

CONSEIL INTERNATIONAL POUR L'EXPLORATION DE LA MER

Zooplankton

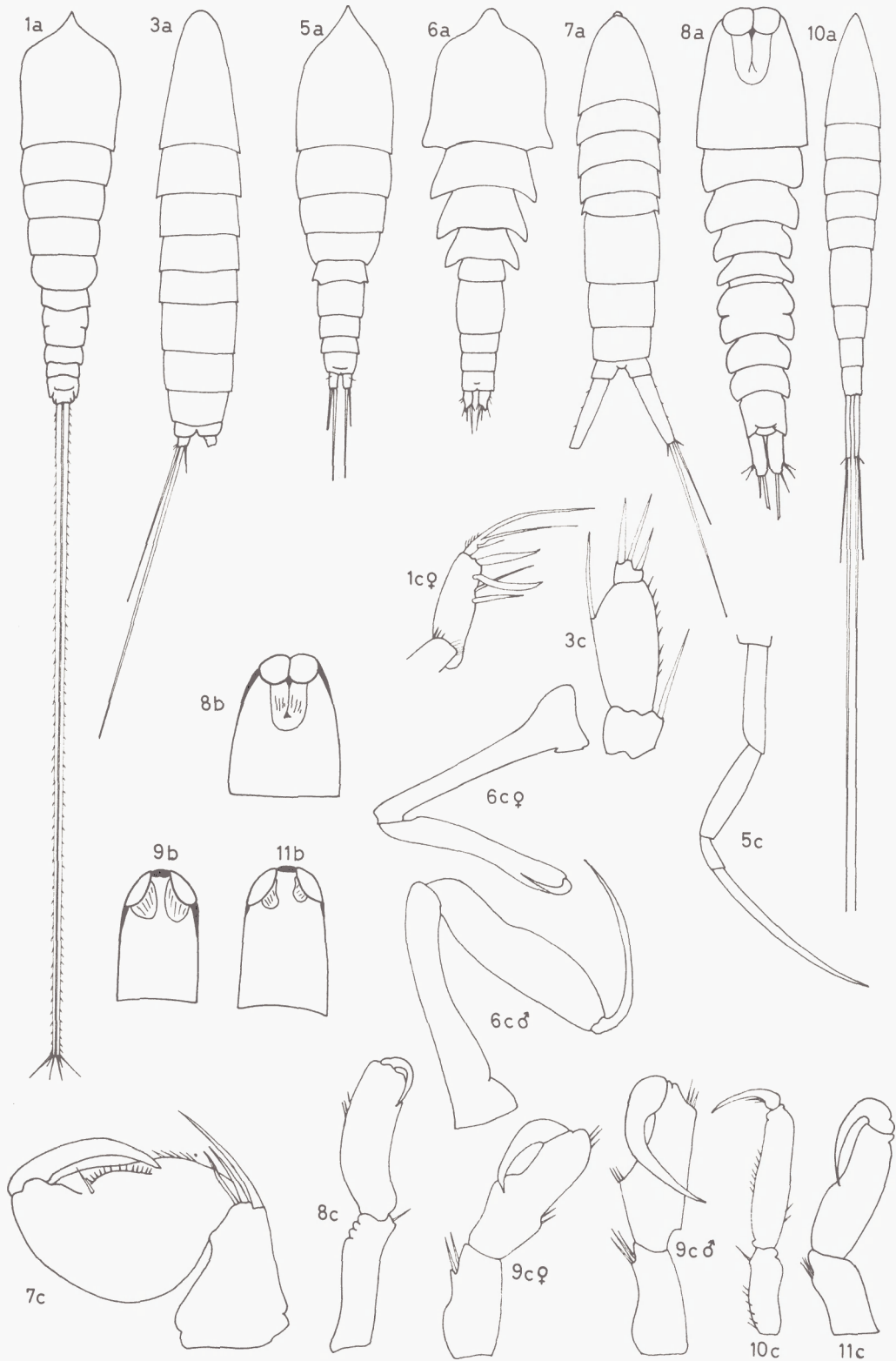
Sheet 133

To replace sheet No. 4

COPEPODA - I
SUB-ORDER HARPACTICOIDA

(Revised by J. B. J. WELLS)

1970



1. *Aegisthus aculeatus*; 2. *A. mucronatus*; 3. *Microsetella norvegica*; 4. *M. rosea*; 5. *Euterpina acutifrons*; 6. *Clytemnestra scutellata*; 7. *Parathalestris croni*; 8. *Miracia efferata*; 9. *M. minor*; 10. *Macrosetella gracilis*; 11. *Oculosetella gracilis*.

a - ♀ dorsal; b - cephalothorax dorsal; c - maxilliped; d - ♀ P. 1; e - P. 5.



Acknowledgements - GIESBRECHT, 1892 (1a, c, d, e, 2e♀, 3e♂, 4e, 6c, 8c, d, 10a, c, e); SARS, 1911 (3a, c, d, e♀, 7a, c, d, e♀); SARS, 1921 (5, 6a, d, e); SCOTT, 1893 (2e♂, 9c, e); BRADY, 1880 (7e♂); WHEELER, 1899 (8e); WILSON, 1932 (11e); original (8a, b, 9b, 11b, c).

HARPACTICOIDA

Family Aegisthidae

Genus *Aegisthus* Giesbrecht

First thoracic segment free. Caudal rami short, fused to the last segment, furcal setae at least twice as long as the the entire body. Maxilla and maxilliped rudimentary in male. Both rami P. 1–P. 4 of three segments. P. 5 styliform.

A. aculeatus Giesbrecht, 1891. GIESBRECHT, 1892, p. 573, Pl. 46, Figs. 44–45, 50, Pl. 49, Figs. 1, 4–5, 7–9, 11; LANG, 1948, p. 177, Fig. 106. (♂ unknown).

A. mucronatus Giesbrecht, 1891. GIESBRECHT, 1892, p. 573, Pl. 46, Figs. 46–49, 51, Pl. 49, Figs. 2–3, 6, 10; T. SCOTT, 1893, p. 104, Pl. XI, Figs. 31–44 (as *A. longirostris*); LANG, 1948, p. 175, Fig. 105.

A. spinulosus Farran, 1905. FARRAN, 1905, p. 46, Pl. XII, Figs. 8–14, Pl. XIII, Figs. 1–4; LANG, 1948, p. 177, Fig. 107 (♂ unknown).

LANG (1948) considers this is a species of doubtful validity. On morphological grounds it is difficult to distinguish from the other species and has certain features which make LANG (1948, p. 174) conclude that it is a last copepodid stage, possibly of *A. aculeatus*. WILSON (1942, 1950) records it from the Pacific Ocean but gives no indication how he identified it as this species.

Family Ectinosomidae

Genus *Microsetella* Brady & Robertson

First thoracic segment fused with head. Caudal rami about as long as broad, furcal setae 1–2 times as long as the body. Both rami P. 1–P. 4 of three segments. Basendopodite P. 5 expanded on inner side. P. 5 reduced in the male.

M. norvegica (Boeck, 1864). GIESBRECHT, 1892, p. 550, Pl. 44, Figs. 33–34, 36, 39–40, 42, 44–45 (as *M. atlantica*); SARS, 1904, p. 44, Pl. XXIV; LANG, 1948, p. 230, Fig. 122.

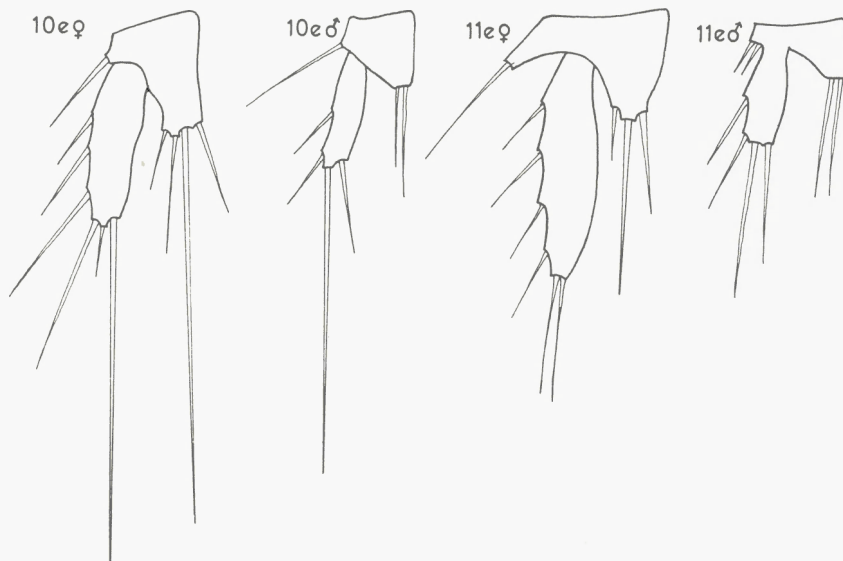
M. rosea (Dana, 1848). GIESBRECHT, 1892, p. 550, Pl. 44, Figs. 32, 35, 37–38, 41, 43, 46, 48–49; JOHNSON, 1942, p. 432, Pl. I (♂); LANG, 1948, p. 232, Fig. 122.

Family Tachidiidae

Genus *Euterpina* Norman

First thoracic segment fused with head. Caudal rami shorter than the last segment, furcal setae short. Both rami P. 1 of two segments; P. 2–P. 4 of three segments. Endopod P. 2 ♂ modified, two segments. P. 5 a rectangular plate, the pair fused together.

E. acutifrons (Dana, 1848). GIESBRECHT, 1892, p. 555, Pl. 44, Figs. 16–31 (as *Euterpe*); SARS, 1921, p. 97, Pl. LXVII; LANG, 1948, p. 285, Fig. 142.



Family Pseudo-Peltidiidae

Genus *Clytemnestra* Dana

First thoracic segment fused with head. Cephalothorax and thoracic segments with large epimeral plates. Caudal rami not longer than the last segment, furcal setae very short. Maxilliped extremely long and slender, with sexual dimorphism. P. 1 with endopodite of one segment, exopodite of three segments. Both rami P. 2–P. 4 of three segments. P. 5 styliform.

C. scutellata Dana, 1848. GIESBRECHT, 1892, p. 566, Pl. 1, Fig. 9, Pl. 45, Figs. 16–18, 21, 23–24, 27–30, 32, 34–38; Sars, 1921, p. 100, Pl. LXIX; LANG, 1948, p. 461, Fig. 195.

C. rostrata (Brady, 1883). GIESBRECHT, 1892, pp. 566, 572, Pl. 45, Figs. 19–20, 22, 25–26, 31, 33; LANG, 1948, p. 462, Fig. 195.

Family Thalestridae

Genus *Parathalestris* Brady & Robertson

First thoracic segment fused with head. Caudal rami longer than the last segment, about four times as long as broad, furcal setae about half the length of the body. Both rami P. 1–P. 4 of three segments. Endopodite P. 2 ♂ modified, of two segments. Basendopodite P. 5 expanded on inner side. Large eye spot present.

P. croni (Kröyer, 1842). Sars, 1905, p. 118, Pl. LXXII (as *Halithalestris*); BRADY, 1880, p. 133, Pl. LIX, Figs. 2–11 (as *Thalestris serrulata*) (♂); LANG, 1948, p. 511, Figs. 209, 211.

Family Miracidae

First thoracic segment fused with head. Caudal rami about as long as the last two segments. P. 1 with exopodite of three segments, endopodite of two segments. Both rami P. 2–P. 4 of three segments. Endopodite P. 2 ♂ modified, of two segments. Basendopodite P. 5 expanded on inner side. Cephalothorax usually with a pair of large cuticular lenses.

Genus *Miracia* Dana

Cuticular lenses present. Exopodite of antenna of one segment with two setae.

M. efferata Dana, 1852. BRADY, 1883, p. 102, Pl. XLIII, Figs. 1–16; GIESBRECHT, 1892, p. 563, Pl. 45, Figs. 39–48 (♂); WHEELER, 1899, p. 188, Fig. 25; WILSON, 1932, p. 284, Fig. 176; LANG, 1948, p. 768, Fig. 311.

M. minor T. Scott, 1893. T. SCOTT, 1893, p. 102, Pl. XI, Figs. 18–30; GIESBRECHT, 1895, p. 217, Pl. 9, Figs. 1–13; LANG, 1948, p. 770, Fig. 311.

Genus *Macrosetella* A. Scott

Cuticular lenses absent; a simple eye spot present. Body very slender and fusiform.

M. gracilis (Dana, 1848). GIESBRECHT, 1892, p. 559, Pl. 1, Fig. 12, Pl. 45, Figs. 1–15 (as *Setella*); LANG, 1948, p. 770, Fig. 311.

Genus *Oculosetella* Dahl

Cuticular lenses present. Exopodite of antenna absent.

O. gracilis (Dana, 1852). DANA, 1852, p. 1261, Pl. 88, Figs. 12 a–c; WILSON, 1932, p. 283, Fig. 176; LANG, 1948, p. 770, Fig. 311. (In most papers prior to 1948, and in many since, this species is referred to as *Macrosetella oculata*).

KEY TO THE SPECIES

- | | | |
|--|--------------------------------------|---|
| 1. 1st. thoracic seg. free; a total of 9 free body segs. in ♀, 10 in ♂ | (Fam. Aegisthidae) | 2 |
| 1st thoracic seg. fused with head; a total of 8 free body segs. in ♀, 9 in ♂ | | 3 |
| 2. ♀ antennule 6-segs. Cephalothorax and thorax without network of ripples in chitin | <i>A. mucronatus</i> (Fig. 2) | |
| ♀ antennule 7-segs. Cephalothorax and thorax with network of ripples in chitin | <i>A. aculeatus</i> (Fig. 1) | |
| 3. Both rami of P. 1 2-segs | <i>Euterpina acutifrons</i> (Fig. 5) | |
| At least one of the rami of P. 1 3-segs | | 4 |
| 4. Exopodite of P. 1 1-seg., P. 5 styliform | (<i>Clytemnestra</i>) | 5 |
| Exopodite of P. 1 3-segs., P. 5 not styliform | | 6 |
| 5. ♀ antennule 8-segs., exopodite of P. 1 with 4 setae | <i>C. scutellata</i> (Fig. 6) | |
| ♀ antennule 7-segs., exopodite of P. 1 with 3 setae | <i>C. rostrata</i> | |

6. Endopodite of P. 1 2-segs	(Fam. Miracidae)	7
Endopodite of P. 1 3-segs		10
7. Cuticular lenses absent, body narrowly fusiform	<i>Macrosetella gracilis</i> (Fig. 10)	
Cuticular lenses present, body more or less cylindrical		8
8. Exopodite of antenna absent	<i>Oculosetella gracilis</i> (Fig. 11)	
Exopodite of antenna 1-seg., with 2 setae	(<i>Miracia</i>)	9
9. Basendopodite of P. 5 ♀ with 5 setae, ♂ with 3 setae	<i>M. efferata</i> (Fig. 8)	
Basendopodite of P. 5 ♀ with 4 setae, ♂ with 2 setae	<i>M. minor</i> (Fig. 9)	
10. Body slightly fusiform, caudal rami 4 times as long as broad	<i>Parathalestris croni</i> (Fig. 7)	
Body distinctly fusiform, caudal rami about as long as broad	(<i>Microsetella</i>)	11
11. Setae of caudal rami not longer than the body	<i>M. norvegica</i> (Fig. 3)	
Setae of caudal rami at least twice as long as the body	<i>M. rosea</i> (Fig. 4)	

Important works on the biology and distribution of the species

LANG (1948) summarizes the information known to about 1940 on the distribution, ecology and biology of each species and gives a general account of the distribution of the pelagic species. SEWELL (1948) gives a comprehensive review of the geographical distribution of planktonic copepods. The more useful papers published since 1940 are listed below.

Microsetella norvegica: DE DECKER, 1964; FISH, 1955; TANAKA, 1960; WIBORG, 1954; WILSON, 1942.

M. rosea: BJÖRNBERG, 1963; BOGOROV, 1958; DAVIS, 1950; DE DECKER, 1964; LEGARÉ, 1961; WILSON, 1942; ZOPPI, 1961.

Euterpina acutifrons: BERNARD, 1963; BJÖRNBERG, 1963; DAVIS, 1950; DE DECKER, 1964; DE DECKER & MOMBERG, 1964; GANAPATI & SHANTHAKUMARI, 1961; GRICE, 1956; HAQ, 1965; LEGARÉ, 1961; EL MAGHRABY, 1965 a, b; TANAKA, 1960; WILSON, 1942; WOODMANSEE, 1958; ZOPPI, 1961.

Clytemnestra scutellata: DE DECKER, 1964; WILSON, 1942.

C. rostrata: BJÖRNBERG, 1963; BOGOROV, 1958; DE DECKER, 1964; DE DECKER & MOMBERG, 1964; LEGARÉ, 1961; WILSON, 1942; ZOPPI, 1961.

Miracia efferata: BJÖRNBERG, 1965; EVANS, 1961; LEGARÉ, 1961; WILSON, 1942.

Macrosetella gracilis: BJÖRNBERG, 1963, 1965; BOGOROV, 1958; DAVIS, 1950; DE DECKER, 1964; DE DECKER & MOMBERG, 1964; EVANS, 1961; GANAPATI & SHANTHAKUMARI, 1961; GRICE & HART, 1962; LEGARÉ, 1961; MOORE & O'BERRY, 1957; MOORE & ROEHR, 1966; TANAKA, 1960; WILSON, 1942; ZOPPI, 1961.

Oculosetella gracilis: BJÖRNBERG, 1965; WILSON, 1942.

Distribution

Aegisthus aculeatus: Southern North Atlantic Ocean, Agulhas current, eastern Indian Ocean, Celebes Sea, eastern Pacific Ocean. Characteristic of moderate depths (150–1500 m.), occasionally at surface.

A. mucronatus: World-wide, except polar seas. Characteristic of moderate to deep waters (150–3000 m.), occasionally at surface.

A. spinulosus: Very rare; one record west of Ireland, isolated records from eastern Pacific Ocean.

Microsetella norvegica: World-wide, except polar seas. Pelagic.

M. rosea: World-wide, including polar seas. Pelagic.

Euterpina acutifrons: World-wide, except polar seas. Pelagic.

Clytemnestra scutellata and *C. rostrata*: Pan-temperate and pan-tropical. Pelagic, some indication that it descends to moderate depths.

Parathalestris croni: Arctic and Atlantic Oceans, north of 42°N. Pelagic, often associated with floating seaweed.

Family Miracidae: See STEUER (1935) for details to that date. All species pelagic.

Miracia efferata: World-wide, except polar seas.

M. minor: Tropical Atlantic and Indian Oceans. One record from the western Mediterranean Sea.

Macrosetella gracilis: Mainly between 15°C mean annual surface temperature isotherms. Scattered records in north Atlantic and Southern Oceans outside these limits.

Oculosetella gracilis: Confined between 15°C mean annual surface temperature isotherms, more common between 25°C isotherms.

Other species of Harpacticoida taken in the plankton

In addition to the 13 species considered above a large number of species have been taken in plankton. In most cases they have been found in the neritic zone and usually only in waters very close to the shore. They are properly considered as part of the littoral and shallow sublittoral benthic fauna which have been become temporarily displaced, their normal habitat being among the attached algae. Identification of these temporary plankters can be made with LANG (1948).

REFERENCES

- BERNARD, M., 1963. "Le cycle vital au laboratoire d'un Copépode pélagique de Méditerranée: *Euterpina acutifrons* Claus." *Pelagos*, **1**: 35-48.
- BJÖRNBERG, T. K. S., 1963. "On the marine free-living copepods off Brazil." *Bolm Inst. Oceanogr.*, S Paulo, **13**: 3-142.
- BJÖRNBERG, T. K. S., 1965. "Observations on the development and the biology of the Miracidae Dana (Copepoda: Crustacea)." *Bull. mar. Sci. Gulf Caribb.*, **15**: 512-520.
- BOGOROV, B. G., 1958. "Biogeographical regions of the plankton of the northwest Pacific Ocean and their influence in the deep sea." *Deep Sea Res.*, **5**: 149-161.
- BRADY, G. S., 1880. "*A monograph of the free and semiparasitic Copepoda of the British Islands*". 2 Ray Society, London, 182 pp.
- BRADY, G. S., 1883. "Report on the Copepoda obtained by H.M.S. "Challenger" during the years 1873-1876". *Rep. scient. Results H.M.S. "Challenger" 1873-1876*, Zool., **8**: (1) 1-142.
- DANA, J. D., 1852. "Crustacea". *In* U.S. Exploring Expedition during the years 1838-1842, under the command of Charles Wilkes. **13**: (2) 1019-1262.
- DAVIS, C. C., 1950. "Observations of plankton taken in the marine waters of Florida in 1947 and 1948". *Q.Jl. Fla Acad. Sci.*, **12**: 67-103.
- DE DECKER, A., 1964. "Observations on the ecology and distribution of Copepoda in the marine plankton of South Africa". *Investl Rep. Div. Fish. Un. S. Afr.*, **49**: 1-33.
- DE DECKER, A. & MOMBERG, F. J., 1964. "A preliminary report on the planktonic Copepoda". *Investl Rep. Div. Fish. Un. S. Afr.*, **51**: 1-49.
- EVANS, F., 1961. "The planktonic Crustacea of the Petula transatlantic expedition". *Proc. Linn. Soc. Lond.*, **172**: 189-207.
- FARRAN, G. P., 1905. "Report on the Copepoda of the Atlantic slope off counties Mayo and Galway". *Rep. Sea inld Fish. Ire.*, 1902-1903, pt. 2, app. 2.
- FISH, C. J., 1955. "Observations on the biology of *Microsetella norvegica*". *Deep Sea Res.*, **3**: (suppl.) 242-49.
- GANAPATI, P. N. & SHANTHAKUMARI, K., 1961. "The systematics and distribution of planktonic copepods in the Lawson's Bay, Waltair". *J. mar. biol. Ass. India*, **3**: 6-18.
- GIESBRECHT, W., 1892. "Systematik und Faunistik der pelagischen Copepoden des Golfes von Neapel und der angrenzenden Meeres-abschnitte". *Fauna Flora Golf. Neapel*, **19**.
- GIESBRECHT, W., 1895. "Mittheilungen über Copepoden. 10-11". *Mitt. zool. Stn Neapel*, **12**: 217-26.
- GRICE, G. D., 1956. "A qualitative and quantitative seasonal study of the Copepoda of Alligator Harbor". *Fla St. Univ. Stud.*, **22**: 37-76.
- GRICE, G. D. & HART, A. D., 1962. "The abundance, seasonal occurrence and distribution of the epizooplankton between New York and Bermuda". *Ecol. Monogr.*, **32**: 287-309.
- HAQ, S. M., 1965. "Development of the copepod *Euterpina acutifrons* with special reference to dimorphism in the male". *Proc. zool. Soc. Lond.*, **144**: 175-201.
- JOHNSON, M. W., 1942. "Concerning the hitherto unknown males of the copepods *Microsetella norvegica* (Dana), *Vetteria granulosa* (Giesbrecht) and *Corissa parva* Farran". *Trans. Am. microsc. Soc.*, **61**: 430-37.
- LANG, K., 1948. "*Monographie der Harpacticiden*". Håkan Ohlsson, Lund. 1682 pp.
- LEGARÉ, J. E. H., 1961. "Preliminary survey of the zooplankton of the Cariaco region". *Boln Inst. Oceanogr. Univ. Oriente (Venez.)*, **1**: 191-218.
- EL MAGHRABY, A. M., 1965 a. "The developmental stages and occurrence of the copepod *Euterpina acutifrons* in the marine environment of Alexandria, U.A.R.". *Ann. Mag. nat. Hist.*, ser. 13, **7**: 223-33.
- EL MAGHRABY, A. M., 1965 b. "The seasonal variation in length of some marine planktonic copepods from the eastern Mediterranean at Alexandria". *Crustaceana*, **8**: 37-47.
- MOORE, H. B. & O'BERRY, D. L., 1957. "Plankton of the Florida Current. IV. Factors influencing the vertical distribution of some copepods". *Bull. mar. Sci. Gulf Caribb.*, **7**: 297-315.
- MOORE, H. B. & ROEHR, M. G., 1966. "Nut values of temperature, illumination, and pressure for a series of oceanic copepods". *Bull. mar. Sci. Gulf Caribb.*, **16**: 259-272.
- SARS, G. O., 1911. "Copepoda Harpacticoida. An Account of the Crustacea of Norway," **5**. Bergen. 449 pp.
- SARS, G. O., 1921. "Copepoda supplement. An Account of the Crustacea of Norway," **7**. Bergen. 121 pp.
- SCOTT, T., 1893. "Report on Entomostraca from the Gulf of Guinea, collected by John Rattray, B.Sc." *Trans. Linn. Soc. Lond.*, Zool., **6**: 1-161.
- SEWELL, R. B. S., 1948. "The free-swimming planktonic Copepoda. Geographical distribution". *Scient. Rep. John Murray Exped.*, **8**: 317-592.
- STEUER, A., 1935. "Die Copepodenfamilie der Macrosetellidae". *Sber. Akad. Wiss. Wien, math.-naturw. Kl., Abt. 1*, **144**: 391-399.
- TANAKA, O., 1960. "Biological results of the Japanese Antarctic expedition. 10. Pelagic Copepoda". *Spec. Publs Seto mar. biol. Lab.*, **10**: 1-95.
- WHEELER, W. M., 1899. "The free-swimming copepods of the Woods Hole region". *Bull. U.S. Fish. Comm.*, **19**: 157-92.
- WIBORG, K. F., 1954. "Investigations on zooplankton in coastal and offshore waters of western and northwestern Norway". *FiskDir. Skr., ser. Havunders.*, **11**: 5-246.
- WILSON, C. B., 1932. "The copepods of the Woods Hole region Massachusetts". *Bull. U.S. natn. Mus.*, **158**: 1-635.
- WILSON, C. B., 1942. "Scientific results of Cruise VII of the Carnegie during 1928-29 under the command of Captain J. P. Ault. Biology - I. The copepods of the plankton gathered during the last cruise of the Carnegie". *Publs Carnegie Instn.*, (536) 1-237.
- WILSON, C. B., 1950. "Contribution to the biology of the Philippine Archipelago and adjacent regions. Copepods gathered by the United States fisheries steamer "Albatross" from 1887 to 1909, chiefly in the Pacific Ocean". *Bull. U.S. natn. Mus.*, **100**: (14) 141-441.
- WOODMANSEE, R. A., 1958. "The seasonal distribution of the zooplankton off Chicken Key in Biscayne Bay, Florida". *Ecology*, **39**: 247-262.
- ZOPPI, E., 1961. "Distribucion vertical del zooplancton en el Golfo y extremo este de la Fosa de Cariaco". *Boln Inst. Oceanogr. Univ. Oriente (Venez.)*, **1**: 219-247.