

119012

Further Notes on the *Schizopoda*.

By Dr. H. J. HANSEN (Kjøbenhavn)

A ajouter au bas de la page 1 du Bulletin N° 41.

M. le Prof. L. Joubin, du Muséum d'histoire naturelle de Paris, invité par le Prince, a fait toute la campagne à bord.

In N° 30 of this Bulletin the present author published a « Preliminary Report on the *Schizopoda* collected by H. S. H. Prince Albert of Monaco during the cruise of the *PRINCESSE-ALICE* in the year 1904 ». While looking over the proof I received additional material still larger than that already determined; it had been collected the same year and the major part of it in the same stations. In April I began to determine this new collection without any intention to write a second note. But while attempting to refer half-grown or still younger specimens of *Euphausia* to their adult forms I discovered grave things as to *Euphausia pellucida*, Dana, G. O. S., which has been considered by Sars « to be by far the commonest of all the *CHALLENGER* species »; in his splendid main work, the *CHALLENGER* Report, he refers all specimens possessing two pairs of lateral denticles on the carapace to this species. All authors have followed Sars as to this matter; only Ortmann has established — on two specimens taken near the Galapagos Islands — an allied species, *E. diomedæ*, which, according to his own statement, « perhaps..... might be better regarded as a variety of *E. pellucida* ». Having discovered that the Monaco material from 1904 contains numerous specimens of two species with two pairs of lateral denticles, and that none of these species is identical with *E. pellucida*, Dana, as represented by Sars in the work mentioned, I felt that a new investigation of this question was absolutely necessary and that besides several other topics ought

to be reconsidered. Consequently I examined the fine collection of Euphausiacea in the Copenhagen Museum, determined the majority of the specimens of the same order captured by the *SIBOGA*, inspected some of the Schizopoda collected by the Swedish Antarctic Expedition, and studied Dana's old work. The result was that I resolved to write a second treatise. My chief purpose in doing so is to put a stop to several errors introduced by Sars in 1885 and adopted by all subsequent writers, but seizing the opportunity I correct a few other points and describe or mention some species not dealt with in my former paper. Most of the forms dealt with in this second note are represented in the Monaco collection, but some other species are embodied for the sake of comparison.

Before entering the discussion of the species some particulars may be mentioned. It is not my intention to enumerate all the species received in March; the majority of them is identical with those dealt with in the former paper, and though in most cases the number of specimens is strongly increased and a few or many stations could be added, this addition to our knowledge of their geographical distribution would yet be of slight value, because nearly all the stations new for each species are found in the same triangle, the angles of which are the Banc de Gorringe, the Azores and the Canary Islands. In the former paper I enumerated 25 species of Schizopoda, and the existence of one species more was indicated; in the new material I find many specimens of the last-named form and besides same other species; the total amount of Schizopoda collected in 1904 is 32, verily a very large number. (For various reasons two of the new forms are omitted in this paper).

I beg Dr. W. T. Calman, Mr. E. W. L. Holt and Miss Mary J. Rathbun to accept my sincere thanks for services kindly rendered me and mentioned in the discussion of some of the species.

In March 1905 E. W. L. Holt and W. M. Tattersall published an important paper: « Schizopodous Crustacea from the North-East Atlantic Slope » (Rep. Sea and Inland Fisheries of Ireland,

1902-1903, Pt. II, Appendix, N° IV). The authors describe and figure a number of new forms, most of them Mysidacea, and give valuable notes on structure or distribution of many other species; the paper is quoted in the sequel.

The following few stations from 1904 are enumerated here, because they are not found in the list on p. 4 in my former paper. All animals from these additional stations have been taken with the « filet à grande ouverture ».

Stat. 1675 : lat. 35° 44' N., long. 11° 52' W.; 0 — 500m.

(Depth of the sea more than 5000m).

Stat. 1715 : lat. 28° 04' N., long. 16° 49' 30" W.; 0 — 1000m.

(Depth of the sea 1571m).

Stat. 1794 : lat. 31° 46' N., long. 25° W.; 0 — 3000m.

(Depth of the sea about 5425m).

Stat. 1797 : lat. 32° 18' N., long. 23° 58' W.; 0 — 2000m.

(Depth of the sea 5422m).

I. Order MYSIDACEA

Eucopia unguiculata, Will.-Suhm

Chalaraspis unguiculata, Willemoës-Suhm, Transact. Linn. Soc. London, Ser. II, Vol. I, Pt. I, 1875, p. 37-40, Pl. VIII. (At least partly).

Eucopia australis, G. O. Sars, op. cit. p. 55, Pls. IX-X. — Only partly, while *E. australis*, Dana, is another species.

More than fifty years ago Dana established the genus and species *Eucopia australis* on a single animal taken — from the stomach of a penguin — in lat. 66° 12' S., long. 149° 44' E., in the Antarctic Ocean.

In 1875 Willemoës-Suhm established *Chalaraspis unguiculata* on specimens from the Atlantic. In the *CHALLENGER* Report G. O. Sars cancelled *C. unguiculata* as synonymous with *E. australis*, Dana; besides he gave the first elaborate description, with numerous figures, of the type, but judging from his list of stations, his statement on the length, from his description and figures of the eyes and the three anterior pairs

of trunk-legs in the male (Pl. x, figs. 13, 14 and 16) and from some other of his figures, I am convinced that his material comprised at least three species. All subsequent authors followed Sars in referring every specimen from the Atlantic or the Pacific agreeing moderately well with his account of female specimens in the *CHALLENGER* Report to *E. australis*, Dana; in the treatise published a few months ago I did the same, and enumerated seven stations.

But in a fine material of Schizopoda secured by the Swedish Antarctic Expedition and received in this spring I found three specimens of an *Eucopia* resembling on the whole the common Atlantic form, but one of the specimens is so gigantic that it created suspicion on the matter. Consequently I examined the whole material at hand of *E. australis* sens. Sars, and will now give the results.

All specimens from the Atlantic — of course excepting those belonging to *E. sculpticauda*, Faxon, and *E. intermedia*, H. J. H. — and the majority of specimens collected by the *SIBOGA* in the East-Indian archipelago agree with each other; one of the largest specimens in the Monaco collection measures 29^{mm}, an adult female in the *INGOLF* material 37^{mm} and a male 38^{mm} in length from the front end of the head to the tip of telson. All these specimens belong unquestionably to the same species, for which the following characters can be pointed out. The eye-stalks are rather short and broad, seen obliquely from above and from the side nearly oblong-ovate; the whitish or yellowish eyes (light red in living specimens), look essentially outwards, occupying more than $\frac{1}{3}$, frequently about $\frac{2}{5}$, of the outer margin of the whole appendage (eye-stalk + eye). The front margin of the carapace is slightly convex. The terminal joint of the exopod of the uropods is in the adults distinctly broader than long, in not full-grown specimens sometimes nearly as long as broad, but not longer than broad; the terminal spines on telson are very long. — All the specimens examined by Willemoes-Suhm were taken in the Atlantic; that at least the major part of them belonged to the species just characterized is quite certain, but judging from the shape of the front margin of the carapace (fig. 1 a) in a large male measuring 37^{mm}, it may

be possible that at least this male belonged to *E. sculpticauda*, Faxon. In spite of this difficulty I think it justifiable to name the common Atlantic species *E. unguiculata*, Will.-Suhm. — It may be added that *E. unguiculata*, Will.-Suhm, *E. australis*, Dana, and the unnamed *SIBOGA* species mentioned below agree with each other in having the three anterior pairs of thoracic legs slender and no small rounded impressions or « cells » on the upper surface of telson, while *E. sculpticauda*, Faxon, and *E. intermedia*, H. J. H., — as pointed out in my former paper — have the three pairs of legs named broad or rather broad, and a portion of the dorsal surface of telson adorned with cells or rounded impressions.

In *Eucopia* the male genital apertures are found on small rounded protuberances situated on the postero-interior side of the basal joint of seventh thoracic legs. Adult males of *E. unguiculata* in the Monaco collection measure 26-28^{mm} in length; they agree completely with adult females in the shape of the front margin of the carapace, in shape and colour of the eyes, in the slenderness of the three anterior pairs of thoracic legs, etc. The discovery of the real males of this species leads to a criticism of some statements in the *CHALLENGER* Report. Sars has described and figured some parts of a male which differs considerably from his females in several features. He says (p. 57) that its « eyes are rather larger and thicker, with a darker pigment »; his fig. 13 on Pl. x represents these eyes agreeing with his description, and besides that the front margin of the carapace is considerably more convex than in *E. unguiculata*. Furthermore he figures the three anterior pairs of thoracic legs in this specimen (figs. 14 and 16 on Pl. x) as shorter and much thicker than in a female (Pl. x, fig. 2); in the text (p. 59) he mentions second and third pairs of legs as « much more powerful than in the female, the propodus being exceedingly dilated... » He is of the opinion that the features pointed out are only sexual differences between male and female of *E. australis*, but his figures and utterances referred to prove beyond question, that his male belongs to *E. sculpticauda*, Faxon, or *E. intermedia*, H. J. H., and he has certainly overlooked that its telson shows interesting peculiarities. Sars gives

seven localities for his *E. australis*, viz. four in the Atlantic, the fifth in lat. $46^{\circ} 46'$ S., long. $45^{\circ} 41'$ E., the sixth in lat. $50^{\circ} 1'$ S., long. $123^{\circ} 4'$ E., the seventh in the North Pacific; besides he says that his largest specimen, an adult female, measures 50^{mm} in length. Judging from these statements, from the fact that the very large female shown in figs. 1 and 2 on Pl. ix can scarcely belong to *E. unguiculata*, and from his representation of the male already criticized, I am convinced that Sars has mixed together at least three species of *Eucopeia*.

Eucopeia australis, Dana

Eucopeia australis, Dana, U. S. Explor. Expedit., Crustacea, p. 609, Pl. 40, fig. 10 a-10 m. (Not *E. australis*, Sars).

DESCRIPTION. — My largest Antarctic specimen, an adult male, measures 70.5^{mm} in length. The front margin of the carapace is a little more convex than in *E. unguiculata*. The eye-stalks are rather long, subcylindrical; the whitish eyes look forwards and occupy scarcely $\frac{1}{4}$ of the outer margin of the whole appendage. Terminal joint of the exopod of the uropods a little longer than broad. (Terminal spines on telson unfortunately lost). — Besides two immature specimens, measuring respectively 19.5 and 26^{mm} , are at hand. Their eye-stalks are, as might be expected, a little broader than in the adult specimen, but yet distinctly longer and more narrow than in specimens of the same length of *E. unguiculata*, while the eyes look essentially forwards, with their outer margin occupying less than $\frac{1}{4}$ of the outer margin of the appendage. The terminal spines of telson are rather short in the small — broken off in the other — specimen. — Some other features are pointed out above on p. 5.

REMARKS. — Dana's Antarctic specimen — which is not extant (see below) — measured one inch. His description is imperfect and his drawings poor, but yet he says: « Eyes with cylindrical pedicels, rather small », and this statement agrees well with one of his figures which shows the eyes as terminal on slender and moderately long stalks. Judging from these particulars I think that my Antarctic specimens can safely be referred to *E. australis*, Dana.

Here I may perhaps insert a few remarks on an adult female captured by the *SIBOGA* (stat. 143). It measures 42^{mm} in length and cannot be referred to any of the four above-named species, but it is, unfortunately, in a bad state of preservation and a special investigation must be postponed. Yet it can be pointed out that the front margin of the carapace is considerably more convex than in *E. australis* or *E. unguiculata*, agreeing well with fig. 13 on Pl. x in the *CHALLENGER* Report (which represents the male belonging to *E. sculpticauda* or *E. intermedia*); the eyes are essentially terminal, and their stalks decidedly longer than in *E. unguiculata*.

Katerythrope Oceanæ, Holt & Tatt.

Katerythrope Oceanæ, Holt & Tattersall, op. cit. p. 117, Pl. xx, p. 143.

LOCALITIES. — Stat. 1844, 2 specimens; stat. 1851, 1 specimen.

REMARKS. — My largest specimen, a female with marsupium, measures 8^{mm} in length. — The British authors quoted mention only two specimens taken west of Ireland.

Euchætomera Fowleri, Holt & Tatt.

Euchætomera Fowleri, Holt & Tattersall, op. cit. p. 123, Pl. xxiv, fig. 1-3, p. 144.

LOCALITY. — Stat. 1781, 1 specimen.

REMARKS. — The specimen is a male; it has two very long setæ inserted on the prominences on the end of telson mentioned by the British authors. The fine species has been established on specimens from the Bay of Biscay.

II. Order EUPHAUSIACEA

Genus EUPHAUSIA, Dana

Half a century ago Dana established the genus *Euphausia* with four new species which he described and figured in his

well-known gigantic work. In the *CHALLENGER* Report G. O. Sars attempted an interpretation of Dana's species, redescribed them and added seven new species to the genus; he pointed out several new excellent characters, among which the number of lateral denticles on the carapace and the shape of a leaflet or a process on the distal upper end of first antennular joint. All subsequent authors have followed the account of Sars almost without attempting any correction not only as to the species of this genus, but as to all species of the order Euphausiacea; I am apt to think that his well-merited renown, his detailed descriptions and numerous beautiful figures conveyed the impression that his work could be considered correct in nearly every detail. In my former paper I pointed out some shortcomings in his account of *Nematoscelis* and *Stylocheiron*, but further investigation shows that much more must be corrected.

Dana's descriptions and figures of his four species of *Euphausia* are so imperfect that only one of his forms, viz. the gigantic Antarctic *E. superba*, can be recognized with any certainty. I am, however, able to prove that Sars' interpretations of the three other species, *E. pellucida*, *E. splendens* and *E. gracilis*, must be erroneous (1). — Dana says on *E. splendens*: « First joint of inner antennæ oblong and produced at apex », and « Abundant in the Atlantic in latitude 2° north, longitude 17° west. » But first antennular joint has no leaflet and is

(1) After the manuscript to this paper had been sent to the press, I became aware of that Stebbing in his paper « On some Crustacea from the Falkland Islands collected by Mr. Rupert Vallentin » (Proc. Zool. Soc. London, May 22, 1900) sets forth critical remarks on Sars' interpretations of Dana's species of the present genus. Stebbing pointed out numerous differences between the descriptions and figures published by Dana and those given by Sars of the forms interpreted as identical; furthermore he re-established *E. Mülleri*, Claus, and *E. bidentata*, G. O. S., as valid species. But his criticism being based only on the literature — because he evidently did not possess any material of the forms in question — his results are, and must necessarily be, rather imperfect. He did not cancel any of Dana's species as unrecognisable, his re-establishment of *E. Mülleri*, Claus, is correct, but from want of material he did not discover that *E. bidentata*, G. O. S., is the same species, and that *E. pellucida* as figured by Sars can not be identical with any form inhabiting the European seas; etc. But he has pointed out that the interpretations in question given by Sars are at least very dubious, and this merit ought to be emphasized.

distally slightly produced above in *E. splendens*, G. O. S., furthermore this species has never been taken in the Northern or the tropical Atlantic. Sars enumerates three localities in the southern Atlantic or off the Cape of Good Hope, all south of lat. 34° S. (and besides one station in the southern Pacific); the Copenhagen Museum possesses numerous specimens from three places south of or far south-west of the Cape of Good Hope and from various localities in the Pacific; in all probability *E. splendens*, G. O. S., does not inhabit the tropical Atlantic. *E. splendens*, Dana, is perhaps identical with *E. Mülleri*, Claus, but it cannot be proved, because, according to kind information from Miss Mary J. Rathbun, « no types of Dana's species of *Euphausia* or *Eucopeia* are extant »; wishing, however, to avoid further confusion I will cancel Dana's species as unrecognisable; for the species described by Sars as *E. splendens* I propose the name *E. lucens*.

Dana writes on *E. gracilis*: « Length, half an inch » — which is the same size as he gives on *E. splendens* and *E. pellucida* — and: « First joint of inner antennæ sparingly produced and acute at apex ». But in *E. gracilis*, G. O. S., the basal antennular joint has no process or leaflet above at the end which is not acute, and according to Sars himself this species, of which he had « a good many specimens » measures only « about 10^{mm} »; it is in reality not only a very small but an exceedingly slender species, while *E. gracilis*, Dana, according to Dana's figure, is even less slender than *E. pellucida* and must be a good deal larger than *E. gracilis*, G. O. S. *E. gracilis*, Dana, is therefore not identical with *E. gracilis*, G. O. S., but it must be discarded as quite unrecognisable; for the characteristic *E. gracilis*, G. O. S., I propose the denomination *E. tenera*.

According to the description and the figures of Sars, *E. pellucida*, G. O. S., is distinguished by possessing two pairs of lateral denticles on the carapace, while only one pair or no denticle at all is found in the other forms of the genus. But I have four excellent species with two pairs of lateral denticles, each of these species from a large number (more than twenty) stations, and judging from the list of stations given by Sars and from his

enumerations of synonyms I am sure that he has mixed together at least three of these species. Dana figures *E. pellucida* as a very slender species with small eyes; if his figures be tolerably correct none of my four species can be referred to that form. I suppose that Dana has examined specimens of *E. gibba*, G. O. S., which on the whole agrees well with his figures and besides is common and has a wide distribution, but as he does not mention or figure the thin process on third abdominal segment the question can not be settled. I must therefore discard *E. pellucida*, Dana, as unrecognisable, and will now give a brief account of the four species at hand.

Conspectus of the Species possessing two pairs of lateral denticles on the carapace.

- A. Front part of the carapace covers at most half of the eye-stalks, and most frequently only the insertion or nothing of these stalks is overlapped.
 - a. Leaflet on the upper end of first antennular joint has the distal margin straight or slightly convex and deeply pectinate with several (6-8) setiform denticles; its outer angle is produced into a narrow process with about three similar denticles..... *E. Mülleri*, Claus
 - b. Leaflet on the upper end of first antennular joint either oblong triangular or, generally, distally bifid or with the distal margin rather concave; a row of setiform denticles is never found, but frequently the distal angles of the leaflet, and in rare cases a small angle on the concave margin, are produced into such denticles.
 - α. Front part of carapace short with a narrowly triangular rostrum well developed. Outer distal angle on the upper side of second antennular joint without any spiniform process, at most with a conical tubercle which is only as long as or shorter than a tubercle or process on the inner angle.

- †. Inner distal angle on upper side of second antennular joint with a spine which is somewhat or much longer than the tubercle on the outer angle. Leaflet on first antennular joint in the male long, oblong triangular and much recurved, in the female vertical or a little recurved with the distal margin rather deeply concave *E. recurva*, n. sp.
- ††. Inner and outer distal angles on the upper side of second antennular joint similarly shaped, either obtuse or with a rather low conical tubercle. Leaflet on first antennular joint similar in both sexes, directed obliquely upwards and forwards, rather small and distally bifid..... *E. mutica*, n. sp.
- β. Front part of the carapace somewhat produced, triangular, with the front angle measuring less than 90°; rostrum obsolete or very short, narrow. Outer angle on the upper side of second antennular joint with a conspicuous spiniform process; inner angle obtuse.. *E. brevis*, n. sp.
- B. Front part of carapace proximally much expanded, overlapping almost totally the eye-stalks. (Rostrum obsolete) ... *E. diomedæ*, Orim.

In this conspectus and in the following descriptions it is seen that the leaflet on first and the armature of second antennular joint must be carefully examined. Seen vertically from above or from the side the exact shape of these parts can not be made out; I may recommend to take the animal between two fingers of the left hand, a good pocket-lens between two fingers of the right hand, and examine the parts in question obliquely from in front while the distal part of the antennulæ is bent somewhat downwards by the third finger of the right hand.

Euphausia Mülleri, Claus

Euphausia Mülleri, Claus, Zeitschr. wiss. Zool. Vol. XIII, 1863, p. 444, Pls. xxviii-xxix, figs. 29-45.

Thysanopoda bidentata, G. O. Sars, Christiania Vidensk. Selsk. Forh. 1882, n° 18, p. 50, Pl. 1, figs. 11-14.

DESCRIPTION. — The rostrum is well developed, very narrowly triangular, and generally rather long, longer than the eye-stalks, while the front part of the carapace behind the rostrum is a very short triangle, covering at most only the base of the eye-stalks. The leaflet on the upper end of first antennular joint is rather large, broader than high, and directed obliquely upwards and forwards; its distal margin is straight or slightly convex, deeply pectinate, with 6 to 8 very slender, setiform denticles; the outer angle of the leaflet is produced into an oblique narrow process with about three similar setiform denticles. Even in very small specimens, measuring scarcely 6^{mm} in length, the margin of the leaflet has some few of these characteristic setiform denticles. Upper distal end of second antennular joint has on each angle an obliquely conical tubercle which generally is very conspicuous in large, feebly developed in small, specimens. — Length of large specimens from the Mediterranean and of one single specimen from stat. 1639, 19.5 mm; other large Atlantic specimens taken in 1904 measure scarcely 16 mm.

LOCALITIES. — Stat. 1639, 35 specimens; stat. 1675, 1 specimen; stat. 1676, 6 specimens; stat. 1715, 5 specimens; stat. 1736, 1 specimen; stat. 1749, 1 specimen; stat. 1768, 33 specimens; stat. 1834, 407 specimens; stat. 1844, 9 specimens; stat. 1849, 106 specimens; stat. 1851, 70 specimens; stat. 1856, 16 specimens; stat. 1869, 32 specimens; stat. 1874, 24 specimens.

DISTRIBUTION. — The Copenhagen Museum possesses a large number of specimens from 24 localities nearly uniformly distributed in the Atlantic between lat. 46° 23' N. and 21° 40' S. But the species goes considerably further northwards, as a specimen has been taken by Sars in about lat. 63 1/2° N. near the Norwegian coast. I have captured it in the harbour of Messina, and it is common in the western half of the Mediterranean (material from Monaco). In all probability the species inhabits only the Atlantic; besides it has not been found south of lat. 21° 40' S., though the Copenhagen Museum possesses several other species from a good number of localities in the Atlantic between lat. 22° S. and lat. 38° S.

REMARKS. — This species is easily distinguished from all other forms by the adornment of the antennular leaflet. Claus established *E. Mülleri* on specimens from Messina; he writes that its basal antennular joint « neben einem mit Borsten dicht besetzten Höcker einen geweihartigen Auswuchs entsendet », and this latter part of the sentence is well-chosen because the leaflet in reality reminds of a branch of *Cervus Alces*. — *Thysanopoda bidentata*, G. O. Sars, is the same species; Sars has given a good description and very characteristic figures of his specimen; it may only be noted that the denticles of the leaflet — certainly accidentally — had been recurved in a way never seen by me. It is easily seen that figs. 1, 2 and 5 on Pl. XI in the CHALLENGER Report do not represent animals belonging to *E. Mülleri*; on these and some other figures on Pl. XI and XII in that work I refer to my « Remarks » on *E. mulica*.

It is an interesting fact that many of the specimens from the Mediterranean are conspicuously larger than my individuals from the Atlantic, a single specimen excepted.

***Euphausia recurva*, n. sp.**

DESCRIPTION. — The rostrum is generally about as long as the eye-stalks, thus frequently a little shorter than in *E. Mülleri*, while the front part of carapace is short as in that species, covering at most the base of the eye-stalks. The leaflet on first antennular joint is in the adult male long or very long, oblong triangular with the end less or more setiform, much recurved, frequently reaching nearly the inner side of the eyes. In the female this leaflet is vertical or a little recurved, moderately broad with the lateral margins parallel, while the distal margin is deeply and less or more obliquely concave; the distal part of the leaflet is therefore shaped as two triangular acute lobes either nearly equal in length or the inner somewhat or considerably longer than the outer. In both sexes second antennular joint has on the upper outer angle a subconical scarcely acute tubercle, while the upper inner angle has a slender, spiniform, acute process directed much forwards and somewhat or much longer than the tubercle mentioned. — Length of the largest

specimen, a female, 17^{mm}, but numerous adult specimens are considerably smaller, measuring only about 11-13^{mm}.

DISTRIBUTION. — This species has never been found in the North Atlantic. The Copenhagen Museum possesses a rich material from in all 28 localities, and my statements are founded exclusively on that collection. The species is common in the South Atlantic from lat. 38° S. to lat. 29° 20' S., and some specimens have been captured in lat. 18° S., long. 2° W.; furthermore it is common in the area between lat. 30° S. and lat. 40° S. from the Cape of Good Hope to about long. 100° E.; finally some specimens have been taken near the southern end of Japan, viz. in lat. 31° 20' N., long. 132° 29' E.

REMARKS. — The male is easily distinguished from every other species by the shape of the antennular leaflet; the most valuable difference between the female of this species and of the two following forms is the armature of second antennular joint, but the shape and direction of the leaflet can also be used. — As to two of the figures given by Sars I refer to « Remarks » on *E. mutica*.

***Euphausia mutica*, n. sp.**

DESCRIPTION. — Front part of carapace and rostrum shaped as in *E. recurva*. Leaflet on first antennular joint similar in both sexes, rather narrow, directed upwards and somewhat or much forwards, distally deeply cleft by a subtriangular incision; each lateral part is produced into a setiform process. Second antennular joint has both distal angles on the upper side similar in shape, either obtuse or each armed with an obliquely conical tubercle, but a slender spiniform process is never found. — Length of a large specimen (in the *SIBOGA* collection) 15^{mm}.

DISTRIBUTION. — No specimen is found in the Monaco material collected during 1904; the species seems to be wanting in the eastern Atlantic from Great Britain to a little south of the Canary Islands. But it has been taken in the Sargasso Sea west of long. 40° W., south of lat. 42° N. (Monaco: stat. 137 and stat. 142; Copenhagen Museum), in lat. 24° N., long. 22° W., and in the tropical and southern Atlantic to lat. 38° S. Besides

I have seen specimens (in the Copenhagen Museum) from the Red Sea, from various localities in the Indian Ocean and from several places situated along south-eastern Asia from the Gulf of Siam to the southern end of Japan and near the Philippine Islands.

REMARKS. — Figs. 1 and 2 — representing an antennula from above and from the side — on Pl. XII in the *CHALLENGER* Report seem to have been drawn from a specimen of this species. The adornment of the antennula in the figures on Pl. XI has not been drawn sufficiently correct; for this reason it can not be decided to which species each of the specimens figured really belongs; judging from the size of the animal I am apt to think that figs. 1, 2 and 5 on Pl. XI represent a specimen of *E. recurva*, though the leaflet is not correct.

***Euphausia brevis*, n. sp.**

DESCRIPTION. — The front part of the carapace is more produced than in any of the three preceding species; it constitutes a triangle with the anterior angle measuring less than 90°, and it covers a portion, at the most about half, of the eye-stalks. The rostrum is either obsolete or very short, narrow. The lateral denticles on the carapace, especially those of first pair, are smaller than in the three preceding species. The eyes are also a little smaller than in those forms.

The leaflet on first antennular joint is directed upwards and only slightly forwards; it is proportionally broad and short with the upper margin less or more concave, the distal lateral angles acute or produced into very short setiform processes; frequently this concave distal margin shows a small angle sometimes produced as a short setiform denticle. Second antennular joint has the upper inner angle obtuse, while the outer upper angle is thickened and adorned with a fine spiniform process directed much forwards; this spine is rather large or small but always conspicuous, either nearly straight or frequently distinctly curved. — Length of adult specimens 9-10^{mm}.

LOCALITIES. — Stat. 1715, 15 specimens; stat. 1736, 11 specimens; stat. 1749, 17 specimens; stat. 1760, 21 specimens;

stat. 1768, 17 specimens; stat. 1781, 12 specimens; stat. 1749, 9 specimens; stat. 1797, 8 specimens; stat. 1800, 2 specimens; stat. 1802, 4 specimens; stat. 1834, 3 specimens; stat. 1849, 1 specimen; stat. 1856, 15 specimens.

DISTRIBUTION. — This species has not been taken in the eastern part of the Atlantic off the European coast, but in the Sargasso Sea in lat. $40\frac{3}{4}^{\circ}$ - $41\frac{2}{3}^{\circ}$ N., long. 40° - $41\frac{2}{3}^{\circ}$ W., and in the Mediterranean (Monaco collection). The Copenhagen Museum possesses specimens from lat. 37° N., long. 41° W., from lat. 33° N., long. 47° W., from lat. 24° N., long. 22° W., from two localities in the Atlantic respectively near the northern and the southern tropic, from a place near lat. 23° S., long. 81° E., and from the southern end of Japan.

REMARKS. — This small species is easily distinguished from the three preceding forms, but it is probably closely allied to — if not identical with — the following species.

Euphausia diomedæ, Ortm.

Euphausia diomedæ, Ortmann, Bull. Mus. Comp. Zool. Vol. xxv, 1894, p. 102, fig. 3.

Ortmann writes: « Frontal part of the carapace produced as a broad triangular-pointed plate, arched over the eyes, and covering their peduncles »; according to his figure the proximal portion of this frontal part is more expanded and its margin more convex than in *E. brevis*, leaving only a very narrow part of the eye-stalks uncovered; the tip is acute, but a narrow rostrum is not developed. Furthermore the author states: « Basal joint of antennula with a projecting leaflet above, divided into two lappets at the top ». But on his figure the shape of these two leaflets is in all probability rather incorrect; besides no armature is shown at the end of second antennular joint, but whether a spine is really wanting or only overlooked must remain uncertain. The species has been established on two specimens taken by the ALBATROSS near the Galapagos Islands. Ortmann's opinion: « Perhaps *E. diomedæ* might be better regarded as a variety of *E. pellucida* », is certainly wrong, but possibly it may be identical with my *E. brevis*. Ortmann does

not give the length of his specimens, and his representation of the antennula is defective, but the front part of the carapace is so much expanded and covers so much of the eye-stalks that I — at least provisionally — must consider *E. brevis* as distinct from *E. diomedæ*.

Euphausia gibba, G. O. Sars

Euphausia gibba, G. O. Sars, op. cit., p. 91, Pl. xvi, figs. 1-8.

— *pseudogibba*, Ortmann, op. cit., p. 12, Pl. 1, fig. 6.

In my former paper I referred a large number of specimens from 12 stations to *E. pseudogibba*, Ortm., being sure that this reference was correct, but not investigating the question whether *E. pseudogibba* can be maintained as a species distinct from *E. gibba*, G. O. Sars. The Copenhagen Museum possesses a large material from the Atlantic, the Indian Ocean, etc., and I have now arrived at the result that the two species are identical. Sars has drawn the sixth abdominal segment a little too long; the process from the end of first antennular joint varies a little in shape, being sometimes as described by Ortmann, but in other specimens with a small or nearly rudimentary tooth at the base on the outer side, as the right antennula in Sars' fig. 2 (while the process of the left antennula in the same figure is erroneous). The other differences mentioned by Ortmann are of no value.

Genus THYSANOPODA, H. Milne-Edw.

Numerous species belonging to this genus live in the Atlantic Ocean. In my former paper I enumerated 10, 5 of which were described as new; to day I am able to add 2 further species. While several of these 12 forms are very easy to distinguish and determine with absolute certainty, others are rather difficult: the descriptions and figures hitherto given of some of the species inhabiting the Atlantic or the Pacific are scarcely sufficient for recognition with absolute certainty.

Especially the shape of the front part of the carapace and the lobes or processes on the two proximal joints of the antennulæ ought to be described more minutely and figured more correctly than hitherto done. Scarcely half-grown or at least still smaller specimens show a somewhat other shape of the front part of the carapace than that observed in the adults. Local variation as to size of adult specimens and as to the shape of antennular lobes or processes ought to be looked for. In future papers I will attempt to fill up these defects in our knowledge as well as possible; here I must confine myself to comments on some few species.

A. Carapace with a pair of lateral marginal denticles near the posterior end.

Thysanopoda æqualis, n. sp.

DESCRIPTION. — Allied to *T. obtusifrons*, G. O. Sars, and *T. vulgaris*, H. J. H., but sharply distinguished by the shape of the lobe from first antennular joint. — The anterior third of the upper side of the carapace is adorned with a low keel which terminates at some distance from the anterior end; slightly behind this end we find a mesial excavation of some breadth, and this excavation goes so far backwards that its posterior portion encompasses on both sides the anterior part of the keel mentioned; outside the excavation the surface is slightly raised so that the impression is conveyed that two very broad and low keels bound the excavation mentioned. Seen from above, the front margin of the carapace is shaped nearly as in *T. obtusifrons*, G. O. Sars (*CHALLENGER* Rep. Pl. xvm, fig. 2), but the end does not protrude so near to the front margin of the eyes as — according to the figure referred to — is the case in the last-named species. Seen from the side, the front tip of the carapace shows scarcely any vestige of the minute vertical tooth observed in *T. vulgaris*. The carapace is otherwise as in *T. vulgaris*, with the lateral denticles well developed. Eyes as in *T. vulgaris*. The lobe from first antennular joint is large, covering about half of the second joint, and very peculiarly shaped.

Seen from the side, the terminal part of first joint is suddenly raised very considerably above the upper surface of the remainder of the joint; seen from above, the posterior margin of this thickened portion is strongly convex. The lobe itself, which proceeds from that thickened part, is a rather flat plate, at the base a little narrower than the proximal part of second joint, but its outer margin proceeds not only forwards but considerably outwards, so that the distal part of the lobe covers nearly or completely the total breadth of second joint; the front margin of the lobe is obliquely and considerably concave, the outer distal part of the lobe being produced as a triangular plate directed forwards and somewhat outwards, with its terminal angle very acute but not spiniform; the inner front angle of the lobe measures about 80° or 90° . The upper surface of the lobe shows a scabrous appearance, being set with a number of generally short setæ, which are much shorter than the curved setæ on the vaulted part of the joint. Second antennular joint without any spine; its upper inner end is produced into a rather short lobe covering a rather small part of third joint, as in *T. vulgaris* and some other species. Abdomen without any dorsal spine. The endopod of the uropods reaches about to the tip of telson, and is a little shorter than the exopod. — Length of the largest specimen, an adult female, 19^{mm}.

LOCALITIES. — Stat. 1715, 18 specimens; stat. 1736, 4 specimens; stat. 1749, 2 specimens; stat. 1760, 1 young specimen; stat. 1768, 1 specimen; stat. 1781, 2 specimens; stat. 1794, 6 specimens; stat. 1797, 10 specimens; stat. 1800, 4 specimens; stat. 1802, 2 specimens; stat. 1851, 1 specimen; stat. 1856, 3 specimens.

REMARKS. — This species resembles in general aspect so closely *T. vulgaris* that it is absolutely necessary to examine the shape of the lobe from first antennular joint in every specimen. But this lobe deviates so much in shape from that in any other species hitherto described that *T. æqualis* must be considered a sharply defined species. Even specimens measuring only 6.5-7^{mm} in length have that lobe so well developed that they can be determined with certainty, but the lobe is yet proportionately

much smaller than in large animals, and the front end of carapace shows — as might be expected — a different shape in such specimens, while in half-grown animals the lobe and the front part of the carapace have assumed respectively nearly the final size and shape.

In my former paper I pronounced the opinion that « the *Plankton* specimens referred by Ortmann to *T. obtusifrons* certainly belong to *T. vulgaris* ». Having now two distinct but closely allied species with lateral denticles on the carapace well developed, it is of course impossible to decide whether the specimens seen by Ortmann belong to *T. vulgaris* or to *T. æqualis*; most probably both species were present in the material in question. — Some informance on the real *T. obtusifrons*, G. O. S., is given below in « Remarks » on *T. vulgaris*.

***Thysanopoda vulgaris*, H. J. H.**

Thysanopoda vulgaris, H. J. Hansen, Bull. Musée Océanogr. n° 30, p. 15.

DESCRIPTION. — The front part of the carapace almost as in *T. æqualis*, but the end has a quite minute conical vertical tooth or at least a vestige of that tooth. The lateral marginal denticles on the carapace near its posterior end are well developed. The lobe from first antennular joint is characteristic; it covers the inner basal part of the upper surface of second joint, the portion overlapped being decidedly less than half and almost only $\frac{1}{3}$ of the length of the joint, and not fully half of its breadth, thus only about $\frac{1}{6}$ of its whole upper surface. The lobe is as long as, or a little longer than, broad and somewhat broader at the base than in front; its anterior margin is transverse, a little convex or feebly concave, the front outer angle being either produced into a tiny triangular tooth or rounded; the shape of this anterior margin is, however, often not very easy to make out, because the setæ on the surface of the lobe, which are longer than in *T. æqualis*, proceed beyond the margin named, concealing it to some degree. — As to other particulars on this species I refer to my earlier description.

LOCALITIES. — Stat. 1676, 2 specimens; stat. 1749, 3 specimens; stat. 1760, 5 specimens; stat. 1768, 1 specimen; stat. 1794, 1 specimen; stat. 1797, 4 specimens; stat. 1800, 1 specimen; (stat. 1802, 1 very small, dubious specimen); stat. 1849, 1 specimen; stat. 1856, 1 specimen. — I give this revised list of stations, because in the former paper I had not separated some specimens of *T. æqualis* from the present form.

REMARKS. — As pointed out in my former treatise *T. obtusifrons*, G. O. S., differs — according to the description and the figures in the *CHALLENGER* Report — in four features from *T. vulgaris*. Two of the three specimens, all from the Pacific, on which Sars established his *T. obtusifrons*, are preserved in the British Museum. Recently Dr. Calman has kindly examined some parts of these specimens for me; his letter and sketches show, however, that they differ from each other and from the representation in the *CHALLENGER* work. Dr. Calman writes that the specimen « from Station 285, lat. $32^{\circ} 36'$ S., long. $137^{\circ} 43'$ W., is marked as the « Type ». I cannot see any denticles on the sides of the carapace. At the most, there is a *very minute* mark near the position where the denticle would lie, which *might* be the scar left if the very small denticle were broken off. On the other side of the specimen the edge of the carapace is damaged at this place ». His sketch shows the antennular lobe from first joint to be about as large as in *T. vulgaris*, while its outer distal angle or the front margin near that angle is produced into a small triangular tooth. But on the other specimen Dr. Calman writes that « it has a pair of *very distinct* lateral denticles on the carapace near the posterior margin », and that its « antennular lobe.... has a very different outline from that of the type »; according to his sketch this lobe agrees as to size and shape of its front margin more with that in *T. æqualis* than with the lobe of the « type ». Judging from these particulars I am sure that Sars has referred two species to his *T. obtusifrons*, furthermore I am less convinced that *T. vulgaris*, H. J. H., is a species distinct from *T. obtusifrons*, G. O. S., in spite of the differences between the representation given by Sars and my specimens from the Atlantic. But having no material from the

south-eastern Pacific and remembering the sentence « præstat distinguere quam confundere », I think it ought to be preferred — at least until a number of specimens from that part of the Pacific are at hand — to consider *T. obtusifrons*, G. O. S., as a species having the lateral denticles mentioned obsolete or wanting, maintaining the Atlantic *T. vulgaris* as a separate species, in which those denticles are well developed. — On the Atlantic material referred by Ortmann to *T. obtusifrons* a few words are said above in « Remarks » on *T. æqualis*.

B. Carapace without lateral marginal denticles.

***Thysanopoda acutifrons*, Holt & Tatt.**

Thysanopoda acutifrons, Holt & Tattersall, op. cit., p. 102 and p. 134. (Immature specimens).

Thysanopoda pectinata, H. J. Hansen, Bull. Musée Océanogr. n° 30, p. 16, fig. 12 (Not *T. pectinata*, Ortm.)

During the period 1895-1904 the Copenhagen Museum gradually obtained a good number of specimens of a large, clumsy species from various localities in the boreal area of the Atlantic. I had referred this species to *T. pectinata*, Ortmann, because it agrees well with the figure given by that author and as to most particulars with his rather brief description. In the Monaco material I found 2 specimens from station 1639 of the same species; consequently I referred them to *T. pectinata* and published some notes accompanied with a figure. But while determining the Monaco material from earlier years, I met with a single large specimen which differs sharply from the species interpreted by me as *T. pectinata* in the shape of the rostrum and in shape and armature of the lobe from first antennular joint. In both particulars, and especially in the armature of the lobe, this specimen agrees so well with Ortmann's description — though not with his figure — of *T. pectinata* that it must be referred to this species. The specimens referred in my former paper to *T. pectinata* belong therefore to a different species, but fortunately it is not necessary to create a new name. Some

months ago Holt & Tattersall established a new species, *T. acutifrons*; the study of their typical specimens kindly lent me gives the result that some of them are immature specimens of the species formerly referred by me to *T. pectinata*, while two others of them are adult or subadult specimens of *T. distinguenda*, H. J. H. I will now give a description of the front part of carapace and the lobe from first antennular lobe in *T. acutifrons* for comparison with the following description of the real *T. pectinata* Ortm., and besides some remarks on the differences between *T. acutifrons* and *T. distinguenda*.

In nearly full-grown or adult specimens of *T. acutifrons* the front part of carapace constitutes, seen from above, a rather low triangle: the most proximal part of its lateral margin is slightly concave, the distal part slightly convex, the distal angle measures 110°-120° and terminates in a tiny tooth directed upwards or obliquely upwards and forwards. In specimens being only half-grown or little more than half-grown the triangle mentioned is a little longer, the distal part of its lateral margins is straight, the terminal angle measures only about 90° or rarely about 100°, and the tip is sometimes produced into a tiny process directed essentially forwards; in still smaller specimens the triangle is still longer, the terminal angle 85°-80°, and the tip more produced as a tiny subhorizontal process. The upper surface of the front part of the carapace is shaped essentially as in *T. vulgaris* and *T. æqualis*, but the mesial keel is higher at the dorsal organ. The eyes are rather small, brown. The lobe from first antennular joint is, seen from above, oblong, longer than broad, rather small, occupying slightly more than the inner third of the proximal part of the upper surface of second joint; its outer margin is nearly parallel with the mesial line, while the distal portion of its inner margin is directed obliquely outwards; it terminates in a short acute process which, seen from the side (fig. 12 in my former paper), is triangular and in rather large or adult specimens shorter than deep, in about half-grown or still smaller specimens sometimes about as long as deep. From the inner oblique margin of the lobe the stiff coupling setæ (described in my former paper) proceed. A broad,

rather short lobe from second antennular joint has no spine. Abdomen without dorsal spines. The endopod of the uropods overreaches somewhat the tip of telson, but is yet shorter than the exopod. — Length of the largest specimen seen (from *INGOLF*) 43^{mm}; length of the largest specimen in the Monaco collection (from Stat. 1639) 31^{mm}.

LOCALITIES. — Stat. 1639, 4 specimens (3 of them less than half-grown). Among material from 1903 I found a large mutilated specimen from Stat. 1583 : lat. 47° 36' N., long. 7° 38' W., 1490^m. — In my future *INGOLF* Report several other localities from the boreal area of the Atlantic will be enumerated; the species has besides been captured west of Ireland (Holt & Tattersall).

REMARKS. — Large specimens of this species are clumsy; half-grown or still smaller specimens are rather slender. Ortmann's figure of his *T. pectinata* — showing the animal from the side — agrees as to antennulæ and rostrum better with *T. acutifrons* than with *T. pectinata* itself. Ortmann says, however, that the proximal antennular joint has above a broad protruding leaflet « dessen vorderer Rand in ca. 10 kammförmige Dörnchen ausläuft », and that the front end of the carapace is « stumpf gerundet (wie bei obtusifrons) ». Seeing that my specimens of a big species agreed on the whole well with other points of his description and in all particulars with his figure, I interpreted in my former treatise the row of stiff coupling setæ as his « Dörnchen », but having now seen a specimen — to be described below — possessing *both* a transverse row of spiniform denticles and the row of coupling setæ on the oblique inner margin, no doubt exists as to the determination.

Thysanopoda distinguenda, H. J. H.

Thysanopoda distinguenda, H. J. Hansen, Bull. Musée Océanogr., n° 30, p. 17, fig. 13.

Of this species I have now 24 specimens — most of them full-grown — from 11 stations situated in the triangular area : Banc de Gorringe, the Azores and the Canary Islands. Besides

a couple among the typical specimens of *T. acutifrons*, Holt & Tatt., belong to the same form; they were taken in the Atlantic west of Ireland. It may be useful to add some remarks to my earlier description.

Adult specimens of *T. distinguenda* measure generally 20-23^{mm}; a single unusually large female specimen measures 25^{mm} in length. Half-grown or a little larger specimens of *T. acutifrons* are thus as long as adult specimens of *T. distinguenda*; I will therefore point out the differences between such specimens of the same length of both species. The integuments of the body are a little more firmly chitinized in *T. distinguenda* than in *T. acutifrons*. The front margin of the carapace in *T. distinguenda* is shaped about as in adult specimens of *T. acutifrons*, having the major distal part of each half a little convex, the terminal angle measuring about 110°, and the tip adorned with a tiny tooth directed considerably or nearly vertically upwards, while half-grown specimens of *T. acutifrons* — as mentioned above — have the front part of the carapace more produced, the distal angle smaller, etc. The eyes are darker and distinctly smaller in *T. distinguenda* than in young specimens of the same length of *T. acutifrons*. The lobe from first antennular joint differs sharply in one particular : in *T. distinguenda* the terminal process is, seen from the side, somewhat or considerably longer than deep, with its distal part very slender, spiniform (in specimens not very well preserved this spiniform end is sometimes mutilated); in half-grown specimens of *T. acutifrons* this process is generally shorter than, sometimes at the most as long as, deep.

Thysanopoda pectinata, Ortm.

Thysanopoda pectinata, Ortmann, op. cit., p. 10, Pl. 1, fig., 4, (not *T. pectinata*, H. J. H.)

DESCRIPTION. — A single somewhat mutilated large specimen is at hand. — The anterior part of the carapace differs much from that in *T. acutifrons*; seen from above it is considerably produced but not triangular, because the front end is broad and very obtuse, while the lateral margins of the part produced

are considerably concave, constituting a kind of orbits; the lateral edges of the part produced are even bent a little upwards, so that the dorsal surface is a little excavated along the margins. The mesial keel is about as in *T. æqualis*, but the excavation surrounding its anterior part is deep in front. Seen from the side, the front end of the carapace is cut off, with the front margin itself sloping even upwards and a little backwards, but just on the front end of the upper surface a small vertical cone is observed: the whole front part is therefore, when seen from the side, shaped exactly as in *T. insignis*, H. J. H. (op. cit., fig. 18). The carapace without lateral denticles and without vestige of any gastro-hepatic groove. Eyes a little larger than in *T. acutifrons*, completely black; the eye-stalks without any tubercle near the cornea. The lobe from first antennular lobe is very interesting; seen from above — and not taking the distal elevated setose part of the joint into account — it is a transverse plate, which is considerably broader than long but yet somewhat more narrow than the second joint; the front margin of the plate is a little convex and very deeply serrate, with 9-12 slender, spiniform saw-teeth; the inner margin of the lobe proceeds downwards and somewhat backwards on the inner side of the antennula and bears the row of strong oblique coupling setæ. The lobe from second joint is, seen from above, rather large, subquadrangular, without any spine or process. Maxillulæ about as in *T. lateralis*, H. J. H. (op. cit., fig. 15). Abdomen without dorsal spines. — Length of the specimen examined 37.5^{mm}; Ortmann's specimen measured 44^{mm}.

LOCALITY. — Stat. 650 (1896): lat. 36° 54' N., long. 23°-23° 12' W., 4400^m; 1 specimen.

REMARKS. — By the armature and shape of the antennular lobe described this species is easily distinguished from all other forms of *Thysanopoda* hitherto known. Judging from the armature of that lobe my determination is certainly correct, though Ortmann's brief description of the shape and adornment of the anterior part of the carapace agrees badly with the features described above and not at all with his drawing. As to some other points I refer to « Remarks » on *T. acutifrons*.

Genus THYSANOËSSA, G. O. Sars

Thysanoëssa parva, H. J. H.

Of this species I have now looked through more than 1600 specimens taken in 14 stations during 1904; all these stations are situated in the triangular area: Banc de Gorringe, the Azores, the Canary Islands.

Nearly all adult specimens measure only 9-10^{mm}, but some few specimens are larger. The largest male seen measures 11.5^{mm}, the largest female 13^{mm}; both these specimens are from stat. 1794.

Among the differences between *T. parva* and *T. gregaria* pointed out in my former paper those drawn from the setæ on the elongate (first) pairs of legs are the best. Here I can add another still better character. In *T. gregaria* the endopods of second, third and fourth pairs of legs have the setæ along the lower margin of fifth and sixth joints robust and long, as long as, or longer than, the terminal setæ on seventh joint, and strongly « ciliated », viz. adorned with numerous short lateral hairs easily seen with an enlargement of about 30 times (compare figs. 11, 13 and 14 on Pl. xxii in the *CHALLENGER* Report). In *T. parva* the setæ along the lower side of the same joints of second-fourth legs are thin, much shorter than some of the terminal setæ, and even with an enlargement of more than 100 times no vestige of « ciliæ » can be discovered. Rather similar differences are found between the setæ on the lower side of fifth and sixth joints of the maxillipeds, but in these appendages one of the terminal setæ is exceedingly long and ciliated in both species. Therefore, if only one single endopod of one of the four anterior pairs of legs, or even only a maxilliped, has been preserved it is easy to decide whether the specimen in question belongs to *T. parva* or it is a small specimen of *T. gregaria*. If a specimen measuring 10 to 13^{mm} has lost all the five pairs of appendages mentioned, it may sometimes be difficult to determine it with absolute certainty.

Thysanoëssa gregaria, G. O. Sars

LOCALITIES. — Stat. 1715, 22 specimens (together with 13 specimens of *T. parva*); stat. 1760, 1 specimen; stat. 1849, 1 specimen.

REMARKS. — This species seems to be rare in the area explored, wherefore I give a new, complete list of the localities.

Genus **NEMATOSCELIS**, G. O. Sars

At present I am acquainted with three species from the Atlantic, viz. *N. megalops*, G. O. S., *N. microps*, G. O. S. (including *N. mantis*, Chun, and *N. rostrata*, G. O. S., as synonyms) and *N. tenella*, G. O. Sars; only the two first-named forms have been dealt with in my former paper. *N. megalops* is omitted here, but the two other species must be mentioned.

Nematoscelis microps, G. O. Sars

Of this species I have now seen more than 250 specimens taken during 1904; besides I have examined a good number captured by the *SIBOGA*. In my former paper the main differences as to lateral denticles on the carapace and shape of rostrum in adult females, subadult females, adult males, and young or very young specimens have been pointed out; some further particulars are to be mentioned presently.

In very small specimens measuring 6-8^{mm} in length the upper section of the eyes is much smaller than the lower part, but the eyes are quite black as in the adults; a little behind the rostrum the mesial line of the carapace is rather suddenly raised at the dorsal organ as a short keel (*N. rostrata*, G. O. S.), and the rostrum is a very long triangle with the base broad. In about half-grown specimens that upper section of the eyes is somewhat or a little smaller than the lower part; in rather large or full-grown specimens the upper section is slightly

smaller than, or fully as large as, or, in very large specimens, rarely slightly larger than, the lower one; the short dorsal keel is less or even feebly developed, but, seen from the side, a very obtuse angle is always visible at the mesial dorsal organ. In the egg-bearing females from the Monaco collection the rostrum is always rather long or long, very or exceedingly narrow; the meros of the elongate legs reaches considerably beyond the tip of the antennular peduncle, the distance between its end and that of the peduncle being as long as, or a little shorter than, the sum of the two distal joints of the last-named appendage. It must, however, be added, that egg-bearing specimens differ considerably in length from each other and show conspicuous difference in the shape of rostrum: in large females the rostrum is not only absolutely but proportionately longer and narrower than sometimes is the case in smaller specimens, being very narrowly triangular in the latter but nearly subulate, thus exceedingly narrow, in the former individuals. The largest adult female from the Atlantic measures 19^{mm} in length. — The adult males are somewhat shorter than the females, and differ in several particulars. The two distal joints of the antennulæ are shorter and thicker than in the female, third joint somewhat shorter than second — in the female these joints are equal in length — a tuft of sensory hairs originates on the basal part of the outer flagellum, finally the distance from the end of meros of the elongate legs to the tip of the antennular peduncle is about as long as one of the distal joints of that appendage, and always conspicuously shorter than the sum of both joints. The front end of the carapace is frequently shaped as a low triangle with its angular apex measuring about 90°, but sometimes a very short rostral process is found.

Adult females in the *SIBOGA* collection differ from my Atlantic specimens in being a little more clumsy and in two further particulars. The distance between the end of the meros of the elongate legs and that of the antennular peduncle is only as long as the terminal joint or, at the most, as the sum of the terminal and half of the second joint of this appendage. Rostrum is never subulate, in some specimens it is very narrowly triangular as in certain Atlantic individuals, but often it is a

little shorter and conspicuously broader at the base; the difference between this narrowly triangular process and the exceedingly narrow, nearly subulate rostrum in many Atlantic specimens of the same size is in reality so considerable that one would not hesitate in considering such specimens as belonging to different species, if the material at hand did not contain every possible transition between them. In adult males the rostrum is often a little longer than in Atlantic specimens, but sometimes very short or even rudimentary.

Nematoscelis tenella, G. O. Sars

Nematoscelis tenella, G. O. Sars, op. cit., p. 133, Pl. xxv, figs. 5-7.

DESCRIPTION. — In my former treatise it was only stated that *N. tenella*, as described and figured by Sars, has been established on very young specimens of a species allied to *N. microps*. Having now obtained a good material, I can give brief descriptions of adults and of very young specimens.

This species is more slender, but only a little smaller, than *N. microps*. In all half-grown, rather large or adult specimens the oblique eyes are nearly black, with their upper anterior section very much larger, especially broader, than the lower part; furthermore the upper outline behind rostrum is feebly and regularly convex, because there is no angle or, at the most, a vestige of an angle at the dorsal organ. As in *N. microps*, adult and subadult females have no lateral marginal denticles on the carapace, in adult males very small denticles are found, in somewhat smaller specimens of both sexes these denticles are more conspicuous, while in specimens measuring only 7-9^{mm} they are proportionately large. In adult specimens of both sexes the terminal joint of the elongate legs is furnished with 7 strong spines, as in *N. microps*; in small specimens this number is reduced. The largest female measures 17^{mm}, an adult male 12^{mm} in length.

In adult females the rostrum is moderately short, somewhat oblong triangular with the margins a little concave; in subadult specimens it is distinctly longer, with the margins more

concave and the terminal portion very slender. In adult or immature female specimens the antennular peduncles are distinctly longer and more slender than in *N. microps*. In adult females the distance from the tip of meros of the elongate legs to the end of the antennular peduncle is very conspicuously longer than the sum of the two distal peduncular joints and nearly as long as the whole peduncle. — In adult males the rostrum is shaped nearly as in the females. The antennular peduncles are considerably thicker and somewhat or a good deal shorter than in the other sex; especially the two distal joints are thickened but show conspicuous difference as to length; being either a little longer, or sometimes almost shorter, than in the adult males of *N. microps*. The distance from the tip of meros of the elongate legs to the end of the antennular peduncle is about as long as, or a little shorter than, the whole peduncle. — Very young specimens measuring 7-8.5^{mm} differ in several particulars from larger or adult specimens. The cornea is very oblong, its upper anterior half is light brownish, a little darker above than below, and only a little broader than the lower posterior half, which is very dark brown. Rostrum is long, seen from above very oblong-triangular; seen from the side the upper outline behind the rostrum is somewhat elevated at the dorsal organ, but less than in similar specimens of *N. microps*. My Atlantic specimens have the elongate legs broken off.

On the material secured by the *SIBOGA* a few remarks may be set forth. Adult females have frequently the antennulæ slightly shorter and the meros of the elongate legs proceeding a little less beyond the tip of the antennular peduncles than in Atlantic specimens. An immature specimen measuring 10.5^{mm} in length agrees with the description and figure of Sars in possessing only 4 spines on the terminal joint of the elongate legs, but their meros overreaches the antennular peduncle as much as the length of the third peduncular joint; its eyes are moderately oblong ovate, their upper anterior section being a little broader and besides especially below conspicuously lighter than their lower posterior section; the rostrum is slightly longer and at the base a little broader than that shown in fig. 6 of

Sars; finally the upper outline behind the rostrum is distinctly angular at the dorsal organ.

LOCALITIES. — Stat. 1676, 1 specimen; stat. 1715, 13 specimens; stat. 1749, 5 specimens; stat. 1760, 1 specimen; stat. 1768, 13 specimens; stat. 1794, 1 specimen; stat. 1797, 2 specimens; stat. 1800, 1 specimen; stat. 1856, 3 specimens. — The localities from the East-Indian archipelago are omitted.

REMARKS. — Among the differences pointed out between *N. microps* and *N. tenella* those observed in the shape of their eyes afford the best distinguishing character, not only in the adults but even in very small specimens. — I take it for certain that the characteristic species described here is identical with *N. tenella*, G. O. S. Sars says that none of his specimens did exceed the length of 10^{mm}; this small size and his descriptions and figures of the elongate legs and of rostrum show that they were young. His fig. 5 is correct in most respects, but the shape and the uniformly black colour of the eye must be incorrect and is, unfortunately, misleading.

Nematobrachion, Calman

(*Nematodactylus*, Calman, olim)

In a Note published together with the above-mentioned paper of Holt & Tattersall Dr W. L. Calman discards the name *Nematodactylus* as preoccupied and introduces the denomination quoted. The single species hitherto referred to that genus must consequently be named *Nematobrachion boöpis*, Calman. This species, which has been mentioned in my former paper, is common in the area explored during 1904: I have now seen 68 specimens from 14 stations.

It may be added that *Stylocheiron flexipes*, Ortm., according to my examination of specimens in the Copenhagen Museum, must be transferred to the genus *Nematobrachion*.

Analyses des échantillons d'eau de mer recueillis pendant la Campagne du yacht "Princesse-Alice" en 1904.

par G. H. ALLEMANDET.

Ces analyses ont été exécutées par deux méthodes différentes :

1° La méthode scientifique rigoureuse, exposée par M. Thoulet (1), qui consiste à prendre la densité à 0° au moyen du pycnomètre, à doser les halogènes en bloc en exprimant les résultats en chlore par kilogramme, à déterminer ensuite la totalité des sulfates par précipitation à l'état de Ba SO₄, les résultats étant exprimés en SO₃ par kilogramme d'eau (2).

2° La méthode de Knudsen, adoptée par le congrès des Assistants hydrographes à Copenhague en 1904 (3), basée sur la titration du chlore par une liqueur convenable de Ag NO₃, comparativement à une eau normale filtrée et analysée avec le plus grand soin au laboratoire central de Christiania. La comparaison des deux titrages se fait au moyen des « Hydrographische

(1) J. Thoulet. Résultats des Campagnes Scientifiques de S. A. S. le Prince de Monaco, fasc. xxii, (1902).

(2) Mes calculs ont été faits d'après les nouveaux poids atomiques adoptés par le Congrès international de Chimie appliquée de Berlin en 1903.

(3) L. G. Sabrou. Bulletin n° 22 du Musée Océanographique de Monaco (1904).

