

CONSEIL INTERNATIONAL POUR L'EXPLORATION DE LA MER

Zooplankton.

Sheet 1.

(First Revision)

CHAETOGNATHA

(By J. H. Fraser)¹⁾

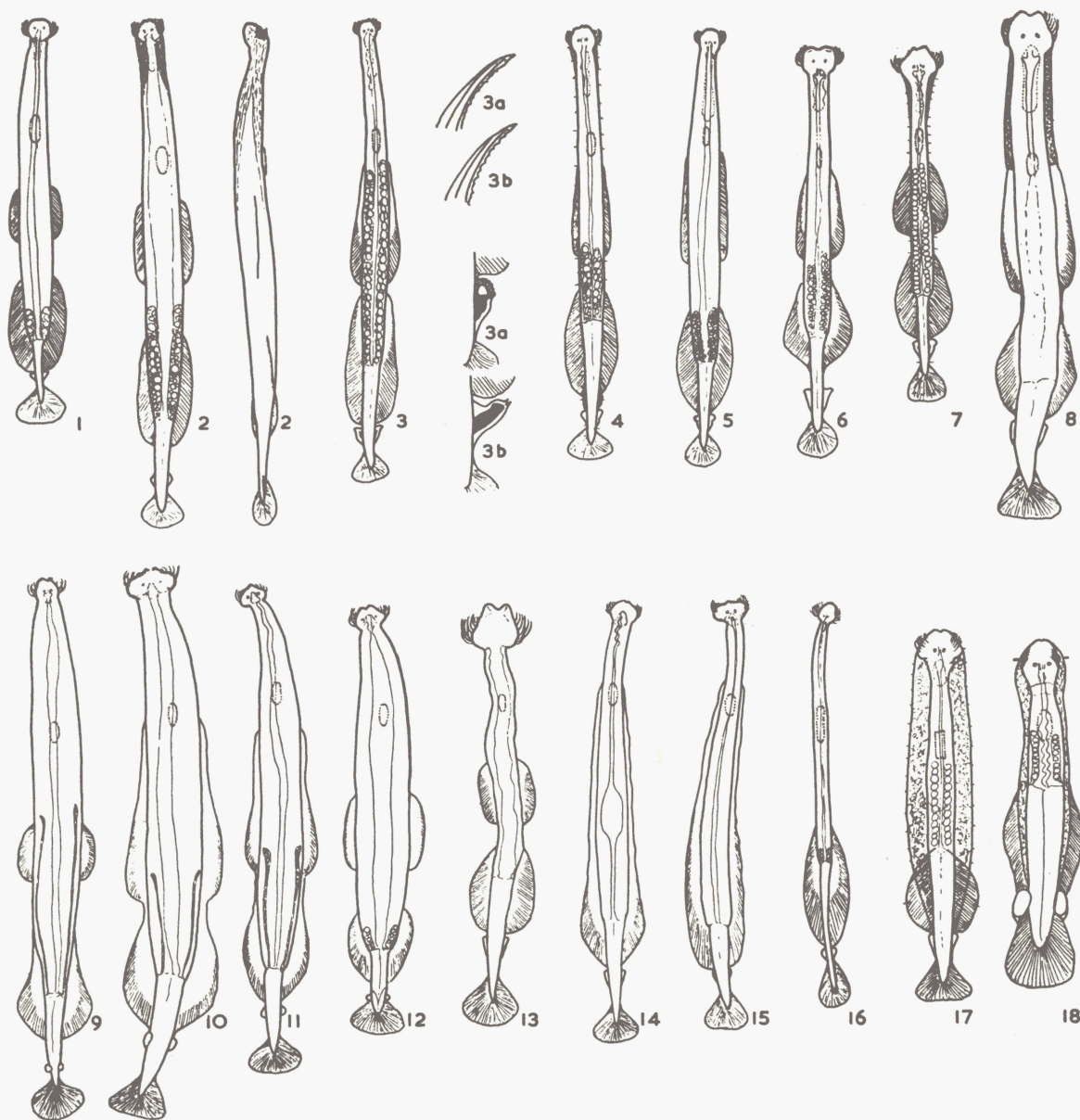
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1, *S. setosa*. 2, *S. elegans*. 3, *S. serratodentata*; 3a, *S. s. tasmanica*; 3b, *S. s. atlantica*.
 4, *S. bipuncta*. 5, *S. friderici*. 6, *S. decipiens*. 7, *S. hispida*. 8, *S. zetesios*. 9, *S. hexaptera*.
 10, *S. maxima*. 11, *S. lyra*. 12, *S. enflata*. 13, *S. macrocephala*. 14, *E. hamata*.
 15, *E. fowleri*. 16, *K. subtilis*. 17, *P. draco*. 18, *S. cephaloptera*.

Figures not all to the same scale, mostly drawn from original photographs modified into diagrammatic form after various authors. Figures 3a and 3b after Furnestin (1953).

Genus SAGITTA

Two pairs of lateral fins, two paired rows of teeth.

Species	Origin of anterior fin relative to ventral ganglion	Rays in fin	Shape of vesiculae seminales	Position of v. s. relative to post. fin and tail	Gut diverticulae	Collarette	Appearance in formalin	Normal max. size
1. <i>S. setosa</i> J. Müller 1847	Behind	Complete	Wedge	Near post. fin	No	Small	Transparent, gut leaves head as a very distinct white line	20
2. <i>S. elegans</i> Verrill 1873	Behind	Complete	Conical	Near tail	Yes	Medium	Milky, characteristic lateral view, see figure	25
3. <i>S. serratodentata</i> Krohn 1853	Near	Partial	Very conspicuous	Near both	No	Very small	Thin, pin-shaped, opaque, sometimes chalky. Inner edge of hooks serrated	17
4. <i>S. bipunctata</i> Q. and G. 1827	Near	Complete	Wedge	Near tail	No	Medium	Milky to opaque, with sensitive papillae prominent	19
5. <i>S. friderici</i> R.-Z. 1911	Near	Complete	Wedge	Near both	No	Small	Fairly transparent, without distinct sensitive papillae	15
6. <i>S. decipiens</i> Fowler 1905	Near	Partial	Wedge	Near tail	Yes	Very small	Variable transparency square head	20
7. <i>S. hispida</i> Conant 1895	Near	Complete	Wedge	Near tail	Yes	Medium	A stout species with prominent sensitive papillae	15
8. <i>S. zetesios</i> Fowler 1905	Near	Partial	Ovate	Near post. fin	Yes	Very large	Stout and very opaque	40
9. <i>S. hexaptera</i> d'Orloigny 1834	Far behind	Partial	Small round	Near tail	No	Absent	Very transparent, anterior fin very small	60
10. <i>S. maxima</i> (Conant) 1896	At or in front	Partial	Ovate	Near post. fin	No	Absent	Very transparent and with a broad head, fins confluent	90
11. <i>S. lyra</i> Krohn 1853	Behind	Partial	Ovate	Rather nearer post. fin	No	Absent	Very transparent, normal head, fins confluent	33
12. <i>S. enflata</i> Grassi 1881	Far behind	Partial	Round	Near tail	No	Very small	Transparent and tumid	30
13. <i>S. macrocephala</i> Fowler 1905	Behind	Partial	Wedge	Near post. fin	No	Absent	Opaque, red or orange gut when fresh, characteristic shaped head	21

Genus EUKROHNIA

One pair lateral fins on both body and tail, one paired row of teeth.

14. *E. hamata* (Möbius) 1875. Opaque species in formalin, no pigment in eyes, often containing an oil globule in the gut. Normal maximum size 45 mm.
15. *E. fowleri* R.-Z. 1909. Rather transparent, red gut when alive, pigment flecks in eyes, collarette visible near the ventral ganglion, neck very distinct and fragile, 40 mm. *E. richardi* Germain and Joubin 1912 is probably this species.

Genus KROHNITTA

One pair lateral fins, mostly on tail, one paired row of teeth.

16. *K. subtilis* (Grassi) 1881. Very slender with long tail (32–40%), very short ovary, 16 mm.

Genus PTEROSAGITTA

Collarlette voluminous and foamy, one pair lateral fins entirely on tail, two paired rows of teeth. A single species, 10 mm.

17. *P. draco* (Krohn) 1853.

Genus SPADELLA

Collarlette very large, but not voluminous, one pair of lateral fins entirely on tail, two paired rows of teeth but the 2nd set is often missing.

18. *S. cephaloptera* (Busch) 1851. A bottom living species.

Other useful characters are the number and shape of the teeth and hooks, the length of tail expressed as % of the total length, and the shape of the corona, although this cannot always be seen. Sometimes the size and proportion of the pigment fleck in the eye can be used (see Tokioka (1950), Fraser (1952), and Furnestin (1954)), but the pigment fades on prolonged exposure to light.

Keys are given by Ritter-Záhony (1911), Thomson (1947), and Fraser (1952) who includes also a short key to the species found in the North Sea.

Further Information on Identification

- S. setosa*: A coastal or low salinity species: The clear line of the gut leaving the head in dorsal or ventral view is a useful guide in separating this species from *S. elegans*, even in young stages. The ovaries are short. Ritter-Záhony, (1910), 1911b, Kühl (1928), Fraser, 1952.
- S. elegans*: A species typical of mixed oceanic and coastal waters. There are 3 varieties, 2a) *S. e. elegans*, 2b) *S. e. baltica*, and 2c) *S. e. arctica*. Ritter-Záhony, 1910 (as *S. bipunctata*), *S. e. arctica* can reach 50 mm. and is somewhat iridescent, it is the normal variety in the arctic and boreal regions, and in the oceanic area of the Faroe-Shetland Channel (Fraser, 1939 — not 1937). See also Ritter-Záhony (1911a), Kühl (1928), Fraser (1952).
- S. serratodentata*: An oceanic form of cosmopolitan distribution except in cold water. There are 2 varieties in the area, 3a) *S. s. tasmanica* and 3b) *S. s. atlantica*. The former is the more northerly distributed, whereas *S. s. atlantica* is found in areas of higher salinity in the Mediterranean and Lusitanian areas (see Furnestin, 1953). They can be separated by the shape of the vesiculae seminales and the serrations of the teeth — see figure. *S. s. tasmanica* is rather larger reaching about 17 mm., but *S. s. atlantica* is rarely more than 12 mm. Furnestin (1953a), Ritter-Záhony (1911b), Thompson (1947), Fraser (1937), Ghirardelli (1948), Fraser (1952).
- S. bipunctata*: An oceanic warm water species only rarely found outside the tropical and subtropical areas. The name has frequently been misused for *S. elegans* and *S. setosa*. Ritter-Záhony (1911b), Tokioka (1940), Faure (1952), Fraser (1952), Suarez-Caabro (1955).
- S. friderici*: A coastal species rather like *S. bipunctata* but without the marked sensory papillae and with the vesiculae seminales touching both posterior fin and tail. Ritter-Záhony (1911b), Fraser (1952) and particularly Faure (1952). For the differences between this species and *S. tenuis* see also Tokioka (1955) and Furnestin (1954).
- S. decipiens*: Not a common species in the Atlantic. Ritter-Záhony (1911b), Burfield and Harvey (1926), Fowler (1905), Furnestin (1953b).
- S. hispida*: Tropical and subtropical only and confined to the southernmost part of the area covered in this sheet. It has been confused with *S. robusta* and *S. ferox*. Pierce (1951), Tokioka (1955), Scaccini and Ghirardelli (1941), Ghirardelli (1948), George (1952), Suarez-Caabro (1955).
- S. zetesios*: A deep water oceanic species which has usually been recorded as *S. planctonis* since Ritter-Záhony referred to them as synonymous. It is now regarded as a separate species. Fowler (1905), David (1956), and (as *S. planctonis*) Ritter-Záhony (1911b), Burfield and Harvey (1926), Fraser (1952).
- (a). *S. planctonis* (sens. str.): A surface warm water form that has been recorded occasionally from the north-east Atlantic. Specimens resembling *S. zetesios* taken from shallow depths in oceanic water south of the Bay of Biscay should therefore be examined carefully. The two species can best be separated by the number of posterior teeth which in *S. zetesios* may be 22 (usually 15–19) and in *S. planctonis* are fewer, up to 14 (usually 10–12). David (1956), Tokioka (1940), Moore (1949).

Distribution

Species

(Species in brackets occur only exceptionally)

Gulf of Bothnia	—
Gulf of Finland	—
Baltic proper	1, (2a), 2b
Belt Sea	1, 2a, 2b
Kattegat	1, 2a, 2b
Skagerak	1, 2a, 3a, (10), (14)
Northern North Sea	1, 2a, 3a, 10, (11), 14
Southern North Sea	1, 2a
English Channel (eastern)	1, (2a)
English Channel (western)	1, 2a
Bristol Channel, Irish Sea, and inshore west of British Isles ..	1, 2a, (3a)
Atlantic, west of Ireland and Scotland	(2a), 3a, (3b), (4), 8, 9, 10, 11, 13, 14, 15, 16
North-eastern Atlantic: 40°–50°N.	(2a), 3a, 3b, (4), (5), (6), (8a), 9, 11, 12, (14), 15, 16
North-eastern Atlantic: 20°–40°N.	(3a), 3b, 4, 5, 6, 7, 9, 11, 12, 16, 17
Faroe Shetland Area	(1), 2a, 2c, 3a, 8, 9, 10, 11, 13, 14, 15
Faroe Iceland Area	(2a), 2c, 3a, 8, (9), 10, 13, 14, 15
Norwegian Sea	2c, (3a), 8, 10, 14
Barents Sea	2c, (10), 14

References to Work on Biology

(excluding those already given under 'Further Information'). Numbers refer to the species considered. Barnes (1950), 1. Bigelow (1926), 2, 3, 8, 9, 10, 14. Clarke, Pierce & Bumpus (1943), 2a. Furnestin, J. (1938), 1, 2a, 3. Ghirardelli (1952), 1, 3, 4, 9, 11, 12, 17, 18; (1953), 18; (1954), 17. Harrison (1940), 1, 2a. Huntsman (1919), 2, 3, 9, 10, 11, 14. Huntsman & Reid (1921), 2. Kramp (1918, 1939), 2c, 8, 10, 14, 15. Kühl (1932), 1, 2a, 9, (?11), 12. Massuti Oliver (1954), 4, 12. Meek (1928), 1, 2a. Moore (1949), 4, 7?, 9, 11, 12, 16, 17. Pierce (1941), 1, 2a; (1953), 3, 4, 9, 11, 12, 16, 17. Redfield & Beale (1940), 2, 3, 10, 11, 12, 14. Russell (1931–35), 1, 2a. Tchindonova (1955), 2, 11, 13, 14, 15, (in Russian). Wimpenny (1937), 1, 2a.

9. *S. hexaptera*: The very small anterior fin so far behind the ganglion clearly separates this species from all but *S. enflata*. The small number of anterior and posterior teeth are confirmatory characters which make identification certain and easy. Ritter-Záhony (1911b), Michael (1911), Ghirardelli (1948), Fraser (1952), Suarez-Caabro (1955).
10. *S. maxima*: The largest species in the North Atlantic, it is found in the upper layers in the Arctic, but elsewhere only in the deeper cold water. Separation from similar species can be made by the forward extension of the anterior fin to or beyond the ganglion. Ritter-Záhony (1910), (1911b), Fraser (1952).
11. *S. lyra*: This species is rather like '10' but the anterior fins do not reach the ganglion, and there is a different arrangement of the nerves. In '10' they run down the ventral side only of the fins, whereas in '11' they run to commencement of the fins, split, and then run down each side. The head is not so broad as in '10' and the tail segment is shorter and thinner. There are two types, *S. lyra lyra* and *S. lyra gazellae* (the latter must not be confused with *S. gazellae* which is now recognized as a valid species and confined to the Antarctic). David (1955), Ritter-Záhony (1911b), Burfield and Harvey (1926), Tokioka (1939), Ghirardelli (1950), Fraser (1952). [Not Michael (1911), who had a mixture of *S. lyra* and *S. maxima*.]
12. *S. enflata*: So far this species has only been recorded from the southern part of the area covered. Its transparent tumid appearance makes it an easy species to recognize. Ritter-Záhony (1911b), Michael (1911), Burfield and Harvey (1926), Tokioka (1940), Ghirardelli (1948),

- George (1952), Fraser (1952), Suarez-Caabro (1955).
13. *S. macrocephala*: The shape of the head with its large number of hooks, the colour of the body and the long transparent tail make this a very easy species to identify. There is no pigment fleck in the eyes. Fowler (1905), Ritter-Záhony (1911b), Fraser (1952).
14. *E. hamata*: Probably the most abundant cold water species in the area. Like *S. maxima* it is epipelagic in Arctic and boreal water but elsewhere is confined to deeper cold water. The table gives sufficient information for identification. Ritter-Záhony (1910, 1911b), Michael (1911), Burfield and Harvey (1926), Burfield (1930), Fraser (1952).
15. *E. fowleri*: Differs from '14' in the marked red colour of the gut, the presence of pigment in the eyes, the very distinct neck and the slightly greater number of hooks. Ritter-Záhony (1911b), Fraser (1952).
16. *K. subtilis*: For separation of this species from *K. pacifica* see Tokioka (1939). Thomson (1947), George (1952), Fraser (1952), Suarez-Caabro (1955).
17. *P. draco*: The collarette may be partly or almost wholly torn off in poorly preserved specimens. Ritter-Záhony (1911b), Tokioka (1940), Michael (1919), Ghirardelli (1948), George (1952), Suarez-Caabro (1955).
18. *S. cephaloptera*: Ritter-Záhony (1911b), Yosii and Tokioka (1939). This species is not strictly planktonic and has been excluded from the distribution table.

Fuller references to the literature are given by many of the authors quoted above.

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Added in proof stage.

After this sheet was prepared an important work was published; Furnestin, M.-L., 1957. *Rev. Trav. Inst. Pêches marit.*, **21**, (1—2), pp. 1—356. It deals especially

with species 3, 4, 5, 9, 11, 12, and 17, and also with *S. minima* Grassi which occurs in the area N. E. Atlantic 20—40°N.