Appendicularians are small free swimming planktonic tunicates, their bodies consisting of a short trunk and a tail (containing the notochord cells) which is present through the life of the individual. Glandular (oikoplast) epithelium on the trunk secretes the mucous house which encloses the whole or part of the body and contains the complex filters which strain food from the water driven through them (Deibel 1998; Flood & Deibel 1998). Unlike other tunicates, there is no peribranchial cavity and a pair of pharyngeal perforations (spiracles) surrounded by a ring of cilia open directly to the exterior from the floor of the pharynx.

The early studies of these organisms, begun with Chamisso's description of *Appendicularia flagellum* Chamisso, 1821, were confounded by questions of its phylogenetic affinity. Chamisso classified his species with medusoids, Mertens (1830) with molluscs, and Quoy & Gaimard (1833) with zoophytes. Only in 1851 were appendicularians correctly assigned to the Tunicata by Huxley. At the time of this placement, the existence of more than one taxon was only just beginning to be recognised, and despite Huxley's work, they were not universally regarded as adult organisms—some authors still insisting that they were ascidian larvae or a free swimming generation of the sessile ascidians (Fenaux 1993). Subsequently, these questions were resolved by the work of Fol (1872) on material from the Straits of Messina, which forms the basis of later studies on the large collections of the great expeditions of the 19th century that revealed their true diversity in the oceanic plankton.

Appendiculariidae Brown, 1862 (at family level) and Appendicularia (as a tribe) were the first collective names given to this group of organisms. Fol (1872) applied the family name Appendiculariidae to the group. Appendicularia predates Copelata Haeckel, 1866, Larvacea Herdman, 1882 and other names at ordinal or class level (see Fenaux 1993). It is, accordingly, the name given to the class in the present work.
Lohmann (1892–1931) and Lohmann & Bückmann (1926) made important contributions to the study of the group, as did Aida (1907–1908) and Tokioka (1940 et seq.) in Japanese waters, and Ritter (1905) and Essenberg (1926) off California. Fenaux et al. (1990) published a bibliography and Fenaux (1993) completely revised the group and reviewed its history. The taxonomy and biology are reviewed in Bone (1998).

The classification within the class is generally that originally proposed by Lohmann (1896a) and followed, with minor modifications, by later workers. The families are Oikopleuridae Lohmann, 1896a, Fritillariidae Seeliger, 1895 and Kowalevskiidae Lahille, 1888. They are distinguished from one another by characteristics of body shape, endostyle, pharyngeal perforations, stomach wall, oikoplast epithelium and tail.

In Australia, the appendicularians of the eastern coast collected by the CSIRO research vessel FRV Warreen between the Tropic of Capricorn and South Australia were studied and recorded by Thompson (1945). A few species were recorded from Shark Bay and off Fremantle by Lohmann (1909), but there is no systematic study on this group in western Australian waters or in the tropical or the southern coastal waters of the Australian continent. So far, no indigenous species are known.

As with the thaliaceans, the geographic ranges of most species are great, being defined by the course of the relevant ocean currents rather than by geographic regions. Tokioka (1960) reviewed the geographic distribution of species in the class.

The search for the location of type specimens of the class has been unsuccessful. In particular, the collections of the Humboldt Plankton Expedition (Lohmann) and the Deutsch Tiefsee Expedition (Lohmann 1892–1931) have not been found. At this stage, no relevant larvacean type specimens have been located in the Natural History Museum (London), U.S. National Museum of Natural History (Washington, D.C.), the American Museum of Natural History (Vienna), the Natural History Museum (Vienna), the Museum d’Histoire Naturelle (Paris), the Naturhistoriske Riksmuseum (Stockholm), Museum für Naturkunde (Berlin) or the Japanese collections. Hopefully, the publication of this section of the Catalogue will advertise the need for information on the location of the type specimens in this taxon of the Tunicata, although it is probable that many were lost during World War II (Fenaux 1993).

References


APPENDICULARIA


The members of the family Fritillariidae Seeliger, 1895 (as amended by Lohmann, 1915) have dorsoventrally compressed or spindle-shaped trunks. The endostyle is curved upwards. The pharyngeal perforations (spiracles) are in the anterior part of the pharynx and each (with its ring of cilia) opens directly to the exterior, rather than through a tubular passage. The stomach wall consists of few large cells. The oikoplast epithelium lacks a row of conspicuous oikoplast cells (Fol's fibroblasts) dorsally, and ventrally is a small anterior area only.

The family is represented in Australian waters by seven species of *Fritillaria* and one of *Tectillaria*. It has been reviewed by Lohmann (1933) and Fenaux (1993) and its occurrence in Australian waters is documented by Thompson (1945).
Fritillaria borealis allongata Lohmann, 1899

Type locality: Straits of Messina.

Type data: type status and whereabouts unknown.


Distribution: QLD (Great Barrier Reef); North Sea, Baltic Sea, Mediterranean Sea.

Ecology: marine, planktonic; warm and mixed waters.

Fritillaria sargassii Lohmann, 1896

Type locality: Banyuls-sur-Mer.

Type data: type status and whereabouts unknown.

Ecology: marine, planktonic; warm and mixed waters.

Fritillaria plana

Type locality: North Sea.

Type data: type status and whereabouts unknown.

Ecology: marine, planktonic; warm and mixed waters.
**FRITILLARIIDAE**


Type data: type status and whereabouts unknown.

Type locality: Banyuls-sur-Mer.


Distribution: NSW (Central E coast, Lower E coast), VIC (Bass Strait); Atlantic Ocean, Pacific Ocean and Indian Ocean.

Ecology: marine, planktonic; warm waters.


*Fritillaria formica* Fol, 1872


Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Distribution: NSW (Central E coast, Lower E coast), Queensland (Central E coast), TAS (Tas. coast); Mediterranean Sea, Atlantic Ocean, South Equatorial Stream, south California, rare in west Pacific Ocean.


*Fritillaria fraudax* Lohmann, 1896


Type data: syntypes (probable) ZMH* (depository uncertain).

Type locality: Sargasso Sea, Atlantic Ocean.

Distribution: NSW (Central E coast), QLD (Central E coast, Lower E coast), TAS (Tas. coast); Mediterranean Sea, Atlantic Ocean, South Equatorial Stream, south California, rare in west Pacific Ocean.

Ecology: marine, planktonic; water temperature 24.1–26.5°C, salinity 34.8–36.8 parts per thousand.


*Fritillaria borealis truncata crassa* Fol, 1872


Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Distribution: Japan, California, NSW (Central E coast, Lower E coast), QLD (Central E coast), TAS (Tas. coast); Mediterranean Sea, Atlantic Ocean, South Equatorial Stream, south California, rare in west Pacific Ocean.

Ecology: marine, planktonic; water temperature 23.3–29.5°C, salinity 34.8–37 parts per thousand.


*Fritillaria megachile* Fol, 1872


Type data: holotype ZMB* (depository uncertain).

Type locality: Swan River, North Fremantle, WA.

Distribution: NSW (Central E coast, Lower E coast), Queensland (Central E coast), TAS (Tas. coast); Mediterranean Sea, Atlantic Ocean, South Equatorial Stream, south California, rare in west Pacific Ocean.

Ecology: marine, planktonic; water temperature 28°C, salinity 34.8–37 parts per thousand.


Type data: type status and whereabouts unknown.

Type locality: San Diego region, 13.68–14.82°C.


Type data: type status unknown.

Type locality: San Diego region, 14.75°C.


Type data: type status and whereabouts unknown.

Type locality: San Diego region, 13–17.3°C.


Type data: type status unknown.

Type locality: San Diego region, 14.7°C.


Distribution: Japan, California, NSW (Central E coast, Lower E coast), QLD (Central E coast), TAS (Tas. coast); Mediterranean Sea, Atlantic Ocean, South Equatorial Stream, south California, rare in west Pacific Ocean.

Ecology: marine, planktonic; water temperature 23.3–29.5°C, salinity 34.8–37 parts per thousand.


*Fritillaria megachile* Fol, 1872


Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.
Type data: type status and whereabouts unknown. Type locality: San Diego region.

Type data: type status and whereabouts unknown. Type locality: San Diego region, surface, 14.2°C.


Distribution: NSW (Central E coast); Mediterranean Sea, Atlantic Ocean, South Equatorial Stream, tropical west Pacific Ocean.
Ecology: marine, planktonic; warm water, surface temperature 22.1–23.3°C.

Fritillaria pellucida  (Busch, 1851)

Type data: holotype (probable) ZMB* (depository uncertain). Type locality: Gibraltar.

Distribution: NSW (Lower E coast); also in warm waters of all oceans.
Ecology: marine, planktonic; not deeper than 200 m, water temperature 15.3–27.2°C, salinity 34.8–37.4 parts per thousand.

Fritillaria venusta  Lohmann, 1896

Type data: type status and whereabouts unknown. Type locality: Cape Verde, equatorial and Guinea currents.

Type data: type status and whereabouts unknown. Type locality: equatorial regions, north and south Atlantic streams.

Type data: type status and whereabouts unknown. Type locality: San Diego, 0–200 m, surface temperature, 20.2°C.


Distribution: NSW (Central E coast), QLD (Central E coast); rare, also equatorial regions in north and south Atlantic Streams, tropical west Pacific Ocean and Mediterranean Sea.
Ecology: marine, planktonic; not deeper than 200 m, temperature 24.10–26.5°C, salinity 34.8–36.8 parts per thousand.

Tectillaria  Lohmann & Bückmann, 1926

Type species: *Fritillaria fertilis* Lohmann, 1896 by monotypy.


Fritillaria fertilis  (Lohmann, 1896)

Type data: syntypes (probable) ZMH* (depository uncertain). Type locality: north and south Atlantic equatorial currents.

Distribution: NSW (Central E coast); the Atlantic Ocean, Florida Stream, E Sargasso Sea, North Equatorial Stream, west Pacific Ocean and Indian Ocean.
Ecology: marine, planktonic; not deeper than 200 m, water temperature 24.5–26.6°C, salinity 35.6–37.0 parts per thousand.
The family Kowalevskiidae Lahille, 1888 is characterised by a short trunk, and lacks both endostyle and heart. The ciliated ring around the internal opening of each spiracle is compressed into a long narrow slit with upper and lower rims. The stomach wall consists of few, large, conspicuous cells; a spectacular, large, button-shaped cell is on the upper part of the oikoplast epithelium. The outline of the tail is fusiform or spindle-shaped.

One of the two known species is recorded from Australia—being taken only once off southeastern Queensland and once off central New South Wales (Thompson 1945).

References

*Kowalevskia* Fol, 1872


Type species: *Kowalevskia tenuis* Fol, 1872 by monotypy.


*Kowalevskia tenuis* Fol, 1872


Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Distribution: Portugal, Japan, California, NSW (Central E coast), QLD (Central E coast); warm waters from Portugal to equator, Mediterranean Sea, Benguela stream, south California.

Ecology: marine, planktonic; in surface waters, temperature 13–14°C.

OIKOPLEURIDAE

Oikopleuridae have ovoid bodies, straight endostyles, and the spiracles have tubular passages from the internal pharyngeal openings to the external ones in the vicinity of the rectum. Stomach walls have numerous small cells and a row of only a few large cells. A row of large (Fol’s) fibroblasts is on both parts of the antero-dorsal oikoplast epithelium.

Appendicularia flagellum Chamisso, 1821, the first recorded organism of the class, although barely recognisable at family level, has a species description and accompanying figures that make the general affinity of the organism clear enough (see Fenaux 1993). Mertens (1830) believed that he had the same species from the Bering Strait but renamed it Oikopleura chamissonis. Fenaux (1993) believes that either Oikopleura labradoriensis Lohmann, 1892 or Oikopleura vanhoeffeni Lohmann, 1896 could be conspecific with either Appendicularia flagellum or Oikopleura chamissonis Mertens, 1830, type species of the genus Oikopleura Mertens, 1830, or with both. Whichever species are found to be synonyms, the genus name Appendicularia Chamisso has priority over Oikopleura Mertens and this is emphasised in discussions on a case put to the International Commission on Zoological Nomenclature (Case 23, 1922). At the time the decision was to table the question until more information was presented. However, the much used names Oikopleura and Oikopleuridae are used here pending an application to the Commission for Zoological Nomenclature to validate them. Further, the description of a neotype from (Bering Strait) is required to establish the identity of O. chamissonis, as the type specimen is not available.

The family is the most diverse in the class. It is represented in Australian waters by nine species of Oikopleura Mertens, 1830, and one each of Megalocercus Chun, 1887, Stegosoma Chun, 1887, Althoffia Lohmann, 1892 (all in the subfamily Oikopleurinae); and one of Bathochordaeus Chun, 1900 (in the subfamily Bathochordaeinae; Fenaux & Youngbluth 1990). The commonly occurring species are Oikopleura rufescens Fol, 1872, Oikopleura dioica Fol, 1872 and Oikopleura longicauda (Vogt, 1854). The family has been reviewed by Lohmann (1933) and Fenaux (1993), and Thompson (1945) has documented its occurrence in eastern Australian waters.

References


OIKOPLEURIDAE


BATHOCHORDAEINAEE

Bathochordaeus Chun, 1900


Type species: _Bathochordaeus charon_ Chun, 1900 by monotypy.


_Bathochordaeus charon_ Chun, 1900


Type data: syntypes (probable) ZMB* (depository uncertain).

Type locality: Benguela Stream, southwest Atlantic Ocean.

Distribution: NSW (SE coastal); SW Atlantic Ocean.

Ecology: marine, planktonic; rare, in vertical hauls from 2000 m and 200 m.

Althoffia Lohmann, 1892

Type species: Althoffia tumida Lohmann, 1892 by monotypy.

Althoffia tumida Lohmann, 1892

Type data: type status and whereabouts unknown.
Type locality: Sargasso Sea, Atlantic Ocean.
Distribution: NSW (Central E coast), QLD (Central E coast), VIC (Bass Strait*); Sargasso Sea, Florida Stream, South Equatorial Stream and in Indian Ocean and Pacific Ocean.
Ecology: marine, planktonic; not taken at surface or deeper than 20 m, present where surface temperature between 15.8–27°C and salinity 35.5–37.4 parts per thousand.

Megalocercus Chun, 1887

Type species: Megalocercus abyssorum Chun, 1887 by monotypy.

Megalocercus huxleyi (Ritter, 1905)

Type data: type status and whereabouts unknown.
Type locality: north of New Guinea [2°38’N 137°22’E].

Type data: type status and whereabouts unknown.
Type locality: Japan.
Distribution: Japan, NSW (Central E coast, Lower E coast), QLD (Central E coast), VIC (Bass Strait*); Indian Ocean, Indo-west Pacific Ocean.
Ecology: marine, planktonic; warm water up to 29.3°C.

Oikopleura Mertens, 1830


Type species: Vexillaria flabellum Mueller, 1846 by monotypy.

Type species: Oikomikron mitrateton Swainson, 1890 by monotypy.

Type species: Appendicularia longicauda Vogt, 1854 by monotypy.

Oikopleura albicans (Leuckart, 1854)

Type data: type status unknown.
Type locality: Mediterranean Sea.
Distribution: Japan, California, NSW (Lower E coast); Indian Ocean, Atlantic Ocean, Mediterranean, Californian coast.
Ecology: marine, planktonic; water temperatures to 27.2°C, a warm water species usually found with Oikopleura longicaudata (Vogt, 1854) and O. rufescens Fol, 1872, but less numerous.

Oikopleura cophocerca Aida, 1907

Type data: type status unknown.
Type locality: Messina, Mediterranean Sea.
Distribution: Japan, Indonesia, NSW (Central E coast, Lower E coast), QLD (Central E coast), VIC (Bass Strait), WA (Central W coast); warmer sections of Indian and Atlantic Oceans (including West Indies), and western and eastern Pacific Ocean, including Indonesia and Japan.
Ecology: marine, planktonic; warm water species, not taken at depths greater than 200 m in waters 13–28°C and salinity to 34.4%.

Oikopleura cornutogastra Aida, 1907

Type data: type status and whereabouts unknown.
Type locality: off Japan.
Distribution: NSW (Lower E coast); off Aguilhas, Benguela and South Equatorial Streams.
Ecology: marine, planktonic; water temperature 19°C or higher.

Oikopleura dioica Fol, 1872

Vexillaria flabellum Mueller, J. (1846). Bericht über einige neue Theiformen der Nordsee. Mäurers Arch. Anat. Phys. Wiss. Med. 1846: 106 [106] [this is a little used name, and for stability in nomenclature, Oikopleura dioica Fol, 1872 is maintained here as the valid name, pending an application to the International Commission on Zoological Nomenclature].
Type data: type status and whereabouts unknown.
Type locality: North Sea.

Type data: type status unknown GMNH (depository uncertain, not found).
Type locality: Straits of Messina, Mediterranean Sea.

Type data: type status and whereabouts unknown.
Type locality: Fiskeläckskil, Gullmarfjorden, Sweden.

Type data: type status and whereabouts unknown.
Type locality: Kattegat.

Type data: type status and whereabouts unknown.
Type locality: Irish Sea.

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulf coast), TAS (Bass Strait*), WA (Central W coast, Lower W coast); Tas. coast, VIC; also in warmer parts of all oceans 3.2–29.5°C, rare in open sea.
Ecology: marine, planktonic; never deeper than 200 m, water temperature 3.2–29.5°C, salinity 11.4–36.7 parts per thousand.

Oikopleura fusiformis Fol, 1872

Type data: type status unknown GMNH (depository uncertain, not found).
Type locality: Straits of Messina, Mediterranean Sea.
Distribution: Japan, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef), VIC (Bass Strait*), WA (Central W coast); Great Barrier Reef, central E coast, lower E coast, QLD, NSW, VIC; also in warmer parts of all oceans 3.2–29.5°C, rare in open sea.
Ecology: marine, planktonic; warm water to 29.3°C.

Oikopleura intermedia Lohmann, 1896


Type data: syntypes (probable) ZMB* (depository uncertain).

Type locality: Atlantic Ocean.


Type data: type status and whereabouts unknown.

Type locality: Japan.


Type data: type status and whereabouts unknown.

Type locality: Tortugas, Florida, USA.


Appendicularia longicauda Vogt, C. (1854)


Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: off Nice, Mediterranean Sea.


Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.


Type data: type status and whereabouts unknown.

Type locality: Madeira, NE Atlantic Ocean.


Distribution: Peru, California, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef), SA (S Gulfs coast), VIC (Bass Strait), WA (Central W coast); Mediterranean Sea, and most warmer oceanic waters, including areas where mixing with cold waters off Peru and S California.

Ecology: marine, planktonic; water temperature 11.2–29.7°C, salinity 12.8–37.3 parts per thousand.

Oikopleura rufescens Fol, 1872


Type data: type status unknown GMNH (depository uncertain, not found).

Type locality: Straits of Messina, Mediterranean Sea.

Distribution: California, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Central W coast), in all oceans but rare in Mediterranean Sea, SE Atlantic Ocean and southern California.

Ecology: marine, planktonic; water temperature 13–29°C, salinity 34.7–37.4 parts per thousand.


Stegosoma Chun, 1888


Type species: Stegosoma pellucidum Chun, 1888 (= Oikopleura magnus Langerhans, 1880) by monotypy.


Stegosoma magnus (Langerhans, 1880)


Type data: type status and whereabouts unknown.

Type locality: Madeira, NE Atlantic Ocean.


Type data: type status and whereabouts unknown.

Type locality: to 1300 m, Mediterranean Sea.
**OIKOPLEURIDAE: OIKOPLEURINAE**


Type data: type status unknown.
Type locality: off San Diego, California.


Distribution: NSW (Lower E coast), QLD (Central E coast*); Indian Ocean and Pacific Ocean, Mediterranean Sea.

Ecology: marine, planktonic; surface waters of warmer oceanic regions, down to 1300 m in Mediterranean Sea.