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Plankton from the Red Sea.

By P. T. Cleve.

(Communicated 1900, November 14.)

I have received two sets of plankton samples from the Red Sea, one collected by the late Swedish naturalist Dr. E. Nyman, from the 25th of February to the 1st of March 1897, and another by the lamented Swedish zoologist Dr. C. Aurivillius, from the 19th to the 24th of February 1899. No observations on the temperature of the water or the salinity correspond to the samples collected by Dr. Nyman, which were examined for phytoplankton and tintinnodea only. The collections of Dr. Aurivillius are accompanied by observations on the temperature, and simultaneously samples of water were taken for determining the salinity by Prof. O. Pettersson, who kindly communicated the hydrographical data, mentioned in the following.

In the following report on the plankton of the Red Sea I have included some data, concerning the copepoda, published by Giesbrecht in his work »Systematik und Faunistik der pelagischen Copepoden» Berlin 1892.

Copepoda.

Acartia centrura Giesbr. — Assab (Giesbr.). — Not noted outside the Red Sea.

A. erythræa Giesbr. — 13°—16° N. 43°—41° E. (*temp.* 24,5—24,8; *sal.* 36,35—37,41). — Assab (Giesbr.) — I found this species in samples from the Malay Archipelago.

A. negligens DANA. — 22° N. 37° E. (*temp.* 23,65; *sal.* 39,5). I found this species in the Arabian Sea. Noted from the Pacific (26° S.—20° N.) the Mediterranean and the tropical Atlantic.

Acrocalanus gibber GIESBR. — ASSAB (GIESBR.). — I noted this species from the Indian Ocean, GIESBRECHT from Hongkong.

A. gracilis GIESBR. — 13°—19° N. 43°—39° E. (*temp.* 24,8—25,5; *sal.* 36,35—38,8). — I found this species in samples from the Arabian and Indian Oceans. GIESBRECHT mentions it from the Pacific, 4° S.—20° N.

A. longicornis GIESBR. — 16° N. 41° E. (*temp* 24,5; *sal.* 37,41), many specimens. — I found this species in the Arabian Sea. GIESBRECHT mentions it from the Indian and Pacific Oceans. I have met with it in the tropical Atlantic.

A. monachus GIESBR. — 22°—19° N. 37°—39° E. (*temp.* 23,65—25,5; *sal.* 39,5—38,8). I noted this species from the Arabian Sea and Malay Archipelago. It occurs, according to GIESBRECHT, in the Pacific (115°—119° W. 5°—9° N.).

Calanus Darwinii (LUBB.) — 13° N. 43° E. (*temp.* 24,8; *sal.* 36,35). — Widely distributed in the tropical Indian and Pacific Oceans; also in the tropical Atlantic (BRADY, GIESBR.).

C. minor (CLAUS.) — 19°—16° N. 39°—41° E. (*temp.* 24,5—25,5; *sal.* 37,41—38,8). — I noted this species from the Arabian Sea. It occurs in the Mediterranean and the tropical Indian, Pacific and Atlantic.

Calocalanus pavo (DANA.) — 19° N. 39° E. (*temp.* 25,5; *sal.* 38,8). — Found in the tropical Pacific, the Mediterranean and the tropical Atlantic. I noted it from the Malay Archipelago.

Centropages calaninus (DANA). — 25° N. 36° E. (*temp.* 22,25; *sal.* 40,22). I noted this species from the Arabian Sea. It occurs, according to GIESBRECHT, in the tropical Pacific.

C. Orsinii GIESBR. — ASSAB (GIESBR.). — I found this species in the Arabian Sea (13° N. 52° E.).

Clausocalanus arcuicornis (DANA). — 16° N. 41° E. (*temp.* 24,5; *sal.* 37,41), ASSAB (GIESBR.). — I found this species in

samples from the Arabian Sea and Indian Ocean. It occurs in the Pacific (26° S.—20° N.), along the west coast of S. America, from 53° S., in the Mediterranean (GIESBR.). — Common in the temperate, eastern Atlantic (33° S.—55° N.).

C. furcatus (BRADY) — 25°—16° N. 36°—41° E. (*temp.* 22,25—25,5; *sal.* 40,22—37,41). I found it to be common in the Arabian Sea and tropical Indian Ocean. Pacific, Mediterranean (GIESBR.). Common in the tropical Atlantic.

Copilia mirabilis DANA — 22° N. 37° E. (*temp.* 23,65; *sal.* 39,5). — Occurs in the Indian Ocean, the Pacific and the tropical Atlantic.

Corycæus Danæ GIESBR. — 16° N. 41° E. (*temp.* 24,5; *sal.* 37,41). — I noted this species from the Arabian Sea and from the Malay Archipelago, where it is frequent. GIESBRECHT mentions this species from the tropical Pacific, 19° N.—3° S. 88°—175° W.

C. gibbulus GIESBR. — 16°—25° N. 41°—36° E. (*temp.* 22,25 to 25,5; *sal.* 37,41 to 40,22). — Common in the Arabian Sea and Indian Ocean. Tropical Pacific (GIESBR.).

C. obtusus Dana. — 16°—22° N. 41°—37° E. (*temp.* 23,65 to 25,5; *sal.* 37,41 to 39,5). I noted this species from the Arabian Sea and Indian Ocean as well as from the tropical Atlantic. Tropical Pacific (GIESBR.).

C. robustus GIESBR. — 13° N. 43° E. (*temp.* 24,8; *sal.* 36,35). Arabian Sea, Indian Ocean, Malay Archipelago. Tropical Pacific (GIESBR.).

Corynura denticulata GIESBR. — ASSAB (GIESBR.) — Not found outside the Red Sea.

C. recticauda GIESBR. — ASSAB (GIESBR.). — Not found outside the Red Sea.

Eucalanus attenuatus (DANA). — 16° N. 41° E. (*temp.* 24,5; *sal.* 37,41). I found this species in samples from the Malay Archipelago. Tropical Pacific (GIESBR.). Tropical Atlantic. Mediterranean.

E. subcrassus GIESBR.—ASSAB (GIESBR.). Malay Archipelago. Hongkong, Amoy and W. of S. America (3° S.—10° N. GIESBR.).

Labidocera acutum (DANA). — ASSAB (GIESBR.). I noted this species from the Arabian Sea and the Malay Archipelago. — Indian Ocean, Hongkong, Pacific (GIESBR.).

L. minutum GIESBR. — ASSAB (GIESBR.). — I noted this species from the Arabian Sea. GIESBRECHT mentions it also from Hongkong.

L. Orsinii GIESBR. — ASSAB (GIESBR.). — I found this species in samples from the Malay Archipelago.

L. pavo GIESBR. — ASSAB (GIESBR.). — I noted this species from the Malay Archipelago.

Microsetella atlantica BRADY & ROBTS. — 22° N. 37° E. (*temp.* 23,65; *sal.* 39,5). Arabian Sea, Indian Ocean, whole Atlantic. Pacific (GIESBR.).

Oithona plumifera BAIRD. — 13°—22° N. 43°—37° E. (*temp.* 23,65 to 24,8; *sal.* 36,35 to 39,5). Arabian Sea, Indian Ocean, Atlantic (33° S.—66° N.), Mediterranean. Pacific Ocean (GIESBR.).

Oncæa conifera GIESBR. — 16° N. 41° E. (*temp.* 24,5; *sal.* 37,41). I noted this species from the Malay Archipelago, where it is rather common. Pacific, Mediterranean (GIESBR.). North Siberian Island (G. O. SARS). North Atlantic, 62°—71° N., in deep water.

O. media GIESBR. — 16°—19° N. 42°—39° E. (*temp.* 24,5 to 25,5; *sal.* 37,41 to 38,8). This species occurs in the Arabian Sea, Indian Ocean and Malay Archipelago, according to GIESBR. in the Mediterranean and Pacific. It is common in the whole tropical Atlantic.

O. mediterranea (CLAUS.). — 13° N. 43° E. (*temp.* 24,8; *sal.* 36,35). Arabian Sea, Indian Ocean. Pacific, Mediterranean, Atlantic (GIESBR.). Franz Josef Land (TH. SCOTT).

O. venusta PHILIPPI. — 16°—19° N. 41°—39° E. (*temp.* 24,5 to 25,5; *sal.* 37,41 to 38,8). Arabian Sea, Atlantic. Mediterranean, Pacific (GIESBR.).

Paracalanus aculeatus GIESBR. — 16° N. 41° E. (*temp.* 24,5; *sal.* 37,41). ASSAB (GIESBR.). Rather common in the Arabian Sea and Indian Ocean. Pacific (GIESBR.). Tropical Atlantic.

P. parvus (CLAUS.). — 28° N. 34° E. (*temp.* 19,65; *sal.* 40,82). Rather common in the Arabian Sea and Indian Ocean. Pacific, Mediterranean (GIESBR.). Atlantic (32° S.—61° N.).

Pontellina plumata DANA. — 19° N. 39° E. (*temp.* 25,5; *sal.* 38,8). Indian Ocean, Pacific, Mediterranean (GIESBR.). Eastern Atlantic, 35° S.—38° N.

Temora discaudata GIESBR. — 16° N. 41° E. (*temp.* 24,5; *sal.* 37,41). ASSAB (GIESBR.). — Arabian Sea, Indian Ocean. Pacific (GIESBR.).

Ciliata.

Codonella morchella CL. — 13°—16° N. 43°—39° E. — Occurs in the Arabian Sea, the Caribbean Sea and the tropical Atlantic.

Cyttarocylis acuminata v. DAD. — 19° N. 39° E. — Arabian Sea, Indian Ocean, tropical and subtropical Atlantic, Mediterranean.

C. Hebe CL. — 19° N. 39° E.; 22° N. 37° E. (*temp.* 23,65; *sal.* 39,51). — Arabian Sea, Indian Ocean, tropical and subtropical Atlantic.

Dictyocysta templum HKL. — 16°—27° N. 41°—34° E. — Arabian Sea, Indian Ocean, subtropical and temperate Atlantic, Mediterranean.

Tintinnus Fraknoi v. DADAY. — 16°—19° N. 41°—39° E. — Arabian Sea, Indian Ocean, tropical and subtropical Atlantic, Mediterranean.

Undella Claparèdii ENTZ. — 16°—19° N. 41°—39° E. — Indian Ocean, tropical and temperate Atlantic. Mediterranean (ENTZ., v. DADAY).

Radiolaria.

Acanthometra quadrifolia HKL. — 19° N. 39° E. (*temp.* 25,5; *sal.* 38,8). — Arabian Sea, Indian Ocean, tropical and temperate Atlantic.

Diploconus fasces HKL. — 16° N. 41° E. — Tropical Atlantic, Mediterranean.

Cystoflagellata.

Noctiluca miliaris SURIRAY. — 16° N. 41° E. (*temp.* 24,5; *sal.* 37,41), very common. I noted this species abundantly in some samples from the Malay Archipelago. The English Channel and southern North Sea.

Silicoflagellata.

Dictyocha fibula EHB. — 27° N. 34° E. — Arabian Sea, South indian Ocean, South and North Atlantic.

Dinoflagellata.

Amphisolenia palmata STEIN. — 16° N. 41° E. — I noted this species from the Arabian Sea, Indian Ocean and tropical Atlantic.

Ceratium contortum GOURRET. — 22° N. 37° E. (*temp.* 23,65; *sal.* 39,5). — Arabian Sea, Indian Ocean, tropical Atlantic.

C. flagelliferum CL. — 22° N. 37° E. (*temp.* 23,65; *sal.* 39,5). — Arabian Sea, Indian Ocean, tropical Atlantic.

C. furca DUJ. — 19° N. 39° E. — Arabian Sea, Indian Ocean, whole eastern Atlantic.

C. fusus DUJ. — 16° N. 41° E. — Atlantic.

C. lineatum EHB. — 16°—27° N. 41°—34° E. — Arabian Sea, Indian Ocean, Atlantic.

C. tripos EHB. — 13°—19° N. 43°—39° E. — Arabian Sea, Indian Ocean, whole Atlantic.

C. volans CL. — 22° N. 37° E. (*temp.* 23,65; *sal.* 39,5). — Arabian Sea, Indian Ocean, tropical Atlantic.

C. vultur CL. — 16° N. 41° E. — Arabian Sea, Indian Ocean, tropical Atlantic.

Dinophysis miles CL. n. sp. — 13°—27° N. 43°—34° E. — Arabian Sea, Malay Archipelago.

By the above name I denote a characteristic form, allied to *D. homunculus*. The annexed figure makes the description superfluous.

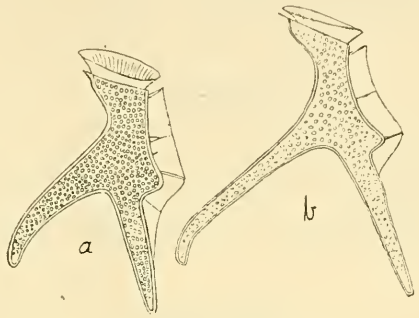

Fig. 1. *Dinophysis miles*, 250 t. m.
a. from the Red Sea; *b*. from the Malay Archipelago.

Exuviella compressa (Bail.). — 19° N. 39° E. — Arabian Sea, Indian Ocean, tropical and subtropical Atlantic.

Goniodoma acuminatum (Ehb.). — 16°—22° N. 41°—37° E. — Arabian Sea, Indian Ocean, tropical and subtropical Atlantic.

Histioneis magnificus (Stein). — 13°—16° N. 43°—41° E. — Arabian Sea, Indian Ocean, whole tropical Atlantic.

Peridinium divergens Ehb. (typus). — 22° N. 37° E. — Arabian Sea, Indian Ocean, whole tropical and temperate Atlantic.

P. globulus Stein. — 13°—19° N. 43°—41° E. — Arabian Sea, Indian Ocean, tropical and temperate Atlantic.

P. oceanicum Vanhöffen. — 13°—22° N. 43°—37° E. — Arabian Sea, Indian Ocean, whole Atlantic.

Phalacroma doryphorum Stein. — 27° N. 34° E. — Arabian Sea, Indian Ocean, tropical Atlantic.

Podolampas palmipes Stein. — 16° N. 41° E. — Arabian Sea, Indian Ocean, tropical and subtropical (rare in the temperate) Atlantic.

Pyrophacus horologium Stein. — 9° N. 59° E. — Arabian Sea, Indian Ocean, whole Atlantic.

Murracytæ.

Pyrocystis pseudonoctiluca J. Murr. — 16° N. 41° E. — Arabian Sea, Indian Ocean, whole tropical Atlantic.

Cyanophyceæ.

Trichodesmium erythræum Ehb. — 28° N. 34° E. (*temp.* 19,65; *sal.* 40,82). — I noted this species abundantly from the north of the Maldives, also from the Malay Archipelago and off Brazil.

Diatomaceæ.

Asterolampra marylandica Ehb. — 27° N. 34° E. — Arabian Sea, Indian Ocean, tropical Atlantic.

Asteromphalus reticulatus Cl. — 27° N. 34° E. — Malay Archipelago.

Bacteriastrum delicatulum Cl. — 27° N. 34° E. — Noted from the Arabian Sea and temperate Atlantic.

Cerataulina Bergonii H. Per. — 27° N. 34° E. — Temperate Atlantic.

Chætoceros coarctatus Lauder (= *C. rudis* Cl.). — 16°—27° N. 41°—34° E. — Arabian Sea, Indian Ocean, Malay Archipelago, tropical Atlantic. This species occurs almost always associated with a small *zooxanthella*-like organism.

C. contortus Schütt. — 22°—27° N. 37°—34° E. (*temp.* 23,65; *sal.* 39,5). Temperate and northern Atlantic.

C. diversus Cl. — 16°—27° N. 41°—34° E. — Indian Ocean, Malay Archipelago, tropical Atlantic.

C. (atlanticus var.?) exiguus Cl. — 27° N. 34° E. — Southern Atlantic and between the Azores and the English Channel.

C. furca Cl. — 16°—27° N. 41°—34° E. — I noted this species in the Arabian Sea. It occurs in the spring N. of the Azores.

C. (didymus var.) longicruris CL. — 27 N. 34° E. — Ascension, temperate Atlantic.

C. Lorenzianus GRUN. — 16°—28° N. 41°—34° E. (*temp.* 19,65 to 25,5; *sal.* 38,8 to 40,82). — Arabian Sea, Indian Ocean, Malay Archipelago, tropical Atlantic.

C. peruvianus BRIGHTW. — 16°—27° N. 41°—34° E. (*temp.* 25,5; *sal.* 38,8). — Arabian Sea, Indian Ocean, warmer Atlantic.

C. Schüttii CL. — 27° N. 34° E. — Temperate Atlantic.

Climacodium biconcavum CL. — 27° N. 34° E. — Indian Ocean, tropical Atlantic.

C. Frauenfeldii GRUN. — 13°—27° N. 43°—34° E. (*temp.* 23,65 to 25,5; *sal.* 36,20 to 39,5). — Arabian Sea, Indian Ocean, tropical Atlantic.

Coscinodiscus anguste-lineatus A. SCHM. — 27° N. 34° E. — Arabian Sea, Atlantic.

C. sol WALLICH. — 13°—27° N. 43°—34° E. — Arabian Sea, Indian Ocean, temperate Atlantic.

Dactyliosolen hyalinus CL. — 16° N. 41° E. (*temp.* 24,5; *sal.* 37,41). — Malay Archipelago, temperate Atlantic.

D. mediterraneus H. P. — 27° N. 34° E. — South and temperate N. Atlantic.

Eucampia cornuta (CL.). — 27° N. 34° E. — Malay Archipelago and at the Azores.

Hemiaulus Heibergii CL. — 27° N. 34° E. — Indian Ocean, Malay Archipelago and tropical Atlantic.

Leptocylindrus danicus CL. — 27° N. 34° E. — This species is of so frequent occurrence in the northern Atlantic, besides off Spitzbergen, that I have classified it as a boreal species. This may be doubtful, as it has been found off Coruña and in the Mediterranean (SCHRÖDER).

Navicula membranacea CL. — 19°—27° N. 39°—34° E. (*temp.* 25,5; *sal.* 38,8). — Northern Atlantic (Plymouth, Scotland, Skagerak).

Nitzschia (pungens var.) atlantica Cl. — 27° N. 34° E. —

(**Pseudoeunotia doliolus** Wallich. Not found in the Red Sea but in the Gulf of Aden, where it occurred abundantly at 11° N. 51° E. This species is very characteristic for the southern Indian Ocean and southern Atlantic.)

Rhizosolenia alata Btw. — 16°—27° N. 41°—34° E. (*temp.* 25,5; *sal.* 38,8). — Arabian Sea, temperate Atlantic.

var. **gracillima** Cl. — Together with the coarser typical form.

R. robusta Norm. — 19° N. 39° E. (*temp.* 25,5; *sal.* 38,8). — Arabian Sea, Malay Archipelago, along the coasts of the tropical Atlantic.

R. Shrubsolei Cl. — 27° N. 34° E. — Temperate Atlantic.

R. styliformis Btw. — 22° N. 37° E. (*temp.* 23,65; *sal.* 39,5). — Arabian Sea, Malay Archipelago, southern Indian Ocean, southern and temperate Atlantic.

Striatella delicatula (Kütz.), very abundant at 13°—19° N. 43°—39° E. (*temp.* 24,8 to 25,5; *sal.* 36,35 to 38,8). — Arabian Sea, Indian Ocean.

Thalassiosira monile n. sp., very common at 19° N. 39° E. (*temp.* 25,5; *sal.* 38,8).

The cellules occur inbedded in globular gelatinous masses, united into moniliform colonies. The pervalvar axis shorter than the diameter of the valve. The alveoli of the valve have the same arrangement as in *Coscinodiscus excentricus*, about 12 in 0,01 mm., somewhat closer near the margin, which is provided with a row of small tubercules, 3,5 in 0,01 m.m. Between the central alveoli there is a small porus. The cylindrical part of the valve as well as the zone is very finely striate (29 striæ in 0,01 m. m.).

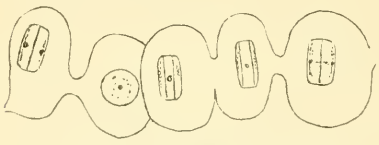

Fig. 2. *Thalassiosira monile*, a chain 250 t. m.

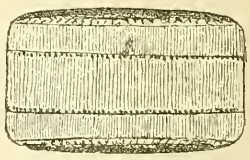

Fig. 3. A cellule in the zonal view, 1,000 t. m.

Thalassiothrix longissima Cl. & Grun. Sparingly at 13°—27° N. 43°—34° E. (*temp.* 25,5; *sal.* 38,8). — Arctic and antarctic seas, whence it follows the currents to far distant regions.

The above list contains 99 plankton-organisms noted from the Red Sea, a number which doubtless will be multipled by a more throughout exploration. In the following I denote by R forms not found outside the Red Sea, by IP forms occurring in the tropical parts of the Indian Ocean and the Pacific, by At forms occurring in the tropical Atlantic and by A forms occurring in the temperate and northern Atlantic.

	Number of Species.	R	IP	At	A
Copepoda . . .	37	8 %	92 %	38 %	13 %
Ciliata	6	0 »	100 »	83 »	17 »
Radiolaria . .	2	0 »	50 »	50 »	50 »
Cystoflagellata .	1	0 »	100 »	0 »	100 »
Silicoflagellata .	1	0 »	100 »	—	100 »
Dinoflagellatæ .	19	0 »	100 »	80 »	42 »
Murracytæ . .	1	0 »	100 »	100 »	0 »
Cyanophyceæ .	1	0 »	100 »	100 »	0 »
Diatomaceæ . .	31	3 »	64 »	29 »	64 ».

We find thus that 8 % of the copepoda and 3 % of the diatoms have not hiterto been found outside the Red Sea. This depends doubtless on insufficient researches, as the basin of the Red Sea is of such a recent origin that indigenous species are highly improbable. This narrow sea, situated between two very dry and hot countries is continually exposed to a strong evaporation, by means of which the salinity increases and the volume of the water decreases. Therefore, if the level should remain, fresh supply of water from the Arabian Sea must come in for covering the loss by evaporation, and with that water doubtless plankton follows. One may consequently expect to find in the north a higher salinity than in the south, which

also agrees with the salinity-determinations, carried out by Prof. O. PETTERSSON on the samples of water collected by Dr. AURIVILLIUS:

Nr.	1	. .	27°	51′	N.	33°	34′	E.	temp. 19,65 salin. 40,82
»	2	. .	25°	22′	»	35°	31′	»	» 22,25 » 40,22
»	3	. .	22°	25′	»	37°	25′	»	» 23,65 » 39,5
»	4	. .	19°	22′	»	39°	15′	»	» 25,5 » 38,8
»	5	. .	16°	16′	»	41°	12′	»	» 24,5 » 37,41
»	6	. .	13°	16′	»	43°	3′	»	» 24,8 » 36,35.

The water N. 1 and 2 was almost sterile in plankton, the high salinity evidently being inimical to the plankton-organisms. Most organisms noted in the above derive from No. 3—6.

Almost all *copepoda* (92 %) occur in the Indo-pacific region, many, or 38 %, also in the tropical Atlantic, both having a very large number of plankton-organisms in common.

Of the *diatoms* 29 % only occur in the tropical Atlantic, but 64 % in the temperate and northern Atlantic, which is a fact of great interest, as many among these diatoms are the same as occur in the spring in the area N. of the Azores. There can scarcely be any doubt that the water, which expands in the spring N. of the Azores and during the summer moves towards Iceland and the Färöe Channel, derives from the southern Atlantic, in parts from the Antarctic Ocean. [1]) The same is probably the case, at least to some extent, with the water that enters the Red Sea, as we find among the plankton-organisms *Thalassiothrix longissima*, an arctic and antarctic species, which scarcely can live permanently in a water of so high a salinity and temperature as that of the Red Sea. The occurrence of *Pseudoeunotia doliolus* in the Gulf of Aden strongly corroborates this hypothesis, as the said diatom is characteristic for the southern Atlantic and southern Indian Ocean.

[1]) Öfvers. K. Sv. Vet. Akad. Förh. 1900. N:o 7, p. 921.

Additional.

Since the above was written I found that Dr. GIESBRECHT [1]) has reported on the copepoda, collected in the Red Sea during July and August in 1895. Among these copepoda the following have not been mentioned above:

Calanus vulgaris (DANA). I found this species in the Arabian Sea and, plentifully, in the Malay Archipelago.

Calanopia elliptica DANA, which I found sparingly in some samples from the Malay Archipelago.

Candace catula GIESBR., a species which I noted in several samples from the Malay Archipelago.

Candace curta DANA, noted from the S. W. of S. America and from the southern Atlantic (50° S. to Aeqv.).

Centropages elongatus GIESBR., not found outside the Red Sea.

C. furcatus DANA, noted from the Straits of Banka, Australia E. and N., the Philippines and America between 10° N. 10° S. I found this species in samples from the Indian Ocean, the Malay Archipelago, abundant at Rio Janeiro, also W. of Africa, 5° S. 4° E. to 6° S. 12° W., and at 9°—10° N. 52°—59° W.

Clytemnestra rostrata (BRADY.), noted from 3° S. 99° W., 27° S. 87° E., the Mediterranean and the warmer Atlantic.

Eucalanus subcrassus GIESBR. I noted this species in some samples from the Malay Archipelago.

Euterpe acutifrons (DANA), which I noted from the Indian Ocean and the Malay Archipelago. It occurs in the Atlantic along the coasts, E. and W., also in the English Channel and the southern North Sea.

Monops Krämeri GIESBR., not found outside the Red Sea.

Oithona nana GIESBR., noted from the Mediterranean.

O. rigida GIESBR. I found this species in some samples from the Malay Archipelago, where it seems not to be rare.

[1]) Ueber pelagische Copepoden des Rothen Meeres in Zool. Jahrbücher 1896, Vol. IX, pag. 315.

Pleuromma abdominale (LUBB.). This species has been found in the Indian, Pacific, Mediterranean and the Atlantic (16°—49° N.). I found it very sparingly in samples from the Malay Archipelago.

Sapphirina nigro-maculata CLAUS. Found in the Mediterranean and the Pacific (20° N.—64° S.). I noted it from the Malay Archipelago and the Atlantic (6° S. to 49° N.).

Schmackeria salina GIESBR., not found outside the Red Sea.

Scolecithrix chelifer GIESBR., not found outside the Red Sea.

Setella gracilis DANA. I noted this species from the Arabian Sea, the Indian Ocean and the Malay Archipelago. It is common in the whole tropical Atlantic.