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CUMACEA

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BULLETIN

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INVERTEBRATE
ZOOLOGY
Crustacea

1893
pt. 2
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Crustacea caspia. Contributions to the knowledge of the carcinological
Fauna of the Caspian Sea, by G. O. Sars, Prof. of Zoology at the
University of Christiania, Norway. (Lu le 15 septembre 1893).

Part II.

CUMACEA.

With 12 autographic plates.

INTRODUCTION.

In my former paper on Caspian Crustacea (Mysidæ), I adverted to the interesting fact that, in addition to *Mysidæ* and *Amphipoda*, also the exclusive marine order *Cumacea* has turned out, by the investigations of Mr. Warpachowsky, to be well represented in the Caspian Sea. It is now my purpose, in the present paper, to treat of the several forms of the latter order, which have hitherto come under my inspection. As will be shown, it is by no means, as should, indeed, have been expected, a scanty and depauperated Cumacean fauna that inhabits the Caspian Sea. On the contrary, the results hitherto gained would seem to prove, that the peculiar physical and biological conditions, prevailing in that isolated basin, must have had a most beneficial influence on the development and thriving of these interesting Crustacea; for the species are rather numerous, and in some places appear with a great abundance of specimens. Moreover, several of the forms attain a rather large size, as compared with their allies in the Oceans, and are only surpassed by some of the giant arctic species of the genus *Diastylis*. As regards outward appearance, the species exhibit rather conspicuous differences, being partly rather clumsy, partly extremely slender, and some of them acquire, moreover, a most peculiar aspect by the strange development of dorsal crests on the free segments of the mesosome. To judge from these very conspicuous differences in the outer habitus, one would at first be disposed to believe, that they belonged to several distinct genera. This, however, is not the case. For anatomical examination has indeed shown them all to belong to one and the same genus, viz., *Pseudocuma* G. O. Sars.

It is, however, worthy of note here, that the North Caspian Sea, to which part the investigations have as yet been confined, is everywhere very shallow, even the greatest depth not exceeding 6 fathoms, and thus may be supposed to exhibit rather uniform physical and biological conditions. Now, it is well known, that of the hitherto known *Cumacea* the great majority are true deep-water forms, only a few genera, among them the genus *Pseudocuma*, being represented in quite shallow water. It therefore seems to me highly probable, that on a future investigation of the greater deeps of the Caspian Sea farther south, other Cumacean genera will also be found to be represented.

Of the 10 species treated of below, only one has been previously described; all the others are new to science. The discovery of these additional species will necessitate a new improved diagnosis of the genus.

Gen. **Pseudocuma**, G. O. Sars, 1864.

«Om den aberrante Krebsdyrgruppe *Cumacea* og dens nordiske Arter». Christiania Vid. Selsk. Forhandl. 1864.

Generic Characteristics. — Body of rather various form, now comparatively short and compact, now very slender. Integuments generally not very strongly incrusted, and exhibiting a distinct squamous structure. Carapace of middle size, with the branchial regions well defined, and the antero-lateral corners more or less produced; pseudo-rostral projection of somewhat various structure, now distinctly prominent, and having the lateral lobes contiguous along the dorsal line, now forming two obtuse, juxtaposed lamellæ separated above by a deep incision. Exposed part of trunk consisting of 5 well defined segments, each provided with distinct laminar epimera. Metasome of the usual slender cylindrical form. Eye well developed, with generally 3 corneæ, the median one being, however, sometimes obsolete in female. Superior antennæ in female with the outer flagellum 3-articulate, the inner very small, uniarticulate; those in male only differing in the outer flagellum being 5-articulate, and the inner biarticulate. Inferior antennæ in female very small, forming a simple conical projection tipped with a single plumose seta; those in male well-developed and of the usual structure, with the peduncle geniculate, and the flagellum filiform, consisting of very elongated articulations. Oral parts of normal structure. Branchial apparatus (epipodite of maxillipeds) with only a few sacciform gills. Posterior gnathopoda with the outer corner of the basal joint scarcely produced, and provided with only a single large plumose seta. The 2 anterior pairs of legs in female, and all but the last pair in male, provided with well developed natatory exopodites. First pair rather slender, with the terminal joint linear; 2nd pair having the ischial joint well defined, and exhibiting sometimes a very marked difference in the

two sexes; 3rd and 4th pairs in female with a small biarticulate appendage (rudiment of exopodite) on the basal joint. Pleopoda in male 2 pairs, both imperfectly developed; the anterior ones consisting each of a laminar basal part edged inside with strong plumose setae, and a single small ramus carrying at the tip a few curved setae; the posterior ones quite rudimentary, forming 2 small claviform appendages, without any setae, but each carrying outside a strong spine. Uropoda with the inner ramus uniarticulate, the outer biarticulate. Telson very small, unarmed, but distinctly defined from the last segment.

Remarks. — The present genus, the type of the family *Pseudocumidae*, was established by the author in the year 1864, to include a Norwegian species, which he at first described as *Pseudocuma bi-triata*, but subsequently identified with a form rather imperfectly described by Prof. P. v. Beneden as *Leucon cercaria*. In 1876 the same species was also found to occur in the Mediterranean, and, in addition, another nearly-allied species, *P. ciliata*, was detected. Though the author has had an opportunity of examining numerous Cumacea from very different parts of the Oceans, no other species of this genus had before come under his inspection. It was therefore highly perplexing to find this genus, so poorly represented in the Oceans, truly abounding in species in the Caspian Sea, and, moreover, presenting forms of a very considerable size, as compared with the 2 earlier known species. As above stated, the Caspian species also exhibit a most wonderful diversity as to their outward appearance, some to certain extent recalling in form the genus *Dia-stylis*, others the slender genus *Iphinoë*, while others again exhibit a perplexing resemblance to the genus *Eudorella*. The question now arises, whether all these forms can in fact be assumed to have immigrated in some remote time from the Oceans, or whether they may, under particularly favourable conditions, have developed themselves independently from a few, or even a single primitive form. The scantiness of species of this genus in the Oceans would indeed seem to support the latter supposition. In every case the character of the Cumacean fauna of the Caspian Sea, as yet known, is so highly remarkable, that some hypothesis is needed to explain it satisfactorily.

With the exception of *P. pectinata*, which has recently been detected by Mr. Sowinsky in the Sea of Azow, all the species here described are, as yet known, wholly restricted to the Caspian Sea.

1. *Pseudocuma pectinata*, Sowinsky.

(Pl. I & II).

Pseudocuma pectinata, Sowinsky: О ракообразныхъ Азовскаго моря, собранныхъ А. А. Остроумовымъ во время плаванія на транспортѣ «Казбекъ» лѣтомъ 1891 года, р. 7. (Протоколы Кіев. Общ. Естествоиспытателей 1892).

Mélanges Zoologiques, T. XIII, p. 103.

Specific Characteristics. — Body rather stout, with the anterior division in female ovoid in form, in male oblong oval. Carapace large and deep, with the sides quite smooth, branchial regions somewhat swollen, and slightly gibbous posteriorly; pseudo-rostral projection comparatively short, antero-lateral corners rather projecting. First free segment of mesosome very narrow, band-like; 2nd with 2 juxtaposed rounded dorsal projections; the 3 posterior segments keeled dorsally, the keel being elevated to compressed, erect projections, the 2 posterior of which are very prominent and narrowly linguiform in shape. Segments of metasome with 2 longitudinal crests dorsally. Eye well developed, with all 3 corneæ distinct in both sexes. Second pair of legs in male much larger than in female, and having the terminal joint armed with 5 recurved hooks. Uropoda rather slender, exceeding half the length of the metasome, rami shorter than the scape, the inner one mucroniform, having in female only a single small spinule in the middle of the inner edge, in male a dense series of ciliated spines occupying the proximal half of that edge. Telson quadrangular. Length of adult female 8 mm, of male 9 mm.

Remarks. — The present very distinct species has recently been detected by Mr. Sowinsky in the Sea of Azow, and is briefly characterised by that naturalist in a russian paper treating of the results of Dr. Ostroumow's dredgings in that part of the Black Sea. Through the kindness of the said author, I have had an opportunity of comparing his original drawings with those made by myself, and have thus convinced myself of the identity of the Caspian form here described with Mr. Sowinsky's species. It is easily distinguishable from the 2 previously known species by its much larger size, and especially by the peculiar armature of the mesosome.

Description of the female.

(Pl. I).

The length of adult ovigerous specimens is about 8 mm, measured from the tip of the pseudo-rostral projection to the end of the uropoda, and the present form thus attains more than twice the size of the 2 previously known species, none of which exceeds $3\frac{1}{2}$ mm in length.

The general form of the body (see figs 1 & 2) is rather robust, with the 2 chief divisions of the body sharply marked off from each other. The anterior division, comprising the cephalon and mesosome, is of an ovoid form and about the length of the metasome, excluding the uropoda. When seen from above (fig. 1), it has its greatest breadth, — which somewhat exceeds the height, — across the 2nd free segment of the mesosome, whence it gradually tapers

both anteriorly and posteriorly. In a lateral aspect (fig. 2), its dorsal face appears considerably arched in the middle, acquiring posteriorly an irregularly pectinated appearance owing to the strong dorsal projections issuing from the exposed part of the trunk.

The carapace is rather large and deep, considerably longer than the exposed part of the trunk, and exhibits, in the lateral aspect of the animal (fig. 2), an irregular oval form. The branchial regions, occupying the greater part of the carapace, are well defined above and somewhat swollen, projecting above in their posterior part as a rounded gibbous prominence. The gastric region, lying in front of the branchial regions, is somewhat flattened, and of the usual bell-shaped form (see fig. 1), being defined from the adjacent parts of the carapace by a well-marked curved fissure, and terminating anteriorly with a rounded lobe, which contains the visual organ. In front of the ocular lobe the pseudo-rostral projection is formed by the extremities of the lateral lobes of the carapace, which here meet along the dorsal line, though being defined from each other by a narrow longitudinal fissure. This projection is rather short, scarcely half as long as the gastric region, and slightly upturned, terminating above in a sharp angle. Beneath it the antero-lateral corners of the carapace project on each side as a rather large and broad triangular lappet defined above by an even sinus. These lappets are somewhat expanded laterally, so as to be visible also in the dorsal view of the animal (fig. 1) on each side of the pseudo-rostral projection. The dorsal face of the carapace is somewhat vaulted in its posterior part, and decline anteriorly in an even slope to the base of the pseudo-rostral projection (see fig. 2). On the sides, the carapace is quite smooth, without any keels or folds. Its inferior edges exhibit, somewhat in front of the middle, a strong curve, and join the posterior edge, without forming any distinct angle.

The exposed part of the trunk consists of 5 well-defined segments, which are provided with rounded, somewhat laterally-expanded epimera. The 1st segment is very narrow, band-like, and its epimera form anteriorly (see fig. 2) a narrow linguiform lobe, which somewhat overlaps the inferior edge of the carapace, while they posteriorly are partly covered by the rather large anterior lobe of the epimera of the next segment. The latter is considerably larger than the 1st, and exhibits dorsally 2 rather conspicuous, juxtaposed, rounded prominences. The 3rd segment is about as long as the 2nd, and is provided with a single laminar dorsal projection of inferior size and rounded form. The 2 posterior segments are considerably longer than the preceding ones, but less broad, and have each a very large erect, laminar, projection of narrow linguiform shape. The epimera of the last segment have the posterior corners slightly produced, though obtuse at the tip.

The metasome, or tail, exhibits the usual slender cylindrical form, and is composed of 6 sharply-defined segments, successively increasing in length to the penultimate one, which is the longest. Their posterior edge is somewhat thickened, and distinctly emarginated both on the dorsal and ventral face, whereas it laterally projects as an obtuse angle. Dorsally these segments have 2 longitudinal keels, which, at the posterior part of each segment, are elevated to rounded crests. The last segment is considerably shorter than the penultimate one, and is somewhat flattened, becoming broader at the extremity, to which the uropoda and telson are articulated.

The integuments are moderately strong, and exhibit everywhere a distinct squamous structure. On the dorsal projections the squamulae are somewhat projecting, giving the edges a finely serrulated appearance (see fig. 2).

The eye, as in most other Cumacea, constitutes a single median organ occupying the ocular lobe. It contains 3 distinct and highly refractive corneae, one median and 2 lateral, all imbedded in a common pigmentary mass.

The superior antennae (fig. 3), which project anteriorly from the sinus between the pseudo-rostral projection and the antero-lateral corners of the carapace, are rather slender, and consist each of a 3-articulate peduncle and 2 flagella. The 1st joint of the peduncle, which to a great extent is hidden between the lobes of the carapace, is rather thick and muscular. It carries at the end exteriorly a single plumose seta, and has the inner edge finely ciliated. The 2nd joint is of about the same length as the 1st, but much narrower, and bears on the outer edge 5 strong bristles and a single one at the end inside. The 3rd joint is still narrower, and also shorter than the 2nd, and nearly linear in form. Of the flagella, the one (the exterior) is well developed, about the length of the last joint of the peduncle, and consists of 3 well defined articulations, the 1st of which is much the largest. It carries at the end 2 band-like sensory appendages, one of which issues from the penultimate articulation, the other from the extremely small last joint, which moreover bears at the tip a short simple bristle. The inner flagellum is quite rudimentary, consisting of a single very minute joint carrying at the tip a few fine bristles.

The inferior antennae (fig. 4) are completely hidden between the antero-lateral corners of the carapace, and can only be seen by dissection. They consist each of a small conically tapering stem, without any distinct articulation, and tipped with a single rather large plumose seta.

The anterior lip (fig. 5) forms a rounded flap covering over the oral orifice. It is strengthened by several chitinous stripes, and has the posterior edge slightly insinuated and finely ciliated.

The posterior lip (fig. 6) is quite membranous, consisting of 2 somewhat securiform lobes, united at the base, and finely ciliated along the inner edge and the obtusely rounded tip.

The mandibles (fig. 7) are rather slender, but strongly incrusted, and, as usual, without any trace of a palp. They consist each of a navicular body, terminating above in a point, and 2 diverging branches issuing from the lower extremity of the body, and constituting together the masticatory part. The outer branch, which forms the immediate continuation of the body, is somewhat compressed, and terminates with 2 slightly dentated lamellæ forming the cutting edge; behind these plates are affixed to the inner edge of the branch 5 slender and curved spines ciliated on the one edge. The inner branch, constituting the molar expansion, issues at a right angle from the body, and is rather massive, cylindrical in form, and terminates in a finely fluted triturating surface.

The 1st pair of maxillæ (fig. 8) each exhibit a rather thick and muscular basal part, from which issue anteriorly 2 masticatory lobes, and exteriorly a peculiarly modified palp. The outer masticatory lobe is somewhat compressed, and tapers a little towards the tip, which is obliquely truncated, and armed with numerous strong spines. The inner masticatory lobe is much smaller than the outer, and of membranous structure, with the inner corner produced to a conical projection, to the end of which are affixed 4 ciliated spines successively increasing in length posteriorly. The palp, which originates from the exterior side of the basal part, at the insertion of the outer masticatory lobe, is turned straight backwards, projecting within the branchial cavity. It consists of a single somewhat cylindrical joint, in the interior of which a strong muscular band is visible, and carries on the tip 2 diverging band-like setæ of unequal size, both edged with fine recurved hairs.

The 2nd pair of maxillæ (fig. 9) are semimembranous, and rather different in shape from the 1st pair. The basal part consists of 2 segments, the 1st of which is very short, whereas the 2nd is rather expanded. It is continued anteriorly in a short and broad, obliquely-truncated masticatory lobe carrying a row of short, densely-ciliated setæ, and has the inner edge somewhat expanded, and provided with a dense series of delicate curved setæ. On the inferior side, at the base of the masticatory lobe, are seen 2 juxtaposed linear lappets pointing anteriorly, and carrying at the tip a number of curved bristles. On a closer examination, the outer lappet is found to be articulated to the base of the inner, and both together would thus seem to constitute a biarticulate palp. Outside, the basal part forms a very thin lamellar expansion, which perhaps may be regarded as an imperfectly developed exognath.

The maxillipeds (fig. 10) each form a short somewhat compressed stem, divided into a number of joints corresponding to those of the gnathopoda and legs. The basal joint is much the largest and rather broad, being produced at the end interiorly to a short, but distinctly-defined masticatory lobe. This is provided at the tip with several short, partly ciliated spines, and has at the base outside a strong plumose seta curving upwards, and 3 others affixed at some distance from the inner edge. The ischial joint is very small and imperfectly defined, whereas the 2 succeeding joints (the meral and carpal ones) are much expanded and connected by a very oblique articulation. From the outer corner of the carpal joint issues a strong, anteriorly-curving, plumose seta, and inside, this joint is clothed with a great number of small curved spinules. The propodal joint is much smaller than the 2 preceding ones, and of a rounded oval form; it is densely clothed with delicate bristles on the inner edge, and has besides 3 rather strong plumose setae, 2 of which issue from the tip, the 3rd from the outer edge. The dactylar joint is extremely minute and linear in form, provided at the tip with 3 small spines.

At the base of these limbs is attached the complicated branchial apparatus, which the author elsewhere has shown to be composed of the modified expodite and epipodite. In its structure it perfectly agrees with that figured in the next species (see Pl. III, fig. 5).

The anterior gnathopoda (fig. 11) are rather slender, and distinctly pediform. The basal joint about equals in length the other joints combined, and is nearly linear in form; it is finely ciliated on both edges, and carries at the end 3 setae, 2 of which are densely plumose. The ischial joint is very small, and but faintly distinguishable, whereas the succeeding ones are all well defined, and constitute together a somewhat incurved terminal part, which is rather richly supplied with bristles, one of which, issuing from the outer side of the propodal joint, is remarkable by its length and dense ciliation. At the base of each of these gnathopoda occurs a semilunar movable lamella, which in the ovigerous female is bordered by a dense row of slender setae increasing in length outwards. These setae project within the incubatory pouch, and form, together with those of the other lamella, a broad fan, which by its regular motions may be the means of aerating the inner cavity of the marsupium.

The posterior gnathopoda (fig. 12) are much larger than the anterior, and like the first 2 pairs of legs, are provided at the base with well developed natatory exopodites, consisting each of a somewhat cylindrical muscular basal part, and a flexible 5-articulate flagellum bearing long ciliated setae. The basal joint is very large, nearly twice as long as the remaining joints combined, and somewhat curved. It is provided on the distal half of the

inner edge with 6 ciliated setæ, and from its outer corner issues a much larger, anteriorly-curving seta, densely plumose throughout. Of the joints composing the terminal part, the carpal one is the largest, and carries on the inner edge a series of short ciliated setæ.

The legs are 5 pairs in number, corresponding to the 5 exposed segments of the mesosome. They originate each from a short piece firmly connected to the inner side of the epimera, and representing their coxal joint (see fig. 2). By dissection this joint, however, remains in connexion with the segments, the true movable articulation being between that joint and the basal one.

The 1st pair of legs (fig. 13) are much the longest and of a very slender form. They are stretched anteriorly, and closely applied against the inferior side of the carapace, only their outer part curving downwards by a more or less strong geniculate bend (see fig. 2). Fully extended, they about equal in length the carapace and the 2 first free segments of the mesosome combined. In their structure they exhibit a close resemblance to the posterior gnathopoda. As in the latter, the basal joint is very large, fully as long as the remaining part of the leg, and exhibits, somewhat above the middle, a strong curvature. Its proximal part is somewhat dilated, to receive the strong muscles joining the exopodite, and has a ridge running along its outer side. Along the inner edge of the joint there is a series of plumose setæ, and from the outer corner a similar seta issues. The terminal part of the leg rapidly tapers distally, and has all the joints well defined and clothed with scattered bristles, some of which are ciliated. The ischial and meral joints are rather short and thick, being connected by a very oblique articulation, and also the articulation between the meral and carpal joints appears very oblique, though in an opposite manner. The 3 outer joints are rather slender, and successively decrease in size, the most movable articulation being between the carpal and propodal joints. The terminal or dactylar joint is very narrow, linear, and terminates with 3 slender curved spines, the second of which is the longest. The exopodite does not differ from that of the posterior gnathopoda, except in the basal part being somewhat thicker, and having at the end outside a plumose seta.

The 2nd pair of legs (fig. 14) are much shorter than the 1st, and, like the latter, generally curved anteriorly. The basal joint is rather massive, though considerably shorter than the terminal part, and but slightly curved. It is provided along the inner edge with 6 strong plumose setæ, and has on the outer corner a somewhat smaller seta. The ischial joint is very short, though well defined, and carries inside a strong plumose seta. The meral joint is rather thick, nearly quadrangular in form, and has 2 plumose setæ

on the inner edge. The carpal joint is nearly twice as long and much narrower, with both edges setiferous. The prododal joint is very small and only provided with a single spiniiform seta at the inner corner. Finally, the dactylar joint is about twice as long as the propodal one, and tapers somewhat distally; it is provided at the tip with several somewhat diverging stiff bristles. The exopodite exhibits the usual structure, and has 3 plumose setæ on the outer edge of the basal part.

The 3 posterior pairs of legs represent the true walking legs or pereiopoda, and are much more freely mobile than the 2 anterior pairs, being also generally more spread at the sides (see fig. 1). They successively decrease in length, and exhibit on the whole a rather uniform structure. In all of them the basal joint is comparatively narrow, cylindric, but of very different size, being in the 3rd pair (fig. 15) rather large, nearly twice as long as the remaining part of the leg, whereas in the last pair (fig. 16) it is so much shortened as scarcely to exceed half the length of that part. It carries a number of plumose setæ, and in addition, on the 3rd and 4th pairs, a small biarticulate appendage affixed to the outer side, at some distance from the base, and carrying 2 plumose setæ. This appendage, which is constantly present in all the species, and also occurs in 4 other Cumacean genera, viz., *Cumopsis*, *Lamprops*, *Hemilamprops* and *Paralamprops*, must undoubtedly be regarded as a rudiment of an exopodite. The terminal part of these legs is more or less curved, and rather richly supplied with slender bristles, those issuing from the end of the carpal joint being peculiarly modified, terminating with a closely annulated lash. The propodal joint is very small, and carries at the end outside a similar bristle. The dactylar joint is still smaller, and not easy to distinguish from the slender curved spine in which it terminates.

The incubatory pouch or marsupium, projecting below the anterior division of the body (see fig. 2), is, as in other Cumacea, composed of 4 pairs of large lamellæ issuing from the base of the posterior gnathopoda, and the 3 anterior pairs of legs. These lamellæ overlap each other both at the sides and at the tip, thus forming together a completely closed, roomy cavity, in which the ova undergo their development.

The uropoda (fig. 17), which are movably articulated to the end of the last segment, and more or less diverge to each side (see fig. 1), are very slender and elongated, exceeding even half the length of the metasome. They are each composed of a narrow cylindrical scape and 2 terminal rami. The scape is much longer than the rami, and is edged inside with about 8 setæ, the 4 anterior of which are placed more apart than the 4 posterior ones. The inner ramus is uniarticulate, and of a narrow mucroniform shape, terminating in a sharp spine, which is not distinctly defined from the ramus.

Its inner edge is minutely serrulate, and has 2 small spinules, the one about in the middle, the other close to the apex. The outer ramus is a little shorter than the inner, and distinctly biarticulate, with the basal joint rather short and thick, whereas the terminal joint is very narrow and conically tapering. It terminates in a very slender and elongated spine, and has the inner edge minutely serrulate, and provided near the tip with a single small seta.

The telson (see fig. 18) is very small, and of a quadrangular form, somewhat broader than it is long, and without any armature whatever. It is distinctly defined from the last segment, and to a certain extent mobile, allowing of being bent down between the uropoda, thus covering over the anal orifice.

Description of the male.

(Pl. II).

Adult male specimens differ rather markedly from the females, both in the outer habitus, and in several of the anatomical details. They also attain a somewhat larger size, the length of the body measuring about $8\frac{1}{2}$ mm.

The form of the body (see figs 1 and 2) is, on the whole, much more slender than in the female, and the anterior division is far less tumid, and, as seen from above (fig. 1), nearly of equal breadth throughout.

The carapace has the branchial regions considerably swollen, though scarcely gibbous posteriorly, as in the female. The pseudo-rostral projection is shorter and more obtuse at the tip, and the antero-lateral corners broader and more expanded laterally.

The free segments of the mesosome are armed in a similar manner to those in the female, but are much narrower, and have the epimera more expanded laterally. Those of the last segment terminate in an obtuse projection fringed with several plumose setæ.

The metasome is somewhat more strongly developed, and exceeds the anterior division in length.

The eye (fig. 3) is considerably larger than in the female, and has the corneæ very distinct and highly refractive.

The superior antennæ (fig. 4) do not differ from those in the female, except in the flagella being divided into a greater number of articulations. The outer flagellum consists of 5 well-defined joints, the 1st of which is rather short. The inner flagellum is less rudimentary than in the female, attaining nearly half the length of the outer, and is composed of 2 distinct joints.

The inferior antennæ (fig. 5), differing in this respect from the female, are greatly developed, attaining nearly the length of the whole body. They con-

sist each of a thick muscular peduncle and a very slender filiform flagellum. The peduncle is bent at the base in a geniculate manner, and is composed of 4 well-defined joints, the first 3 of which are rather short, whereas the last joint is very large and somewhat compressed, tapering gradually towards the tip. It is provided along the inferior edge with numerous transverse rows of delicate sensory bristles, and exhibits in its interior several strong muscles joining the base of the flagellum. The latter is divided into a number of distinct articulations (about 22 in all), which are rather elongated and provided along the inferior edge with tufts of small sensory bristles. Most frequently these antennæ are carried in such a manner as to be nearly hidden. In this case the peduncle is received between the greatly expanded antero-lateral corners of the carapace, and the flagellum applies itself closely within the inferior edge of the carapace and of the epimera of the exposed segments of the trunk; its remaining part, too, is received within a groove extending along the ventral side of all the segments of the metasome, and thus only the extremities of the flagella project freely at the end of the body, between the uropoda. By the aid of the strong muscles of the peduncle, these antennæ can, however, be moved out from the body at any angle with the same, and are not infrequently found, in alcoholic specimens, stretched out in quite the opposite direction.

The oral parts do not differ in any manner from those in the female.

The gnathopoda are also of a very similar structure, with the exception that the basal lamellæ of the anterior ones do not exhibit any trace of marginal setæ, and that the basal joint of the posterior ones is comparatively larger and more expanded at the base, in concordance with the much stronger development of the exopodite.

Of the legs not only the 2 first pairs, but also the 3rd and 4th pairs are provided with natatory exopodites. The latter appendages are much more fully developed than in the female, having the basal part very broad and lamellar, and the outer half of the flagellum divided into a great number of short articulations, each bearing a pair of densely ciliated natatory setæ (see figs 6—8). Owing to this powerful development of the exopodites the basal joint of all the legs, excepting the last pair, is much dilated, to receive the strong muscles moving these appendages. The 3rd and 4th pairs especially (figs. 6 and 7) thereby acquire an appearance very different from that of the female.

The 2nd pair of legs (fig. 6) differ also in other respects considerably from those in the female. They are considerably larger, not much shorter than the first pair, and have the carpal joint much elongated, fully twice as long as the 2 preceding ones combined, and provided on both edges with several short plumose setæ. Finally the terminal joint (fig. 6) is highly re-

markable by the occurrence in its outer part of 5 strong, recurved hooks, wholly wanting in the female, and probably subservient in getting hold of the female during copulation.

The first 2 segments of the metasome have each (see fig. 2) a pair of ventral appendages (pleopoda), of which no trace is to be found in the female. The anterior pair are much the larger, and consist each (fig. 9) of a lamellar basal part and a short terminal joint or ramus. The basal part slightly tapers distally, and has on the inner edge a series of 8 very strong and curved plumose setæ; outside occur moreover 2 somewhat shorter, but very densely ciliated setæ. The terminal joint is rather small and obliquely truncated at the tip, which carries 5 plumose setæ of moderate length.

The posterior pair of pleopoda (fig. 10) are very small and rudimentary, and have the form of 2 apparently quite immobile, claviform appendages, without any setæ, but each armed with a strong spine near the extremity outside. At the tip of each of these appendages occurs an extremely minute and pellucid terminal joint, or ramus, projecting in 3 fine hairs.

The 3 succeeding segments of the metasome have each, on the place where, in the 2 anterior segments the pleopoda occur, 2 strong ciliated setæ, of which no trace is to be found in the female.

The uropoda (fig. 11) exhibit a similar structure to those in the female, differing however in the scape having a much greater number of setæ, and in the inner ramus being provided along the proximal half of the inner edge with a dense series of short ciliated spinules.

The telson (fig. 12) does not exhibit any essential difference from that in the female.

Colour. — Although the colour, as a rule, cannot be stated in alcoholic specimens, it may be observed, that some specimens, both males and females, received immediately after having been collected, still exhibited a most beautiful ornament of reddish brown arborescent pigmentary patches, especially on the carapace. The number and arrangement of these patches seemed, however, to be somewhat variable. They are indicated on the habitus-figures here given, as they occurred in the specimens delineated.

Occurrence. — The present species is by far that most abundantly represented in the collections of Mr. Warpachowsky. It has been collected in no less than 15 different Stations, distributed chiefly in the western part of the North Caspian Sea, as also north of the peninsula Mangyschlak. In some of the Stations (as St. 2 and 47) it occurred in great profusion, both adult females, males and young being present, in others now males, now females were the more predominant.

Distribution. The Sea of Azow (Sowinsky).

2. *Pseudocuma Sowinskyi*, G. O. Sars, n. sp.

(Pl. III).

Specific Characteristics ♀. — Very like the preceding species in its outward appearance, though perhaps a little more slender. Carapace with the branchial regions much swollen and evenly rounded above, with a low coarsely serrated crest running along their most prominent part, and continued anteriorly on each side of the gastric region as far as the tip of the pseudo-rostral projection; the latter very short and subtruncated at the tip; antero-lateral corners very much projecting, and having their anterior edge coarsely serrated. All the free segments of mesosome distinctly keeled dorsally, the keel being elevated in the 3 anterior segments to comparatively small rounded projections, in the 2 posterior segments to somewhat larger laminar prominences, that of last segment the most projecting and triangular in form; edge of the projections coarsely serrated. Segments of metasome without any keels dorsally. Ocular lobe rounded triangular, with the visual elements less distinct, the median cornea being inconspicuous. Antennæ, oral parts, and legs nearly as in the preceding species. Uropoda, on the other hand, comparatively much shorter, not nearly attaining half the length of the metasome, scape scarcely longer than the rami; the latter equal-sized, and without any spinules on the inner edge. Telson transversely quadrangular. Length of adult female reaching 11 mm.

Remarks. — Though very nearly related to the preceding species, this form may, on a closer examination, be readily distinguished by several well-marked characteristics. For instance the carapace differs in the distinct serrated crests running along the branchial regions and continued along the sides of its anterior part, in the considerably inferior size of the pseudo-rostral projection, and in the greatly-projecting antero-lateral corners, the anterior edge of which is coarsely serrated. Moreover the dorsal projections of the mesosome are far less prominent, and the 2 juxtaposed dorsal prominences occurring in *P. pectinata* are replaced by a single median projection of inferior size. Finally the metasome is more elongated, and the uropoda considerably shorter than in that species. Only female specimens have hitherto come under my inspection.

Description of the female.

The length of adult ovigerous specimens amounts to 11 mm., and this form thus attains a still larger size than the preceding species, and is in fact the largest of the hitherto known Caspian Cumacea.

The general form of the body (see figs. 1 and 2) resembles that of *P. pectinata*, though being perhaps somewhat more slender, and thus cor-

responding far more with that of the adult male of the latter species. The anterior division is, however, as in most female Cumacea, rather tumid, and, as seen from above (fig. 1), of oblong ovoid form, with the greatest breadth about in the middle, and gradually tapering both anteriorly and posteriorly.

The carapace about equals in length the exposed part of the trunk and the 1st segment of metasome combined. It is, as seen laterally (fig. 2), of an irregular oval form, and somewhat truncated in front. The branchial regions are considerably swollen and evenly rounded above, with a low crest running along their most prominent part. These crests are coarsely serrated, and are continued anteriorly, on each side of the gastric region, as an horizontal ridge until the tip of the pseudo-rostral projection. The latter is very short and obtusely truncated at the tip, whereas the antero-lateral corners of the carapace are greatly projected, forming broad triangular lappets, the anterior edge of which is very coarsely serrated (see fig. 3). The gastric region (see fig. 1) exhibits the usual bell-shaped form, and has along the middle a slight, minutely serrated keel. The ocular lobe is of a rounded triangular form, and has the visual elements but slightly distinct, the median cornea even being quite inconspicuous. The inferior edges of the carapace have their greatest curvature about in the middle, and, as in the preceding species, join the posterior edge, without forming any angle.

The free segments of the mesosome are sharply defined from each other, and all distinctly keeled dorsally. On the 3 anterior segments the keel is elevated to comparatively small, rounded projections, finely serrated on the edge; on the 2 posterior segments the projections are somewhat larger and laminar, though not nearly so prominent as in the preceding species; that of the last segment is the largest and of triangular form, with the anterior edge, as in the preceding one, coarsely serrate. Of the rounded juxtaposed dorsal prominences occurring in *P. pectinata* on the 2nd segment, no trace is to be found. The epimera are rather broad, and of a similar form to those in that species.

The metasome is rather strongly built, and considerably longer than the anterior division of the body. Its segments are simple cylindric, without any dorsal keels.

The antennæ (fig. 4) and oral parts do not differ materially from those parts in the preceding species.

In fig. 5 the left branchial apparatus is represented in its natural connexion with the corresponding maxilliped. As will be seen, it consists of 2 principal parts: a narrow band-like portion stretching anteriorly, and a broad navicular plate extended backwards. The former, representing the modified exopodite, expands at the end to a triangular, slightly incrustated

lamella, which meets the corresponding lamella on the other side in front of the pseudo-rostral projection, both forming together a valvular apparatus, regulating by its movements the current of the water introduced into the branchial cavity. The large, posteriorly-pointing plate, representing the epipodite, is somewhat hollowed, exhibiting a convex outer face and a slightly concave inner cavity; it terminates with a narrow, triangular, recurved lappet, and carries along the inner edge a series of 4 sacciform gill-elements, rapidly decreasing in size posteriorly; another much larger gill-sac is seen issuing from the inner face of the plate, somewhat in front of the others.

The gnathopoda (figs. 6 and 7) exhibit a similar structure to those in the preceding species. As the specimen selected for dissection was a young female, the marginal setæ of the basal lamellæ of the anterior gnathopoda are only indicated as short projections (see fig. 6), and the incubatory plates of the posterior ones are still small and of a triangular form (see fig. 7).

The legs (figs 8—11) likewise are very similar in structure to those of the preceding species, and it will thus be sufficient to refer to the figures, without giving a detailed description.

The uropoda (fig. 12), though constructed upon the same type as in the said species, differ conspicuously in being comparatively much shorter and stouter, scarcely exceeding in length the last 2 segments of the metasome combined. The scape is rather thick, and has on the inner edge 8 small bristles, the 3 anterior of which are separated from the others by a larger interval. The rami are about the length of the scape, and nearly equal-sized. They are both minutely ciliated along the inner edge, and terminate with a strong, though not very elongated spine, close to which there is a small bristle; but otherwise they are quite devoid of lateral spinules.

The telson (fig. 13), as in *P. pectinata*, is transversely quadrangular in form, being much broader than it is long.

Colour. — Also of this form, some specimens recently received still exhibited a number of reddish brown pigmentary patches, arranged both on the anterior and posterior divisions of the body, and especially very conspicuous on the carapace. As seen from the figures (1 and 2), their number was somewhat greater than in *P. pectinata*, and the ramifications less extended.

Occurrence. — Of the present species I at first had for examination only a few still immature specimens, which I found among the material of *P. pectinata*, from Stations 2, 32, 48 and 50, all belonging to the western part of the North Caspian Sea. In a collection recently received from Mr. Warpachowsky, however, a number of fully grown ovigerous females were included. These specimens were derived from 4 different places, 2 of which

(Stat. 58 and 59) belong to the western part of the North Caspian Sea, whereas the other 2 (St. 61 and 66) are located far north, at some distance from the mouth of the Ural.

3. *Pseudocuma rostrata*, G. O. Sars, n. sp.

(Pl. IV).

Specific Characteristics ♀. — Body rather stout, with the anterior division fully as long as the posterior, and nearly fusiform in shape. Carapace somewhat attenuated in front, and having on each side 3 oblique folds, 2 of which limit the branchial region, the 3rd crossing it in the middle; ocular lobe narrowly triangular with the visual elements less distinct; pseudo-rostral projection exceedingly prominent and acuminate at the tip; antero-lateral corners but slightly projecting, and defined above by an angular notch. Free segments of mesosome keeled dorsally, the keel being elevated to comparatively low projections somewhat increasing in size posteriorly, that of last segment the most prominent and triangular of form. Antennæ, oral parts and legs nearly as in the 2 preceding species. Uropoda rather short and robust, scarcely exceeding in length $\frac{1}{3}$ of the metasome, rami equal-sized and about the length of the scape, each terminating in a strong spine and having the inner edge minutely serrate. Telson transversely quadrangular. Length of adult female 8 mm.

Remarks. — The present species is easily distinguishable from either of the 2 preceding ones by the strongly prominent and acuminate pseudo-rostral projection, as also by the oblique folds running across the sides of the carapace. In the structure of the limbs it shows itself however to be nearly related to the former. Also of this form, only female specimens have hitherto come under my inspection.

Description of the female.

The largest specimen, a fully grown ovigerous female, measures in length 8 mm, this form also being thus of a much larger size than either of the 2 earlier known species.

The general form of the body (see figs. 1 and 2) is rather stout, with the 2 chief divisions sharply marked off from each other, and of about equal length. As seen from above (fig. 1), the anterior division exhibits a somewhat fusiform shape, with the greatest breadth at some distance behind the middle, whence it rapidly tapers anteriorly. Viewed from the side (fig. 2), the dorsal face appears slightly arched and irregularly indented in its posterior part, on account of the projections issuing from the free segments of the mesosome.

The carapace is rather large, nearly equalling in length the exposed part of the trunk and the first 2 segments of metasome combined. Its superior face (see fig. 2) is but little arcuate, declining with an even slope anteriorly. As seen from above (fig. 1), it appears somewhat instricted in the middle, and has its greatest breadth quite posteriorly. The branchial regions are but little swollen, and have each, in the middle, a distinct fold descending obliquely along the sides. Above, they are sharply marked off from each other by a distinct crest running along their most prominent part, and continued in front as a short oblique fold defining them from the gastric region. Quite posteriorly they are, moreover, defined by another fold running close to the posterior edge of the carapace, and thus the sides of the carapace have the appearance of being moulded in 3 parallel oblique folds. The gastric area has the usual form, and is continued backwards as a narrow wedge-shaped space lying between the branchial regions (see fig. 1). The ocular lobe exhibits a somewhat unusual form, being very narrow triangular, or nearly conical in shape. The pseudo-rostral projection is exceedingly prominent, nearly horizontal, and acuminate at the tip, being defined below by an angular notch. The antero-lateral corners project but little, and are nearly rectangular, with the anterior edge slightly serrate. The inferior edges of the carapace are rather curved in the middle, and join the posterior edge without any distinct demarcation.

The free segments of the mesosome are all distinctly keeled, as in *P. Sowinskyi*, and their dorsal projections of much the same appearance as in that species, except that their edges are smooth, not serrate.

The metasome scarcely exceeds in length the anterior division of the body, and has the segments of the usual shape, without any dorsal keels or projections.

The eye has the visual elements imperfectly developed, exhibiting only 2 small, juxtaposed pigmentary patches.

As regards the antennæ (fig. 3), oral parts, gnathopoda (figs. 4 and 5) and legs (figs. 6—9), I do not find it necessary to describe them in detail, as on the whole they agree in their structure with those parts in the 2 preceding species.

The uropoda (see fig. 10) are comparatively short and stout, scarcely exceeding in length $\frac{1}{3}$ of the metasome. The scape is rather clumsy, and only provided with a few (about 4) small bristles inside. The rami are nearly equal-sized, and about the length of the scape, both mucroniform in shape and terminating in a strong spine. The inner edge is minutely serrulate, and has besides a small seta, which, on the inner ramus, is attached somewhat beyond the middle, on the outer one, close to the apex.

The telson (ibid.) exhibits the same transversally quadrangular form as in the 2 preceding species.

Colour. — The specimens of this form also exhibited traces of the original colouring in a number of reddish brown, stellate pigmentary spots, the arrangement of which is shown in figures 1 and 2.

Occurrence. — A few specimens of this form were collected by Mr. Warpachowsky at Stat. 53 and 63, the former located at some distance north of the islands of Kulaly and Morskoj, the latter in the eastern part of the North Caspian Sea, south of the mouth of the Ural. Another specimen of the same species was contained in a small collection of Caspian Crustacea sent me from the Zoological Museum in St. Petersburg, and was, according to the label, taken by the late academician Baer off the peninsula Mangyschlak.

4. *Pseudocuma cercaroides*, G. O. Sars, n. sp.

(Pl. V and VI).

Specific Characteristics. — Body short and stout, with rather strongly incrustated integuments, and having the anterior division in female rather tumid and ovoid in form, in male, as usual, considerably narrower. Carapace comparatively large and deep, with the branchial regions very sharply defined in front, but without any lateral folds; pseudo-rostral projection rather prominent, horizontal and terminating in an obtusely acuminate point; antero-lateral corners in female very slight, in male somewhat more projecting and nearly rectangular. Exposed part of trunk strongly vaulted above, especially in female, but without any keel or projections. Metasome scarcely longer than the anterior division of the body. Eye rather fully developed, especially in the male, with all 3 corneae distinct. Legs of comparatively robust structure. Uropoda rather short, with the rami very unequal, the inner one being considerably larger than the outer, and having the inner edge spinulose. Telson very small, nearly semicircular in form. Length of adult female 5 mm, of male about the same.

Remarks. — In its outer appearance this species somewhat resembles the typical form *P. cercaria*, and its specific denomination refers to this resemblance. It is, however, much more strongly built, and has the pseudo-rostral projection considerably more prominent. Moreover, in the carapace, the oblique folds, which characterize both that species and the Mediterranean form, *P. ciliata*, are entirely wanting.

Description of the female.

(Pl. V)

The length of adult ovigerous specimens does not exceed 5 mm., and this species is consequently far inferior in size to the 3 preceding ones, though exceeding in this respect the 2 earlier known species. •

The general form of the body (see figs. 1 and 2) is rather short and stout, with the 2 chief divisions sharply marked off from each other. As seen from the side (fig. 1), the anterior division of the body appears boldly vaulted dorsally, and rather attenuated in front. Viewed from above (fig. 2), it exhibits a regular ovoid form, with the greatest breadth somewhat farther back than the middle, and tapers gradually both anteriorly and posteriorly.

The carapace is rather large and deep, considerably exceeding in length the exposed part of the trunk, and exhibits, when seen laterally (fig. 1), a somewhat triangular form, the upper contour being nearly straight and slightly declining in front, whereas the inferior edges are very strongly curved in the middle. The branchial regions are somewhat swollen, and marked off from the gastric region by a very conspicuous, obliquely descending crest. The gastric area is somewhat flattened and without any dorsal keel, terminating in front with a comparatively large ocular lobe of a semi-circular form. The pseudo-rostral projection is rather prominent, horizontal, and terminating in an obtusely acuminate point. Below it, there is a very slight notch, defining it from the antero-lateral corners of the carapace. The latter are very small and obtuse, being scarcely visible, when the animal is viewed from above (fig. 2).

The free segments of the mesosome are all evenly vaulted above, without the slightest trace of any keel or projections, but have their anterior edge somewhat raised. As usual, the 1st segment is the shortest and nearly band-like. The 3 succeeding segments are of nearly equal length, whereas the last segment is much smaller, though considerably broader than the segments of the metasome. The epimera are well-developed, and somewhat projecting laterally; those of the last segment are evenly rounded.

The metasome scarcely exceeds in length the anterior division of the body, and has the segments very sharply defined.

The integuments are rather strongly incrustated, and exhibit everywhere a pronounced squamous structure.

The eye is very fully developed, with all 3 corneæ distinct, and having between them a darkish pigment.

The superior antennæ (fig. 3) are somewhat less slender than in the 3 preceding species, and have the peduncle only sparingly supplied with bristles.

The gnathopoda (figs. 4 and 5) are likewise somewhat more robust, especially the posterior ones (fig. 5), though otherwise exhibiting the structure characteristic of the genus.

As to the legs (figs. 6—10), they are on the whole much more strongly built than in the 3 preceding species. On the 1st pair (fig. 6) the basal joint is scarcely longer than the 4 succeeding joints combined, and the latter are comparatively broader and more laminar than in those species, whereas the terminal joint has conserved its narrow linear form unaltered.

The 2nd pair of legs (fig. 7) are much curved and extremely robust, otherwise of the usual structure.

The 3 posterior pairs of legs (figs. 8—10) likewise exhibit an unusually robust appearance, and are distinguished by the large size of the meral joint, which is fully twice as long as the carpal one. The dactylar joint, moreover, is unusually strong and claw-like, whereas the modified setæ issuing from the 2 preceding joints are comparatively short. The rudimentary exopodite, present in the penultimate and antepenultimate pairs, is very small, though consisting of 2 well-defined articulations and carrying the 2 usual, plumose setæ (see figs. 8 and 8 *a*).

The uropoda (see fig. 11) are comparatively short and stout, scarcely exceeding in length $\frac{1}{3}$ of the metasome. The scape is rather massive, and provided on the inner edge with 4 strong spines. The rami are very unequal, the inner one being by far the larger and about the length of the scape. It carries on the inner edge 4 short spines and on the tip 2 unequal ones, the outer of which is about half as long as the ramus. The outer ramus is about $\frac{3}{4}$ the length of the inner, and terminates with 2 very unequal, slender spines, the inner of which attains the length of the whole ramus; it moreover carries on both sides, near the tip, a small seta.

The telson (ibid. fig. 12) is very small, and exhibits a nearly semicircular form, the tip being evenly rounded.

Description of the male.

(Pl. VI).

The length of adult male specimens does not exceed that of the female. The general appearance is, however, rather different (see figs. 1 and 2), the body being comparatively much more slender, with the anterior division not nearly so tumid, and also less boldly vaulted above. The carapace exhibits a somewhat different form, being less attenuated in front, and having the pseudo-rostral projection shorter and more obtuse, whereas the antero-lateral corners are much more prominent and nearly rectangular.

The free segments of the mesosome are considerably narrower than in the female, and have the epimera very distinctly defined, and expanded laterally.

The eye is unusually large, with the corneæ very fully developed and highly refractive.

The superior antennæ (fig. 3), as usual in male specimens, differ from those in the female, chiefly in the greater number of articulations in the flagella.

The inferior antennæ (fig. 4) exhibit the usual strong development, and are nearly equal in length to the whole body.

The 4 anterior pairs of legs (figs. 5, 6, 7) have the basal joint much larger than in the female, and considerably expanded, in order to receive the strong muscles moving the largely developed exopodite. The outer joints of the 2nd pair (fig. 6) do not, in this species, differ in structure from those in the female.

The 2 pairs of pleopoda (figs. 8—9) exhibit the structure characteristic of the genus.

The uropoda (see fig. 10) appear comparatively more slender than in the female, and both the scape and the inner ramus have the inner edge finely ciliated between the marginal spines. The number of the latter is on the scape 5, on the inner ramus 9.

The telson (*ibid.*) does not differ in its appearance from that in the female.

Colour. — In some of the specimens the anterior part of the body exhibited a pronounced yellowish tinge, but no trace of any distinctly defined, stellate, pigmentary spots could be detected.

Occurrence. — Several specimens of this form, both males and females, were collected by Mr. Warpachowsky at Stat. 27 and 52, the former located between the islands of Kulaly and Morskoj, the latter somewhat more south, off the island of Podgornyi. Solitary specimens have moreover been taken in 3 other Stations (17, 49 and 53), all lying in about the same tract of the Caspian Sea, north of the peninsula Mangyschlak.

5. *Pseudocuma gracilis*, G. O. Sars, n. sp.

(Pl. VII).

Specific Characteristics. — Body extremely slender and elongated, with rather thin and semipellucid integuments, and the anterior division narrow oblong in form. Carapace comparatively small, scarcely as long as the exposed part of the trunk, and having the branchial regions but little swollen; pseudo-rostral projection comparatively short and obtuse at the tip, antero-lateral corners but little projecting and obtusangular. Free segments of mesosome

evenly vaulted above, without any keels or projections, epimera rather broad and laminar. Metasome considerably longer than the anterior division of the body. Eye well developed, with all 3 corneæ distinct. Antennæ and oral parts of the usual structure. Legs comparatively slender: 2nd pair in male modified in the same manner as in *P. pectinata*. Uropoda slender, with the scape densely setiferous inside, and the rami equal-sized, both fringed inside with slender spines. Telson very small, semi-elliptical. Length of adult female about 5 mm, that of male nearly the same.

Remarks. — The present species is at once distinguished from any of the preceding ones by its extremely slender and elongated body, strongly resembling in that respect some species of the genus *Iphinoë*. It is, however, a true *Pseudocuma*, as shown by the structure of the several limbs.

Description of the female.

The largest specimens attain a length of nearly 6 mm.; but generally it is far inferior in size, scarcely exceeding $4\frac{1}{2}$ mm.

The general form of the body (see figs. 1 and 2) is exceedingly slender and elongated, more so even than in most other known Cumacea. The anterior division of the body appears, from this cause, to be less sharply marked off from the posterior than in most other species, exhibiting a rather narrow oblong form. As seen from above (fig. 1), it has its greatest breadth about in the middle, and tapers very slightly, and quite uniformly, both anteriorly and posteriorly. In a lateral view (fig. 2), it appears somewhat thicker in its anterior part than posteriorly, and its upper contour forms a very slight and even curve.

The carapace is comparatively small, not nearly attaining the length of the exposed part of the trunk, and exhibits, as seen from the side (fig. 2), a somewhat oval form, with the upper contour nearly straight, and the inferior edges evenly curved. The branchial regions are but faintly marked off from the adjacent parts of the carapace, and the gastric area exhibits the usual bell-shaped aspect, terminating in front in a semicircular ocular lobe. The pseudo-rostral projection is comparatively short, horizontal, and somewhat obtuse at the tip. Below it is a slight sinus defining it from the antero-lateral corners, which latter project but slightly, and are obtusely rounded.

The free segments of the mesosome are quite evenly vaulted above, without any trace of keels or projections. The 2nd and 3rd segments are considerably larger than the others, and have the epimera very broad and laminar. The last segment is comparatively small, and has the epimera evenly rounded.

The metasome is extremely slender and elongated, considerably exceeding in length the anterior division of the body, and has the segments simply cylindric in form.

The integuments are rather thin and semipellucid, though exhibiting trace of the usual squamous structure.

The eye is well developed, with all 3 corneæ distinct.

The superior antennæ (fig. 3) have the joints of the peduncle nearly of equal length and rather slender, being only supplied with a few scattered bristles.

The inferior antennæ, oral parts and gnathopoda do not differ essentially from those organs in the other species.

The legs (figs. 4—8) are on the whole rather slender, and resemble in structure those in *P. pectinata*, with the exception that the rudimentary exopodite of the penultimate and antipenultimate pairs (figs. 6 and 7) is somewhat larger.

The uropoda (see fig. 9) are comparatively slender, equalling in length about $\frac{1}{3}$ of the metasome. The scape is rather narrow, and has on the inner edge a series of about 9 setæ. The rami are nearly equal-sized, and about the length of the scape, both nearly linear in form. The inner ramus is armed inside with 8 slender spines, and carries on the tip 2 unequal spines, the outer of which is much the larger. The outer ramus likewise terminates in 2 unequal spines, the inner of which is very much elongated, nearly attaining the length of the whole ramus; it has moreover on the inner edge 4 slender spines or bristles and another on the outer edge.

The telson (ibid.) is rather small and nearly semi-elliptical in form, being fully as long as it is broad at the base, and evenly rounded at the tip.

Description of the male.

Adult male specimens (fig. 17) attain about the same size as the females, and, setting aside the usual sexual characteristics, do not differ much in their outward appearance, exhibiting, as they do, a similar slender and elongated form. The carapace is, however, comparatively larger, nearly equaling in length the exposed part of the trunk, and has the pseudo-rostral projection somewhat shorter and more obtuse, whereas the antero-lateral corners are broader and more expanded laterally.

The eye is considerably larger than in the female, and has the corneæ more prominent and refractive.

The superior antennæ (fig. 11) are modified in the usual manner.

The same is also the case with the inferior antennæ (fig. 12) and the legs (fig. 13, 14). As in the male of *P. pectinata*, the dactylar joint

of the 2nd pair (fig. 13) is armed at the tip with small recurved hooks, 3 in number.

The 2 pairs of pleopoda (figs. 15 and 16) do not differ in their structure from those in the males of the other species of the genus.

The uropoda (fig. 17) have the rami somewhat more elongated than in the female, and the inner ramus moreover differs in its inner edge being finely ciliated between the marginal spines, which are 9 in number. The telson exhibits a form similar to that in the female.

Colour. — All the specimens which I have examined, were of a uniform whitish colour, without any trace of pigmentary ornament.

Occurrence. — Numerous specimens of this form were collected by Mr. Warpachowsky at Stat. 2 in the western part of the North Caspian Sea, south of the Tschisty-Bank.

The same species also occurred occasionally in 4 other Stations, 2 of which (48 and 50) likewise belonged to the western part of the North Caspian Sea, whereas the other 2 (49 and 51) were located between the islands of Kulaly and Morskoj, north of the peninsula Mangyschlak.

6. *Pseudocuma graciloides*, G. O. Sars, n. sp.

(Pl. VIII).

Specific Characteristics. — Very like the last described species, but comparatively more strongly built, the anterior division being oblong oval in form and somewhat vaulted above. Carapace comparatively larger, exceeding in length the exposed part of the trunk, and having the branchial regions more distinctly defined; pseudo-rostral projection rather prominent and acuminate; antero-lateral corners obtusangular. Metasome rather slender, exceeding in length the anterior division of the body. Eye well developed and very large in the male. Antennæ, oral parts and legs nearly as in *P. gracilis*. Uropoda rather slender and elongated, with the rami equal-sized and much attenuated, the inner one in female armed inside with a row of 6 comparatively very small spinules, the outer one having only a single spinule on the inner edge near the tip. Telson small, semi-elliptical. Length of adult female 6 mm., of male about the same.

Remarks. — As indicated by the specific name, this form is very nearly allied to *P. gracilis*, with which it may easily be confounded. On a closer examination, it is however distinguished by a somewhat less slender form of the body, and by the comparatively larger size of the carapace, the pseudo-rostral projection of which is also more prominent and acute.

Description of the female.

The length of a fully grown ovigerous specimen is about 6 mm., and this species is thus somewhat larger than *P. gracilis*.

The general form of the body (see figs 1 and 2) is rather slender, though not nearly to such a degree as in *P. gracilis*. The anterior division of the body is of an oblong oval form, and on the whole considerably thicker than in that species, both as seen from above (fig. 1) and laterally (fig. 2). Moreover, in the latter aspect, its upper face appears considerably vaulted in the middle, and it thus marks itself off more sharply from the slender metasome.

The carapace is considerably larger than in the afore-said species, exceeding in length the exposed part of the trunk, and has the branchial regions more distinctly defined. The pseudo-rostral projection is rather prominent, quite horizontal, and terminating in a sharp point. The antero-lateral corners, as in *P. gracilis*, project but little, and are obtusangular, being defined above by a slight notch.

The free segments of the mesosome are evenly vaulted above, without any trace of keel or projections, but have their anterior edge somewhat raised. They are, on the whole, considerably deeper than in *P. gracilis*, otherwise of a very similar form.

The metasome is very slender and, as in that species, exceeds in length the anterior division of the body. Its segments are cylindrical of form, and exhibit the usual longitudinal relation.

The eye is well developed, with all 3 corneæ distinct.

The superior antennæ (fig. 4) do not differ materially from those in *P. gracilis*.

The posterior gnathopoda (fig. 4) have the basal joint rather large, and provided on the distal part of the inner edge with 4 strong, plumose setæ.

The legs (figs. 5—9) on the whole resemble in structure those in *P. gracilis*, though comparatively somewhat more strongly built. In the 2nd pair (fig. 6) the terminal joint is comparatively larger than in that species, being considerably longer than the carpal joint, and has one of the apical spines much prolonged.

The uropoda (see fig. 10) are very slender, and exceed in length $\frac{1}{3}$ of the metasome. The scape is of a narrow cylindrical form, and carries along the inner edge a series of about 8 not very large spinules. The rami are very narrow, nearly equal-sized, and about the length of the scape. The inner ramus has on the inner edge 6 very small spinules and 2 unequal ones at the tip; the outer ramus has, besides the 2 apical ones, only a single small bristle on the inner edge, near the tip.

The telson (ibid.) exhibits the same semi-elliptical form as in *P. gracilis*.

The adult male (fig. 11) looks very like that of the last-named species, but is somewhat less slender, with the anterior division of the body comparatively thicker and more vaulted above. The sexual characteristics also, are, on the whole, developed in a very similar manner, and need not therefore be treated in detail. The eye (see the figure on the left side) is very large, and has the cornea strongly vaulted and highly refractive. The uropoda (fig. 12) only differ from those of the female in the greater number (10) of marginal spinules with which the inner ramus is armed, and in the finely ciliated edge.

Colour. — Unlike what was the case with the specimens of *P. gracilis*, those of the present form exhibited an ornament of distinct, reddish brown, stellate, pigmentary spots very similar to that stated in the 3 first described species.

Occurrence. — I have only had an opportunity of examining a few specimens of this form. They were collected by Mr. Warpachowsky at 3 different Stations, one of which (St. 51) was located between the islands of Kulaly and Morskoj, the second (St. 53) at some distance North of these islands, and the third (St. 63) in the eastern part of the north Caspian Sea, south of the mouth of the Ural.

7. *Pseudocuma tenuicauda*, G. O. Sars, n. sp.

(Pl. IX).

Specific Characteristics. — Body somewhat less elongated than in the 2 preceding species, with very thin and pellucid integuments. Anterior division of the body sharply marked off from the posterior, and considerably exceeding it in length, being oblong in form, and nearly of same height throughout. Carapace in female scarcely longer than the exposed part of the trunk, and having the branchial regions but faintly defined; pseudo-rostral projection comparatively small, horizontal; antero-lateral corners obtusangular. Free segments of mesosome rather deep, and quite smooth above, the 2 posterior ones unusually massive, and filled on the sides with strong muscles. Metasome extremely narrow, cylindrical. Eye well developed. Antennæ, oral parts and gnathopoda scarcely differing from those in the 2 preceding species. The 2 anterior pairs of legs rather slender, and of the usual structure; the 3 posterior pairs unusually strongly built, with the propodal joint much shorter than the carpal one, and oval in form. Uropoda moderately slender, and having the scape fringed inside with ciliated setæ, rami equal-sized, and about the length of the scape, the inner one in female having only 3 marginal spinules. Telson semi-elliptical in form. Length of adult female scarcely exceeding $3\frac{1}{2}$ mm, that of male about the same.

Remarks. — The present species is chiefly distinguished by the extremely narrow and feeble metasome, and by the unusually strong development of the 3 posterior pairs of legs, which again causes an unusual development of the corresponding segments of the mesosome.

Description of the female.

Full grown ovigerous specimens scarcely exceed a length of $3\frac{1}{2}$ mm, and this form is therefore much smaller than any of those described in the preceding pages.

The general form of the body (see figs 1 and 2) appears somewhat slender, being, however, not nearly so much elongated as in the 2 preceding species. The anterior division of the body is very sharply marked off from the posterior, and appears somewhat compressed, the height considerably exceeding the breadth. As seen laterally (fig. 1), it exhibits an oblong oval form, with the upper face but very little arched, and only quite posteriorly suddenly declining to the base of the metasome. As seen from above (fig. 2) it appears rather narrow oblong, and but very slightly tapering to each extremity.

The carapace is not very large, scarcely exceeding in length the exposed part of the trunk, and exhibits in the lateral aspect (fig. 1) a rounded oval form, with the upper contour nearly straight and horizontal, and the inferior edges considerably curved. The branchial regions are but faintly marked off from the adjacent parts of the carapace. The gastric area exhibits the usual shape, and terminates in front with a semicircular ocular lobe. The pseudo-rostral projection is not very prominent, is horizontally projected, and terminates in a sharp point. The sinus below it is very slight, and the antero-lateral corners but slightly projecting, and obtuse.

The free segments of the mesosome are quite smooth above, and rather deep, with broad laminar epimera. The 3rd segment is dorsally, to some extent, overlapped by the succeeding one, and appears therefore rather short in the middle, but expands considerably on each side. The last 2 segments exhibit a somewhat unusual shape, being nearly as deep as the preceding ones, and very oblique. Their lateral parts are, as it were, swollen and filled up with strong muscles joining the corresponding legs. The last segment suddenly declines towards the insertion of the metasome, and has the epimera evenly rounded.

The metasome is extremely narrow, and scarcely at all as long as the anterior division of the body. Its segments are simple cylindric, and exhibit the usual longitudinal relation.

The integuments are very thin and pellucid, though exhibiting traces of the usual squamous structure.

The eye is well developed, with all 3 cornæ distinct.

The superior antennæ (fig. 3) have the basal joint comparatively short and thick, whereas the 2 succeeding ones are rather slender and nearly equal-sized. The flagella are normally developed.

The inferior antennæ and oral parts do not exhibit any essential difference from those parts in the other species, and also the gnathopoda (fig. 4) are constructed upon the very same type.

Of the legs the 2 anterior pairs (figs 5 and 6) are normally developed, and resemble those in *P. gracilis*. The 3 posterior pairs (figs 7, 8, 9), on the other hand, are much more strongly built, with the joints much tumefied and densely setous. The longitudinal relation of the several joints is also somewhat different. Thus the basal joint is comparatively less elongated, and especially in the last pair (fig. 9) very short and thick, bulging out considerably on the outer side. The meral joint is in all pairs very large, whereas the propodal one is quite short, of an oval form, and fringed on the inner edge with the usual strong, unciliated setæ, which are more developed on the 2 last pairs than on the antepenultimate ones. The rudimentary exopodite, issuing from the basal joint of the former, is distinctly biarticulate, and carries the 2 usual plumose setæ.

The uropoda (see fig. 10) are moderately slender, equalling in length about $\frac{1}{3}$ of the metasome. The scape is provided on the inner edge with 5 ciliated setæ. The rami are nearly equal-sized, and about the length of the scape. The inner ramus has on the inner edge only 3 spinules in addition to the 2 unequal spines issuing from the tip. The outer ramus, as in *P. graciloides*, has only a single spiniform seta on the inner edge near the tip, and 2 apical ones of unequal length.

The telson (ibid.) exhibits a similar, semi-elliptical form to that in the 2 preceding species.

The adult male (fig. 11) does not differ much from the female, as regards the general form of the body, and is also of about same size. It is however easily recognizable by the sexual characteristics, which are displayed in much the same manner as in the other species. The uropoda (fig. 16) are, as usual, somewhat more elongated than in the female, and the setæ of the scape are longer, and 6 in number. The inner ramus is armed on the inner edge with no less than 10 spinules, and exhibits besides the usual fine ciliation of the edge.

Colour. — No colouring marks could be detected in the specimens examined. They all exhibited a uniform, whitish colour.

Occurrence. — Of the present species, several specimens, almost exclusively males, were collected by Mr. Warpachowsky at Stat. 15, located in the

western part of the North Caspian Sea, off the Tschistyi-Bank. Solitary specimens were moreover captured at Stat. 48, almost in the same tract, and at Stat. 53, north of the islands of Kulaly and Morskoj.

8. *Pseudocuma bilamellata*, G. O. Sars, n. sp.

(Pl. X and XI).

Specific Characteristics. — Body comparatively slender and elongated, especially in the male, with the anterior division considerably shorter than the posterior and oblong oval in form. Carapace of moderate size, with the branchial regions sharply defined from each other by a low crest running along their most prominent part, and suddenly bent downwards in front; gastric area provided with 2 parallel, longitudinal keels, and terminating with a rather broad and transversely-truncated ocular lobe; pseudo-rostral projection of a rather unusual shape, being divided by a deep incision into 2 juxtaposed, thin, oval lamellæ pointing somewhat obliquely upwards; antero-lateral corners in female nearly rectangular, in male more obtuse. Free segments of mesosome without any keel or projections above, but rather sharply defined, and having the epimera very broad; the 3 anterior ones rather short in their dorsal part, the 2 posterior comparatively large and massive. Metasome considerably more elongated in male than in female. Eye in male well developed, in female with only 2 corneæ placed wide apart. Superior antennæ rather elongated, with the last joint of the peduncle the longest. Inferior antennæ in male not attaining the length of the body. First pair of legs comparatively slender, and in male having the basal joint much curved; 2nd pair rather different in the two sexes, being much larger in the male, and having the terminal joint armed with recurved hooks. The 3 posterior pairs of legs rather strongly built, and of a structure similar to that in *P. tenuicauda*. Uropoda comparatively strong, with the scape densely setiferous inside, and the rami equal-sized, the inner one coarsely spinulose inside, apical spines in both comparatively short. Telson nearly quadrate in form. Length of adult female 9 mm, that of male 10 mm.

Remarks. — This is a very distinct species, easily recognizable from any of those previously described, and especially clearly distinguished by the peculiar shape of the pseudo-rostral projection, which is, at is were, double, being divided by a deep incision into 2 juxtaposed, thin lamellæ: hence the specific name.

Description of the female.

(Pl. X).

The length of adult ovigerous specimens measures about 9 mm., and this form thus belongs to the larger species of the genus.

The general form of the body (see figs. 1 and 2) is rather slender and elongated, with the anterior division well marked off from the posterior, the length of which it does not nearly attain. As seen from above (fig. 1), this part of the body exhibits an oblong oval form, with the greatest breadth about in the middle, and but very slightly tapering to each extremity. In a lateral view (fig. 2) it somewhat approaches to a clavate form, tapering more distinctly posteriorly than in front. The dorsal face is but very little arched, exhibiting, however, a somewhat irregularly indented aspect, on account of the projecting branchial regions, and the sharp demarcation of the free segments of the mesosome.

The carapace is not very large, scarcely exceeding in length the exposed part of the trunk. It exhibits in a lateral aspect (fig. 2) an oval quadrangular form, with the upper contour nearly horizontal and somewhat irregular, on account of the sharp demarcation of the branchial regions. The latter have, along their most prominent part, a distinct and slightly serrated crest, which anteriorly, at the limit of the gastric area, is suddenly bent down, thus causing at this place a notch, as it were, in the upper contour. The gastric region has 2 parallel keels along the middle, likewise slightly serrated, and terminating each in front with a small dentiform projection (see fig. 3). The ocular lobe is very broad and transversely truncated in front. The pseudo-rostral projection exhibits a very remarkable and unusual shape, being divided into 2 vertical, juxtaposed, thin lamellæ (see fig. 2), which are somewhat upturned and evenly rounded at the tip. When the animal is viewed from above (figs. 1 and 3), these lamellæ are found to be separated by a rather wide and deep sinus, and only quite posteriorly a small transverse apophysis is seen issuing from the inside of each lamella, both meeting just in front of the ocular lobe (see fig. 3). The antero-lateral corners are rather broad, nearly rectangular, and have their anterior edge minutely serrate. The inferior edges of the carapace exhibit a rather strong curve in front of the middle.

The exposed part of the trunk does not exhibit any keel or dorsal projections, though its upper face appears somewhat jagged, on account of the sharp demarcation of the segments (see fig. 2). The 2nd and 3rd segments have their dorsal part rather short, but both expand considerably on the sides, forming broad laminar epinera. The last 2 segments are comparatively large and massive, and resemble those in *P. tenuicauda*.

The metasome is much more fully developed than in that species, and, as above stated, considerably longer than the anterior part of the body.

The integuments are slightly incrustated, and exhibit everywhere a conspicuous squamous structure.

The eye contains but 2 corneæ, which are placed far apart, one at each corner of the broad ocular lobe, whence the animal has the appearance of being binocular.

The superior antennæ (fig. 4) are rather elongated, with the joints of the peduncle successively increasing in length, and provided with scattered bristles, 3 of which, belonging to the 1st joint, are distinctly ciliated. The flagella exhibit the usual structure.

The inferior antennæ (see fig. 5) have each, as in the other species of the genus, the form of a uni-articulated, conical projection tipped by a rather strong plumose seta.

The oral parts do not exhibit any essential difference from those in the other species.

The gnathopoda (figs. 6 and 7) likewise exhibit the usual structure.

The 1st pair of legs (fig. 8) are rather slender, and resemble on the whole those in *P. tenuicauda*.

The 2nd pair of legs (fig. 9) appear somewhat more robust than in that species and more richly clothed with ciliated setæ, but otherwise are also rather similar.

The 3 posterior pairs (figs 10, 11) are rather strongly built and densely setiferous, being constructed nearly in the same manner as in *P. tenuicauda*.

The uropoda (see fig. 12) are comparatively large, considerably exceeding in length $\frac{1}{3}$ of the metasome. The scape is somewhat flattened, and exhibits inside a row of about 14 setæ. The rami are nearly equal-sized and about the length of the scape. They are both mucroniform in shape, and terminate with 2 unequal spines, neither of which attains any great length. The inner ramus is armed along the inner edge with a dense series of comparatively small spinules, about 17 in number. The outer ramus is, as usual, somewhat narrower than the inner, and has the inner edge finely ciliated and provided with a single small seta near the tip.

The telson (ibid.) is nearly quadrate in outline, the breadth about equaling the length.

Description of the male.

(Pl. XI).

Adult male specimens are considerably larger than the females, attaining a length of fully 10 mm., and also differ conspicuously in their outer habitus.

The general form of the body (see figs. 1 and 2) is comparatively much more slender and elongated, with the metasome rather strongly developed. The anterior division exhibits in the lateral aspect (fig. 2) a similar form to that in the female, though perhaps a little broader in its anterior part and

having the dorsal face somewhat more arched. As seen from above (fig. 1), it appears much less attenuated in front, thus approaching to a claviform shape.

The carapace is comparatively considerably larger than in the female, exceeding in length the exposed part of the trunk, and has the branchial regions somewhat more swollen, whereas the pseudo-rostral lamellæ appear shorter and more obtuse. Below them there is scarcely any sinus (see fig. 2), the anterior edges being obliquely truncated, with the antero-lateral corners obtusangular. The latter are considerably more expanded laterally than in the female, so as to be wholly visible in the dorsal view of the animal (figs. 1 and 3). The crests running along the branchial regions and the gastric area are less sharply defined and quite smooth. Finally the ocular lobe (see fig. 3) appears less broad, and has the lateral corners more evenly rounded.

The free segments of the mesosome are comparatively narrower than in the female, the 3rd segment especially being very short in its dorsal part. The epimera are, as usual in male specimens, more prominent laterally, and those of the last segment terminate posteriorly in a conical projection.

The metasome is very much elongated, considerably exceeding in length the anterior division of the body, and has the 2 anterior segments comparatively thicker than in the female.

The eye (see fig. 3) is very fully developed, exhibiting, in addition to the lateral corneæ, another median one; all the corneæ are very distinctly defined and highly refractive.

The superior antennæ (fig. 4) have the flagella modified in the usual manner.

The inferior antennæ (see figs. 1 and 2) do not nearly attain the length of the body; otherwise they are built in the very same manner as in the other species.

The 1st pair of legs (fig. 5) have the basal joint considerably curved, and much dilated in its proximal part, to receive the strong muscles moving the exopodite. It has a double series of plumose setæ, one along the interior edge, the other along the lateral crest running along the joint.

The 2nd pair of legs (fig. 6) appear rather unlike those in the female, being much larger and more densely setiferous. The carpal joint is considerably prolonged, being more than twice as long as the 2 preceding joints combined, and is edged on both sides with numerous short plumose setæ. The terminal joint is somewhat curved, and armed in its outer part with 5 recurved hooks.

The 2 succeeding pairs (fig. 7) are modified in the usual manner, having the basal joint very large and expanded, and the exopodite well developed.

The 2 pairs of pleopoda (figs. 8 and 9) exhibit the structure characteristic of the genus.

The uropoda (fig. 10) are comparatively still larger than in the female, and have the setæ of the scape considerably more elongated. The rami exceed in length the scape, and the inner one has a very great number of small spinules on the inner edge.

The telson (fig. 11) exhibits the same nearly quadrate form as in the female.

Colour. — The specimens examined were all quite devoid of any colouring marks, exhibiting a uniform whitish tinge.

Occurrence. — This pretty species has been stated to occur in 6 different Stations, but in most of them only solitary specimens were secured. Of the Stations two (St. 48 and 58) are located in the western part of the North Caspian Sea; the 3rd (St. 32) about midway between the peninsula Mangyschlak and the opposite western coast; the 4th (St. 16) off the island of Svjatoj; the 5th (St. 53) North of the islands of Kulaly and Morskoj; and the 6th (St. 61) in the most northern part of the Caspian Sea, at some distance south of the Bay Bogatyj Kultuk.

9. *Pseudocuma eudorelloides*, G. O. Sars, n. sp.

(Pl. XII, figs. 1—10).

Specific Characteristics ♀. — Body not nearly so slender as in the last described species, and having the anterior division less sharply marked off from the posterior, and of a somewhat club-shaped form. Carapace not very large, but rather deep, with the branchial regions well defined, and sharply marked off from the gastric area; the latter with 2 slight longitudinal keels, and having the ocular lobe very short and broad, with only 2 small corneæ placed far apart; pseudo-rostral projection short and obtuse, being cleft by a deep incision in front, as in *P. bilamellata*; antero-lateral corners nearly rectangular. Exposed part of trunk evenly vaulted above, without any keel or projections. Metasome of moderate length, scarcely exceeding that of the anterior division of the body. Antennæ, oral parts and legs somewhat resembling those parts in *P. bilamellata*. Uropoda not very large, with the inner ramus shorter than the outer, and having inside only 5 small spinules, outer ramus about the length of the scape. Telson nearly semicircular in form, the edge being divided into a few dentiform projections. Length of adult female scarcely attaining 5 mm.

Remarks. — The present form bears a perplexing resemblance in its outward appearance to the species of the genus *Eudorella*, or perhaps still more to those of the genus *Eudorellopsis*. It is however a true *Pseudocuma*,

and nearly allied to *P. bilamellata*. From the latter species it may be easily distinguished by its far less slender form of body, by the somewhat different shape of the pseudo-rostral projection, as also by the structure of the uropoda and the telson.

Description of the female.

Adult ovigerous specimens scarcely attain a length of 5 mm, and this species is thus much inferior in size to *P. bilamellata*.

The general form of the body (see figs. 1 and 2) is not nearly so slender and elongated as in that species, and its 2 chief divisions are also less sharply marked off from each other. The anterior division of the body appears of an oblong, or somewhat club-shaped form, being scarcely at all attenuated in front, and having the dorsal face but slightly arched.

The carapace about equals in length the exposed part of the trunk, and exhibits, as seen laterally (fig. 1), an oval quadrangular form, being rather deep and somewhat truncated in front. As seen from above (fig. 2), it is nearly of equal breadth throughout. The branchial regions are well defined, having along their most prominent part a low crest, which is suddenly bent downwards anteriorly, and thus marks these regions sharply off from the gastric area. The latter has, as in *P. bilamellata*, 2 longitudinal keels, which, however, are less distinctly defined, and terminates with a very short and broad ocular lobe, transversely truncated in front (see fig. 3). The pseudo-rostral projection appears, when the animal is viewed from the side (fig. 1), as a very slight and obtusely rounded prominence in front of the ocular lobe. In a dorsal view (figs. 2 and 3), the projection is found to be, as in *P. bilamellata*, deeply cleft in the middle by a rather narrow incision, its lateral parts meeting only directly in front of the ocular lobe by 2 small transverse apophyses. The antero-lateral corners are nearly rectangular, and defined above by a very slight sinus, the edges of which, as also those of the lateral half of the pseudo-rostral projection and of the dorsal crests, are minutely serrulate. The inferior edges of the carapace have their greatest curvature about in the middle.

The free segments of the mesosome are quite evenly vaulted above, and less sharply marked off from each other than in *P. bilamellata*. They successively decrease in depth posteriorly, the last segment being comparatively small, with the epimera evenly rounded.

The metasome does not exceed in length the anterior division of the body, and has the segments simply cylindric, though, as usual, sharply defined from each other.

The integuments are not very strong, and exhibit, as in *P. bilamellata*, everywhere a distinct squamous structure.

The eye (see fig. 3) exhibits, as in the female of that species, only 2 small corneæ, which are placed far apart, at the outer corners of the ocular lobe.

The superior antennæ (fig. 4) are rather elongated, and have both edges of the peduncle supplied with bristles; the 2nd peduncular joint is much the longest.

The 1st pair of legs (fig. 5) are comparatively shorter than in *P. bilamellata*, otherwise of a very similar structure.

The same also applies to the 2nd pair (fig. 6), which are particularly short and stout.

The 3 posterior pairs of legs (figs. 7, 8) are comparatively less strongly built than in the 2 preceding species, but exhibit a very similar longitudinal relation of their several joints.

The uropoda (see fig. 9) are not very large, scarcely equalling in length $\frac{1}{3}$ of the metasome. The scape is simple cylindric, and has inside but 4 small setæ. The rami are somewhat unequal, the inner one being considerably shorter than the outer and, as usual, gradually tapering distally; it has on the inner edge only 5 small spinules and on the tip 2 unequal ones. The outer ramus about equals in length the scape, and has, besides the 2 usual apical spines, only a single small seta on the inner edge near the tip.

The telson (ibid. and fig. 10) is nearly semicircular in form, and has the edge slightly serrate, 2 of the serrations on each side of the tip being particularly strong and dentiform.

Colour. — The specimens examined were uniformly whitish, without any colouring marks.

Occurrence. — Of this form 2 female specimens were collected by Mr. Warpachowsky at Stat. 52, located off the northern point of the island of Swjatoj. A few specimens of the same species were moreover contained in a small collection of Caspian Crustacea sent to me from the Museum in St. Petersburg for examination. According to the label, they were collected by the late Academician Baer off the peninsula Mangyschlak.

10. *Pseudocuma scabriuscula*, G. O. Sars, n. sp.

(Pl. XII, figs. 11—14).

Specific Characteristics ♀. — Body very short and stout, with the anterior division considerably tumefied, and sharply marked off from the posterior one. Integuments everywhere scabrous with small projecting spikes. Carapace rather large, having on each side in its anterior part a very conspicuous horizontal crest continued to the tip of the pseudo-rostral projection; branchial regions well defined; gastric area without any keels; pseudo-rostral projection, as in

the 2 preceding species deeply cleft in the middle, its lateral halves somewhat projecting and obtusely rounded at the tip; antero-lateral corners nearly rectangular. Exposed part of trunk without any keel or projections, its last segment comparatively small. Metasome poorly developed, scarcely attaining the length of the anterior division of the body. Eye well developed, with all 3 corneæ distinct. Antennæ and legs apparently of the normal structure. Uropoda comparatively small, with the rami equal-sized and exceeding the scape in length, each terminating in a rather strong spine, the inner one minutely serrated inside. Telson semicircular. Length of adult female scarcely exceeding 3 mm.

Remarks. — This is a very distinct species, easily recognizable by the unusually short and stout form of body, the scabrous integuments and the shape of the carapace.

Description of the female.

The solitary specimen examined, a fully grown ovigerous female, does not exceed a length of 3 mm, and this form belongs thus to the smaller species of the genus.

The general form of the body (see figs. 12 and 13) is exceedingly short and stout, more so than in any of the other known species, and the 2 chief divisions appear very sharply marked off from each other. The anterior division is rather tumid and of an ovoid form, with the greatest breadth about in the middle. As seen from above (fig. 11), it tapers gradually both anteriorly and posteriorly. In a lateral aspect (fig. 12), the dorsal face appears gently arched, and the anterior extremity somewhat truncated.

The integuments are rather strongly incrustated, and exhibit everywhere a distinct squamous structure, the squamule being elevated to small projecting spikes, thus giving the surface a scabrous character.

The carapace is comparatively large and deep, exceeding in length the exposed part of the trunk, and exhibits, as seen from the side (fig. 12), a somewhat quadrangular form, with the upper contour nearly horizontal, though somewhat interrupted in the middle by the projecting branchial regions. In a dorsal view (fig. 11), it has its greatest breadth quite posteriorly, and appears somewhat constricted in the middle. The branchial regions are distinctly defined and, as in the 2 preceding species, very sharply marked off in front from the gastric area. The latter is flattened, without any distinct keels, and terminates in front in a well defined, though rather short and broad ocular lobe. On each side of the gastric region a very conspicuous horizontal crest runs forwards, terminating at the tip of the pseudo-rostral projection. The latter appears, when the animal is viewed from the side

(fig. 12), as a somewhat projecting, obtusely-rounded prominence in front of the ocular lobe. In a dorsal view of the animal (figs. 11 and 13), this prominence is found to exhibit a similar structure to that in the 2 preceding species, being divided in the middle, by a deep incision, into 2 parts, which only close to the ocular lobe meet by 2 small converging apophyses. The antero-lateral corners are nearly rectangular, though somewhat rounded at the tip, being defined above by an even sinus. The inferior edges of the carapace are rather strongly curved in the middle.

The free segments of the mesosome are evenly vaulted above, without any keel or projections, though being rather sharply marked off from each other. They successively decrease in depth posteriorly, and the last segment is rather small, with the epimera evenly rounded.

The metasome shows an unusually poor development, not nearly attaining the length of the anterior division of the body, and has the segments narrow cylindrical and scabrous like the other part of the body.

The eye (see fig. 13) is well developed, with all 3 corneæ distinct.

The several appendages of the body, as far as they could be examined in the solitary specimen before us, would not seem to differ materially in their structure from those in the other species of the genus.

The uropoda (fig. 14) are rather small, not nearly attaining $\frac{1}{3}$ of the length of the metasome. The scape is comparatively short, and provided inside with a few small bristles. The rami are about equal-sized, and considerably longer than the scape, both gradually tapering distally and terminating in a slender spine. The inner ramus has the inner edge slightly serrate, but without any distinct spinules.

The telson (see fig. 11) is small and semicircular in form.

Colour. — The specimen exhibited a uniform greyish white tinge, without any pigmentary ornament.

Occurrence. — The above-described specimen was taken by Mr. Warpachowsky at Stat. 48, off the Tschistyj-Bank.

Explanation of the Plates.

Pl. I.

Pseudocuma pectinata, Sowinsky.

- Fig. 1. Adult ovigerous female, viewed from the dorsal face.
 " 2. Same, lateral view.
 " 3. Right superior antenna.
 " 4. Right inferior antenna.
 " 5. Anterior lip.
 " 6. Posterior lip.
 " 7. Left mandible.
 " 8. First maxilla.
 " 9. Second maxilla.
 " 10. Maxilliped, without the branchial apparatus.
 " 11. Anterior gnathopod.
 " 12. Posterior gnathopod.
 " 13. Leg of 1st pair.
 " 14. Leg of 2nd pair.
 " 15. Leg of 3rd pair.
 " 16. Leg of 5th pair.
 " 17. Left uropod.
 " 18. Last segment of metasome, with the telson and the bases of the uropoda, viewed from the ventral face.

Pl. II.

Pseudocuma pectinata, Sowinsky

(continued).

- Fig. 1. Adult male, dorsal view.
 " 2. Same, viewed from left side.
 " 3. Ocular lobe, with the visual organ; dorsal view.
 " 4. Right superior antenna.
 " 5. Left inferior antenna, with the base of the flagellum.
 " 6. Leg of 2nd pair.
 " 6*. Extremity of same leg, more highly magnified.
 " 7. Leg of 3rd pair.
 " 8. Leg of 4th pair.
 " 9. Pleopod of 1st pair.
 " 10. Pleopoda of 2nd pair.
 " 11. Left uropod.
 " 12. Extremity of last segment, with the telson; dorsal view.

Pl. III.

Pseudocuma Sowinskyi, G. O. Sars.

- Fig. 1. Adult ovigerous female, dorsal view.
 " 2. Same, viewed from left side.
 " 3. Extremity of left antero-lateral corner of carapace, showing the coarsely serrated anterior edge.
 " 4. Right superior antenna.
 " 5. Right maxilliped, with the corresponding branchial apparatus.
 " 6. Anterior gnathopod.

- Fig. 7. Posterior gnathopod.
 » 8. Leg of 1st pair.
 » 9. Leg of 2nd pair.
 » 10. Leg of 3rd pair.
 » 11. Leg of 5th pair.
 » 12. Left uropod.
 » 13. Telson, viewed from the dorsal face.

Pl. IV.

Pseudocuma rostrata, G. O. Sars.

- Fig. 1. Adult ovigerous female, dorsal view.
 » 2. Same, viewed from left side.
 » 3. Left superior antenna.
 » 4. Anterior gnathopod.
 » 5. Posterior gnathopod.
 » 6. Leg of 1st pair.
 » 7. Leg of 2nd pair.
 » 8. Leg of 3rd pair.
 » 9. Leg of 5th pair.
 » 10. Last segment, with the uropoda and telson; dorsal view.

Pl. V.

Pseudocuma cercaroides, G. O. Sars.

- Fig. 1. Adult ovigerous female, viewed from left side.
 » 2. Same, dorsal view.
 » 3. Right superior antenna.
 » 4. Anterior gnathopod.
 » 5. Posterior gnathopod.
 » 6. Leg of 1st pair.
 » 7. Leg of 2nd pair.
 » 8. Leg of 3rd pair.
 » 8*. Rudimentary exopodite of same leg, more highly magnified.
 » 9. Leg of 4th pair.
 » 10. Leg of 5th pair.
 » 11. Last segment, with the telson and left uropod; dorsal view.
 » 12. Telson, viewed from the ventral face.

Pl. VI.

Pseudocuma cercaroides, G. O. Sars.

(continued).

- Fig. 1. Adult male, viewed from left side.
 » 2. Same, dorsal view.
 » 3. Right superior antenna.
 » 4. Left inferior antenna, with the base of the flagellum.
 » 5. Leg of 1st pair.
 » 6. Leg of 2nd pair.
 » 7. Leg of 4th pair.
 » 8. Anterior pleopoda.
 » 9. Posterior pleopoda.
 » 10. Last segment with the telson and left uropod; dorsal view.

Pl. VII.

Pseudocuma gracilis, G. O. Sars.

- Fig. 1. Adult ovigerous female, dorsal view.
 " 2. Same, viewed from left side.
 " 3. Right superior antenna.
 " 4. Leg of 1st pair.
 " 5. Leg of 2nd pair.
 " 6. Leg of 3rd pair.
 " 7. Leg of 4th pair.
 " 8. Leg of 5th pair.
 " 9. Last segment, with the telson and left uropod; dorsal view.
 " 10. Adult male, viewed from right side.
 " 11. Left superior antenna.
 " 12. Right inferior antenna, with the base of the flagellum.
 " 13. Leg of 2nd pair.
 " 14. Leg of 4th pair.
 " 15. Anterior pleopod.
 " 16. Posterior pleopod.
 " 17. Left uropod.

Pl. VIII.

Pseudocuma graciloides, G. O. Sars.

- Fig. 1. Adult ovigerous female, dorsal view.
 " 2. Same, viewed from left side.
 " 3. Right superior antenna.
 " 4. Posterior gnathopod.
 " 5. Leg of 1st pair.
 " 6. Leg of 2nd pair.
 " 7. Leg of 3rd pair.
 " 8. Leg of 4th pair.
 " 9. Leg of 5th pair.
 " 10. Last segment, with the telson and left uropod; dorsal view.
 " 11. Adult male, viewed from right side.
 " 11* (not numbered in the plate). Ocular lobe, with the visual organ; dorsal view.
 " 12. Right uropod.

Pl. IX.

Pseudocuma tenuicauda, G. O. Sars.

- Fig. 1. Adult ovigerous female, viewed from left side.
 " 2. Same, dorsal view.
 " 3. Right superior antenna.
 " 4. Posterior gnathopod.
 " 5. Leg of 1st pair.
 " 6. Leg of 2nd pair.
 " 7. Leg of 3rd pair.
 " 8. Leg of 4th pair.
 " 9. Leg of 5th pair.
 " 10. Last segment, with the telson and left uropod; dorsal view.
 " 11. Adult male, viewed from left side.
 " 12. Right superior antenna.
 " 13. Extremity of a leg of 2nd pair.
 " below (not numbered in the plate). Leg of 4th pair.
 " 14. Anterior pleopod.
 " 15. Posterior pleopoda.
 " 16. Right uropod.

Pl. X.

Pseudocuma bilamellata, G. O. Sars.

- Fig. 1. Adult ovigerous female, dorsal view.
 » 2. Same, viewed from left side.
 » 3. Anterior part of the carapace, dorsal view.
 » 4. Right superior antenna.
 » 5. Anterior lip and left inferior antenna.
 » 6. Anterior gnathopod.
 » 7. Posterior gnathopod.
 » 8. Leg of 1st pair.
 » 9. Leg of 2nd pair.
 » 10. Leg of 4th pair.
 » 11. Leg of 5th pair.
 » 12. Last segment, with the telson and right uropod; dorsal view.

Pl. XI.

Pseudocuma bilamellata, G. O. Sars.

(continued).

- Fig. 1. Adult male, dorsal view.
 » 2. Same, viewed from left side.
 » 3. Anterior part of the carapace, dorsal view.
 » 4. Right superior antenna.
 » 5. Leg of 1st pair.
 » 6. Leg of 2nd pair.
 » 6*. Extremity of same leg, more highly magnified.
 » 7. Leg of 4th pair.
 » 8. Anterior pleopod.
 » 9. Posterior pleopoda.
 » 10. Right uropod.
 » 11. Telson, viewed from the dorsal face.

Pl. XII.

Pseudocuma eudorelloides, G. O. Sars.

- Fig. 1. Adult ovigerous female, viewed from left side.
 » 2. Same, dorsal view.
 » 3. Anterior part of the carapace, viewed from the dorsal face.
 » 4. Right superior antenna.
 » 5. Leg of 1st pair.
 » 6. Leg of 2nd pair.
 » 7. Leg of 4th pair.
 » 8. Leg of 5th pair.
 » 9. Last segment, with the telson, left uropod, and scape of the right one; dorsal view.
 » 10. Telson, more highly magnified; dorsal view.

Pseudocuma scabriuscula, G. O. Sars.

- Fig. 11. Adult ovigerous female, dorsal view.
 » 12. Same, viewed from left side.
 » 13. Anterior part of the carapace, dorsal view.
 » 14. Left uropod.

G.O.Sars autogr.

Pseudocuma Sowinskyi, G.O.Sars.♀.
n.sp.

G.O.Sars autogr.

Pseudocuma cercaroides, G.O.Sars. ♂.
n.sp.

G.O.Sars autogr.

Pseudocuma gracilis, G.O.Sars ♀ & ♂.
n.sp.

G.O.Sars autogr.

Pseudocuma graciloides, G.O.Sars ♀ & ♂.
n.sp.

G.O.Sars autogr.

Pseudocuma tenuicauda, G.O.Sars, ♀ & ♂
n.sp.

G.O.Sars autogr.

Pseudocuma bilamellata, G.O.Sars, ♀
n.sp.

G. O. Sars autogr.

Pseudocuma bilamellata, G.O. Sars, ♂
n.sp.

G.O.Sars autogr.

Figs 1-10. *Pseudocuma eudorelloides*, G.O.Sars, ♀
n.sp.

Figs 11-14. *Pseudocuma scabriuscula*, G.O.Sars, ♀
n.sp.

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