On Epischura baikalensis, a new Calanoid from Baikal Lake.

By

G. O. Sars.

[With autographic plate VI.]

(Présenté le 19 janvier 1900).

INTRODUCTION.

In the year 1898, I received from the Zoological Museum of St. Petersburg, for examination, several proofs of plankton taken during the months of June and July of the same year from the southern part of Lake Baikal. The samples were procured by means of an ordinary MÜLLER's net which had been lowered to different depths, some of the samples having also been taken from the very surface of the water. I have carefully examined all these samples, in order to get a view of the pelagic fauna of that large fresh-water basin, and the result of this examination is very perplexing. For, although the samples were taken in different places and apparently during the most favourable season, I have failed to detect in them more than a single species of *Entomostraca*, the one that is the object of the present paper. This form, a small *Copepod* of the *Calanoid* group, occurred, however, very abundantly in all the samples, and has turned out to be a new species of the genus *Epischura* FORBES, hitherto only known from the North American continent. The absolute want of any *Cladocera* or *Cyclopidæ* in these samples, is very remarkable, and, indeed, among the numerous samples from different parts of the world that I have examined, I have not yet come across any from large fresh-water lakes, that did not contain some forms of both these groups. This apparent scantiness of the pelagic fauna of Baikal Lake is the more surprising, as the bottom fauna of this sea, according to the investigations of Mr. DYBOWSKY, is extremely rich, especially in different forms of *Gammarids*. Still it is perhaps possible that this peculiar character of the samples in question may be due to some still unproved circumstances, perhaps to the construction of the tow-net employed. As a systematical investigation of Lake Baikal will be instituted by the Russian government in the course of this year, I hope subsequently to be enabled to give some additional information about the pelagic fauna of this large lake.

Gen. **Epischura**, FORBES.

Remarks. This genus was established in the year 1882 by Prof. FORBES, to include a peculiar *Calanoid* from the great lakes of North America, *E. lacustris* FORBES. Subsequently 3 other species have been added, viz., *E. fluviatilis*, HERRICK, *E. nevadensis*, LILLJEB, and *E. nordenskjöldi*, LILLJEB, all from North America. The genus is nearly allied to *Heterocope*, G. O. SARS, and has hitherto been considered as peculiar to the North American continent, replacing here, as it were, the genus *Heterocope*. It is therefore of considerable interest to find that this genus is now proved to be also represented in the Old World; for the above-mentioned Baikal *Calanoid* ought undoubtedly to be referred to this genus, though in some respects it conspicuously differs from the 4 previously known species. As no altogether exhaustive account of any of the species of this genus exists, I propose to give below a full description of the Baikal species, accompanied by carefully drawn figures, both habitus and detail.

Epischura baikalensis, G. O. SARS, n. sp.

(Pl. VI).

Specific Characters. Body of female comparatively short and robust, with the anterior division oblong oval in form, and

having its greatest width quite in front. Cephalic segment well defined, and exhibiting dorsally, about in the middle, a very strongly-marked cervical depression, front narrowly rounded and quite simple. Last pedigerous segment well defined from the preceding one, and deeply emarginated behind, lateral parts expanded to rather large rounded lobes extending behind. Tail comparatively short, not nearly attaining half the length of the anterior division, and in the adult female, as a rule, obtected by a hyaline curved plate accompanying the twisted spermatophore; middle segment rather small, anal segment nearly as long as the genital one. Caudal rami scarcely more than twice as long as they are broad, and rounded at the tip, apical setæ in adult female remarkably short, subequal, and abruptly curved downwards. Body of adult male more slender than in female, with the tail fully half the length of the anterior division, and conspicuously asymmetrical, though less so than in the other species; caudal rami longer than in female, and likewise somewhat asymmetrical; apical setæ normal. Anterior antennæ about the length of the body; right one in male distinctly geniculate. Last pair of legs in female rather slender, with the terminal joint about the length of the other 2 combined, and sublinear in form, with 3 blunt spines outside; 2nd joint with a similar spine at the end outside. Right leg of this pair in male much smaller than left, and distinctly cheliform; left leg with the basal process exceedingly long and slender, terminal joint scarcely longer than the middle one, and lamelliform, slightly expanded distally, and armed with 2 very small denticles. Length of adult female 1.50 mm., of male 1.20 mm.

Remarks. This form is easily distinguishable from any of the previously known species, both as regards its external appearance, and the structure of some of the appendages. Thus, in the female, the last pedigerous segment is distinguished by the comparatively large size of the lateral expansions, and the relative length of the caudal segments also seems to be different from that found in the other species. In the male, the tail is less conspicuously transformed than is usually the case in the males of this genus, in which the segments, as a rule, form peculiar lateral processes, considered to be prehensile in character. In form, this part agrees most nearly with that in the male of *E. nordenskjöldi*, as figured by MM. Jules de Guerne and Richard.

The last pair of legs, too, in both sexes exhibit well-marked differences from those in the 4 previously known species.

Description of the Female. The average length of adult specimens is only 1½ mm., and this form is accordingly of rather small size, about equalling in this respect the type species *E. lacustris* Forbes.

The general form of the body (see Pl. VI, figs. 1 & 2) is rather short and robust, somewhat resembling that in the genus *Heterocope*, but with the relative length of the two chief divisions very different. The anterior division is somewhat tumid, and, seen dorsally (fig. 2), oblong oval in form, with the greatest width about equalling ⅔ of the length, and occurring quite in front. Posteriorly it tapers quite gradually, anteriorly more abruptly towards the front, which appears narrowly rounded, or almost conically projecting in the middle. This division is composed of 6 well-defined segments, the 1st of which, the cephalic segment, is nearly as long as all the others combined. The lateral edges of this segment are somewhat expanded, forming in front of the middle a thin fornicate border covering the bases of the posterior antennæ, mandibular palps and maxillæ. Dorsally this segment has at about the middle a very deep cervical depression, best seen in the lateral view of the animal (fig. 1). From this depression the dorsal margin slopes rather steeply towards the front, which is quite simple, without any rostrum or tentacular filaments. The last pedigerous segment is well defined from the preceding one, and very deeply emarginated in the middle, the lateral parts being expanded to rather large rounded lobes extending to each side of the genital segment.

The posterior division of the body, or tail, is comparatively very short, scarcely exceeding in length ⅔ of the anterior division. It is slightly asymmetrical, and is composed of only 3 segments, the middle of which is rather short, and very sharply defined both from the 1st and 3rd. The 1st, or genital segment is slightly dilated in its anterior part, and has the dorsal face somewhat bulging behind, whereas the ventral face is scarcely at all protuberant (conf. fig. 1). The last, or anal segment is about the length of the genital segment, and is transversely truncated behind, exhibiting dorsally at the end a small thin-skinned area, containing the anal orifice. The caudal rami are comparatively

small, being scarcely more than twice as long as they are broad, and they extend straight behind. To the obtusely rounded tip of each ramus 3 densely ciliated setæ of about equal size are attached, besides a very small simple bristle at the inner corner. The 3 apical setæ, in young specimens, exhibit quite a normal appearance, being of moderate length and extended straight behind. In adult females, on the other hand, these setæ undergo, as it were, a retrogressive development, becoming considerably shortened and abruptly bent downwards, not infrequently even curled up, so as not to project behind at all. This peculiar reduction of the caudal setæ seems to take place immediately after copulation; for in all females carrying spermatophores, the setæ have the above-described appearance. In almost all cases, only one such spermatophore is found in each female, and it is constantly accompanied by a rather large hyaline plate of a somewhat irregular oval quadrangular form, placed horizontally upon the tail. The spermatophore itself is attached by its narrow end to the genital orifice, and exhibits the usual narrow lageniform shape; but it is twisted in a peculiar manner, so as to embrace the tail from the right side at the middle segment, its distal dilated part being abruptly bent backwards along the left side of the tail (see figs. 3 & 4). Although no doubt this apparatus must to some extent impede the free mobility of the females, the above-mentioned thin plate evidently gives the tail, when bent downwards, an increased surface with which to work against the water, and may, indeed, explain the peculiar reduction of the caudal setæ, which thus become comparatively inoperative.

The eye, which could only be faintly traced in the preserved specimens seems to be of the very same structure as in the genus *Heterocope*.

The anterior antennæ (see figs 1 & 2) are very slender and elongated, fully attaining the length of the whole body, and are composed of 25 articulations, of which the first 2 are the largest, the last one being very small. They are clothed along the anterior edge with scattered bristles of somewhat unequal length, and arranged in much the same manner as in *Heterocope*.

The posterior antennæ (fig. 5), as in other *Calanoida*, are each composed of a biarticulate basal part and 2 rami. The 1st basal joint is greatly constricted at the base, and carries at the end anteriorly a ciliated seta. The 2nd basal joint is more than

twice as large, and has at the end, anteriorly, 2 juxtaposed ciliated setæ. The inner ramus, which forms the immediate continuation of the basal part, consists of 2 unequal joints, the proximal one being much the larger, and about the length of the basal part. This joint is sublinear in form, and carries at some distance from the tip anteriorly 2 juxtaposed ciliated setæ. The distal joint is very movably articulated to the proximal one, and has the form of a somewhat irregularly oval lamella, unequally bilobular at the end, and greatly constricted at the base. It carries about 16 slender ciliated setæ arranged in a flabelliform manner, and successively increasing in length distally. The outer ramus, which is very movably attached to the basal part, is about the length of the inner, but somewhat narrower, cylindric in form. It is very flexible, being generally abruptly bent beyond the middle, and is apparently composed of only 5 joints, whereas in *Heterocope* this ramus is distinctly 7-articulate. Of the joints, the 2nd is much the largest, equalling in length the 3 succeeding joints combined. The 3rd and 4th joints are both very short, and each carry a long plumose seta. A similar seta originates from the end of the 2nd joint, which, moreover, carries 2 somewhat shorter setæ. The terminal joint has 3 very long apical setæ and one much shorter lateral one.

The anterior lip (see fig. 7) is distinguished by a very conspicuous, rounded, button-like prominence, projecting in front and clothed at the tip with long diverging hairs. This prominence is easily traced in the lateral view of the animal (fig. 1), appearing just between the anterior and posterior antennæ. The posterior part of the lip bounding the oral orifice in front, exhibits the usual flap-shaped appearance.

The posterior lip (see fig. 7) consists of 2 juxtaposed, somewhat securiform lobes, which seem to be without the usual ciliation. Between the two lips, the masticatory parts of the mandibles are squeezed in (see fig. 7), the palps being, as a rule, extended more or less laterally (see fig. 2).

The body of the mandibles (see fig. 6) is highly chitinized, and exhibits the usual navicular shape. The masticatory part is somewhat securiform, and defined from the remaining part of the body by a well-marked constriction. The cutting edge is divided into 7 comparatively short and simple teeth, the outermost of which is a little larger than the others. At the inner

corner moreover, a short bristle is secured. The palp is fully as large as the body, and distinctly biramous. The basal part, which is very movably connected with the body, is somewhat fusiform in outline, being obliquely produced at the inner corner, and it carries a single ciliated seta inside. The inner ramus is well defined from the basal part, and projects considerably beyond the outer. It is composed of 2 joints, the proximal of which is the larger, and projects at the end inside to a rounded lobe carrying 4 ciliated setæ. The distal joint is quadrangular in form, and carries on the tip 6 very slender setæ arranged in a flabelliform manner. The outer ramus is attached to the basal part at some distance from the inner, at about the middle of its length. It is scarcely longer than the inner, and is somewhat fusiform in shape, being divided into 5 articulations, the last of which, however, is so very small as easily to escape attention. This ramus carries 6 strong plumose setæ, successively decreasing in length distally, 2 of them originating from the terminal joint.

The maxillæ (fig. 8) consist each of 2 rather well-defined chief parts, a basal and a terminal or distal part. The basal part projects inside to a rather large masticatory lobe, densely clothed with denticulated spines, which proximally assume a more setiform character. Opposite this lobe, the outer side of the basal part forms a slight lamellar expansion, fringed with 6 remarkably large and densely plumose setæ, somewhat diminishing in length proximally. This expansion is the so-called vibratory plate, which is also often termed the branchial plate. In the dorsal view of the animal (fig. 2), the setæ of this plate are generally seen projecting laterally behind the mandibular palps. The distal part of the maxilla, or more properly the palp, is of a very delicate, membranous structure, and is divided into several setiferous lobes. Next to the masticatory lobe, there occur, inside, 2 well-defined and partly superposed lobules, each carrying 3 or 4 slender incurved setæ; and beyond them, 2 other much smaller lobules, or rather ledges of the inner edge, are seen. From these ledges, as also from the narrowly truncated tip of the palp, a number of very delicate setæ originate, forming together a dense fringe. To the outer side of the palp is an oval lamella movably articulated, carrying 8 slender diverging setæ, and almost extending to the tip of the palp.

This lamella undoubtedly answers to the outer ramus in the mandibular palps and posterior antennæ, the inner ramus not being defined. Just above this lamella, the outer edge of the palp carries a single rather short seta.

The anterior maxillipeds (fig. 9) are rather powerful and, on the whole, resemble in structure those in the genus *Heteroscope*. They each form a rather thick, slightly curved stem divided into 5 very unequal joints, the first 2 of which together constitute the basal part, the 3 very small distal joints the terminal part. The 1st basal joint is much the largest, occupying considerably more than half the length of the stem. Its anterior edge is divided into 4 successive lobes, the distal one being rather prominent and digitiform, the other 3 very short and rounded. The proximal lobe carries 3 long setæ and one short one each of the other 3 lobes only one long and a very short seta. All these setæ are fringed on both edges with stiff hairs, somewhat far apart, and are curved anteriorly. The 2nd basal joint is about half the length of the 1st, and is somewhat constricted at the base, gradually expanding distally. It is produced at the end anteriorly to a 5th lobe, which carries an exceedingly long and curved claw-shaped spine accompanied by a very small bristle. Four similar spines originate from the terminal part and also 2 smaller apical setæ. The 5 above-mentioned spines, which follow each other at rather regular interspaces, are clothed, like the setæ belonging to the 1st basal joint, with stiff hairs, which are confined to the concave edge on the 3 distal ones. In *Heteroscope* each of the 2 distal lobes of the 1st basal joint carries 2 long setæ and one short one, and the curved spines issuing from the distal part are much shorter than in the present form.

The posterior maxillipeds (fig. 10) likewise have a very similar appearance to that in *Heteroscope*. They are somewhat longer than the anterior, but considerably narrower, and with the terminal part more produced. The 1st basal joint is much larger than the 2nd, and has the anterior edge divided into 3 successive rounded lobes, each carrying 2 long anteriorly-curving setæ, which are fringed on both edges, as in the anterior maxillipeds, with far-apart stiff hairs. The 2nd basal joint gradually widens somewhat distally, and has at the end anteriorly a similar, but somewhat shorter seta accompanied by a small bristle. The terminal part is considerably longer than the 2nd basal joint, and is

rather narrow, being divided into 4 well-defined articulations, the 1st of which is the largest, about equalling in length the 2 succeeding ones combined. This joint carries 2 comparatively short spines inside, the 2nd joint a single considerably longer and more curved spine, and the 3rd joint 2 still more elongated claw-shaped spines. The last joint is extremely small, and carries a similar spine and 2 unequal setæ. All the spines are very finely ciliated only along the concave edge.

The natatory legs are rather slender (see fig. 1), and in structure resemble those in the genus *Heterocope*, the inner ramus in all of them being very small and uniarticulate.

The 1st pair of legs (fig. 11) are somewhat smaller than the 3 succeeding pairs, but are otherwise not very different from them. The 1st basal joint has its usual plumose seta inside, and is considerably larger than the 2nd, which exhibits a dense ciliation outside. The outer ramus is almost twice as long as the basal part, and is considerably narrowed distally. The 1st joint has the outer edge densely ciliated and provided at the end with a setiform spine; inside this joint has a normal natatory seta. The 2nd joint is considerably shorter than the 1st, and has likewise at the end, outside, a setiform spine, inside a natatory seta. The last joint is about the length of the 1st, but much narrower and somewhat tapering distally. It carries inside 3 natatory setæ, outside a single setiform spine, and at the tip 2 unequal spines, which are likewise setiform, the inner one being more than 3 times as long as the outer. The inner ramus is scarcely longer than the 1st joint of the outer ramus, and is oblong oval in form, carrying 5 natatory setæ, 2 apical and 3 lateral.

The succeeding pairs (fig. 12) are all of exactly the same structure. They are still more slender and elongated than the 1st pair, and moreover differ in the following points: The outer edge of the 2nd basal joint, as also that of the 1st joint of the outer ramus, is perfectly smooth, without any trace of the dense ciliation found in the 1st pair. The terminal joint of the outer ramus is fully as long as the other 2 combined, and carries 4 natatory setæ inside. The number of spines on this ramus is the same as in the 1st pair; but they are all stronger, and not, as in this pair, setiform. The longer apical spine exceeds half the length of the ramus, and is slightly curved, being coarsely

spinulous outside. The inner ramus, as in the 1st pair, is uniarticulate, but somewhat more slender, and exceeding in length the 1st joint of the outer ramus. The number of natatory setæ is the same as in the 1st pair.

The last pair of legs (fig. 13), as in the other species of this genus, are simple, each forming a slender 3-articulate stem of nearly uniform breadth throughout, and originating from a common lamellar basal part. In the relative proportions of the joints, as also in their armature, there are very conspicuous differences between this form and the other known species. The 1st joint is quite short, scarcely longer than it is broad, and carries a small spinule outside. The 2nd joint is fully twice as long, and exhibits at the end outside a remarkably short and blunt spine. The last joint is about the length of the other 2 combined, sublinear in form, and terminates in a short conical point. This joint, like the 2 preceding ones, is perfectly smooth inside, whereas outside it carries 3 successive blunt spines, exactly similar to that of the 2nd joint, and secured to very strongly marked ledges of the outer margin.

The adult male (fig. 14) is much smaller than the female, scarcely exceeding a length of 1.20 mm.

The form of the body is, on the whole, much more slender than in the female, and the relative proportions of the 2 chief divisions are rather different.

The anterior division appears shorter in proportion to its width or height, and the lateral expansions of the last segment are comparatively smaller than in the female.

The tail (see fig. 17) is considerably more slender than in the female, about equalling in length half the anterior division, and is composed of 5 well-defined segments, besides the caudal rami. It is somewhat asymmetrical, being slightly bent towards the right side; but the asymmetry is far from being so strongly pronounced as in some of the other species. The segments are of about equal size, and are somewhat more protuberant on the right than on the left side, without, however, forming true lateral processes, except on the last segment, from which, somewhat ventrally, a well-defined recurved lobule projects to the right side. The caudal rami are considerably more elongated than in the female, being about 3 times as long as they are broad, and are somewhat unequal, the right ramus being a little shorter

than the left and less distinctly defined at the base. The caudal setæ, too, are normally developed and about the length of the tail, being extended straight behind.

The right anterior antenna (fig. 15) is distinctly geniculate, with the 6 joints preceding the geniculation conspicuously dilated, and containing the usual strong muscle acting upon the terminal part. The latter is considerably shorter than the dilated portion, and composed of 4 joints, the 1st of which exhibits anteriorly a slender appressed spine, finely ciliated on the edges. The 2nd joint is about the length of the 1st, and shows a slight indication to a subdivision into 2 joints. The last 2 joints are much smaller, and combined are scarcely more than half the length of the preceding one. The proximal part of the antenna consists of 12 articulations, none of which project anteriorly to spiniform processes.

The last pair of legs (fig. 16) are very different from those in the female, and conspicuously prehensile in character. They are, as usual, very asymmetrical, the left leg being much larger than the right, both originating from a common basal part. Though, on the whole, built upon the same type as in the other species, they exhibit in their structure well-marked differences from any of them. The right leg is apparently composed of only 2 joints, which together form a rather complete chela. The proximal joint is very broad, transverse, and is produced inside to a thick thumb-like prominence, transversely truncated at the tip and without any armature whatever. The distal joint has the form of a sharply curved claw, which admits of being impinged against the above-mentioned thumb-like prominence. The left leg is distinctly 3-articulate, and more than twice as large as the right. Its 1st joint, as in the other species of this genus and also of *Heterocope*, sends off from the base inside a slender falciform process, which, in the present species, is quite extraordinarily prolonged, reaching far beyond the tip of the leg. The 2nd joint is longer than the 1st, but considerably narrower, and has the inner edge slightly concave. The last joint has the form of an incurved lamella, scarcely longer than the 2nd joint, and slightly expanded distally. The tip of this lamella is obtusely truncated, and carries, somewhat within the margin, 2 extremely small denticles placed at some distance from each other. The appearance of this joint is very different from that

found in the other known species, where it has a more or less oblong tapered form, with the edges coarsely dentated and ciliated.

As to the relative frequency of the two sexes, adult males seem to be much more scarce than females. In some of the samples, indeed, not a single male specimen could be detected. As stated above however, all fully grown females were provided with the above-described peculiar spermatophoric apparatus, and it would thus seem that several females become copulated by a single male individual.

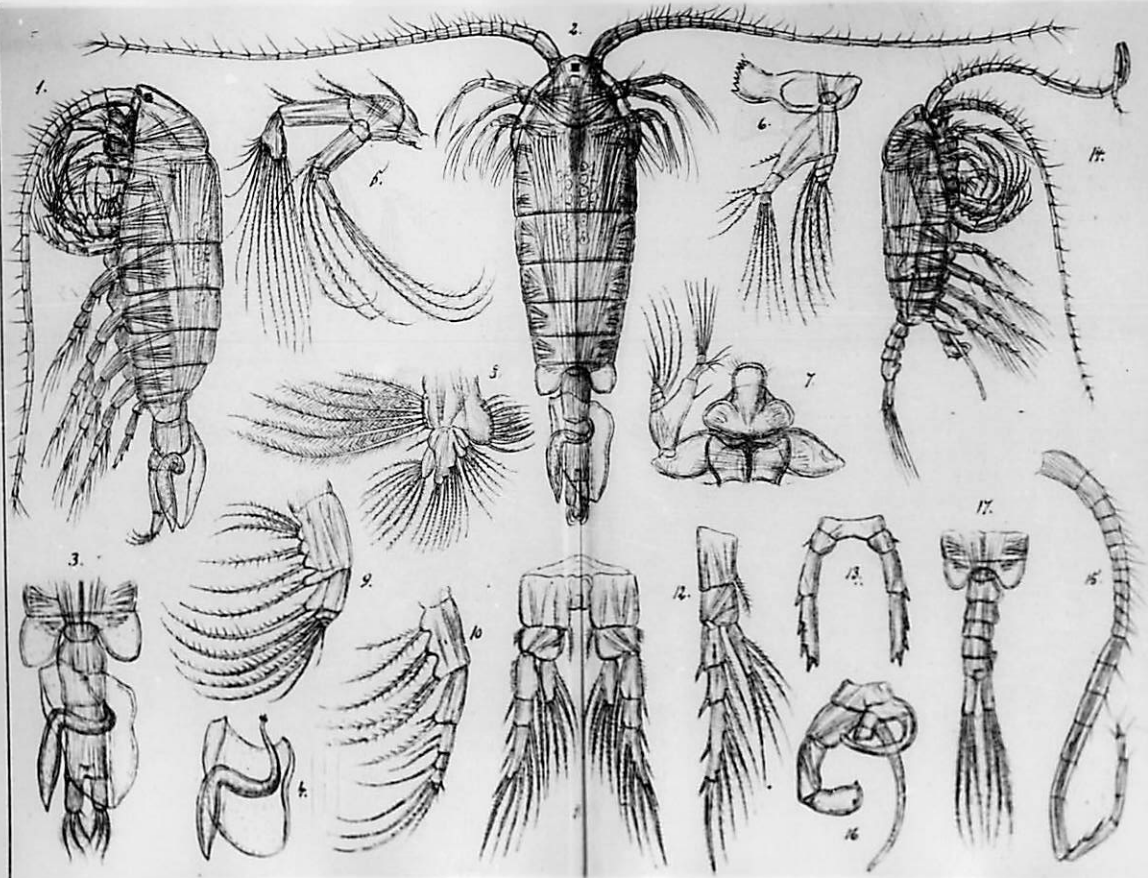
In none of the female specimens was there any ovisac, and it is very probable that the ova in this form, as is the case with the species of the nearly-allied genus *Heterocope*, are poured out to in directly the water, without being held together by any common envelope.

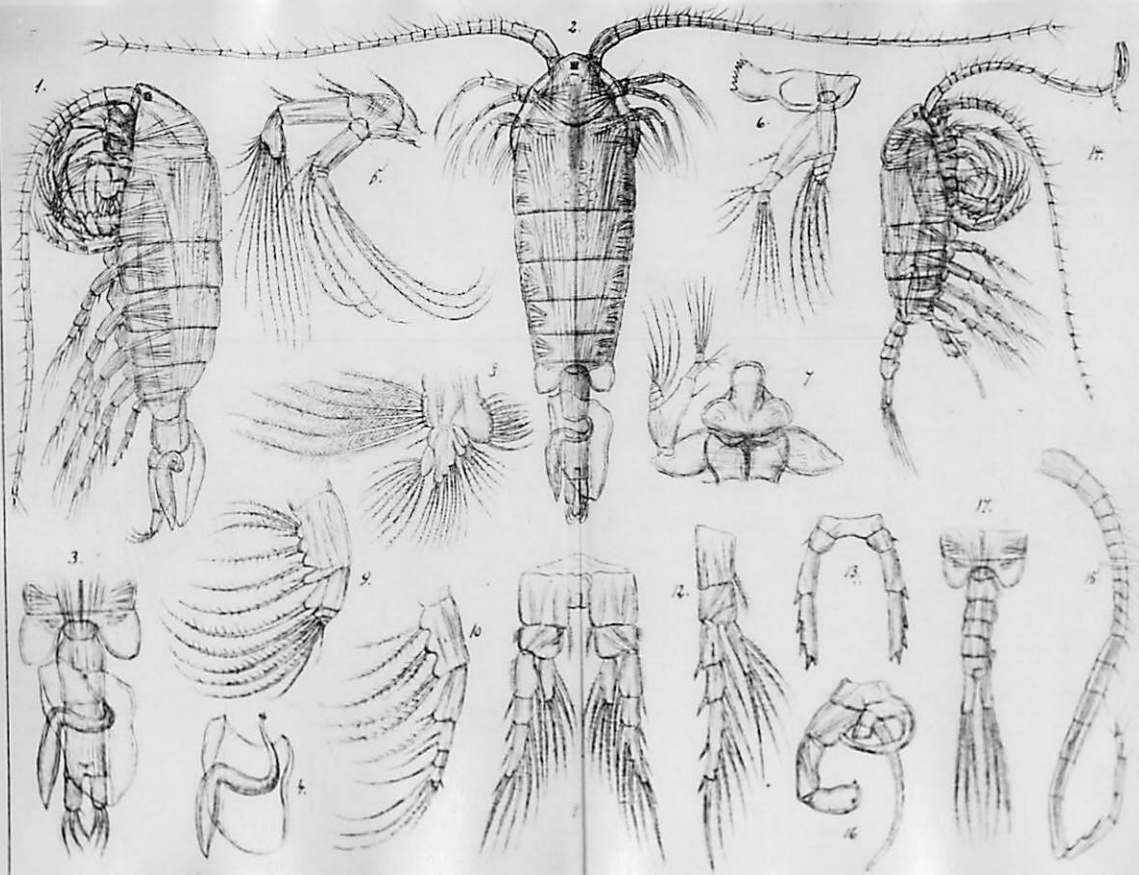
Explanation of the Plate.

Pl. VI.

Epischura baikalensis, G. O. Sars.

Fig. 1. Adult female with spermatophore, viewed from left side; magnified 68 diameters.
„ 2. Same, dorsal view.
„ 3. Same, tail together with the last 2 segments of trunk, dorsal view; magnified 100 diameters.
„ 4. Spermatophoric apparatus isolated.
„ 5. Posterior antenna, magnified 180 diameters.
„ 6. Mandible with palp.
„ 7. Anterior and posterior lips together with the mandibles, ventral view (palp of left mandible omitted).
„ 8. Maxilla.
„ 9. Anterior maxilliped.
„ 10. Posterior maxilliped.
„ 11. First pair of natatory legs.
„ 12. Natatory leg of 2nd pair.
„ 13. Last pair of legs of female.
„ 14. Adult male viewed from right side, magnified 68 diameters.
„ 15. Same, right anterior antenna, magnified 110 diameters.
„ 16. Same, last pair of legs, magnified 145 diameters.
„ 17. Same, tail together with the last 2 segments of the trunk, dorsal view; magnified 100 diameters.


1.
2.
3.
4.
5.
6.
7.
9.
10.
12.
13.
14.
15.
16.
17.


1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.

ANNUAIRE

DU

MUSÉE ZOOLOGIQUE

DE

L'ACADÉMIE IMPÉRIALE DES SCIENCES

DE ST.-PÉTERSBOURG.

TOME V.

1900.

RÉDIGÉ PAR

W. Salensky et R. Schmidt.

ÉDITION DE L'ACADÉMIE IMPÉRIALE DES SCIENCES.

St.-PÉTERSBOURG.

IMPRIMERIE DE L'ACADÉMIE IMPÉRIALE DES SCIENCES.

Vass. Ostr., 9-ème ligne, № 12.

1900.

ЕЖЕГОДНИКЪ

ЗООЛОГИЧЕСКАГО МУЗЕЯ

ИМПЕРАТОРСКОЙ АКАДЕМІИ НАУКЪ.

ТОМЪ V.

1900.

ИЗДАННЫЙ ПОДЪ РЕДАКЦІЕЮ

В. В. Заленскаго и Р. Г. Шмидта.

ИЗДАНІЕ ИМПЕРАТОРСКОЙ АКАДЕМІИ НАУКЪ.

САНКТПЕТЕРБУРГЪ.

ТИПОГРАФІЯ ИМПЕРАТОРСКОЙ АКАДЕМІИ НАУКЪ.

(Вас. Остр., 9 лин., № 12).

1900.