

**Zooplankton**

**Sheet 138**

To replace sheet No. 36

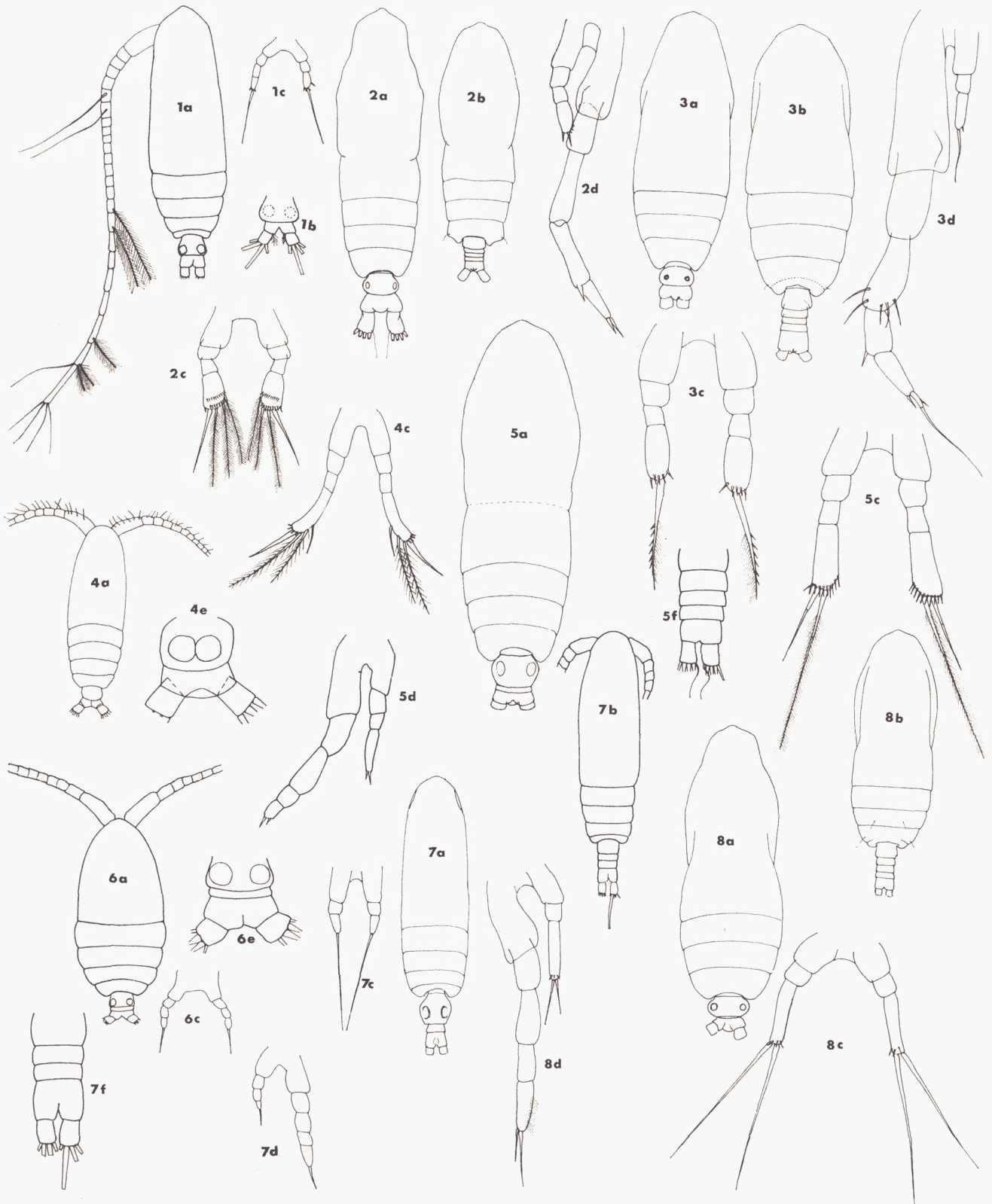
**COPEPODA**  
**SUB-ORDER: CALANOIDA**

**Family: Calocalanidae**  
**(Paracalanidae part.)**

**Genera: Calocalanus**  
**Ischnocalanus**  
**Mecynocera**

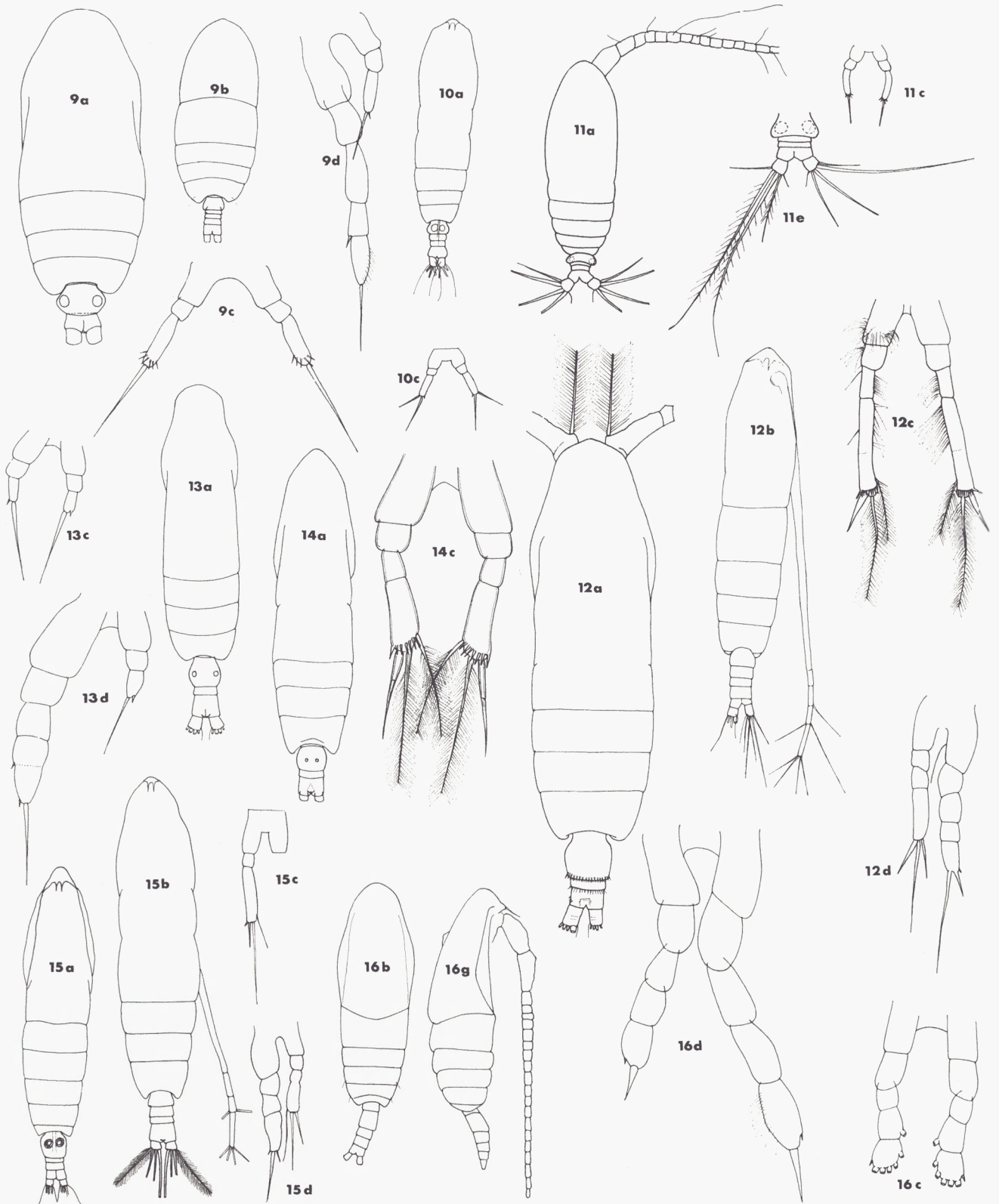
(Revised by J. CORRAL)

**1972**



1. *Calocalanus plumatus*; 2. *C. pavo*; 3. *C. pavoninus*; 4. *C. adriaticus*; 5. *C. neptunus*; 6. *C. ovalis*; 7. *C. elegans*; 8. *C. contractus*; 9. *C. styliremis*; 10. *C. pseudocontractus*; 11. *C. longisetosus*; 12. *Ischnocalanus plumulosus*; 13. *I. gracilis*; 14. *I. tenuis*; 15. *I. equalicauda*; 16. *Mecynocera clausi*.

For all figures: a: ♀ dorsal; b: ♂ dorsal; c: ♀ 5th feet; d: ♂ 5th feet; e: ♀ abdomen; f: ♂ abdomen; g: ♂ lateral.



(Figs. 1, 4, 5d, 5f, 6, 7b, 7d, 7f, 11 after SHMELEVA; figs. 10, 12b, 12d, 15 after BERNARD; figs. 2, 5c, 7a, 7c, 8b, 9a, 9c, 12a, 12c, 13, 14, 16 after CORRAL; remainder original).

## Family Calocalanidae

Small copepods of delicate general appearance. Cephalothorax at least 4 times longer than the abdomen which is generally thin in relation to the body. Female with genital segment sometimes globular and almost always with two easily visible spherical spermathecae. Anal segment of the male well developed, at least twice as long as the preceding one. Furca sometimes articulate, with 4 beautiful feathered setae on both sides. Antennule of female longer than the body, in *Mecynodera clausi* it is over twice as long as the body. Last joint long and thin. Exopod of antenna, twice as long as endopod. Oral parts developed equally in female and male, but in male maxilla sometimes reduced. 1st exopodal joint of 2nd foot almost always with small spinules on outer edge. 3rd exopodal joints of 2nd–4th feet each with 2 spines on outer edge but without teeth. 2nd joint of endopod of 2nd–4th feet almost always with a row of spinules. 3rd joint of endopod of 3rd–4th feet generally with some spinules in a transversal row. Terminal seta smooth.

5th feet always present, uniramous, small and almost always symmetrical in female, always asymmetrical in male.

5th feet of male ending with 2 or 3 setae, sometimes reduced, generally 5-jointed on left side and 3 or 4-jointed on right side.

### Genus *Calocalanus* s. str. Giesbrecht, 1888

Species from 0.36 to 1.30 mm long. Body sometimes stocky. Head fused with 1st thoracic segment, 4th and 5th thoracic segments almost always fused. Rostrum of male and female bifurcated. Last segment of the female antennule from somewhat less than twice to 6 times the preceding one. Abdomen in female short and wide, 2,4-segmented, genital segment always globular. In male, abdomen 5-segmented (in *elegans* 4-segmented), anal segment at least twice as long as preceding one. Furcal rami articulated, always symmetrical each carrying 4 large feathered setae. There is no internal seta on the coxa of 1st foot (except *neptunus*). 5th feet symmetrical in female (except *plumatus*). 5th feet asymmetrical in male, 5-jointed on left side, 3,4-jointed on right side.

1. *C. plumatus* Shmeleva, 1965. Female: length 0.58–0.61 mm. Abdomen 2-segmented. Genital segment wider than long, very well developed spermathecae. Furcal rami as long as wide. 5th feet asymmetrical, left 4-segmented, right 3-segmented, last joint with a small lateral spine. Antennule 1.5 times as long as body, last joint 1.7 times as long as the preceding one. Male: unknown.
2. *C. pavo* (Dana, 1849). Female: length 0.88–1.25 mm. Abdomen 2-segmented. Genital segment wider than long, globular. Furcal rami longer than wide, movable. 5th feet symmetrical, 4-jointed, last joint with 2 rows of small spines and 4 setae. Antennule 1.3–1.4 times as long as body, last joint 4.5–5 times as long as the preceding one, joints 12th to 21st with spines. Male: length 0.91–1.04 mm. Abdomen 5-segmented. Left 5th foot 5-jointed, right 5th foot 4-jointed, last joint with 2 spines.
3. *C. pavoninus* Farran, 1936. Female: length 0.64–0.72 mm. Abdomen 2-segmented. Genital segment 2 times as wide as long. Furcal rami about as long as wide. 5th feet symmetrical, 4-jointed, last joint with a row of spines and 1 seta. Antennule almost twice as long as body, last joint 6 times as long as the preceding one, joints 12th to 21st with small spines. Male: length 0.48–0.50 mm. Abdomen 5-segmented. Left 5th foot 5-jointed, right 5th foot 3-jointed, last joint with 1 spine and 1 seta.
4. *C. adriaticus* Shmeleva, 1965. Female: length 1.03–1.08 mm. Abdomen 2-segmented, genital segment oval, wider than long. Furcal rami short almost square, movable. 5th feet symmetrical, 4-jointed, last joint with 1 row of spines and 4 unequal setae. Male: unknown.
5. *C. neptunus* Shmeleva, 1965. Female: length 0.84–0.95 mm. Abdomen 3-segmented, genital segment oval, wider than long, very well developed spermathecae. Furcal rami short, movable, about twice as wide as long. 5th feet symmetrical, 4-jointed, last joint with a row of spines and 2 setae. Antennule slightly longer than body, last joint 2–2.2 (in specimens from Atlantic) 2.5 (in specimens from Mediterranean) times as long as the preceding one. Male: length 0.81–0.84 mm. Abdomen 5-segmented. Left 5th foot 5-jointed, right 5th foot 4-jointed.
6. *C. ovalis* Shmeleva, 1965. Female: length 0.36–0.38 mm. Abdomen 3-segmented, genital segment wider than long with feebly developed spermathecae. Furcal rami movable. 5th feet symmetrical, 4-jointed, last segment with 1 seta. Antennule slightly longer than body, last joint twice as long as the preceding one. Male: unknown.
7. *C. elegans* Shmeleva, 1965. Female: length 0.49–0.52 mm. Abdomen 3-segmented, genital segment as long as wide, furca short and almost square. 5th feet symmetrical, 3-segmented, last joint with 1 seta. Antennule 1.2 times as long as body, last joint twice as long as the preceding one. Male: length 0.46–0.48 mm. Abdomen 4-segmented. Left 5th foot 5-jointed, right 5th foot 4-jointed.
8. *C. contractus* Farran, 1926. Female: length 0.56–0.78 mm. Abdomen 3-segmented, 2nd segment very short usually covered by genital segment so that in some specimens its presence could not be made out, genital segment wider than long, very well developed spermathecae widely separated. Furca a little longer than wide, movable. 5th feet symmetrical, 3-jointed, last joint with 2 setae and a few subterminal spinules. Antennule 1.5–1.7 times as long as body, last joint 2.1–2.2 times as long as the preceding one, joints 14th to 21st with spinules. Male: length 0.48 mm. Abdomen 5-segmented. Left 5th foot 5-jointed, right 5th foot 3-jointed, last joint on both sides with 2 setae.
9. *C. styliremis* Giesbrecht, 1888. Female: length 0.50–0.95 mm. Abdomen 3-segmented, 2nd segment very short and in most cases completely covered by the genital segment. Genital segment globular, furca as long as wide, movable. 5th feet symmetrical, 3-jointed, last joint with 1 seta. Antennule 1.5–1.8 times as long as body, last joint 1.7–2.2 times as long as the preceding one, joints 13th to 21st with small almost invisible spinules. Male: length 0.48–0.50 mm. Abdomen 5-segmented. Left 5th foot 5-jointed, right 5th foot 3-jointed.
10. *C. pseudocontractus* Bernard, 1958. Female: abdomen 4-segmented, long and thin, genital segment wider than long, central spermathecae little separated. Furca longer than wide. 5th feet symmetrical, 3-jointed, last joint with 2 setae and 1 minute internal spinule. Male: unknown.
11. *C. longisetosus* Shmeleva, 1965. Female: length 0.48–0.50 mm. Abdomen 4-segmented, genital segment wider than long, spermathecae situated along the margins, furca almost square, movable. 5th feet symmetrical, 3-jointed, last segment with 1 seta and a row of spinules. Male: unknown.

### Genus *Ischnocalanus* Bernard, 1963

Species from 0.61 to 1.24 mm long. Body thin. Female with head fused with 1st thoracic segment, 4th and 5th thoracic segments fused (except *equalicauda*). Abdomen extended. Genital segment without marked lateral expansion. Furca symmetrical except *plumulosus*. 2nd and 3rd endopodal joints of 3rd–4th feet with a row of spinules (except *gracilis*). In female, abdomen, 3,4-segmented, genital segment longer than the others, protruding in ventral side. Last segment of the antennule about twice as long as the preceding one. There is an internal seta, or at least a small rudiment, on the coxa of 1st foot. 5th feet symmetrical, 3,4-jointed and the last joint more than twice as long as the preceding one (except *gracilis*).

Male with abdomen 4,5-segmented, anal segment almost as long as two preceding. Last segment antennule less than twice as long as the preceding one. 5th feet 5-jointed on left side, 3,4-jointed on right side, ending in 2 or 3 setae. On the whole similar to the 5th feet of the genus *Calocalanus*.

12. *I. plumulosus* (Claus, 1863). Female: length 0.93–1.20 mm. Abdomen 3-segmented, genital segment longer than wide, with two rows of spines. Furca asymmetrical, left side longer and wider than right side, a strong seta on left side. 5th feet symmetrical, 4-jointed, some joints with hairs. Antennule slightly longer than body, last segment 2–2.2 times as long as the preceding one, joints 13th to 21st with spines. Male: abdomen 5-segmented. 5th feet 5-jointed on left side, 4-jointed on right side.
13. *I. gracilis* (Tanaka, 1956). Female: length 0.61–0.64 mm. Abdomen 3-segmented, genital segment as long as wide, furca a little longer than wide. 5th feet symmetrical, 3-jointed. Antennule 1.3 times longer than body, last segment 1.9–2 times as long as the preceding one, joints 13th to 21st with small spinules. Male: length 0.57–0.60 mm. Abdomen 4-segmented. Left 5th foot 4-jointed, right 5th foot 3-jointed.
14. *I. tenuis* (Farran, 1926). Female: length 0.90–1.24 mm. Abdomen 3-segmented, genital segment wider than long, furca as long as wide. 5th feet symmetrical, 4-jointed. Antennule as long as body, last segment 2.1 times as long as the preceding one. Male: unknown.
15. *I. equalicauda* (Bernard, 1958). Female: abdomen 4-segmented, genital segment almost as wide as long, trapezoidal. Furca short, square. 5th feet symmetrical, 3-jointed. Male: (probably 5th copepodite stage) abdomen 4-segmented. 5th feet 4-jointed on left side, 3-segmented on right side.

### Genus *Mecynocera* I. C. Thompson, 1888

Cephalon separated from 1st thoracic somite, and the 4th and 5th thoracic somites are also separated. 1st antennae 24-jointed in female, over twice as long as body. 1st feet each with 3-jointed exopod and 1-jointed endopod. Exopods and endopods of the 1st to 4th feet 3-jointed. 3rd exopodal joint of the 2nd to 4th feet each with 2 spines on outer edge and 5 setae on inner edge. Exopodal joints without spinules. Female with short 3-segmented abdomen, genital segment globular, anal segment and furca separate. Male with small transparent swelling on back, abdomen 5-segmented. 5th feet uniramous, 5-jointed on both sides, symmetrical in female, asymmetrical in male. Right 5th foot longer and thicker than on left side.

16. *M. clausi* I. C. Thompson, 1888. Female: length 0.75–1.20 mm. Genital segment wider than long with two big spermathecae almost joined, furca twice as long as wide. Joints 7th to 19th of antennule with spines. Male: length 0.94–1.05 mm.

### KEY TO THE SPECIES OF *CALOCALANUS* (FEMALES ONLY)

- |   |                            |    |
|---|----------------------------|----|
| 1. P <sub>5</sub> asymmetric, left side 4-segmented, little longer than 3-segmented right side. Last joint on right side with a small lateral spine | <i>C. plumatus</i>         |    |
| 1. P <sub>5</sub> different from the above  |                            | 2  |
| 2. P <sub>5</sub> with 4 segments well marked in each branch  |                            | 3  |
| 2. P <sub>5</sub> 3-segmented   |                            | 7  |
| 3. Last segment antennule more than 4 times the preceding one   |                            | 4  |
| 3. Last segment antennule less than 4 times the preceding one   |                            | 5  |
| 4. Last segment antennule 6 times the preceding   | <i>C. pavoninus</i>        |    |
| 4. Last segment antennule 4.5–5 times the preceding   | <i>C. pavo</i>             |    |
| 5. Last segment P <sub>5</sub> with 4 unequal setae   | <i>C. adriaticus</i>       |    |
| 5. Last segment P <sub>5</sub> with less than 4 setae   |                            | 6  |
| 6. Last segment P <sub>5</sub> with 2 setae, external 1/2 of the internal, and a row of spines  | <i>C. neptunus</i>         |    |
| 6. Last segment P <sub>5</sub> with 1 seta and without spines   | <i>C. ovalis</i>           |    |
| 7. Last segment P <sub>5</sub> without spines and 1 seta  | <i>C. elegans</i>          |    |
| 7. Last segment P <sub>5</sub> with some spines   |                            | 8  |
| 8. Abdomen 3-segmented  |                            | 9  |
| 8. Abdomen 4-segmented  |                            | 10 |
| 9. Last segment P <sub>5</sub> with 2 setae longer than P <sub>6</sub>  | <i>C. contractus</i>       |    |
| 9. Last segment P <sub>5</sub> with 1 seta  | <i>C. styliremis</i>       |    |
| 10. Last segment P <sub>5</sub> with 2 setae shorter than P <sub>6</sub>  | <i>C. pseudocontractus</i> |    |
| 10. Last segment P <sub>5</sub> with 1 seta   | <i>C. longisetosus</i>     |    |

KEY TO THE SPECIES OF *ISCHNOCALANUS* (FEMALES ONLY)

- |  |                       |   |
|--|-----------------------|---|
| 1. Furca asymmetric .....                                    | <i>I. plumulosus</i>  |   |
| 1. Furca symmetric .....                                     |                       | 2 |
| 2. Last segment P <sub>5</sub> with 1 seta and 1 spine ..... | <i>I. gracilis</i>    |   |
| 2. Last segment P <sub>5</sub> with more than 1 seta .....   |                       | 3 |
| 3. Abdomen 3-segmented .....                                 | <i>I. tenuis</i>      |   |
| 3. Abdomen 4-segmented .....                                 | <i>I. equalicauda</i> |   |

## REFERENCES TO DESCRIPTIONS AND FIGURES

- C. plumatus*: SHMELEVA, 1965.
- C. pavo*: GIESBRECHT, 1892; T. SCOTT, 1894; WILSON, 1932; ROSE, 1933; VERVOORT, 1946; BERNARD, 1960; GRICE, 1962; CORRAL, 1970.
- C. pavoninus*: FARRAN, 1936; TANAKA, 1956b; LEGARE, 1964; CORRAL, 1970.
- C. adriaticus*: SHMELEVA, 1965.
- C. neptunus*: SHMELEVA, 1965; CORRAL, 1970.
- C. ovalis*: SHMELEVA, 1965.
- C. elegans*: SHMELEVA, 1965; CORRAL, 1970.
- C. contractus*: FARRAN, 1926; SEWELL, 1929; ROSE, 1933; CORRAL, 1970.
- C. styliremis*: GIESBRECHT, 1892; FARRAN, 1926; ROSE, 1933; WILSON, 1942; TANAKA, 1956b; BERNARD, 1960; CORRAL, 1970.
- C. pseudocontractus*: BERNARD, 1958, 1960.
- C. longisetosus*: SHMELEVA, 1965.
- I. plumulosus*: CLAUS, 1863; GIESBRECHT, 1892; T. SCOTT, 1894; WILSON, 1932; ROSE, 1933; TANAKA, 1956b; BERNARD, 1958, 1960; GRICE, 1962; PAIVA, 1963; CORRAL, 1970.
- I. gracilis*: TANAKA, 1956b; CORRAL, 1970.
- I. tenuis*: FARRAN, 1926; ROSE, 1933; PARK, 1968; CORRAL & GENICIO, 1970; CORRAL, 1970.
- I. equalicauda*: BERNARD, 1958, 1960.
- M. clausi*: I. C. THOMPSON, 1888; GIESBRECHT, 1892; T. SCOTT, 1894; ROSE, 1933; FARRAN & VERVOORT, 1951; TANAKA, 1956a; LEGARE, 1964; CORRAL, 1970.

## DISTRIBUTION

- C. plumatus*: Adriatic and Ionian seas. Canary Islands?. Epiplanktonic.
- C. pavo*: temperate, subtropical and tropical Atlantic, Indian and Pacific Oceans, Mediterranean and Red Seas. In Atlantic: from 60° N to 40° S. Mainly oceanic and generally epiplanktonic it descends to moderate depths (about 1000 m).
- C. pavoninus*: Gulf of Mexico and Caribbean Sea, Canary Islands, Great Barrier Reef Region, Izu Region (Japan), Western Mediterranean Sea. Mainly oceanic and epiplanktonic.
- C. adriaticus*: Adriatic, Ionian, Sirte and Aegean Seas. Moderate epiplanktonic (50–300 m).
- C. neptunus*: Mediterranean and Red Seas, Canary Islands. Oceanic, epiplanktonic (0–200 m).
- C. ovalis*: Adriatic, Ionian Seas. Epiplanktonic (25–100 m).
- C. elegans*: Mediterranean and Red Seas, Tenerife Island. Oceanic and epiplanktonic.
- C. contractus*: North-eastern Atlantic, Gulf of Mexico, Bay of Biscay, Canary Islands; Great Barrier Reef Region; Northern, South-western (Agulhas Current), and West Indian Ocean; Western Mediterranean Sea. Mainly oceanic and epiplanktonic (0–200 m).
- C. styliremis*: Probably world-wide except polar seas. Mainly epiplanktonic. Indistinctly neritic or oceanic.
- C. pseudocontractus*: South and West Ireland, North-east Atlantic, Mediterranean Sea.
- C. longisetosus*: Adriatic Sea. Epiplanktonic (50–100 m).
- I. plumulosus*: Temperate, subtropical and tropical Atlantic, Indian and Pacific Oceans, Mediterranean Sea. Mainly oceanic. Generally epiplanktonic it descends to moderate depths (about 1000 m).
- I. gracilis*: Gulf of Mexico, Canary Islands, Izu Region (Japan), South-western Indian Ocean. Mainly oceanic. Epiplanktonic.
- I. tenuis*: Bay of Biscay, Canary Islands, North-western Atlantic Ocean, Central North Pacific, South-western Indian Ocean, Western Mediterranean Sea. Oceanic. Moderately epiplanktonic it descends to moderate depths (1200 m).
- I. equalicauda*: Mediterranean Sea. Epiplanktonic.
- M. clausi*: Subtropical and tropical Atlantic, Indian and Pacific Oceans, Mediterranean and Red Seas. Oceanic epiplankton.

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