles, and on the inner edge 2 similar fascicles. The terminal joint is rather small and narrow conical in form, being surrounded by several spines and bristles issuing from the end of the proximal joint.

The telson (fig. 14) is comparatively short and broad, nearly semicircular in outline, each half being armed with 3 slender lateral spines and a single apical one accompanied by 2 small hairs. The cleft is very narrow, and as usual extends to the very base of the telson.

*The adult male* (fig. 15) is a little larger than the female, attaining a length of 7 mm.

In the general form of the body it does not differ much from the female, though, as usual, somewhat more slender and compressed, and having the coxal plates shallower.

The superior antennæ are nearly of same appearance as in the female, whereas the inferior ones (fig. 16) are very markedly distinguished by a dense clothing of extremely delicate and slender sensory bristles, arranged in several fascicles along the posterior edge of both the peduncle and the flagellum, giving these organs a brush-like appearance.

The gnathopoda (figs. 17, 18) are much more strongly built than in the female, and nearly equal both in size and structure, exhibiting an aspect rather similar to that met with in the males of the genera *Gmelina* and *Amathillina*. As in those genera, the propodos in both pairs is very large and almost clavate in shape, with the palm much shorter than the hind margin and slightly concave, being defined below by a somewhat projecting corner armed with 2 strong spines. The dactylus is rather strong and curved,

and impinges, when closed, with the tip inside the inferior corner of the propodos.

The pereiopoda exhibit exactly the same structure as in the female.

The last pair of uropoda are perhaps a little larger, but otherwise do not differ in their structure from those in the female.

*Occurrence.* — This form has been collected by Mr. Warpachowsky in 9 different Stations of the North Caspian Sea. Of these, one (St. 50) is located off the Tschistyi-Bank, another (St. 61) far north, outside the Bai Bogatuj Kultuk, 2 others (St. 54, 55) at some distance north of the islands Kulaly and Morskoy, the remaining Stations (17, 21, 27, 29, 52) distributed over the tract north of the peninsula Mangyschlak. In none of the Stations did it occur in any abundance.

In the collection of Dr. Grimm, this form is represented by a few specimens collected in the Bai of Baku, partly in quite shallow water, among grass, partly from a depth of 2—3 fathoms.

#### 9. *Gammarus minutus*, G. O. Sars, n. sp.

(Pl. X, figs. 1—26).

*Specific Characters.* — Body comparatively short and stout, with evenly rounded back. Lateral lobes of cephalon somewhat projecting and broadly rounded at the tip. Anterior pairs of coxal plates of moderate size and rather densely setous at the distal edge; 1st pair very slightly widening distally; 4th pair not so broad as they are deep. The last 2 pairs of epimeral plates of metasome nearly rectangular. Urosome comparatively short and somewhat gibbous above, the 1st segment partly overlapping the 2nd dorsally, both having a very small dorsal fascicle of hairs; last segment with a single spinule on each side. Eyes not very large, and oblong oval in form. Superior antennæ but little longer than the inferior, and having the basal joint rather large, flagellum about the length of the peduncle, accessory appendage 3-articulate. Gnathopoda in female comparatively small and nearly equal-sized; those in male much more powerful and rather unequal, propodos of the anterior ones obpyriform, of the posterior ones very large and oval quadrangular in form. Anterior pairs of pereiopoda rather densely setous, and having the meral joint somewhat expanded; the 3 posterior pairs moderately slender; basal joint of last pair very large, forming posteriorly a broadly rounded expansion somewhat projecting at the infero-posteal corner. Last pair of uropoda with the inner ramus very small, outer one sublinear, with a single fascicle of spines about in the middle of the outer edge; terminal joint small. Telson with the lateral lobes comparatively narrow and tipped

with 2 spines, cleft rather wide. Length of adult female 4 mm., of male 5 mm.

*Remarks.*—This is a very small species, indeed the smallest as yet known, and is also easily distinguished from the preceding species by the comparatively stout body, the short and, as it were, gibbous urosome, and by the structure of the gnathopoda and pereiopoda.

#### Description of the female.

The length of fully adult, ovigerous specimens scarcely exceeds 4 mm.

The form of the body (see fig. 1) appears on the whole rather short and stout, being not nearly so much compressed as in the preceding species. As in the latter, the back is quite smooth throughout, and broadly rounded.

The cephalon about equals in length the first 2 segments of mesosome combined, and has the lateral lobes somewhat projecting and broadly rounded at the tip, being defined from the postantennal corners by a rather deep emargination, encircling the large, globular basal joint of the inferior antennæ.

The anterior pairs of coxal plates are nearly twice as deep as the corresponding segments, and have their distal edge densely fringed with delicate bristles. The 1st pair (see fig. 4) are slightly expanded in their outer part, whereas the 2 succeeding pairs (see fig. 5) are almost of equal breadth throughout. The 4th pair (see fig. 6) are, as usual, larger than the preceding pairs, being somewhat expanded below the posterior emargination, though not nearly as broad as they are deep.

The epimeral plates of the metasome are well developed, the 1st pair being, as usual, the smallest, and evenly rounded, whereas the 2 posterior pairs terminate in an angle.

The urosome (see fig. 1) is comparatively short and stout, without any dorsal projections, but having the dorsal face of the first 2 segments strongly convex, and as it were gibbous. The 2nd segment is very short in its dorsal part, being to some extent overlapped by the 1st, and, like the latter, has dorsally a small fascicle of hairs, whereas lateral spinules are wholly absent. The last segment has on either side a single small spinule, but no dorsal fascicle.

The eyes are not very large, but of an oblong oval form, with well-developed visual elements and dark pigment.

The superior antennæ (fig. 2) are comparatively short, but little exceeding in length  $\frac{1}{4}$  of the body, and have the 1st joint of the peduncle rather large, nearly twice as long as the other 2 combined. The flagellum is about the length of the peduncle, and composed of only 8 articulations. The accessory

appendage equals in length  $\frac{1}{4}$  of the flagellum, and is composed of 3 distinctly defined articulations.

The inferior antennæ (fig. 3) are a little shorter than the superior, and have the antepenultimate joint of the peduncle rather thick, and projecting posteriorly as an angle tipped by several slender bristles. The penultimate joint forms likewise posteriorly a slight angular expansion provided with a number of slender bristles, and is somewhat longer than the last one. The flagellum is about half the length of the peduncle, and is composed of only 4 articulations.

The gnathopoda (figs. 4, 5) are rather small, and almost exactly of same shape, the propodos being in both pairs of an oval quadrangular form, with the palm rather short and almost transverse.

The 2 anterior pairs of pereiopoda (fig. 6) are rather densely supplied with slender bristles, and have the meral joint comparatively large and expanded distally.

The 3 posterior pairs of pereiopoda (figs. 7—9) are moderately slender and but little different in length, having their outer part edged with fascicles of slender bristles. The basal joint of the antepenultimate pair (fig. 7) is rather broad and subquadrangular in form, with the infero-posteal corner nearly rectangular; that of the penultimate pair (fig. 8) is considerably narrower, though somewhat expanded in its proximal part. The last pair (fig. 9) differ considerably from the others in the unusually large size of the basal joint, which forms posteriorly a very broad and evenly rounded expansion edged with a few small hairs, and projecting below as a broadly rounded lobe reaching somewhat beyond the ischial joint.

The 2 anterior pairs of uropoda (fig. 10) have the rami quite smooth except at the tip, which carries the usual fascicle of spines.

The last pair of uropoda (fig. 11) are of moderate size, with the inner ramus very small and tipped by a single minute spinule. The outer ramus is narrow linear in shape, and only provided with a single lateral fascicle of spines occurring somewhat beyond the middle of the outer edge. The terminal joint is very small, narrow conical in form, and tipped by 3 small bristles.

The telson (fig. 16) has the lateral halves rather narrow and each armed on the obtusely pointed tip, with 2 small spinules. The cleft, which, as usual, extends to the base of the telson, gradually widens distally.

*The adult male* (fig. 12) is a little larger than the female, attaining a length of about 5 mm.

It resembles the female in the general form of the body, but is easily recognized by the somewhat shallower coxal plates, and especially by the structure of the gnathopoda.

The latter appendages (figs. 13, 14) are much more powerfully developed than in the female, and also rather unequal in size, the posterior ones (fig. 14) being much stronger than the anterior, with the propodos very large and of an oval quadrangular form. In the anterior pair (fig. 13) the propodos is also rather large, as compared with that in the female, but much narrower than in the posterior pair, and nearly obpyriform in shape, with the palm very oblique. In both pairs the palm is defined below by a distinct, though somewhat obtuse angle armed with several strong spines.

The last pair of uropoda (fig. 15) are a little larger than in the female, about equalling in length the urosome, but are otherwise of much the same structure.

*Occurrence.* — Of this form, a few specimens were collected by Mr. Warpachowsky at St. 52, lying north of the island Swjatoj. This is the only place where the species has hitherto been found. In the collection of Dr. Grimm I have not yet succeeded in detecting any specimen of this species.

#### 10. *Gammarus macrurus*, G. O. Særs, n. sp.

(Pl. X, figs. 17—27).

*Specific Characters.* — Body slender and quite smooth throughout. Lateral lobes of cephalon somewhat projecting and evenly rounded at the tip. Anterior pairs of coxal plates rather large and closely contiguous; 1st pair slightly widening distally; 4th pair very large, being fully as broad as they are deep. The last 2 pairs of epimeral plates of metasome obtusely produced at the lateral corners. Urosome rather slender and smooth above; last segment with a small spinule on either side. Eyes of moderate size and oblong oval in form. Antennæ rather short and equal-sized, but little exceeding in length  $\frac{1}{4}$  of the body, the superior ones with the 1st joint of the peduncle rather large, flagellum about the length of the peduncle, accessory appendage 3-articulate. Gnathopoda in female extremely small and feeble, with the propodos scarcely larger than the carpus. Anterior pairs of pereopoda normally developed; the 3 posterior pairs moderately slender; basal joint of antepenultimate pair rather broad and rounded at the infero-posteal corner, that of last pair considerably expanded and of regular oval form. Last pair of uropoda considerably exceeding the urosome in length, inner ramus small, outer very much elongated, with the terminal joint well developed, being about half the length of the proximal one. Telson rather narrow, each half having 1 lateral and 1 apical spine, cleft narrow. Length of adult female 6 mm.



*Remarks.* — This species may be readily distinguished from the 2 preceding ones by the very slender form of body, the comparatively small and equal-sized antennæ, the extremely feeble gnathopoda, and especially by the very much elongated last pair of uropoda, which latter characteristic has given rise to the specific name. Only female specimens have hitherto come under my inspection.

#### Description of the female.

Fully adult, ovigerous specimens scarcely exceed 6 mm. in length, and accordingly, this species also belongs to the small-sized species of the genus.

The form of the body (see fig. 17) is very slender and compressed, with the back perfectly smooth throughout.

The cephalon scarcely attains the length of the first 2 segments of mesosome combined, and has the lateral lobes somewhat projecting and broadly rounded at the tip, being defined behind by a rather deep emargination.

The anterior pairs of coxal plates are comparatively large and closely contiguous, forming together on each side a perfectly continuous wall. Their distal edge is only fringed with very small and scattered bristles. The 1st pair (see fig. 19) are slightly expanded in their outer part, and obtusely truncated at the tip; the 2 succeeding pairs are of a more regular, oblong quadrangular form. The 4th pair (see fig. 21) are very large and greatly expanded in their outer part, being fully as broad as they are deep, and exhibiting an irregularly angular shape, with the posterior expansion vertically truncated.

The epimeral plates of the metasome are comparatively large, the last 2 being produced at the lateral corners to a somewhat obtuse point.

The urosome is rather slender and perfectly smooth above, with only a very small spinule on each side of the dorsal face in the last segment.

The eyes are of moderate size and oblong oval form, with well-developed visual elements and dark pigment.

The antennæ (see fig. 17) are unusually short and nearly equal-sized, scarcely exceeding in length  $\frac{1}{4}$  of the body, and are supplied with scattered fascicles of slender bristles. The superior ones (fig. 18) have the 1st joint of the peduncle very large, being nearly twice as long as the other 2 combined. The 3rd joint is rather short, scarcely longer than it is broad. The flagellum is about the length of the peduncle, and composed of 6 articulations only. The accessory appendage about equals in length the last 2 peduncular joints combined, and is composed of 3 articulations. The inferior antennæ nearly agree in their structure with those in *G. minutus*.

The gnathopoda (figs. 19, 20) are extremely small and feeble, the post-

erior ones being somewhat more slender than the anterior. The propodos in both pairs is scarcely broader than the carpus and about equals it in length. In the posterior pair both the carpus and the propodos appear somewhat more elongated than in the anterior one.

The 2 anterior pairs of pereiopoda (fig. 21) are of moderate size and resemble those in *G. minutus*, except that the meral joint is somewhat less expanded.

The 3 posterior pairs of pereiopoda (figs. 22—24) are rather slender, and have their outer part supplied with fascicles of slender bristles. The basal joint of the antepenultimate pair (fig. 22) is very broad and of a rounded quadrangular form, with the infero-posteal corner rounded off; that of the penultimate pair (fig. 23) is considerably smaller, and has the posterior edge evenly curved. The last pair (fig. 24) have, as usual, the basal joint larger than that of the 2 preceding pairs and of a rather regular oval form, with the posterior edge but slightly curved, and the infero-posteal corner expanded to a rounded lobe reaching about to the end of the ischial joint. The outer part of these legs, in all the specimens, was broken off.

The 2 anterior pairs of uropoda (fig. 25) have the rami equal-sized and narrow linear in form, being edged with a few lateral spines in addition to the usual apical ones.

The last pair of uropoda (fig. 26) are remarkable by their unusual length, even considerably exceeding that of the urosome. The basal part is comparatively short, and armed at the end below with a transverse row of strong spines. The inner ramus, as in most of the Caspian species, is very small, terminating with 2 slender spines. The outer ramus, on the other hand, is unusually elongated and rather slender, with the terminal joint well developed and occupying about the third part of the length of the ramus. The proximal joint has outside 2 small fascicles of spines, and inside a row of about 6 slender, ciliated setæ; at the end it carries, moreover, a few spines and simple bristles. The terminal joint has the outer edge smooth, the inner provided with a row of 4 setæ, and moreover carries on the tip 3 slender bristles.

The telson (fig. 27) is rather narrow, being much longer than it is broad at the base, and gradually tapers distally. Each half is armed with a small lateral spinule and another apical one accompanied by a small hair. The cleft is rather narrow and extends to the base of the telson.

*Occurrence.* — Only a few specimens of this form were found among other Gammari collected by Mr. Warpachowsky at St. 53 and 54, both located at some distance north of the islands Kulaly and Morskoj. In the collection of Dr. Grimm I have not yet succeeded in detecting any specimen of this species.

11. *Gammarus compressus*, G. O. Sars, n. sp.

(Pl. XI, figs. 1—10).

*Specific Characters.* — Body moderately slender and very much compressed, with the back smooth throughout. Lateral lobes of cephalon but slightly projecting, and narrowly rounded at the tip. Anterior pairs of coxal plates rather large and densely fringed with bristles distally; 1st pair very much expanded in their outer part; 4th pair large, about as broad as they are deep. The last 2 pairs of epimeral plates of metasome but very slightly produced at the lateral corners. Urosome comparatively short and quite smooth above. Eyes not very large, narrow oblong in form. Antennæ comparatively short and nearly equal-sized, the superior ones having the 1st joint of the peduncle very large and massive, flagellum but little longer than the peduncle, accessory appendage 3-articulate. Gnathopoda in female small and feeble, and nearly equal-sized. Anterior pairs of pereopoda comparatively strongly built, and densely setous, with the meral joint not a little expanded, especially in the 2nd pair; the 3 posterior pairs rather slender and nearly equal in length; basal joint of last pair moderately expanded and regularly oval in form. Last pair of uropoda with the inner ramus less rudimentary than in the preceding species, being nearly half as long as the outer, the latter having the terminal joint well developed. Telson fully as long as it is broad at the base, each half with 2 apical spines. Length of adult female 7 mm.

*Remarks.* — This new species is chiefly characterised by its extremely compressed body, the short, equal-sized antennæ, the form of the 1st and 4th pair of coxal plates, and the structure of the last pair of uropoda. As of the preceding species, only female specimens have hitherto come under my inspection.

**Description of the female.**

The length of fully adult, ovigerous specimens measures about 7 mm., and accordingly this form must also be reckoned among the smaller species of the genus.

The form of the body (see fig. 1) is rather slender and very much compressed, with the back narrowly rounded and smooth throughout.

The cephalon about equals in length the first 2 segments of the mesosome combined, and appears nearly transversely truncated in front, the lateral lobes projecting but slightly, and being narrowly rounded at the tip.

The anterior pairs of coxal plates are rather large and fringed on their distal edge with numerous delicate bristles. The 1st pair (see fig. 3) are of

a somewhat unusual form, being very much expanded in their outer part, and forming in front a linguiform lobe advancing beneath the cephalon as far as the insertion of the inferior antennæ. The 2 succeeding pairs (see fig. 4) are of regular oblong quadrangular form and transversely truncated at the tip. The 4th pair (see fig. 5) are very large and expanded, being fully as broad as they are deep, and projecting below the posterior emargination as a distinct angle.

The epimeral plates of the metasome are of moderate size, and the 2 posterior pairs but very slightly produced at the lateral corners.

The urosome is comparatively short and stout, being quite smooth above, with only an extremely minute spinule on each side of the dorsal face of the last segment.

The eyes are not very large but of a narrow oblong form, with well developed visual elements and dark pigment.

The antennæ are comparatively short and nearly equal-sized, scarcely exceeding in length  $\frac{1}{4}$  of the body. The superior ones (fig. 2) have the 1st joint of the peduncle very large and massive, considerably exceeding in length the other 2 combined. The flagellum is scarcely longer than the peduncle, and is composed of only 9 articulations. The accessory appendage does not attain the length of the last 2 peduncular joints combined, and is composed of 3 articulations. The inferior antennæ have the last joint of the peduncle smaller than the penultimate one, and the flagellum nearly as long as the peduncle and 6-articulate.

The gnathopoda (figs. 3, 4) are comparatively small and feeble, resembling in structure those in the 3 preceding species. The propodos in the anterior pair (fig. 3) is a little broader than in the posterior (fig. 4), where it is scarcely larger than the carpus. In both pairs the palm is very short and nearly transverse.

The 2 anterior pairs of pereopoda are rather strongly built and, especially the 2nd pair (fig. 5), very densely clothed with slender bristles, which form a dense fringe along the posterior edge of the meral and carpal joints. The former joint is very large and expanded, and the latter likewise unusually broad and regularly oval in form.

The 3 posterior pairs of pereopoda (figs. 6—8) are comparatively slender and nearly of equal length, with their outer part edged with fascicles of delicate bristles. In all pairs the meral joint is somewhat expanded, whereas the carpal and propodal ones are linear in form and about equal in length. The basal joint of the antepenultimate pair (fig. 6) is of a rounded oval form, with the infero-posteal corner somewhat produced and rounded off; that of the penultimate pair (fig. 7) is considerably narrower and ob-

liquely oblong, being expanded at the upper part posteriorly to a rounded, minutely setiferous lobe. The last pair (fig. 8) have the basal joint considerably larger than that of the 2 preceding pairs, and of a regular oval form, with the posterior edge slightly curved and fringed with small bristles, the infero-posteal corner being produced to a broadly rounded lobe extending to the end of the ischial joint.

The 2 anterior pairs of uropoda have the rami subequal and of a narrow linear form, being spinous only at the tip.

The last pair of uropoda (fig. 9) are of moderate size, and have the basal part, as usual, armed at the end below with a transverse row of strong spines. The inner ramus is less rudimentary than in most other Caspian species, being about half the length of the outer. It is conically tapering and carries at the tip a slender spine and 2 or 3 delicate bristles. The outer ramus is about twice as long as the basal part, and has the terminal joint well developed, about half the length of the proximal one. The latter has outside 2 small fascicles of spines and inside about 4 slender setæ.

The telson (fig. 10) is fully as long as it is broad at the base, and is, as usual, cleft to the base, the cleft widening gradually distally. The lateral lobes are comparatively narrow, and each carry at the somewhat truncated tip 2 slender spines.

*Occurrence.* — Some specimens of this form were collected by Mr. Warpachowsky at St. 2, located off the Tschisty-Bank; a single specimen was moreover found at St. 16, lying east of the island Swjatoj.

In the collection of Dr. Grimm this species seems not to be represented.

## 12. *Gammarus similis*, G. O. Sars, n. sp.

(Pl. XI, figs. 11—20).

*Specific Characters.* — Very like the preceding species, though not nearly so much compressed. Lateral lobes of cephalon somewhat projecting and obtusely rounded at the tip. Anterior pairs of coxal plates densely setous at the terminal edge; 1st pair but very slightly widening distally; 4th pair not so broad as they are deep. Epimeral plates of metasome about as in *G. compressus*. Urosome somewhat more slender than in that species and smooth above, last segment with 2 small spinules on each side of the dorsal face. Eyes oblong oval in form, with dark pigment. Antennæ comparatively short and nearly equal-sized, the superior ones with the 1st joint of the peduncle very large, flagellum somewhat longer than the peduncle, accessory appendage 4—5-articulate. Gnathopoda in female nearly as in *G. compressus*; those in male somewhat stronger and rather unequal, the post-

erior ones being the larger, palm in both pairs more oblique than in the female, and having in the middle, outside, a strong spine. Pereiopoda of a similar structure to that in *G. compressus*, except that the basal joint of the last pair is somewhat more expanded. Last pair of uropoda with the inner ramus rather small, the outer elongated and having the terminal joint poorly developed. Telson not as long as it is broad at the base, each half with 2 small apical spines. Length of adult female 9 mm., of male about the same.

*Remarks.* — The present species is nearly allied to *G. compressus*, but on a closer examination is easily distinguishable by its far less compressed body, the different form of the 1st and 4th pair of coxal plates, and the likewise rather different structure of the last pair of uropoda. It also bears some resemblance to the form described by Mr. Sowinsky from the Azow Sea, as *G. macoticus*, which latter species also occurs in the Caspian Sea, and is represented by several well marked specimens in the collection of Dr. Grimm.

#### Description of the female.

The length of adult, ovigerous specimens amounts to 9 mm., and this form accordingly grows to a somewhat larger size than the preceding species.

The form of the body (see fig. 11) is, as in the latter, rather slender, but considerably less compressed, the back being broadly vaulted and quite smooth throughout.

The cephalon does not fully attain the length of the first 2 segments of mesosome combined, but has the lateral lobes rather prominent and obtusely rounded at the tip, being defined behind by a rather deep emargination.

The anterior pairs of coxal plates are of moderate size and densely setiferous on their distal edge. The 1st pair (see fig. 13) differ not a little in their shape from those in *G. compressus*, being only very slightly expanded distally, and nearly transversely truncated at the tip. Also the 4th pair (see fig. 15) are markedly distinguished in being far less expanded in their outer part.

The epimeral plates of the metasome are nearly of same appearance as in the above-mentioned species.

The urosome, on the other hand, appears considerably more elongated and slender than in that species, and has on each side of the last segment 2 minute spinules.

The eyes are comparatively a little larger than in *G. compressus* and of a more pronounced oblong reniform shape.

The antennæ, as in that species, are comparatively short and equal-sized, scarcely exceeding in length  $\frac{1}{4}$  of the body. The superior ones (fig. 12) have the 1st joint of the peduncle very large, nearly twice as long as the other 2 combined. The flagellum somewhat exceeds the peduncle in length, and is composed of about 11 articulations. The accessory appendage is comparatively more fully developed than in *G. compressus*, and composed of 4 to 5 articulations. The inferior antennæ have the outer joints of the peduncle rather richly supplied with bristles. The flagellum nearly attains the length of the peduncle, and is composed of about 7 articulations.

The gnathopoda (figs. 13, 14) resemble those in *G. compressus*, though the posterior ones are perhaps still more slender than in that species.

The pereopoda (figs. 15—18) also exhibit a very similar structure to that in the above-named species, and need not therefore be described in detail. In the last pair (fig. 18), however, the basal joint is comparatively larger and more expanded, being nearly as broad as it is long.

The last pair of uropoda (fig. 18) are rather elongated, about equalling the urosome in length, and differ very markedly in their structure from those in *G. compressus*. Thus the inner ramus is much smaller, being scarcely  $\frac{1}{3}$  as long as the outer, and the terminal joint of the latter is likewise very minute, as compared with that in the said species. The proximal joint of the latter ramus is, on the other hand, much elongated and of a linear form, with several slender setæ on the inner edge and 2 or 3 small fascicles of spines on the outer.

The telson (fig. 20) is comparatively shorter than in *G. compressus*, being not nearly so long as it is broad at the base; otherwise it exhibits a very similar structure.

*The adult male* is about same size as the female, and does not greatly differ from it in outward appearance. It is, however, easily recognized by the somewhat more strongly built gnathopoda. As in most other Gammari, the posterior pair (fig. 22) are more powerful than the anterior (fig. 21), the propodos being in the former considerably larger and broader. In both pairs the palm is somewhat oblique, and armed in the middle, outside, with a strong spine in addition to those occurring on the lower corner.

*Occurrence.* — This species has been collected by Mr. Warpachowsky in 6 different Stations of the North Caspian Sea. Of these, one (St. 16) is located off the island Swjatoj; another (St. 21) at the northern point of the peninsula Mangyschlack, 2 others (St. 53, 54) at some distance north of the islands Kulaly and Morskoj, the last 2 (St. 61, 63) in the northern and eastern part of that Sea.

In the collection of Dr. Grimm, several specimens of this species are

to be found, partly collected at Baku from stones on the shore, partly on the west coast of Sara, among *Zostera*.

13. *Gammarus robustoides*, Grimm MS.

(Pl. XII).

Syn.: ? *Gammarus caspius*, Sp. Bate (not Pallas)

*Gammarus aralo-caspius*, Grimm MS.

*Specific Characters.* — Body rather strongly built and but little compressed, the back being broadly rounded. Lateral lobes of cephalon rather projecting and somewhat obliquely truncated at the tip, the lower corner being more prominent than the upper. Anterior pairs of coxal plates of moderate size, and densely fringed with bristles on their distal edge; 1st pair but very slightly widening distally; 4th pair scarcely as broad as they are deep. The last 2 pairs of epimeral plates of metasome acutely produced at the lateral corners. Urosome with the 2 anterior segments forming each at the end dorsally a slight protuberance armed with a number of densely crowded spines arranged in an angularly bent transverse row, the 1st segment having generally 8 such spines, the 2nd 6; last segment with a dorsal fascicle of delicate hairs, and having besides on either side of the dorsal face 2 spinules. Eyes of moderate size and oval reniform in shape. Antennæ comparatively short and nearly equal-sized, the superior ones with the 1st joint of the peduncle rather large, flagellum somewhat exceeding the peduncle in length and composed of numerous short articulations, accessory appendage well developed, 6—8-articulate. Gnathopoda in female moderately strong and somewhat unequal, the posterior ones being the larger, carpus in both pairs rather short, propodos well developed, with the palm somewhat oblique; those in male considerably more strongly built than in female, with the propodos, especially of the posterior ones, very large and tumid. Anterior pairs of pereopoda rather robust, and very densely setiferous, with the meral joint large and expanded; the 3 posterior pairs moderately slender, and having their outer part clothed with numerous fascicles of bristles and scattered spines; basal joint of last pair oblong oval in form, being somewhat broader in female than in male, hind edge densely fringed with short bristles, infero-posteal corner produced to a short, narrowly rounded lobe. Last pair of uropoda of moderate size, with the inner ramus very small, outer one well developed and densely fringed with slender, partly ciliated setæ, terminal joint extremely minute. Telson about as long as it is broad, each half with 3 or 4 apical spines. Length of adult female 17 mm., of male reaching 22 mm.



*Remarks.* — The *Gammarus caspius* of Sp. Bate may perhaps be referable to this species, but, as above stated, this name was given a long time ago by Pallas to a very different form. In the collection of Dr. Grimm this species has been labelled in 2 different manners. On one bottle, containing an unusually large male specimen, in which, by some accident, the dorsal spines of the 1st segment of the urosome were rubbed off, the name *G. robustoides* is given; 2 other bottles, containing several considerably smaller specimens of the same species, are labelled with the name *G. aralo-caspius*. I think I am right in preferring the former name, as the latter is inconveniently near *G. caspius*, which is a very different form. The species is easily recognized by the strong and densely crowded dorsal spines occurring on the 2 anterior segments of the urosome.

#### Description of the female.

The length of adult ovigerous specimens amounts to about 17 mm., but in some places they would seem not to attain to such a large size. In every case this form must be reckoned among the larger-sized species of the genus.

The body (see fig. 1) is of a rather robust form and but little compressed, the back being broadly rounded and perfectly smooth.

The cephalon about equals in length the first 2 segments of mesosome combined, and has the lateral lobes rather projecting and somewhat obliquely truncated at the tip, with the lower corner more prominent than the upper. They are defined posteriorly by a rather deep emargination encircling the large, globular basal joint of the inferior antennæ.

The anterior pairs of coxal plates are of moderate size, and densely fringed on their distal edge with delicate bristles. The 1st pair (see fig. 3) are very slightly expanded in their outer part, whereas the 2 succeeding pairs (see fig. 4) are nearly of same breadth throughout. The 4th pair (see fig. 5) are, as usual, the largest, though scarcely as broad as they are deep; their posterior expansion is vertically truncated, and, like the distal edge, densely fringed with bristles.

The epimeral plates of the metasome are well developed, and the 2-nd pair a little deeper than the last, both being acutely produced at the lateral corners.

The urosome (comp. figs. 17, 18) is of moderate size, and has the 2 anterior segments somewhat elevated at the end dorsally, whereby 2 obtuse dorsal prominences are formed, each armed with a number of densely crowded spines arranged in a somewhat angularly bent transverse row. The

number of these spines is generally on the 1st segment 8, on the 2nd 6. In the last segment occurs a dorsal fascicle of delicate hairs, and, in addition, on either side of the dorsal face 2 spinules.

The eyes are of an oval reniform shape, with well-developed visual elements and dark pigment. In some specimens, however, preserved from older time in the Museum of St. Petersburg, and collected at Baku, no trace of any ocular pigment was observable; but whether this was merely due to the action of the spirit, or to some different nature of the pigment in those specimens, I am unable to state.

The antennæ are comparatively short and but little different in length, differing in this respect from what is the case in the typical *Gammari*. The superior ones (fig. 2) but slightly exceed in length  $\frac{1}{4}$  of the body, and have the 1st joint of the peduncle rather large and longer than the other 2 combined. The flagellum somewhat exceeds the peduncle in length, and is very flexible, being composed of numerous short articulations, amounting to 20—24 in all. The accessory appendage is well developed, though scarcely as long as the last 2 peduncular joints combined, and is composed of from 6 to 8 articulations. The inferior antennæ are a little shorter than the superior, and are more densely setiferous. The penultimate joint of the peduncle is somewhat larger than the last one, and the flagellum about equals in length those joints combined, being composed of 8—10 articulations.

The gnathopoda (figs. 3, 4) are moderately strong and somewhat unequal, the posterior ones (fig. 4) being considerably more powerful than the anterior (fig. 3). In both pairs the carpus is quite short, triangular, and expanded below to a narrow, setiferous lobe. The propodus is comparatively large and tumid, especially in the posterior pair, and has the palm somewhat oblique, being defined below by an obtuse angle armed with several strong spines.

The 2 anterior pairs of pereopoda (fig. 5) are unusually robust and densely edged with slender bristles, especially along the posterior edges of the meral and carpal joints. The former joint is very large and expanded, and also the carpal joint gradually expands somewhat distally, whereas the propodal joint is of the usual narrow linear form.

The posterior pairs of pereopoda (figs. 6—8) are considerably more slender, and have their outer part edged with numerous fascicles of delicate bristles, and by a number of scattered spines. The antepenultimate pair (fig. 6) are considerably shorter than the other 2, and have the basal joint rounded quadrangular in form, with the anterior edge somewhat curved, and edged with several fascicles of slender bristles, as also with a number of small spines; the infero-posteal corner of this joint is somewhat project-

ing and angular. In the penultimate pair (fig. 7) the basal joint is somewhat more elongated and slightly expanded in its proximal part, gradually tapering distally. The last pair (fig. 8) are about same length as the penultimate, but are markedly distinguished by the much larger size of the basal joint. This exhibits a rather regular oval form, with the posterior edge evenly curved, and, as in the preceding pairs, densely fringed throughout with comparatively short bristles; its infero-posteal corner projects below as a narrowly rounded lobe, reaching about to the end of the ischial joint. Of the outer joints, the carpal one in all 3 pairs is rather elongated and slender, exceeding in length both the meral and the propodal joints. The dactylus is not very strong, and has near the tip a small bristle.

The anterior pairs of uropoda (figs. 9 and 16) have the rami sublinear in form and armed with scattered lateral spines, their tip carrying only a single spine accompanied by 2 small denticles.

The last pair of uropoda (fig. 10) are of moderate size, and, as in most other Caspian Gammari, have the inner ramus very small and scale-like, with a single minute apical spinule and several slender bristles on the inner edge. The outer ramus is about twice the length of the basal part and slightly tapers distally. It is fringed all round with numerous slender, partly ciliated setæ, and has besides, on the outer edge, 3 fascicles of spines; the terminal joint is extremely minute.

The telson (fig. 11) is about as long as it is broad, and is, as usual, divided by a deep cleft into 2 halves, each of which carries on the narrowly truncated tip 3 or 4 spines, but no trace of any lateral ones.

*The adult male* (fig. 12) generally attains a considerably larger size than the female, its length amounting to 22 mm.

It does not differ conspicuously in its general form from the female, but is easily recognizable by the much stronger development of the gnathopoda.

As in the female, these limbs (figs. 14, 15) are somewhat unequal, the posterior ones (fig. 15) being considerably stronger than the anterior (fig. 14). The propodos in both pairs, but especially in the posterior ones, is very large and tumid, though of a similar shape to that in the female.

Of the other appendages, the last pair of pereopoda somewhat differ in the basal joint being narrower and less expanded than in the female, with the posterior edge nearly straight, and the last pair of uropoda appear a little more elongated and still more densely setous.

*Occurrence.* — This species would seem to be one of the most frequent Amphipoda of the Caspian Sea. It has been collected by Mr. Warpachowsky in no less than 14 different Stations, and in some of them in great abundance. Of these Stations, one (St. 2) is located off the Tschistyi-Bank, an-

other (St. 12), in the inner part of the Bai Agrachansky, a 3rd (St. 40), off the promontory Brjanskaja, a 4th (St. 31), about midway between the peninsula Mangyschlak and the opposite western coast, a 5th (St. 61), far north, at some distance outside the Bai Bogatyi Kultuk, the remaining Stations (16, 17, 23, 24, 26, 27, 28, 51, 54), distributed over the tract north of the peninsula Mangyschlak. I have also had an opportunity of examining some specimens of this species preserved in the Museum of St. Petersburg from earlier time, and collected by Baer and Göbel, partly at Baku, partly at Krasnowodsk.

Dr. Grimm has collected this species in several localities both of the southern and middle part of the Caspian Sea, from the shore down to a depth of 6 fathoms. A single specimen, that labelled *G. robustoides*, was found at the considerable depth of 108 fathoms.

*Distribution.* — To judge from the one of the specific names (*aralo-caspicus*) attributed by Dr. Grimm to this species, it would also seem to occur in the Aral Sea. I have not yet, however, had an opportunity of examining any specimens from that basin.

#### 14. *Gammarus crassus*, Grimm MS.

(Pl. XIII).

*Specific Characters.* — Body rather short and stout, with broadly rounded back. Lateral lobes of cephalon somewhat projecting and obtusely rounded at the tip. Anterior pairs of coxal plates of moderate size, and fringed distally with scattered bristles; 1st pair but very slightly widening distally; 4th pair considerably expanded in their outer part, though of scarcely as broad as they are deep. The last 2 pairs of epimeral plates of metasome acutely produced at the lateral corners. Urosome smooth above, 1st segment with a dorsal fascicle of fine hairs, the 2 succeeding ones each with one or two spinules on either side of the dorsal face. Eyes of moderate size and oval reniform. Antennæ nearly equal-sized, and scarcely attaining to  $\frac{1}{3}$  of the length of the body; the superior ones with the 1st joint of the peduncle about the length of the other 2 combined, flagellum considerably longer than the peduncle, accessory appendage 4—5-articulate. Gnathopoda in female not very strong, in male much more powerfully developed, the posterior ones having the propodos very large. Anterior pairs of pereopoda less robust than in *G. robustoides*; the 3 posterior pairs moderately elongated, with the basal joint rather expanded, that of last pair being very large, with the posterior edge distinctly serrate, and having the infero-posteal corner expanded to a broad, obtusely truncated lobe projecting far

beyond the ischial joint. Last pair of uropoda nearly as in *G. robustoides*. Telson somewhat broader than it is long, each half with only 2 apical spines. Length of adult female 11 mm., of male 12 mm.

*Remarks.* — The present species, established by Dr. Grimm, is nearly allied to *G. robustoides*, differing, however, in the still stouter form of the body, the different armature of the urosome, the structure of the gnathopoda and the large size and peculiar form of the basal joint of the last pair of pereopoda. It is also rather inferior in size.

#### Description of the female.

Adult, ovigerous specimens scarcely exceed 11 mm. in length.

The body (see fig. 1) is of a still shorter and stouter form than in *G. robustoides*, being rather tumid, with broadly vaulted back, and the species thus fully deserves the specific name proposed for it by Dr. Grimm.

The cephalon about equals in length the first 2 segments of the mesosome combined, and has the lateral lobes rather projecting and obtusely rounded at the tip, being defined behind by a rather deep emargination.

The anterior pairs of coxal plates are of moderate size, and have their distal edge slightly crenulated and fringed with scattered bristles. The 1st pair (see fig. 4) are very slightly expanded distally, and are obtusely rounded at the tip. The 2nd pair (see fig. 5) have the distal edge somewhat oblique, whereas the 3rd pair are more regularly oblong quadrangular in form. The 4th pair (see fig. 6) are rather broadly expanded in their outer part, though scarcely as broad as they are deep. Their distal edge is smooth in the middle and passes both into the anterior and posterior edges in an even curve.

The epimeral plates of the metasome are well developed, and the last 2 pairs acutely produced at the lateral corners. The urosome is of moderate size and does not exhibit any dorsal prominences. The 1st segment has dorsally a fascicle of delicate bristles but no spines. The last 2 segments, on the other hand, are armed on either side of the dorsal face with one or two small spinules.

The eyes are of the usual oval reniform shape, and have the visual elements well developed and the pigment dark.

The antennæ are comparatively short, though perhaps a little more elongated than in the preceding species, and are not very different in length. The superior ones (fig. 2) do not nearly attain to  $\frac{1}{2}$  of the length of the body, and have the 1st joint of the peduncle rather large, being fully as long as the other 2 combined. The flagellum is very slender and considerably longer

than the peduncle, being composed of about 16 articulations. The accessory appendage about equals in length the 2nd peduncular joint, and is composed of 4 articulations. The inferior antennæ are a little shorter than the superior and of the usual structure.

The gnathopoda (figs. 4, 5) are not nearly so strongly developed as in the female of *G. robustoides*, and are also less unequal. The propodos of the anterior ones (fig. 4) is oval in form, with the palm rather oblique and defined below by a very slight angle, carrying 2 strong spines. In the posterior pair (fig. 5) the propodos is somewhat more elongated and of an oval quadrangular form, the palm being nearly transverse.

The 2 anterior pairs of pereopoda (fig. 6) are less strongly built than in *G. robustoides*, but are otherwise of a rather similar structure.

The 3 posterior pairs of pereopoda (figs. 7—9) are moderately slender, and have their outer part edged with fascicles of spines and delicate bristles. In all the basal joint is rather expanded, though of very different size. In the antepenultimate pair (fig. 7) this joint is of a rounded quadrangular form, with the infero-posteal corner somewhat projecting; in the penultimate pair (fig. 8) it is somewhat larger, being strongly expanded posteriorly, with the hind edge boldly curved and distinctly serrate, each serration carrying a short bristle. The last pair (fig. 9) are highly distinguished by the very large size of the basal joint, which expands at the infero-posteal corner to a broad, obtusely truncated lobe, reaching nearly to the middle of the meral joint. The posterior edge of the joint is distinctly serrate throughout, and provided with a number of short bristles corresponding to the serrations. Of the outer joints in these legs, the carpal one is a little shorter than the propodal joint. The dactylus is in all very strong and curved.

The 2 anterior pairs of uropoda (fig. 10) have the rami nearly equal-sized and each tipped with several spines, one of which is longer than the others; the inner ramus has also one or two lateral spines, whereas the outer is without such spines.

The last pair of uropoda (fig. 11) nearly agree in their structure with those in *G. robustoides*.

The telson (fig. 12) is scarcely as long as it is broad, and has, on the tip of each half, 2 spines accompanied by 2 delicate hairs.

*The adult male* (fig. 13), as usual, attains a somewhat larger size than the female, the length of the body amounting to 12 mm. It is of a somewhat more slender and compressed form, and also easily recognizable by the strong development of the gnathopoda.

The latter (figs 14, 15) are very unequal, the posterior ones (fig. 15) being much more powerful than the anterior, with the propodos exceedingly

large and tumid. In the anterior ones (fig. 14) the propodos is considerably narrower and obpyriform in shape, being scarcely more than half as large as that of the posterior. In both pairs the palm is rather oblique, and armed in the middle, outside, with a strong spine, in addition to those occurring on the inferior corner.

*Occurrence.* — Of this form numerous specimens were collected by Mr. Warpachowsky at Stat. 49, lying between the islands Kulaly and Morskoy. It also occurred, though more sparingly, in 5 other Stations (16, 21, 32, 54, 55) distributed over about the same tract of the North Caspian Sea.

In the collection of Dr. Grimm this species is rather abundantly represented, but only a single bottle, containing 3 very small and somewhat defective specimens taken from the considerable depth of 108 fathoms, bears the name of the species. The other specimens were collected in comparatively shallow water, partly at Baku, partly on the west coast of Sara, and partly near the mouth of the river Surgudschy.

15. *Gammarus abbreviatus*, G. O. Sars, n. sp.

(Pl. XIV).

*Specific Characters.* — Body short and robust, being rather tumid in the female. Lateral lobes of cephalon slightly prominent and broadly rounded at the tip. Anterior pairs of coxal plates of moderate size, and having their distal edge conspicuously crenulated and fringed with rather long bristles; 1st pair obliquely expanded distally; 4th pair very large, being fully as broad as they are deep. The last 2 pairs of epimeral plates of metasome acutely produced at the lateral corners. Urosome smooth above, with one or two very small spinules on the dorsal face of the 2 posterior segments. Eyes oval reniform. Antennæ unusually short; the superior ones not attaining the length of the inferior, but having the 1st joint of the peduncle very large, flagellum about the length of the peduncle, accessory appendage 4—5-articulate. Gnathopoda in female not very strong, propodos in both pairs nearly of same form, with the palm rather oblique; those in male, as usual, much stronger and more unequal, the posterior ones being much the larger. Anterior pairs of pereopoda very robust and densely setiferous; the 3 posterior pairs considerably more slender, basal joint of last pair regularly oval in form, with the infero-posteal corner slightly produced and narrowly rounded. Last pair of uropoda nearly as in the 2 preceding species. Telson fully as long as it is broad, each half with 3 apical spines. Length of adult female 12 mm., of male 13 mm.

*Remarks.* — This new species somewhat resembles *G. crassus* in the short and stout body, but is, on a closer examination, easily distinguishable by the unusually short superior antennæ, the different shape of the 1st and 4th pairs of coxal plates, and by the form of the basal joint of the last pair of pereopoda. It also attains a somewhat larger size than that species.

#### Description of the female.

The length of a fully adult, ovigerous specimen measures 12 mm.

The form of the body (see fig. 1) is comparatively short and stout, with the anterior division rather tumid, and the back broadly rounded.

The cephalon does not attain the length of the first 2 segments of the mesosome combined, and has the lateral lobes slightly prominent and evenly rounded at the tip, being defined behind by a rather deep emargination.

The anterior pairs of coxal plates are of moderate size and have their distal edge conspicuously crenulated and fringed with rather long and slender bristles. The 1st pair (see fig. 5) are obliquely expanded in their outer part extending beneath the cephalon as far as the insertion of the inferior antennæ. The 4th pair (see fig. 7) are very large and expanded, being fully as broad as they are deep, and are vertically truncated below the posterior emargination.

The epimeral plates of the metasome are well developed, and of about same appearance as in the preceding species.

The urosome is rather short and quite smooth above, with only one or two very small spinules on the dorsal face of the 2 posterior segments.

The eyes are of the usual oval reniform shape.

The superior antennæ (fig. 3) are unusually short, not even attaining to  $\frac{1}{4}$  of the length of the body, and have the 1st joint of the peduncle very large, exceeding in length the other 2 combined. The flagellum is scarcely longer than the peduncle, and is composed of about 9 articulations. The accessory appendage about equals in length the last 2 peduncular joints combined, and is composed of 4—5 articulations.

The inferior antennæ (fig. 4), unlike what is generally the case in this genus, are somewhat longer than the superior, and rather densely setous posteriorly. The flagellum about equals in length the last 2 peduncular joints combined, and is composed of about 7 articulations.

The gnathopoda (figs. 5, 6) are not very strong, but of the very same structure, though the posterior ones are a little larger. The propodos in both pairs is of a somewhat irregular oval form, with the palm rather oblique and defined below by a very slight angle armed with 2 spines.



The 2 anterior pairs of pereopoda (fig. 7) are very strongly built and densely setiferous, with the meral joint large and expanded.

The 3 posterior pairs of pereopoda (figs. 8—10) are moderately slender, and have their outer part edged with fascicles of slender bristles and scattered spines. The basal joint of the antepenultimate pair (fig. 8) exhibits the usual rounded quadrangular shape; that of the penultimate pair (fig. 9) is only expanded in its proximal part, and gradually tapers distally. The last pair (fig. 10) have the basal joint rather large and of a regularly oval form, with the infero-posteal corner projecting below as a narrowly rounded lappet. The posterior edge of this joint is, as in the 2 preceding pairs, minutely serrate and fringed with short bristles. Of the outer joints in these legs, the carpal one considerably exceeds the meral one in length, being fully as long as the propodal joint.

The 2 anterior pairs of uropoda (figs. 11, 12) have the rami rather narrow and provided at the tip with several spines; the outer ramus has also one, and the inner, 2 lateral spines.

The last pair of uropoda (fig. 13) do not differ much from those in the 2 preceding species, having the inner ramus very small, and the outer densely fringed with partly ciliated setæ.

The telson (fig. 19) is about as long as it is broad, with the lateral halves smooth except at the tip, which carries 3 slender spines.

*The adult male* (fig. 14) is a little larger than the female, the length of the body measuring about 13 mm.

It does not differ much in its external appearance from the female, except in being somewhat less tumid.

In the specimen examined the accessory appendage of the superior antennæ (fig. 15) was somewhat more fully developed and composed of 5 distinct articulations; otherwise the antennæ exhibited the very same structure as in the female.

The gnathopoda (figs. 16, 17) are, as usual, much more powerfully developed than in the latter, and of rather unequal size, the posterior ones (fig. 17) being much the stronger, with the propodos very large, and of an oblong oval form. In the anterior pair (fig. 16) the propodos is not nearly so large, but of a more obpyriform shape. In both pairs the palm is rather oblique, with the defining corner nearly obsolete, though armed with the usual spines. As in most other male Gammari, there is also found a spine about in the middle of the palm outside.

The last pair of uropoda (fig. 18) are somewhat larger than in the female, otherwise of a very similar structure.

*Occurrence.* — Of this form solitary specimens were collected by Mr.

Warpachowsky in 3 different Stations of the North Caspian Sea, the first (St. 54) located at some distance north of the islands Kulaly and Morskoj, the 2nd (St. 58) lying North of the Tschistyi-Bank, and the 3rd (St. 56) occurring about midway between the 2 former Stations.

In the collection of Dr. Grimm, only a single specimen of this form was found. It was, according to the label, taken off the west coast of Sara, among *Zostera*.

16. *Gammarus obesus*, G. O. Sars, n. sp.

(Pl. XV).

*Specific Characters.* — Body exceedingly short and stout, with broadly vaulted back. Lateral lobes of cephalon but slightly projecting, and evenly rounded at the tip. Anterior pairs of coxal plates very large and fringed on their distal edge with slender bristles; 1st pair rather widely expanded distally; 4th pair not nearly as broad as they are deep. Epimeral plates of metasome not very large, and scarcely produced at the lateral corners. Urosome short and stout, being quite smooth above. Eyes oval reniform. Superior antennæ somewhat longer than the inferior, with the 1st joint of the peduncle rather large, flagellum a little longer than the peduncle, accessory appendage comparatively small. Gnathopoda in female not very strong, subequal, in male somewhat larger and more unequal. All pereopoda very densely furnished with bristles, the 3 posterior pairs comparatively strongly built, with the carpal joint rather short; basal joint of antepenultimate and penultimate pairs of nearly same shape, with the infero-posteal corner not at all produced; that of last pair very large and expanded, forming at the infero-posteal corner a broadly rounded lobe. Last pair of uropoda unusually short and stout, inner ramus minute, outer ramus setiferous in its outer part only, terminal joint extremely small. Telson short and broad, each half with only a single apical spine. Length of adult female 8 mm., of male 9 mm.

*Remarks.* — The present new species is highly distinguished by its unusually short and compact form of body, differing in this point considerably from the Gammarid type, and approaching the species of the next genus. It is moreover easily recognized by the densely hirsute and rather strongly built pereopoda, and by the poor development of the last pair of uropoda.

**Description of the female.**

The length of an apparently adult specimen measures about 8 mm.

The form of the body (see fig. 1) is extremely short and stout, indeed more so than in any other known *Gammarus*, with the back broadly vaulted and smooth throughout.

The cephalon about equals in length the first 2 segments of the mesosome combined, and has the lateral lobes but slightly prominent and evenly rounded at the tip.

The anterior pairs of coxal plates are unusually large and closely contiguous, being nearly twice as deep as the corresponding segments. They are fringed on the distal edge with rather long and slender setæ springing from small crenulations of the edge. The 1st pair (see fig. 4) are rather broadly expanded in their outer part, nearly concealing the buccal area at the sides. The 2 succeeding pairs (see fig. 5) are oblong quadrangular in form and of nearly same breadth throughout. The 4th pair (see fig. 6) are, as usual, larger than the preceding pairs, though not very much expanded in their outer part, being not nearly as broad as they are deep. Their posterior expansion is obliquely truncated and projects immediately below the emargination to an acute corner.

The epimeral plates of the metasome are not very large, and not at all produced at the lateral corners, the 1st pair being evenly rounded, the other two obtusangular.

The urosome is comparatively short and stout, and quite smooth above, with only a very small spinule on each side of the dorsal face of the last segment.

The superior antennæ (fig. 2) about equal in length  $\frac{1}{2}$  of the body and have, as in the preceding species, the 1st joint of the peduncle rather large, exceeding in length the other 2 combined. The flagellum is somewhat longer than the peduncle, and composed of about 15 articulations. The accessory appendage is comparatively small and in the specimen examined consisted of only 2 articulations.

The inferior antennæ (fig. 3) are a little shorter than the superior, and have the flagellum about the length of the last 2 peduncular joints combined, and composed of 7 articulations.

The gnathopoda (figs. 4, 5) are of moderate size and almost exactly alike, though the posterior ones (fig. 5) are perhaps a little larger than the anterior (fig. 4). The carpus is in both pairs comparatively short and expanded below to a rounded setiferous lobe. The propodus is oval quadrangular in form, with the palm rather short, and defined below by an obtuse angle carrying a single spine.

The 2 anterior pairs of pereopoda (fig. 6) are moderately strong and densely setiferous, some of the setæ attached to the posterior edge of the meral joint being distinctly ciliated.

The 3 posterior pairs of pereopoda (figs. 7—9) are comparatively strongly built and very densely setiferous, with the carpal joint compara-

tively short, and the dactylus very strong. The basal joint of the antepenultimate pair (fig. 7) is of a somewhat unusual form, being not at all produced at the infero-posteal corner, but of nearly the same shape as that of the penultimate pair (fig. 8), though somewhat shorter. In both pairs this joint is densely fringed posteriorly with short setæ, and has anteriorly several fascicles of slender bristles. The last pair (fig. 9) have the basal joint very large and expanded, widening distally and forming at the infero-posteal corner a broadly rounded lobe. The posterior edge of the joint is throughout fringed with numerous rather slender and elongated setæ, and the anterior edge is also rather richly supplied with bristles arranged in several dense fascicles.

The 2 anterior pairs of uropoda (comp. figs. 16, 17) have the rami quite smooth, except at the tip, which is armed with a strong spine accompanied by 2 much smaller ones.

The last pair of uropoda (fig. 10) are unusually short and stout, but reaching little beyond the others. The basal part is rather thick and massive, being armed at the end below with several spines. The inner ramus exhibits the usual scale-like appearance, and carries a single small apical spine. The outer ramus is scarcely longer than the basal part, and provided in its outer part with a number of long ciliated setæ and with 2 spines on the outer edge. The terminal joint is so extremely minute as readily to escape attention.

The telson (fig. 11) is short and broad, being, as usual, divided by a deep and narrow cleft into two halves, each of which carries, at the narrowly truncated tip, a single spine accompanied by 2 small hairs.

The adult male (fig. 12) is somewhat larger than the female, measuring in length about 9 mm., and exhibits a similar short and compact form of the body.

In the specimen examined, the accessory appendage of the superior antennæ (fig. 13) was somewhat more fully developed than in the female, being composed of 4 articulations. It did not, however, much exceed the last peduncular joint in length.

The gnathopoda (figs. 14, 15) are, as usual, more strongly built than in the female, though the difference in this point is not as great as in most other species. The propodos in both pairs is oblong oval in form and in the posterior pair somewhat larger than in the anterior, the palm being in both somewhat more oblique than in the female.

The last pair of uropoda (fig. 18) are scarcely larger than in the latter but of a similar structure.

*Occurrence.* — Solitary specimens of this form were collected by Mr. Warpachowsky in 3 different Stations of the North Caspian Sea, the 1st

(St. 16) located off the island Swjatoj, the 2nd (St. 40) off the promontory Branskaja, and the 3rd (St. 61) lying far north, outside the Bai Bogatui Kultuk.

Dr. Grimm's collection contains several specimens of this form, collected in quite shallow water, partly at Baku, partly at the mouth of the river Surgudschy.

Gen. 5. **Niphargoides**, G. O. Sars.

Syn.: *Niphargus*, Grimm (not Schödte).

*Generic Characters.* — Body smooth and of a very robust form, with the coxal plates not very large, and more or less densely setous on their distal edge. Cephalon comparatively small and without any rostrum, lateral lobes more or less projecting. Eyes distinct, though generally not very large. Antennæ extremely short and stout, equal-sized, and more or less densely setous, the superior ones provided with a distinct accessory appendage, and having their outer part, as a rule, extended laterally. Mandibular palps large, and generally densely setous. Oral parts otherwise normal. Gnathopoda strongly developed and of same appearance in the two sexes, though rather differing in shape in the different species, both pairs distinctly subcheliform. Pereiopoda rather strong and more or less densely clothed with bristles, basal joint of last pair much larger than that of the 2 preceding pairs. The 2 anterior pairs of uropoda comparatively strongly built, with the rami subequal; last pair not very large, with the inner ramus squamiform, the outer more or less densely setiferous, and having a very small terminal joint. Telson divided by a deep and narrow cleft into two halves spinous at the tip.

*Remarks.* — This genus is founded upon the form recorded by Dr. Grimm under the name of *Niphargus caspius*. In his treatise on some blind Amphipoda of the Caspian Sea, this author observes, that the above-named form might perhaps be more properly regarded as the type of a separate genus, differing, as it does, in some points rather conspicuously from the known species of the genus *Niphargus*, Schödte, though he believes that there is, in a genealogical sense, a near relationship between the two. In my opinion, the Caspian form ought, indeed, to be far removed from the genus *Niphargus*, to which in reality it does not exhibit any very close affinity, nearly all the appendages being very differently constructed. As I wish, however, to make as little change as possible with the names proposed by Dr. Grimm, I have substituted for the generic name *Niphargus* that of *Niphargoides*. In their outward appearance, the species of this new genus exhibit a much closer re-

semblance to another apparently widely remote genus, viz., that of *Pontoporeia*, and in some species, indeed, the similarity is truly perplexing; but the gnathopoda are very different. In many particulars the new genus would seem to approach nearer to the genus *Gammarus* than to that of *Niphargus*, and there are, as above stated, some species of the former genus, which form, as it were, a transition to the type revealed in the present genus.

In the collection of Mr. Warpachowsky, no less than 4 distinct species of this genus are to be found, one of which will be described below, the others in a subsequent article. A 5th species is also represented in the collection of Dr. Grimm.

### 17. *Niphargoides caspius* (Grimm).

(Pl. XVI).

Syn.: *Niphargus caspius*, Grimm.

*Specific Characters.* — Body somewhat elongated, but very tumid, with broadly vaulted back. Cephalon rather small, with the lateral lobes somewhat projecting and rounded at the tip. Anterior pairs of coxal plates but little deeper than the corresponding segments, and very densely clothed on their distal edge with slender bristles; 1st pair not expanded distally; 4th pair somewhat deeper than they are broad. Epimeral plates of metasome well developed, the last 2 pairs nearly rectangular, and having outside the lateral corners an oblique row of delicate bristles. Urosome smooth above. Eyes of moderate size and oval reniform, pigment dark. Antennæ rather densely setiferous, the superior ones about twice as long as the cephalon, and having the 1st joint of the peduncle very large and massive, 3rd joint extremely small, flagellum about the length of the last 2 peduncular joints combined, accessory appendage half the length of the flagellum and 3-articulate. Inferior antennæ with the flagellum extremely short, being scarcely longer than the last peduncular joint. Gnathopoda very unequal, the posterior ones being much larger than the anterior, propodos in both pairs conically tapering distally, with the palm very oblique, its defining angle being nearly obsolete. Pereiopoda densely setiferous, the 2 anterior pairs rather robust, the 3 posterior pairs more slender; basal joint of antepenultimate pair rather narrow and nearly of same shape as that of the penultimate pair; basal joint of last pair moderately expanded and of broadly oval form, being densely fringed with bristles both anteriorly and posteriorly. The 2 anterior pairs of uropoda with the rami rather stout and armed with unusually strong, blunt spines; last pair comparatively short, with the outer ramus rather broad and edged in its outer part with long ciliated setæ.

Telson with the lateral lobes sublinear and slightly diverging, each carrying at the tip 3 strong spines. Length of adult male 11 mm.

*Remarks.* — In the collection of Dr. Grimm, 2 nearly allied, but evidently distinct species are labelled as *Niphargus caspius*. For the larger species this specific name may be retained; for the other species, which is not contained in the collection of Mr. Warpachowsky, I propose the name of *Niphargoides Grimmi*. The species here described is easily distinguished by the densely hirsute anterior pairs of coxal plates and legs, the peculiar conically tapering shape of the propodos of both pairs of gnathopoda, as also by the form of the basal joint of the last pair of pereiopoda. Most of the specimens examined would seem to be of the male sex.

*Description of the adult male.* — The length of the largest specimen measures about 12 mm.

The form of the body (see fig. 1) is somewhat elongated, but rather robust, and not at all compressed, the breadth being fully as great as the height, including the coxal plates. The dorsal face is broadly vaulted and quite smooth throughout. In a dorsal view (fig. 2) the body exhibits a somewhat fusiform shape, with the greatest breadth occurring across the 4th segment of the mesosome, whence it gradually tapers both anteriorly and posteriorly. The metasome is well developed and about half the length of the anterior division of the body.

The cephalon is comparatively small, but little longer than the 1st segment of the mesosome, and does not exhibit any distinct rostral projection. The lateral lobes somewhat project between the insertions of the 2 pairs of antennæ, and are obtusely rounded at the tip. Behind they are defined by a very deep emargination, encircling the large and globular basal joint of the inferior antennæ.

The anterior pairs of coxal plates are not very large, being but little deeper than the corresponding segments, and are somewhat discontinuous in their outer part. They successively increase in size posteriorly, and have their distal edge very densely clothed with slender bristles in an almost brush-like manner. The 1st pair (see fig. 11) are about same breadth throughout, and obtusely rounded at the tip; the 2 succeeding pairs (see fig. 12) are a little narrowed distally, whereas the 4th pair (see fig. 14), as usual, are somewhat expanded in their outer part, forming, below the rather slight posterior emargination, an obtuse corner.

The 3 posterior pairs of coxal plates (see figs. 15—17) are unusually small and slightly bilobed.

The epimeral plates of the metasome are rather large, the 1st pair being, as usual, rounded, whereas the last 2 pairs are nearly rectangular, and

having each, just above the lateral corner, outside, a somewhat oblique row of densely crowded delicate bristles (see fig. 1 *a*).

The urosome is of moderate size and quite smooth above, with only a very small spinule on either side of the dorsal face of the last segment.

The eyes are well developed, and of an oval reniform shape, with dark pigment.

The superior antennæ (fig. 3) are very short and stout, scarcely exceeding in length  $\frac{1}{7}$  of the body, and about twice as long as the cephalon. They are rather richly supplied with bristles, and generally have their outer part extended laterally. The 1st joint of the peduncle is very large and massive, considerably exceeding in length the 2 outer joints combined; the last joint is extremely small, being scarcely longer than it is broad. The flagellum about equals in length the last 2 peduncular joints combined, and is composed of 7 rather short articulations. The accessory appendage is about half as long as the flagellum, and 3-articulate, the 1st articulation being about the length of the other 2 combined.

The inferior antennæ (fig. 4) are perhaps a little longer than the superior, and have the antepenultimate joint of the peduncle rather thick, forming posteriorly an angular, densely setous projection. The last joint of the peduncle is somewhat smaller than the penultimate, both being densely setiferous. The flagellum is extremely small, scarcely exceeding in length the last peduncular joint, and is composed of 5 articulations.

The buccal area (see fig. 1) considerably projects below, being only partly obtected at the sides by the 1st pair of coxal plates. The oral parts composing it are on the whole of normal structure resembling those in the genus *Gammarus*.

The anterior lip (fig. 5) exhibits the usual rounded form, and has the terminal edge somewhat narrowed and very slightly insinuated in the middle.

The posterior lip (fig. 7) has the inner lobes well defined, the outer ones projecting outside in a conical lappet.

The mandibles (fig. 6) are strongly built, and exhibit the usual armature of the masticatory part. The palp is very large, nearly twice as long as the mandible, and has the middle joint the largest, being edged inside with numerous long and slender bristles. The terminal joint is rather narrow and somewhat compressed, with the distal part of the inner edge densely setous, and having besides on the outer edge 3 fascicles of bristles.

The 1st pair of maxillæ (fig. 8) have the basal lobe well developed and of a triangular form, with about 8 ciliated setæ along the inner edge. The masticatory lobe and the palp are of the usual appearance.



The 2-nd pair of maxillæ (fig. 9) have the inner lobe smaller than the outer, both being provided at the tip with numerous curved bristles, and the inner lobe, in addition, with a series of setæ somewhat inside the edge.

The maxillipeds (fig. 10) are of moderate size, with the masticatory lobes a little larger than the basal ones, and armed on the inner edge with a row of strong spines, at the tip with several curved setæ. The palp is not very strong, with the last joint rather narrow, and the dactylus unguiform.

The gnathopoda (figs. 11, 12) are powerfully developed and very unequal in size, the posterior ones being much the larger. In structure they otherwise nearly agree with each other, both pairs having the basal joint rather strong and muscular and the carpus comparatively small, with a narrow setiferous lobe below. The propodos, especially in the posterior pair (fig. 12), is very large and elongated, gradually tapering distally, with the palm very oblique and scarcely defined from the hind margin by any distinct angle; though marked off from by 2 strong spines.

The 2 anterior pairs of pereiopoda (figs. 13, 14) are very strongly built and densely setiferous. The meral joint is considerably expanded, terminating in front in a projecting, densely setous corner, and also the carpal joint somewhat widens distally, whereas the propodal joint exhibits the usual narrow linear form.

The 3 posterior pairs of pereiopoda (figs. 15—17) are likewise rather strong and moderately elongated, being, like the anterior ones, densely covered with bristles both on the basal and terminal part. There also occur on the outer joints a number of strong spines, especially densely crowded at the end of the meral and carpal joints. The antepenultimate pair (fig. 15) are, as usual, somewhat shorter than the succeeding pairs, and have the basal joint not very large, oblong oval in form, and not at all produced at the infero-posteal corner. The basal joint of the penultimate pair (fig. 16) is somewhat more elongated, but otherwise of a similar appearance to that of the former pair. The last pair (fig. 17) have the basal joint much larger than in the preceding ones, and of a rather regular oval form, with the distal part of the anterior edge very densely clothed with bristles and projecting below as an obtuse corner. The posterior edge of the joint is quite evenly curved, and, as in the preceding pairs, densely fringed with rather long and slender bristles. Of the outer joints of these legs, the carpal one is fully as long as the propodal one, the dactylus not being very strong.

The 2 anterior pairs of uropoda (figs. 18, 19) are comparatively strongly built, with the rami subequal and rather stout, each having at the tip 4 unusually coarse and somewhat blunted spines, and a single lateral one.

The last pair of uropoda (fig. 20) are comparatively short and stout, but little projecting beyond the others. The basal part is rather thick and armed at the end below with a transverse row of strong spines. The inner ramus is very small and scale-like carrying, at the tip a single spine. The outer ramus is scarcely twice as long as the basal part and somewhat flattened, being fringed in its outer part with long, ciliated setæ, and having besides, about in the middle outside, 2 strong juxtaposed spines. The terminal joint is extremely small, nodiform.

The telson (fig. 21) consists of 2 slightly diverging lobes of nearly equal breadth throughout, each armed, on the obtusely truncated tip, with 3 strong spines increasing in length outwards.

*Occurrence.* — A few specimens of this form were collected by Mr. Warpachowsky at Stations 63 and 64, both lying in the eastern part of the North Caspian Sea.

Dr. Grimm has collected the species in 3 different Stations, one belonging to the southern part of the Caspian Sea, the other 2 to the middle part, the depth being from 35 to 40 fathoms.

## EXPLANATION OF THE PLATES.

### Pl. IX.

#### *Gammarus Warpachowskyi*, G. O. Sars.

- |   |   |
|---|---|
| Fig. 1. Adult, ovigerous female, viewed from left side.                       | Fig. 10. Last pereopod.                                     |
| » 2. Cephalon, from left side.  | » 11. First uropod.   |
| » 3. Superior antenna.  | » 12. Second uropod.  |
| » 4. Inferior antenna.  | » 13. Last uropod.  |
| » 5. Anterior gnathopod, with the corresponding coxal plate.                  | » 14. Telson.   |
| » 6. Posterior gnathopod, with coxal plate, branchial and incubatory lamellæ. | » 15. Adult male, viewed from right side.                   |
| » 7. Second pereopod, with coxal plate.                                       | » 16. Inferior antenna of same.                             |
| » 8. Antepenultimate pereopod.  | » 17. Anterior gnathopod.                                   |
| » 9. Penultimate pereopod.  | » 18. Posterior gnathopod.                                  |
|   | » 19. Urosome, without the uropoda, viewed from right side. |

### Pl. X.

#### *Gammarus minutus*, G. O. Sars.

- |   |   |
|---|---|
| Fig. 1. Adult, ovigerous female, viewed from left side.                       | Fig. 8. Penultimate pereopod.                       |
| » 2. Superior antenna.  | » 9. Last pereopod.                                 |
| » 3. Inferior antenna.  | » 10. Second uropod.                                |
| » 4. Anterior gnathopod, with coxal plate.                                    | » 11. Last uropod.                                  |
| » 5. Posterior gnathopod, with coxal plate, branchial and incubatory lamellæ. | » 12. Adult male, viewed from right side.           |
| » 6. Second pereopod, with coxal plate.                                       | » 13. Anterior gnathopod of same, with coxal plate. |
| » 7. Antepenultimate pereopod.  | » 14. Posterior gnathopod, with coxal plate.        |
|   | » 15. Last uropod.                                  |
|   | » 16. Telson.                                       |

*Gammarus macrurus*, G. O. Sars.

- |  |   |
|--|---|
| Fig. 17. Adult, ovigerous female, viewed from left side.                       | Fig. 22. Antepenultimate pereopod.                      |
| » 18. Superior antenna.  | » 23. Penultimate pereopod, without the propodal joint. |
| » 19. Anterior gnathopod, with coxal plate.                                    | » 24. Last pereopod, without the outer part.            |
| » 20. Posterior gnathopod, with coxal plate, branchial and incubatory lamellæ. | » 25. First uropod.                                     |
| » 21. Second pereopod, with coxal plate.                                       | » 26. Last uropod.                                      |
|  | » 27. Telson.   |

## Pl. XI.

*Gammarus compressus*, G. O. Sars.

- |   |  |
|---|--|
| Fig. 1. Adult ovigerous female, viewed from left side.                        | Fig. 5. Second pereopod, with coxal plate.           |
| » 2. Superior antenna.  | » 6. Antepenultimate pereopod.                       |
| » 3. Anterior gnathopod, with coxal plate.                                    | » 7. Penultimate pereopod, without the outer joints. |
| » 4. Posterior gnathopod, with coxal plate, branchial and incubatory lamellæ. | » 8. Last pereopod.                                  |
| » 4a Outer part of the latter, more highly magnified.                         | » 9. Last uropod.                                    |
|   | » 10. Telson.  |

*Gammarus similis*, G. O. Sars.

- |  |   |
|--|---|
| Fig. 11. Adult, ovigerous female, viewed from right side.                      | Fig. 17. Basal part of penultimate pereopod.        |
| » 12. Superior antenna.  | » 18. Last pereopod.                                |
| » 13. Anterior gnathopod, with coxal plate.                                    | » 19. Last uropod.                                  |
| » 14. Posterior gnathopod, with coxal plate, branchial and incubatory lamellæ. | » 20. Telson.                                       |
| » 15. Second pereopod, with coxal plate.                                       | » 21. Anterior gnathopod of male, with coxal plate. |
| » 16. Antepenultimate pereopod.  | » 22. Posterior gnathopod of same.                  |

## Pl. XII.

*Gammarus robustoides*, Grimm.

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|---|---|
| Fig. 1. Adult, ovigerous female, viewed from left side.                       | Fig. 10. Last uropod.   |
| » 2. Superior antenna.  | » 11. Telson.   |
| » 3. Anterior gnathopod, with coxal plate.                                    | » 12. Adult male, viewed from right side.                                       |
| » 4. Posterior gnathopod, with coxal plate, branchial and incubatory lamellæ. | » 13. Accessory appendage of superior antenna.                                  |
| » 5. Second pereopod, with coxal plate.                                       | » 14. Anterior gnathopod, with coxal plate.                                     |
| » 6. Antepenultimate pereopod.  | » 15. Posterior gnathopod, with coxal plate, but without the branchial lamella. |
| » 7. Penultimate pereopod, without the outer joints.                          | » 16. Second uropod.  |
| » 8. Last pereopod.   | » 17. Urosome with telson, dorsal view.   |
| » 9. First uropod.  | » 18. Dorsal part of urosome, viewed from right side.                           |

## Pl. XIII.

*Gammarus crassus*, Grimm.

- |   |   |
|---|---|
| Fig. 1. Adult, ovigerous female, viewed from left side.                       | Fig. 7. Antepenultimate pereopod.         |
| » 2. Superior antenna.  | » 8. Penultimate pereopod.                |
| » 3. Dorsal part of urosome, viewed from left side.                           | » 9. Last pereopod.                       |
| » 4. Anterior gnathopod, with coxal plate.                                    | » 10. Second uropod.                      |
| » 5. Posterior gnathopod, with coxal plate, branchial and incubatory lamellæ. | » 11. Last uropod.                        |
| » 6. Second pereopod with coxal plate.  | » 12. Telson.                             |
|   | » 13. Adult male, viewed from right side. |
|   | » 14. Anterior gnathopod.                 |
|   | » 15. Posterior gnathopod.                |

## Pl. XIV.

*Gammarus abbreviatus*, G. O. Sars.

- |   |  |
|---|--|
| Fig. 1. Adult, ovigerous female, viewed from left side.                       | Fig. 10. Last pereopod.                        |
| » 2. Dorsal face of urosome, viewed from left side.                           | » 11. First uropod.                            |
| » 3. Superior antenna.  | » 12. Second uropod.                           |
| » 4. Inferior antenna.  | » 13. Last uropod.                             |
| » 5. Anterior gnathopod, with coxal plate.                                    | » 14. Adult male, viewed from right side.      |
| » 6. Posterior gnathopod, with coxal plate, branchial and incubatory lamellæ. | » 15. Accessory appendage of superior antenna. |
| » 7. Second pereopod, with coxal plate.                                       | » 16. Anterior gnathopod, with coxal plate.    |
| » 8. Antepenultimate pereopod.  | » 17. Posterior gnathopod.                     |
| » 9. Basal part of penultimate pereopod.                                      | » 18. Last uropod.                             |
|   | » 19. Telson.                                  |

## Pl. XV.

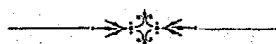
*Gammarus obesus*, G. O. Sars.

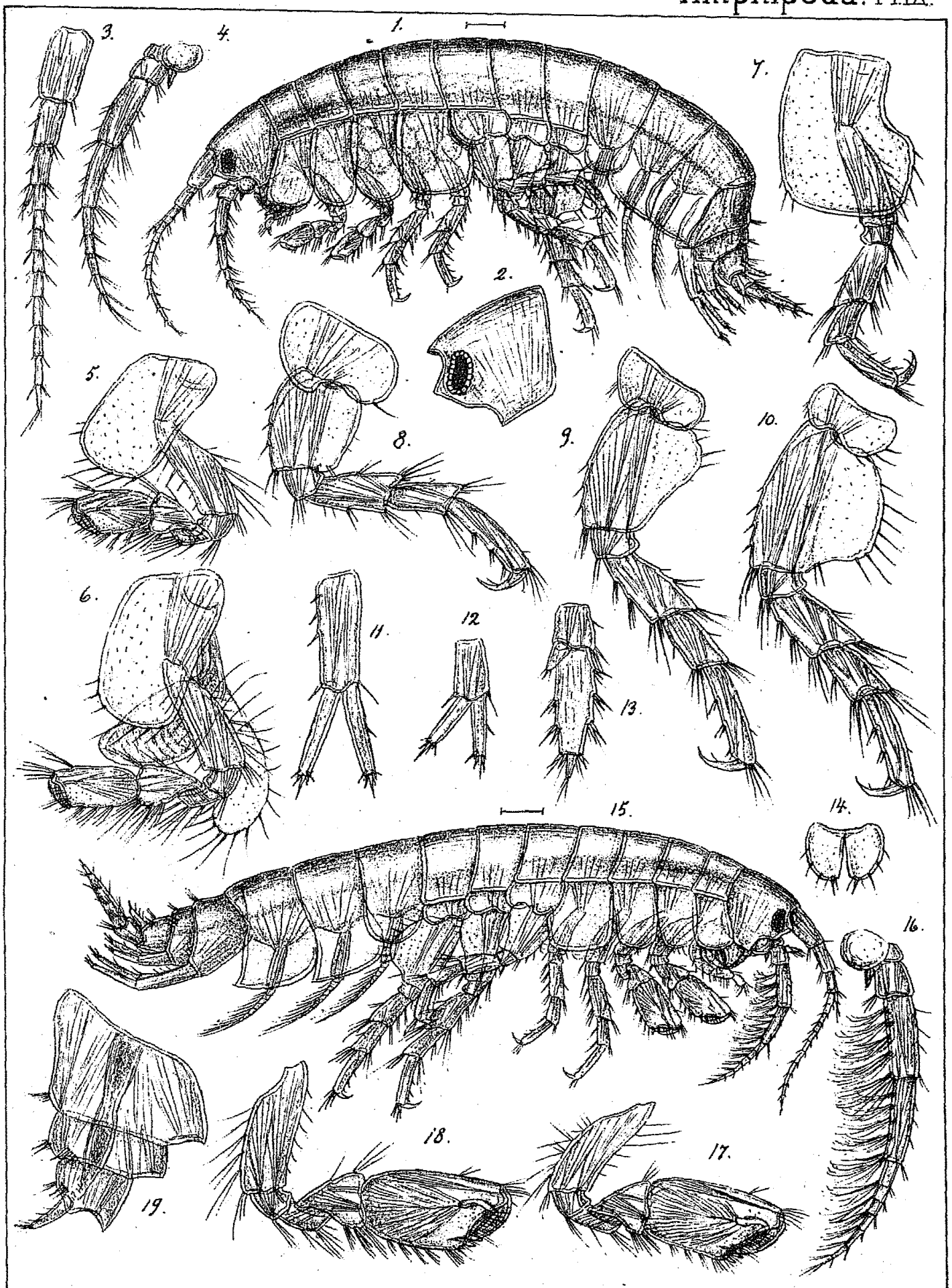
- |   |  |
|---|--|
| Fig. 1. Adult female, viewed from left side.                                  | Fig. 10. Last uropod.                          |
| » 2. Superior antenna.  | » 11. Telson.                                  |
| » 3. Inferior antenna.  | » 12. Adult male, viewed from right side.      |
| » 4. Anterior gnathopod, with coxal plate.                                    | » 13. Accessory appendage of superior antenna. |
| » 5. Posterior gnathopod, with coxal plate, branchial and incubatory lamellæ. | » 14. Anterior gnathopod, with coxal plate.    |
| » 6. Second pereopod, with coxal plate.                                       | » 15. Posterior gnathopod.                     |
| » 7. Antepenultimate pereopod.  | » 16. First uropod.                            |
| » 8. Penultimate pereopod.  | » 17. Second uropod.                           |
| » 9. Last pereopod.   | » 18. Last uropod.                             |

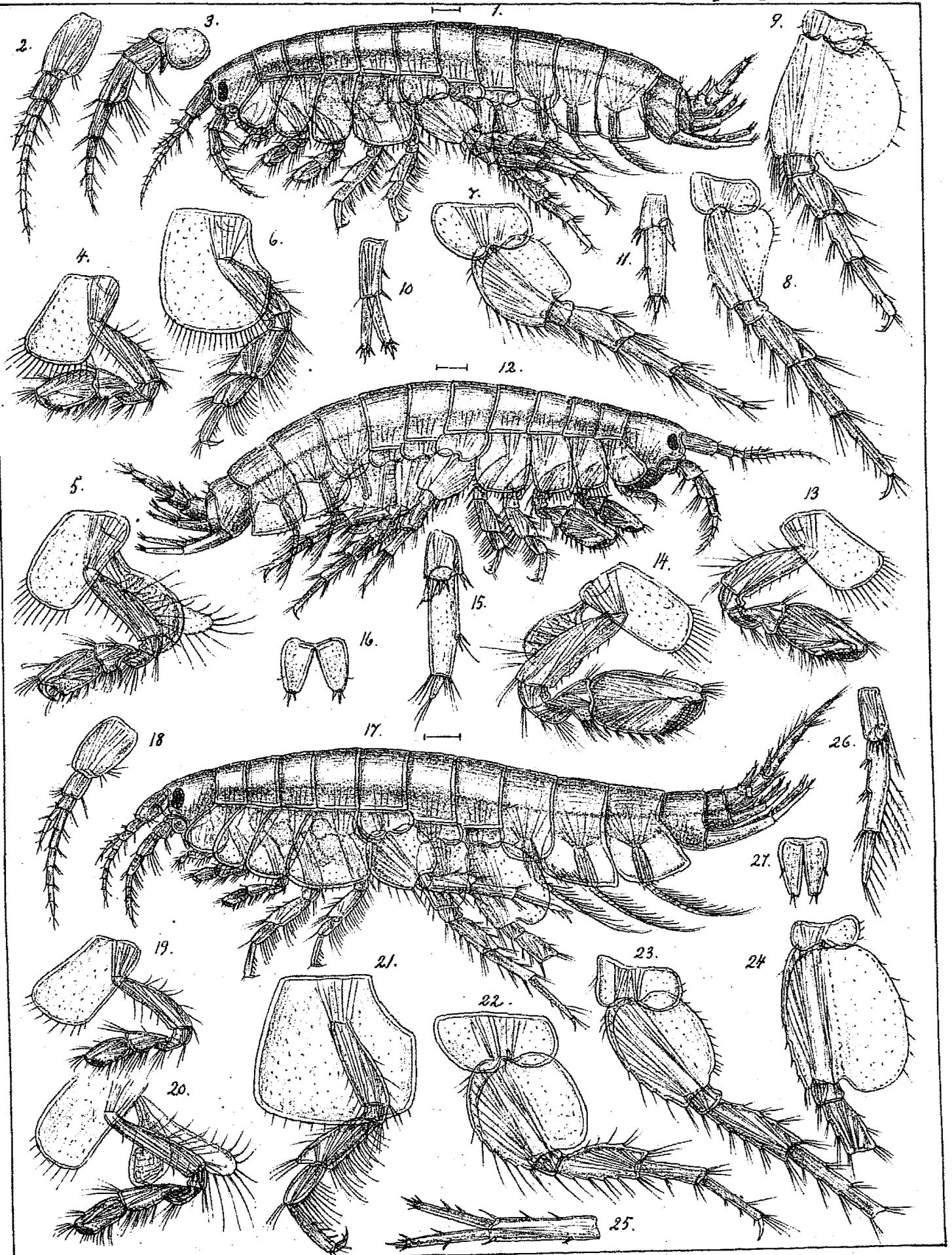
## Pl. XVI.

*Niphargoides caspius*, Grimm.

- |   |  |
|---|--|
| Fig. 1. Adult male, viewed from left side.              | Fig. 11. Anterior gnathopod, with coxal plate.                     |
| » 1a Lateral corner of last epimeral plate of metasome. | » 12. Posterior gnathopod, with coxal plate and branchial lamella. |
| » 2. Adult male, dorsal view.                           | » 13. First pereopod.  |
| » 3. Superior antenna.                                  | » 14. Second pereopod.   |
| » 4. Inferior antenna.                                  | » 15. Antepenultimate pereopod.                                    |
| » 5. Anterior lip.                                      | » 16. Penultimate pereopod.  |
| » 6. Right mandible, with palp.                         | » 17. Last pereopod.   |
| » 7. Posterior lip.                                     | » 18. First uropod.  |
| » 8. First maxilla.                                     | » 19. Second uropod.   |
| » 9. Second maxilla.                                    | » 20. Last uropod.   |
| » 10. Maxillipeds, without the left palp.               | » 21. Telson.  |





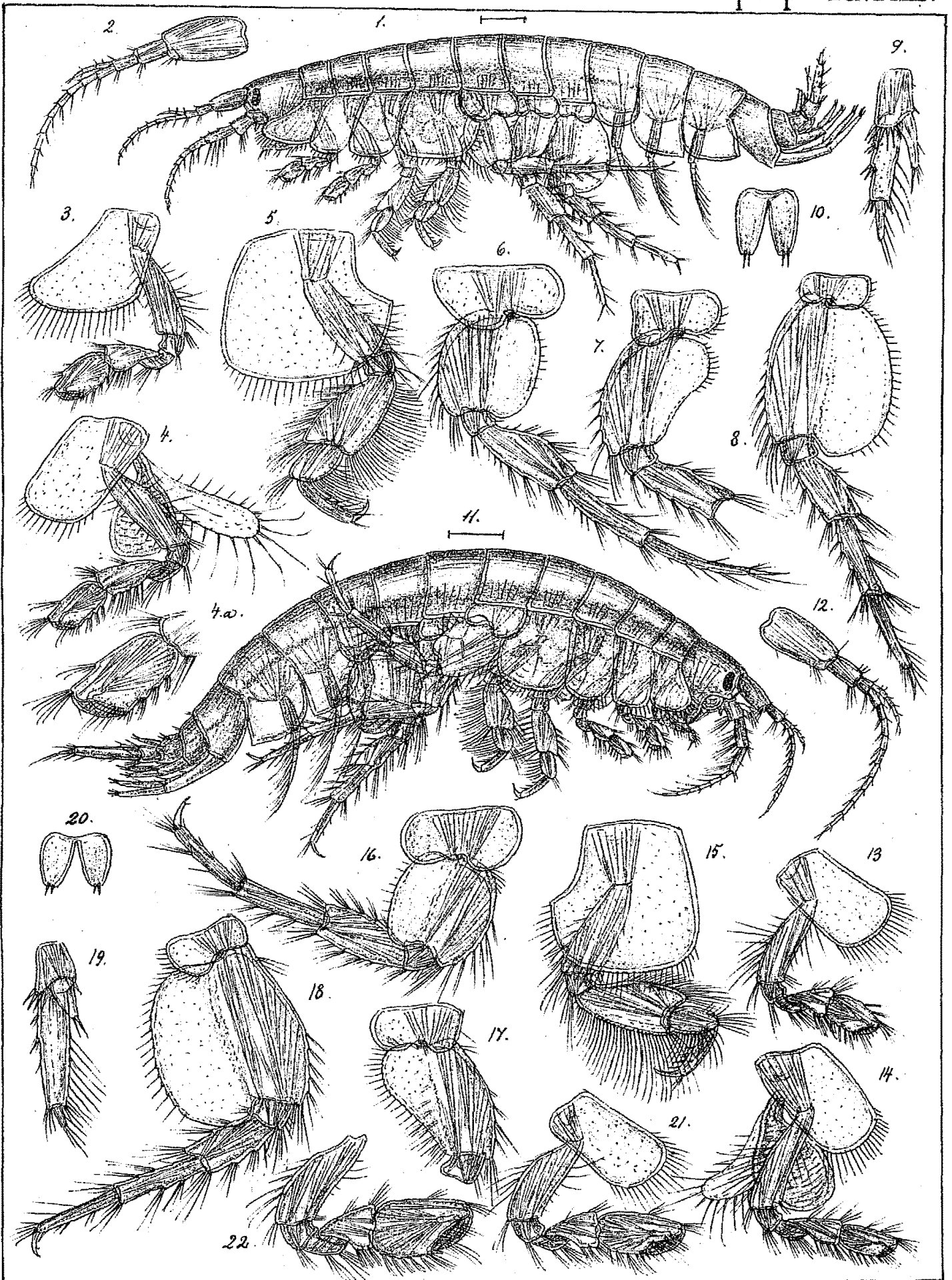


G.O.Sars. autogr.

Figs 1-16 *Gammarus minutus*, n. sp.

Figs. 17-27 *Gammarus macrurus*, n. sp.





G.O.Sars. autogr. Figs. 1-10 *Gammarus compressus*, n. sp.

Figs. 11-20 *Gammarus similis*, n. sp.

