

TORNIPORA, A NEW CHEILOSTOME BRYOZOAN FROM THE MAASTRICHTIAN AND DANIAN OF DENMARK

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A study of species of *Floridina* Jullien, 1881 from the Danian of Denmark shows that several of these species cannot be placed in *Floridina*. A new genus, *Tornipora*, is erected to accommodate the species rejected from *Floridina*. The new genus is characterised by the trifoliated opesian region, by the traces of spines, by the nearly circular avicularian opesium, and by the single dentalian process in the latter opesium. Two new species, *Tornipora harvigensis* and *T. grandisa* are described.

Since Jullien (1881) erected the genus *Floridina*, several authors have identified some of the cheilostome bryozoans from the Upper Cretaceous and Lower Tertiary with this genus, but characteristic morphological features demonstrated by Schager (1968) indicate that some of these species must be removed from *Floridina*. Some of the former "*Floridina*" species must be assigned to *Floridinella* Canu & Bassler, 1917, or *Diplopholeos* Canu & Bassler, 1917. But several of the "*Floridina*" species in the Danish bryozoan limestone (Danian) do not fit into any of the mentioned genera. Therefore a new genus, *Tornipora*, is established for the displaced "*Floridina*" species which are especially distinguished by spines in the distal part of the zooecia.

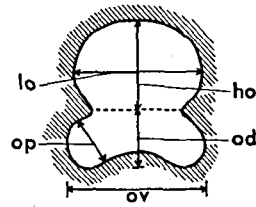
Figured specimens are in the type collection of the Mineralogical Museum of the University of Copenhagen.

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Floridina Jullien, 1881

Type species: *Mollia antiqua* Smitt, 1873 (see also Osburn 1950, and Cook 1964).

Fig. 1. Arrangement of measurements in the opesian region of cheilostome bryozoans. *ho*: length of opesium. *lo*: width of opesium. *od*: length of opesiule. *op*: diameter of opesiule. *ov*: maximum distance between the opesiules.



Description: Zoaria as encrusting unilamellar plates. The zooecia are hexagonal with trifoliate apertures (circular opesia) and two large, symmetrical opesiular indentations. Cryptocyst granulated. Avicularia (onychozellaria) straight and symmetrical with oval-shaped opesia. Bimembraneous mandible.

Affinities: The Cretaceous species, which Jullien has referred to *Floridina*, differ from this genus in several respects. *Vincularia gothica* d'Orbigny, 1851 does not possess the dentalian processes which form the trifoliate opesia of the zooecia, but some specimens may show a pair of dental-like fragments; these are the remains of the calcified lip and form an angle with the surface of the zooecium. "*Vincularia*" *gothica* must be grouped with "*Floridina*" *gothica vallengbaeki* Jürgensen, 1968, "*F.*" *gothica ramosa* Jürgensen, 1968, "*F.*" *pulchella* (Kade, 1852), and "*F.*" *tubulosa* Voigt, 1923 in a new genus.

Stratigraphic range: ? Miocene to recent.

Tornipora n. gen.

Type species: *Semieschara canui* Brydone, 1906. Lower to Middle Maastrichtian.

Derivation of name: *Torn* (Danish) = spine, alluding to the marginal spines in the distal part of the zooecium and to the dentalian process in the avicularian opesium.

Diagnosis: Zoaria as unilamellar plates with the hexagonal zooecia in nearly regular, longitudinal rows. The opesian region ("aperture") is trifoliate with a nearly circular, or widely oval opesium (pentagonal base). Two dentalian processes separate the opesium from the two symmetrical opesiules, and a low, wide lip separates the opesiules. There is no calcified connection between the opesian processes. Marginal spines surrounding the opesia in the distal part of the zooecia. The cryptocyst is granulated and depressed.

The avicularia are symmetrical and the avicularian opesia are nearly circular with a distinct dentalian process in the posterior part. Ovicells present.

Affinities: The new genus has been compared with the genera *Floridina* Jullien, *Floridinella* Canu & Bassler, and *Diplopholeos* Canu & Bassler. The new genus differs from these genera especially by having spines and by the elaboration of the avicularian opesia which are provided with single dentalian processes.

The species *Tornipora harvigensis* n. sp. from the Danian of Denmark, *Membranipora assimilis* Levinsen, 1925, and *Tornipora grandisa* n. sp. from the Danish Maastrichtian must also be referred to the new genus. However, *M. assimilis* and *T. grandisa* n. sp. appear to lack avicularia, but, on the other hand, they do possess spines which serve to separate them from *Floridinella*. Furthermore, the two species have other morphological features in common with *Tornipora harvigensis*. Accordingly, they are here assigned to *Tornipora*.

Tornipora harvigensis n. sp.

Plate 1, figs 1-4; text-fig. 2C

Holotype: MMH no. 11160; plate 1, fig. 1.

Derivation of name: Named after the type locality, Harvig, Stevns Klint.

Diagnosis: Essentially the same as for the genus. 5 marginal traces of spines in the distal part of the zooecium, 3 at the top and 2 close to the two dentalian processes in the opesian region. The avicularia are symmetrical, rhombic and tapering. The cryptocysts of the avicularia are granulated, with an anteriorly finely granulated part which is delimited by a distinct line.

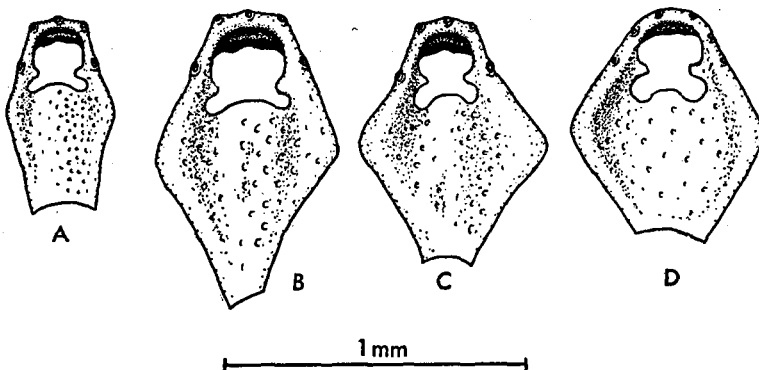


Fig. 2. Zooecia in species of *Tornipora* n. gen. $\times 40$. A: *Tornipora assimilis* (Levinsen, 1925). B: *Tornipora grandisa* n. sp.; holotype MMH no. 11157. C: *Tornipora harvigensis* n. sp. D: *Tornipora canui* (Brydone, 1906).

Measurements

	Range	Average
Length of zooecium	0.54–1.01 mm	0.76 mm
Width of zooecium	0.43–0.69 mm	0.56 mm
Length of opesium	0.09–0.14 mm	0.12 mm
Width of opesium	0.15–0.22 mm	0.18 mm
Diameter of opesiule	0.05–0.09 mm	0.07 mm
Max. distance between opesiules	0.18–0.28 mm	0.23 mm
Length of opesiule	0.06–0.11 mm	0.08 mm

Material: About 200 zoaria from the type locality.

Type locality: Harvig, Stevns Klint. Lower bryozoan limestone up to 1.6 m above the Maastrichtian-Danian boundary.

Stratigraphic range: Lower Danian.

Affinities: The new species resembles *Tornipora canui* (Brydone), but it differs from this species by having only five traces of spines, by having longer zooecia, and by its tapering, rhombic avicularia. Two other species, *T. assimilis* (Levinsen) and *T. grandisa* n. sp. also show a great resemblance to *T. harvigensis*, but these species appear to lack avicularia. On the other hand, the zooecia are smaller in *T. assimilis* and longer in *T. grandisa* as compared to those in *T. harvigensis*. "*Floridina*" *trifolioides* Berthelsen, 1962 lacks avicularia and spines.

Tornipora canui (Brydone, 1906)

Fig. 2D

- 1906 *Semieschara canui* Brydone: p. 295, fig. 5.
 1913 *Semieschara canui* Brydone. – Brydone: p. 249, pl. VIII, figs. 10–11.
 1923 *Floridina trifolium* Voigt: p. 5, pl. 1, fig. 3.
 1925 *Membranipora crustalenta* Gold. – Levinsen: p. 346, pl. IV, fig. 40.
 1930 *Floridina canui* Brydone. – Voigt: p. 470, pl. 20, figs. 3–4.
 1959 *Floridina canui* Brydone. – Voigt: p. 30.

Description: As for the genus, but with almost regular hexagonal zooecia in regular longitudinal rows. The species has 6 marginal traces of spines in the anterior part of the zooecia, surrounding the opesium. The anterior part of the avicularia is rounded.

Measurements

	Range	Average
Length of zooecium	0.50–0.64 mm	0.58 mm
Width of zooecium	0.39–0.56 mm	0.50 mm
Length of opesium	0.08–0.13 mm	0.10 mm
Width of opesium	0.14–0.19 mm	0.16 mm
Diameter of opesiule	0.05–0.07 mm	0.06 mm
Max. distance between opesiules	0.17–0.26 mm	0.21 mm
Length of opesiule	0.06–0.10 mm	0.08 mm

Material: Mixed material (about 90 zoaria) from Møns Klint (Taleren), the limestone quarry east of the town of Nysted, and the limestone quarry of Hasselø (Falster).

Stratigraphic range: Lower to Middle Maastrichtian.

Tornipora assimilis (Levinsen, 1925)

Fig. 2A

1925 *Membranipora assimilis* Levinsen: p. 347, pl. IV, fig. 41.

1930 *Floridina assimilis* Levinsen. – Voigt: p. 470, pl. 21, fig. 11(?)

Description: As for the genus and with 5 marginal traces of spines arranged in the same manner as in *T. harvigensis* n. sp., but without avicularia, and with the zoaria as compressed stems.

Measurements

	Range	Average
Length of zoecium	0.58–0.69 mm	0.64 mm
Width of zoecium	0.31–0.47 mm	0.37 mm
Length of opesium	0.10–0.14 mm	0.11 mm
Width of opesium	0.11–0.17 mm	0.14 mm
Diameter of opesiule	0.04–0.06 mm	0.05 mm
Max. distance between opesiules	0.14–0.20 mm	0.16 mm
Length of opesiule	0.05–0.07 mm	0.06 mm

Material: 25 zoaria from Møns Klint (Taleren) and the limestone quarry of Hasselø (Falster).

Stratigraphic range: Maastrichtian (? only Lower Maastrichtian).

Affinities: Canu & Bassler (1917) erected the genus *Floridinella* which differ from *Floridina* by lacking avicularia, but otherwise with the same general morphology as *Floridina*. Therefore *T. assimilis*, which shows traces of spines, cannot be referred to *Floridinella* and, as stated above, the species is here assigned to *Tornipora* n. gen. *Tornipora assimilis* is smaller than *T. harvigensis* and *T. grandisa*. Voigt (1967) has described a related species, *Floridina spinifera*, but the arrangement of the marginal spines in this species is different from that in *T. assimilis*.

Tornipora grandisa n. sp.

Fig. 2B, holotype, MMH no. 11157.

Derivation of name: *Grand* = large, which refers to the large zoecia.

Diagnosis: Essentially the same as for the genus. 5 marginal traces of spines, 3 at the top and 2 close to the two dentalian processes. Avicularia have not been observed. Only unilamellar plates have been found.

Measurements

	Range	Average
Length of zooecium	0.79–1.06 mm	0.90 mm
Width of zooecium	0.49–0.60 mm	0.56 mm
Length of opesium	0.14–0.18 mm	0.16 mm
Width of opesium	0.18–0.22 mm	0.20 mm
Diameter of opesiule	0.06–0.07 mm	0.06 mm
Max. distance between opesiules	0.21–0.28 mm	0.24 mm
Length of opesiule	0.06–0.09 mm	0.08 mm

Material: Only 9 zoaria fragments from the type locality.

Type locality: Glacial mass of white chalk about 1.5 km west of Hvide Klint (Møn).

Stratigraphic range: Maastrichtian.

Affinities: *T. grandisa* n. sp. is morphologically related to *T. assimilis* (Levinsen), but the length of the zooecia in the latter is only about two-thirds of that in *T. grandisa*. The zooecia in *T. grandisa* are larger and also relatively more narrow than those in *T. harvigensis* n. sp. It is not known if *T. grandisa* lacks avicularia, as only a few fragments have been found.

Dansk sammendrag

I 1968 påviste Schager, at en række Øvre Kridt og Nedre Tertiær bryozoarter, som tidligere har været henregnet til den recente slægt *Floridina*, havde morfologiske træk, som tydeligt adskiller disse arter fra typearten (*Mollia antiqua*) og dermed fra slægten *Floridina*. Schager prøvede ikke selv at gruppere de nu »hjemløse« arter. Det skal bemærkes, at Canu & Bassler (1917) opstillede to *Floridina*-lignende slægter, hvortil flere af de »hjemløse« arter kan henføres. Det gælder dog ikke en del af de danske Danienarter, hvorfor en ny slægt, *Tornipora*, opstilles. Til den nye slægt henføres flere arter, som bærer marginale torne. Desuden er slægten karakteristisk ved det særlige avicularium (pl. 1, fig. 2).

Samtidig opstilles to nye arter, *Tornipora harvigensis* fra nederste Danien og *T. grandisa*, som kun kan lokaliseres til Maastrichtien. Yderligere to arter fra det danske skrivekridt, *Tornipora assimilis* (Levinsen, 1925) og *T. canui* (Brydone, 1906) beskrives og henføres til den nye slægt. For sammenligningens skyld er medtaget en beskrivelse af *Floridina*.

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Plate 1

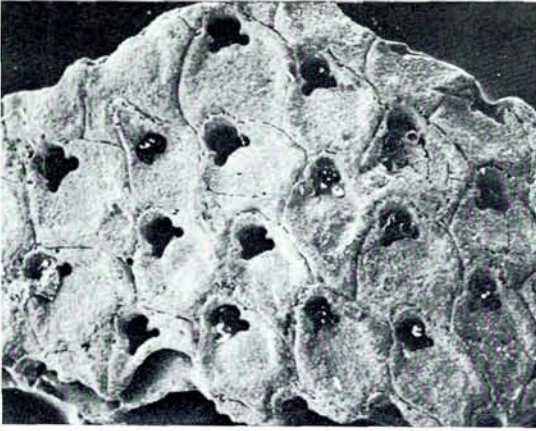
Figs. 1–4. *Tornipora harvigensis* n. gen. et n. sp.

1: Holotype; MMH no. 11160 × 32.

2: Avicularium. × 69.

3: Zoarium with the zooecia depressed in various ways. × 40.

4: Opesian region and marginal traces of spines. × 270.



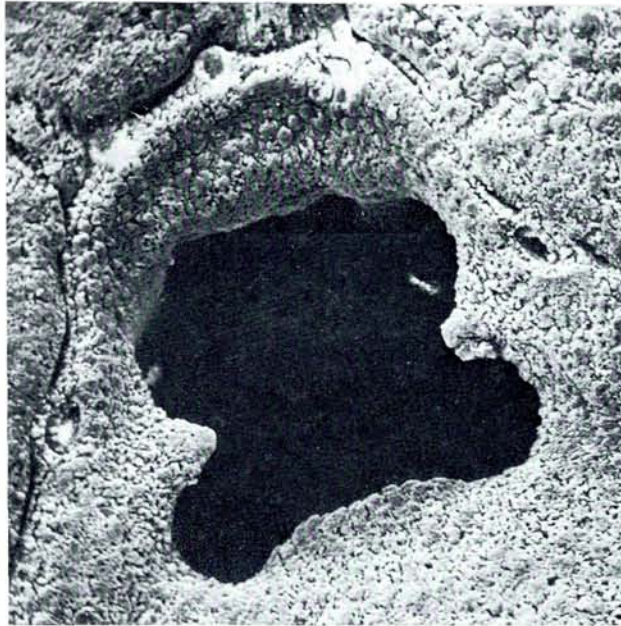
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