

FICHES D'IDENTIFICATION DU ZOOPLANCTON

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FICHE NO. 169/170/171

CRUSTACEA

ORDER: COPEPODA
SUB-ORDER: CYCLOPOIDA
FAMILY: ONCAEIDAE
GENUS: ONCAEA

by

S.J. MALT

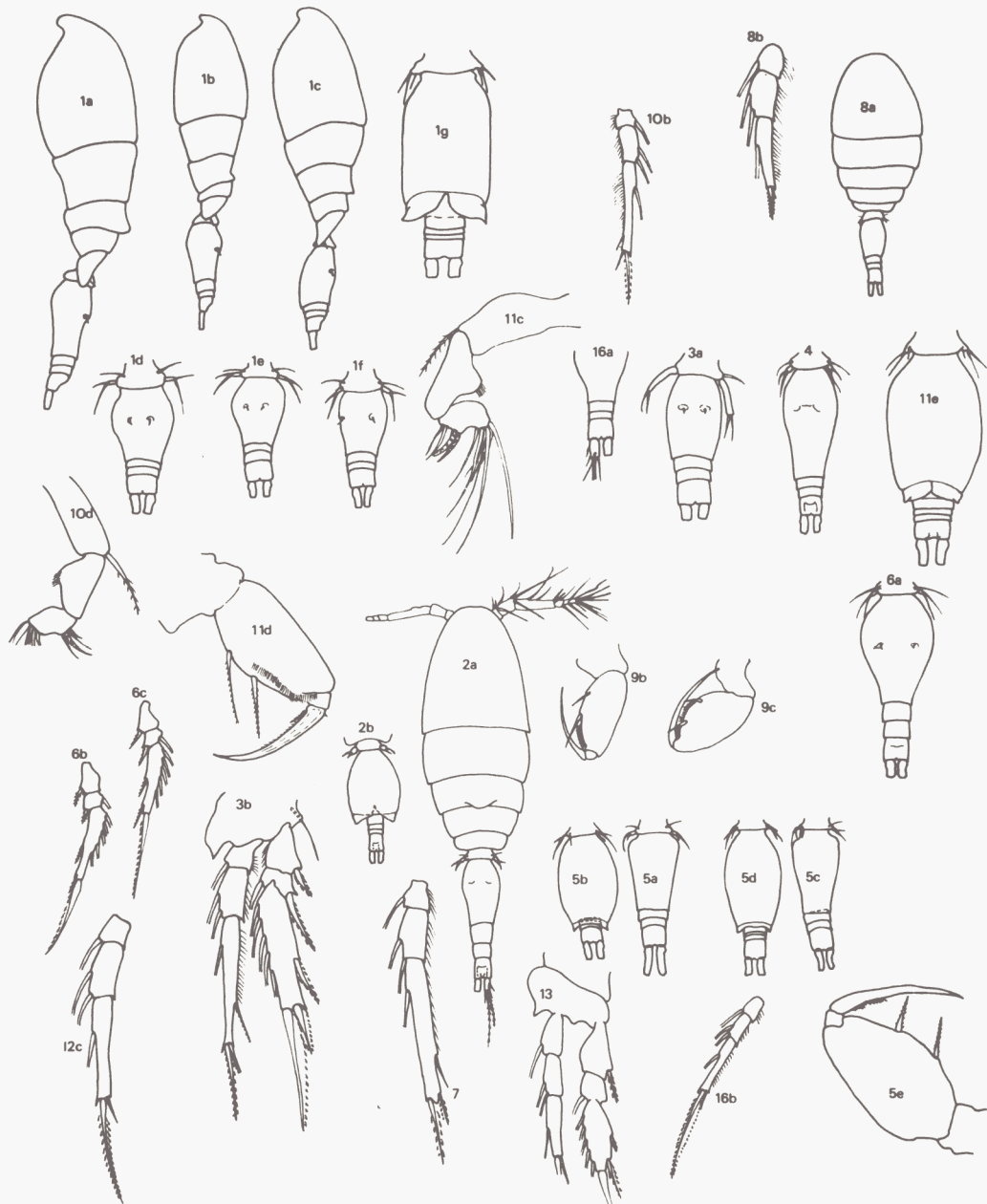
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Figures 1-17

Figure 1. *Oncaea confifera*: a. ♀ stocky form, lateral; b. ♀ minus form, lateral; c. ♀ form A, lateral; d. ♀ stocky form, urosome, dorsal; e. ♀ minus form, urosome, dorsal; f. ♀ form A, urosome, dorsal; g. ♂ urosome, ventral.

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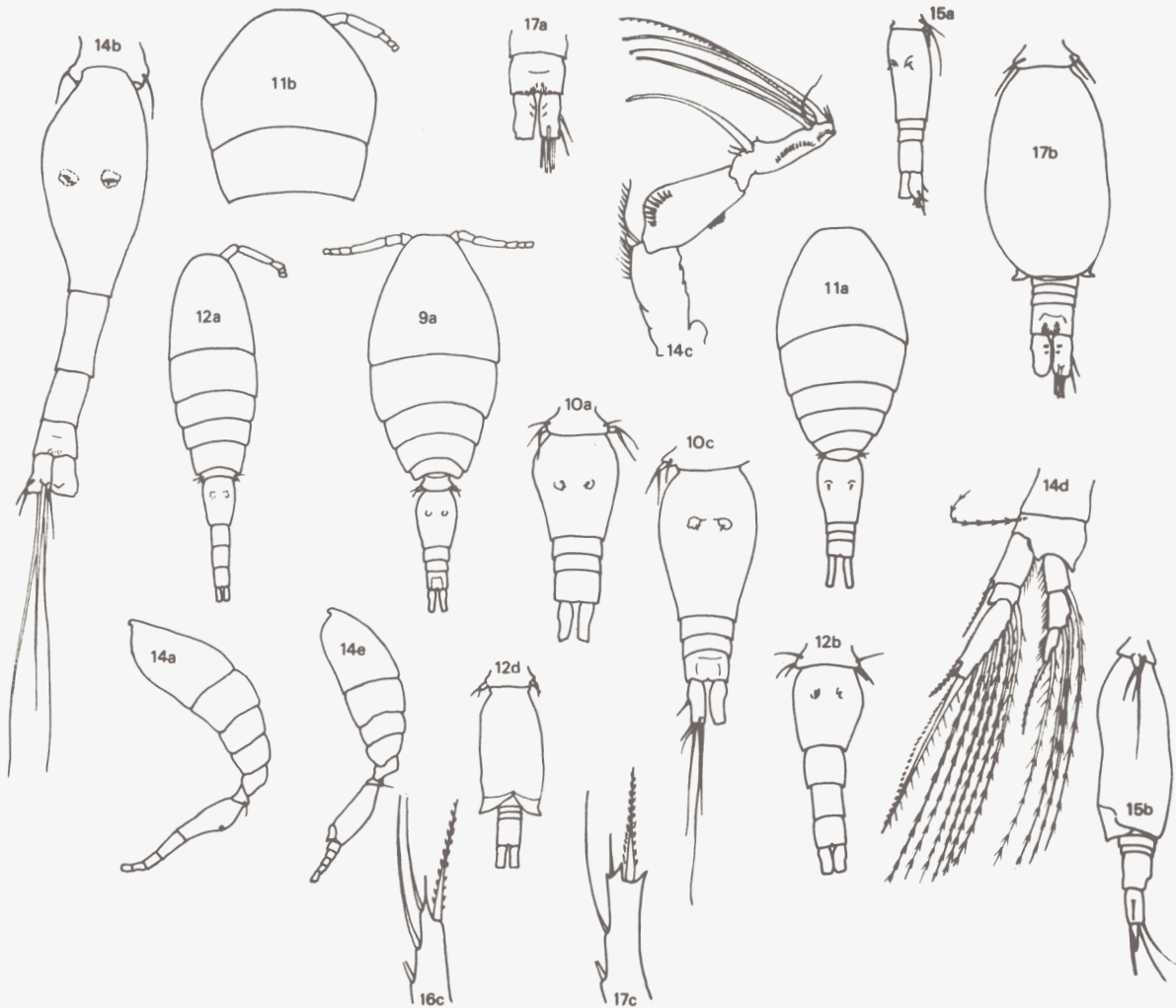


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Figures 1g, 5e, 6a, 7, 10c, 11d, e, 16a after Giesbrecht, 1892; Figures 2, 4, 9 after Sars, 1916; 1918; Figures 3a, 8, 10d, 11a-c, 16b after Boxshall, 1977a; Figures 3b, 14, 17 after Heron, 1977; Figure 5 after Ferrari, 1975; Figures 6b,c after Razouls, 1974; Figure 13 after Farran, 1908; Figures 16c, 17c, original; others after Malt, 1982a, b, and 1983b.

Genus *Oncaea* Philippi, 1843

Seventeen of the most common species of *Oncaea* occur in the North Atlantic and are listed in this paper. Polymorphism in the genus is well documented and morphs which are common in the area are also listed here. *O. anglica* Brady, 1905, only known from the holotype in this area, is omitted as it is *species inquirendum*. Whenever possible specimens of each species have been examined; when this has not been possible comments have been based upon type descriptions.

Oncaea can be distinguished from other *Cyclopoidea* (*sensu* Sars) by the following diagnosis:

Cyclopoid shape. Rostral area thickened and with rounded postero-ventral margin. Female urosome 5-segmented, male 6-segmented. First antenna 6-segmented in female, 4-segmented in male, both with long third segment. Second antenna 3-segmented; terminal segment bearing proximal group of 3 or 4 setae and a distal group of 6 to 8 setae. Mandible bearing 2 blades and 2 or 3 setae. First maxilla bilobed; inner lobe with 3 elements, outer with 4. Second maxilla with setose claw. Maxilliped 4-segmented in female, and 3-segmented in male; second segment in female bearing 2 setae on internal surface; terminal segment produced as a long, curved claw. Legs 1–4 with 3-segmented rami. Endopodites slender, exopodites armed with serrate spines on external margins. Leg 5 reduced to small rod or to knob-like segment which may be fused to urosome somite and bearing 1 or 2 terminal setae. Sexual dimorphism in *Oncaea* is usually apparent only in the segmentation of the first antenna, the maxilliped and urosome.

KEY

- Ur. 5-segm., A1 6-segm., mxp. 4-segm. (Figs. 2a, 5e) ♀ ♀
 Ur. 6-segm., A1 4-segm., mxp. 3-segm. (Figs. 1g, 9c) ♂ ♂

FEMALES

- | | |
|---|--------------------------------|
| 1. 3rd pr. segm. projected dorsally (Figs. 1a–1c) | 2 |
| 3rd pr. segm. lacking projection | 5 |
| 2. Caudal rami longer than anal segm. | 3 |
| Caudal rami shorter, or approx. same length as anal segm. | 4 |
| 3. Gen. apertures closely spaced (Fig. 1d) | <i>O. conifera</i> stocky form |
| Gen. apertures widely spaced (Fig. 1f) | <i>O. conifera</i> form A |
| 4. Gen. segm. 1·0 to 1·2 times as long as post. ur. segms combined (Fig. 2a) | <i>O. borealis</i> |
| Gen. segm. 1·7 to 1·8 times as long as post. ur. segms (Fig. 1e) | <i>O. conifera</i> minus form |
| 5. Term. segm. A2 short (less than 2·5 times as long as wide) (Figs. 10d, 11c) | 11 |
| Term. segm. A2 elongate (2·5 times as long as wide, or longer) (Fig. 14c) | 6 |
| 6. Term. segm. P4 endop. shorter than segms 1 and 2 combined (Figs. 13, 14d) | 10 |
| Term. segm. P4 endop. longer than segms 1 and 2 combined (Figs. 12c, 16b) | 7 |
| 7. P5 represented by 2 setae on body segm. (Fig. 12b) | <i>O. subtilis</i> |
| P5 short, delimited from body segm. | 8 |
| 8. Caudal rami shorter than anal segm., with stout spine on post. ext. margin (Fig. 15a) | <i>O. ivlevi</i> |
| Caudal rami and anal segm. approx. same length or caudal rami longer, lacking stout spine | 9 |
| 9. Caudal rami and anal segm. approx. same length (Fig. 16a) | <i>O. ornata</i> |
| Caudal rami longer than anal segm. (Fig. 17a) | <i>O. englishi</i> |
| 10. Ext. armature P4 exop., 2 spines (Fig. 13) | <i>O. exigua</i> |
| Ext. armature P4 exop., 1 spine (Fig. 14d) | <i>O. gracilis</i> |
| 11. Term. segm. P4 endop. with term. conical projection (Fig. 7) | 12 |
| Term. segm. P4 endop. lacking term. conical projection (Figs. 3b, 10b) | 14 |
| 12. Term. spines P3 and P4 exops longer than term. segms (Figs 6b, c) | <i>O. dentipes</i> |
| Term. spines and term. segms P3 and P4 exops approx. same length or spines shorter | 13 |
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| Gen. segm. 2·0 to 2·2 times as long as post. ur. segms combined | <i>O. minuta</i> |
| 14. P5 elongate (Fig. 3a) | <i>O. notopus</i> |
| P5 short (Figs. 5a,c, 6a, 10a,c) | 15 |
| 15. Term. segm. P4 endop. longer than segms 1 and 2 combined (Figs. 7, 10b) | 16 |
| Term. segm. P4 endop. approx. same length as segms 1 and 2 combined (Fig. 8b) | <i>O. rotundata</i> |

16. Basis mxp. with relatively short distal spine (approx. 0.25 times as long as basis) (Fig. 5e)	17
Basis mxp. with relatively long distal spine (approx. 0.5 times as long as basis) (Fig. 11d)	18
17. Caudal rami approx. 3.0 times as long as wide (Fig. 5c)	<i>O. mediterranea</i> small form
Caudal rami approx. 4.0 times as long as wide (Fig. 5a)	<i>O. mediterranea</i> typical form
18. Basis mxp. with relatively short prox. spine (approx. 0.25 times as long as basis) (Fig. 9b)	<i>O. curta</i>
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19. Term. spine and term. segm. P4 exop. approx. same length	20
Term. spine P4 exop. shorter than term. segm.	21
20. Caudal rami approx. 2.5 times as long as wide (Fig. 10d)	<i>O. media</i> forma <i>major</i>
Caudal rami approx. 3.0 times as long as wide (Fig. 10a)	<i>O. media</i> forma <i>minor</i>
21. Body highly sclerotised, head segm. laterally swollen (Fig. 11b)	<i>O. venusta</i> forma <i>typica</i>
Body weakly sclerotised, head segm. broadest at post. margin (Fig. 11a)	<i>O. venusta</i> forma <i>venella</i>

MALES

(Males of *O. curta* and *O. minuta* excluded owing to lack of reliable data. Males of *O. dentipes*, *O. notopus* and *O. similis* unknown)

1. Gen. lappets relatively small, not prominent (Fig. 11e)	5
Gen. lappets relatively large, produced postero-laterally or postero-ventrally (Figs. 1g, 2b)	2
2. Term. segm. P4 endop. with term. conical projection (Fig. 7)	3
Term. segm. P4 endop. lacking projection	4
3. P5 delimited from body segm. (Fig. 2b)	<i>O. borealis</i>
P5 fused to body segm. (Fig. 1g)	<i>O. conifera</i> stocky form
4. Caudal rami and anal segm. approx. same length (Fig. 5d)	<i>O. mediterranea</i> small form
Caudal rami longer than anal segm. (Fig. 5b)	<i>O. mediterranea</i> typical form
5. Term. segm. A2 elongate (2.5 times as long as wide or longer) (Fig. 14c)	6
Term. segm. A2 short (less than 2.5 times as long as wide) (Figs. 10d, 11c)	11
6. Term. segm. P4 endop. shorter than segms 1 and 2 combined (Figs. 13, 14d)	7
Term. segm. P4 endop. longer than segms 1 and 2 combined (Figs. 12c, 16b)	8
7. Ext. armature P4 exop., 2 spines (Fig. 13)	<i>O. exigua</i>
Ext. armature P4 exop., 1 spine (Fig. 14d)	<i>O. gracilis</i>
8. Term. spine P3 endop. shorter than term. segm.	9
Term. spine and term. segm. P3 endop. approx. same length.	10
9. Caudal rami approx. 2.0 times as long as wide, with stout spine on post. ext. margin (Fig. 15b)	<i>O. ivlevi</i>
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* Only distinguished by differences in body size.

NOTES ON THE SPECIES

1. *O. conifera* Giesbrecht, 1891. Female: length stocky form (= form a, Farran, 1936) 1.02–1.45 mm, length minus form (= form c, Farran, 1936) 1.00–1.18 mm, length form A 1.11–1.20 mm. Third prosome segment projected dorsally, projection small or medium-sized (minus form and form A) or relatively large (stocky form). Genital apertures closely spaced (stocky and minus forms) or widely spaced (form A) on dorsal surface of genital segment. Caudal rami approximately equal in length to anal segment (minus form) or longer (stocky form and form A), 2.5 (minus form) or approximately 3.0 times (stocky form and form A) as long as wide. Basis of maxilliped with 2 short spines on setulose inner margin, distal spine denticulate, proximal spine setulose; terminal claw spinulose. Fourth endopodite with terminal conical projection. Male: of the above forms, only stocky form known. Length 0.60–0.88 mm. Lacking dorsal projection. Genital lappets produced postero-laterally. Caudal rami shorter than anal segment, 1.5–2.0 times as long as wide. Basis of maxilliped with 2 small spines on inner margin, also bearing 2 rows of denticles in this position; terminal claw smooth. Fifth leg fused to body segment. Giesbrecht, 1892, Plate 47, Figs. 4, 16, 21, 23, 28, 34–38, 42, 55 and 56; Farran, 1936, Figs. 25 a–f and 26 a–c; Sewell, 1947; Moulton, 1973, Figs. 4A a–l and 4B m–x; Malt, 1983b.
2. *O. borealis* Sars, 1918. Female: length 0.60–0.75 mm. Third prosome segment projected dorsally. Caudal rami shorter than anal segment, 2.0 times as long as wide. Basis of maxilliped with 2 short spines on setulose inner margin, distal spine spinulose?; terminal claw setulose. Fourth endopodite with terminal conical projection. Male: length 0.35–0.45 mm. Lacking dorsal projection. Genital lappets produced postero-laterally. Terminal claw of maxilliped smooth. Sars, 1900 (as *O. conifera*), Plate XXXII, Figs. 15 and 16; Sars, 1918, Plate CVIII.
3. *O. notopus* Giesbrecht, 1891. Female: length 0.60–1.01 mm. Caudal rami shorter than anal segment, 1.5 times as long as wide. Basis of maxilliped with 2 short spines on spinulose inner margin, distal spine with serrate flange; terminal claw denticulate. Fifth leg cylindrical and elongate. Male: unknown. Giesbrecht, 1892, Plate 47, Figs. 12, 15 and 45; Heron, 1977, Fig. 18 f–i.
4. *O. similis* Sars, 1918. Female: length 0.62–0.90 mm. Caudal rami equal in length to anal segment, 2.0 times as long as wide. Basis of maxilliped with 2 short setulose spines on setulose inner margin; terminal claw spinulose. Fourth endopodite with terminal conical projection. Male: unknown. Sars, 1918, Plate CIX, Fig. 1; Heron, 1977, Figs. 7 d–m and 8 a–d.
5. *O. mediterranea* (Claus, 1863). Female: length small form 0.85–1.16 mm, length typical form 1.07–1.29 mm. Caudal rami longer than anal segment (? small form), 3.0 (small form) or 4.0 times (typical form) as long as wide. Basis of maxilliped with 2 short, setulose spines on setulose inner margin; terminal claw spinulose. Male: length small form 0.60–0.75 mm, length typical form 0.76–0.95 mm. Genital lappets produced postero-ventrally. Caudal rami equal in length to anal segment (small form) or just longer (typical form); 2.0 times as long as wide. Basis of maxilliped with 2 small spines on denticulate inner margin; terminal claw smooth. Fifth leg fused to body segment. Claus, 1863 (as *Antaria mediterranea*), Plate XXX, Figs. 1–7; Giesbrecht, 1892, Plate 4, Figs. 4 and 16, Plate 47, Figs. 8–10 and 47; Ferrari, 1975, Figs. 3 E–K, 4 and 5 A–D; Malt, 1983b.
6. *O. dentipes* Giesbrecht, 1891. Female: length 0.52 mm. Caudal rami shorter than anal segment, 1.5? times as long as wide. Basis of maxilliped with 2 short spines on setulose inner margin, distal spine spinulose; terminal claw setulose. Fourth endopodite with terminal conical projection. Male: unknown. Giesbrecht, 1892, Plate 47, Figs. 7, 17, 41, 51, and 52; Razouls, 1974, Fig. 10 A–I.
7. *O. minuta* Giesbrecht, 1892. Female: length 0.45–0.58 mm. Caudal rami shorter than anal segment, approximately 2.0 times as long as wide. Basis of maxilliped with 2 short spines on setulose inner margin, distal spine spinulose; terminal claw setulose. Fourth endopodite with terminal conical projection. Male: length unknown. Basis of maxilliped with setulose inner margin; terminal claw smooth. Giesbrecht, 1892, Plate 47, Figs. 3, 6, 26, 46, and 59; Aurivillius, 1899, Figs. 1–3; ?Sars, 1918, Plate CXVIII, Fig. 2.

8. *O. rotundata* Boxshall, 1977. Female: length 0.93–1.36 mm. Body rounded. Caudal rami shorter than anal segment, 2.5 times as long as wide. Basis of maxilliped with 2 short spines on inner margin, distal spine serrate, also bearing row of setules and denticulate flange in this position; terminal claw denticulate. Terminal segment fourth endopodite reduced. Male: length 0.89–1.00 mm. Caudal rami longer than anal segment, 2.0 times as long as wide. Basis of maxilliped with 2 small spines on setulose inner margin; terminal claw denticulate. Boxshall, 1977a, Figs. 14 a–h and 15 a–d; Malt, 1983a.
9. *O. curta* Sars, 1916. Female: length 0.42–0.75 mm. Caudal rami longer than anal segment, 2.5? times as long as wide. Basis of maxilliped with 2 spines on setulose inner margin, distal spine long and setulose; terminal claw smooth. Male: length 0.31–0.68 mm. Sars, 1916, Plate IV.
10. *O. media* Giesbrecht, 1891. Female: length forma *minor* 0.49–0.76 mm, length forma *major* 0.73–0.95 mm. Caudal rami longer than anal segment; 2.5 (forma *major*) or 3.0 times (forma *minor*) as long as wide. Basis of maxilliped with 2 long, setulose spines on setulose inner margin; terminal claw spinulose. Male: length forma *minor* 0.37–0.60 mm, length forma *major* 0.70–0.93 mm. Caudal rami longer than anal segment, 1.5–2.0 times as long as wide. Basis of maxilliped with 2 rows of denticles on inner margin; terminal claw smooth. Fifth leg represented by 2 setae. Giesbrecht, 1892, Plate 2, Fig. 12; Plate 47, Figs. 1, 11, 29–33 and 40; Farran, 1903; Sewell, 1947; Tanaka, 1960, Plate XXXI, Figs. 4–9; Estrada and Genicio de Corral, 1968 (as *O. curta*), Plate XII, Figs. 1–5; Malt, 1982b, Figs. 1 a–i, 2 a–j, 3 a–z', 4 a–o, and 5 a–h.
11. *O. venusta* Philippi, 1843. Female: length forma *venella* 0.81–1.07 mm, length forma *typica* 1.06–1.33 mm. Exoskeleton of forma *typica* highly sclerotised. Caudal rami longer than anal segment, 3.5 to 4.0 times as long as wide. Basis of maxilliped with 2 long, spinulose spines on setulose inner margin; terminal claw setulose. Male: length forma *venella* 0.57–0.63 mm, length forma *typica* 0.76–1.08 mm. Caudal rami 2.5 times as long as wide. Basis of maxilliped with 2 small spines on denticulate inner margin; terminal claw smooth. Fifth leg fused to body segment. Philippi, 1843, Plate 3, Fig. 2 a–d; Dana, 1852 (as *Antaria crassimana* and *A. obtusa*), Plate 86, Figs. 10 a–c and 13 a–d'; Lubbock, 1860 (as *O. pyriformis*), Plate XXIX, Figs. 24 and 25; Claus, 1866 (as *A. coerulea*); Brady, 1883 (as *O. obtusa*), Plate LI, Figs. 1–11; Giesbrecht, 1892, Plate 2, Fig. 5; Plate 3, Fig. 7; Plate 47, Figs. 2, 5, 13, 19, 39, 44, 48, 50, 54, and 58; Farran, 1929, Fig. 33; Sewell, 1947; Tanaka, 1960; Malt, 1983b.
12. *O. subtilis* Giesbrecht, 1892. Female: length 0.46–0.69 mm. Caudal rami equal in length to anal segment, 2.0 times as long as wide. Terminal segment second antenna elongate. Basis of maxilliped with 2 long, setulose spines on setulose inner margin; terminal claw spinulose. Fifth leg represented by 2 setae on body segment. Male: length 0.45–0.62 mm. Caudal rami just shorter than or equal in length to anal segment, 2.5 times as long as wide. Basis of maxilliped with 2 small spines on setulose inner margin; terminal claw smooth. Giesbrecht, 1892, Plate 47, Figs. 14, 18, 25, 43, and 60; Gallo, 1976, Fig. 1 A–I; Malt, 1982b, Figs. 6 a–g, 7 a–n, 8 a–z' and 9 a–p.
13. *O. exigua* Farran, 1908. Female: length 0.48–0.55 mm. Caudal rami longer than anal segment, 2.0 times as long as wide. Terminal segment second antenna elongate. Basis of maxilliped with 2 spines on inner margin, distal spine long and denticulate?, proximal spine short and smooth; terminal claw smooth. External armature terminal segments exopodites II, III, III, II; terminal segment fourth endopodite reduced. Fifth leg represented by a single seta. Male: length 0.30–0.55 mm. Farran, 1908, Plate X, Figs. 25–30; Plate XI, Figs. 9–11; Razouls, 1974, Fig. 15 A–H.
14. *O. gracilis* (Dana, 1849). Female: length 0.88–1.16 mm. Caudal rami longer than anal segment, most broad posteriorly. Terminal segment second antenna elongate, with hook-tipped terminal setae. Basis of maxilliped with 2 setulose spines on spinulose inner margin, distal spine long; terminal claw spinulose. External armature exopodites: III, II, II, I; terminal segment fourth endopodite reduced. Fifth leg represented by 2 setae. Male: length 0.76–1.05 mm. Caudal rami 1.5 times as long as wide. Basis of maxilliped with 2 small spines on inner margin, also bearing 2 rows of denticles in this position; terminal claw smooth. Dana, 1852 (as *Antaria gracilis*), Plate 86, Fig. 11 a–d; Giesbrecht, 1892 (as *Conaea rapax*), Plate 48, Figs. 50–59; Heron, 1977 (as *C. rapax*), Figs. 30 d–j, 31 a–h, and 32 a–d; Malt, 1982a, Figs. 3a–k and 4a–d.

15. *O. ivlevi* Shmeleva, 1966. Female: length 0.32–0.33 mm. Caudal rami shorter than anal segment, 2.0 times as long as wide; each bearing a stout spine on distal external corner. Terminal segment second antenna elongate. Basis of maxilliped with 2 spines on denticulate inner margin, distal spine long and spinulose; terminal claw spinulose. Male: length 0.28–0.35 mm. Caudal rami equal in length to anal segment. Basis of maxilliped with 2 small spines on setulose inner margin, terminal claw spinulose. Shmeleva, 1966, Plate 1, Figs. 1–11; Malt, 1982a, Figs. 3 a–k and 4 a–d.

16. *O. ornata* Giesbrecht, 1891. Female: length 0.75–1.07 mm. Genital segment tapering more posteriorly than anteriorly. Caudal rami equal in length to anal segment, approximately 2.0 times as long as wide. Terminal segment second antenna elongate. Basis of maxilliped with 2 spines on setulose inner margin, distal spine long and denticulate, proximal spine setulose; terminal claw spinulose. Male: length 0.68–0.93 mm. Caudal rami longer than anal segment. Basis of maxilliped with 2 small spines on denticulate inner margin; terminal claw smooth. Fifth leg represented by a single seta. Giesbrecht, 1892, Plate 44, Figs. 50 and 51; Plate 47, Figs. 20, 24, 49, and 53; Malt, 1983b.

17. *O. englishi* Heron, 1977. Female: length 0.76–1.15 mm. Caudal rami longer than anal segment, 2.0 times as long as wide. Terminal segment second antenna elongate. Basis of maxilliped with 2 spines on setulose inner margin, distal spine long and denticulate, proximal spine setulose; terminal claw spinulose. Male: length 0.74–1.00 mm. Basis of maxilliped with 2 small spines on inner margin, also bearing several rows of setules in this position; terminal claw smooth or with membranous flange. Fifth leg represented by single seta. Boxshall, 1977a (as *O. ornata* form 2), Figs. 17 b, d–f, and i, 18 e and f; Heron, 1977, Figs. 25 n and o, 26 a–h, and 27 a–l; Malt, 1983b.

REFERENCES TO WORK ON THE BIOLOGY AND DISTRIBUTION OF *ONCAEA*

Vertical distribution and diurnal migration: Hure, 1955, 1961; Hure and Scotto di Carlo, 1969a,b, 1971; Zalkina, 1970, 1972, 1975; Marlowe and Miller, 1975; Scotto di Carlo *et al.*, 1975; Boxshall, 1977b; McGowan and Walker, 1979.

Life history and ecology: Digby, 1950; Hanaoka, 1952; Kovalev, 1970; Alldredge, 1972; Björnberg, 1972; Petipa, 1978; Malt, 1982b.

Bioluminescence: Giesbrecht, 1895; Rudyakov and Voronina, 1967.

Predation: Hobson and Chess, 1976; Purcell, 1981.

Distribution: References to distributions are given below. Further data may be found in references which have been quoted for their species descriptions and for figures, and in references quoted above. Cleve, 1900; Wolfenden, 1902, 1904; Wiborg, 1940, 1954; Wilson, 1942; Lysholm and Norgaard, 1945; Sewell, 1948; Østvedt, 1955; Marine Biological Association, 1957; Crothers, 1966; Vilela, 1968.

DISTRIBUTION

E = epipelagic, M = mesopelagic, B = bathypelagic.

1. *O. conifera* (stocky form): widespread between 65°N and 45°S in Atlantic, Indian, and Pacific Oceans, Mediterranean Sea. Records from the Southern Ocean now thought to represent distinct species. Minus form known from tropical and temperate North Atlantic, Indian Ocean, Gulf of Mexico, Great Barrier Reef, New Zealand. Form A known from tropical and temperate North Atlantic. EMB.
2. *O. borealis*: widespread north of 45°N, in all North Polar and subpolar Seas. EMB.
3. *O. notopus*: tropical and temperate North Atlantic, North and South Pacific, southern Adriatic, Caribbean and Red Seas, coast of Sumatra. Records from the North and South Polar Seas now thought to represent distinct species. Mainly MB.
4. *O. similis*: tropical and temperate North Atlantic, North and South Pacific, Norwegian and Bering Seas, south of Madagascar, Southeast Asian coastal waters, East China Sea. EMB.
5. *O. mediterranea* (typical form): widespread between 65°N and 60°S, in Atlantic, Indian, and Pacific Oceans, Mediterranean Sea. Small form known from tropical and temperate North Atlantic, Gulf of Mexico, coast of Brazil, south of New Zealand. Mainly EM.
6. *O. dentipes*: northwestern temperate Atlantic, coastal waters of Portugal, North Africa, and Angola, Mediterranean and Black Seas, southeast of Madagascar, west coast of Sumatra, East China Sea, southeastern tropical and temperate Pacific, north coast of New Zealand, Californian coast. EMB.
7. *O. minuta*: widespread from Far North to 50°S, in Atlantic, Indian, and Pacific Oceans, Mediterranean and North Polar Seas. EMB.
8. *O. rotundata*: tropical and temperate North Atlantic. Deep MB.
9. *O. curta*: tropical and temperate Atlantic and Pacific Oceans, Mediterranean Sea, southeast of Madagascar. EMB.
10. *O. media* (forma *major*): widespread between 55°N and 45°S, in Atlantic, Indian, and Pacific Oceans, Mediterranean Sea. Forma *minor* known from English Channel, northern Arabian Sea, off Cape of Good Hope, South and East China Seas. Mainly EM.
11. *O. venusta* (forma *typica*): ubiquitous between 65°N and 50°S. Forma *venella* known from tropical and temperate Atlantic, Gulf of Mexico, Arabian Sea, Indian Ocean, South China Sea, Great Barrier Reef, north coast of New Zealand. Mainly EM.
12. *O. subtilis*: widespread between 65°N and 40°S, in Atlantic and Pacific Oceans, Mediterranean Sea. E.
13. *O. exigua*: tropical South Atlantic, west of Ireland, Mediterranean Sea. MB.
14. *O. gracilis*: tropical and temperate North Atlantic, Caribbean Sea, coast of South West Africa, east coast of South Africa, Southeast Asian coastal waters, tropical Pacific, north coast of Western Australia, Great Barrier Reef, Southern Oceans. Mainly MB.
15. *O. ivlevi*: tropical Atlantic, English Channel, southern Adriatic. EM.
16. *O. ornata*: tropical and north temperate Atlantic, Caribbean and Mediterranean Seas, Southeast Asian coastal waters, East China Sea, tropical Pacific, Great Barrier Reef. MB.
17. *O. englishi*: tropical and temperate North Atlantic, southern Adriatic, southwestern Pacific–Antarctic region. MB.

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