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## Two new species of cheilostome Bryozoa from Svalbard

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## Two new species of cheilostome Bryozoa from Svalbard

Piotr Kukliński & Peter J Hayward

### SARSIA



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Two new species of cheilostome Bryozoa are described: *Pentapora boreale* sp. nov. and *Microporella svalbardensis* sp. nov. Both are illustrated using scanning electron microscopy. The genus *Pentapora* is recorded for the first time from the Arctic realm. *Pentapora boreale* is especially characterized by a columnar umbo present proximal to the primary orifice and a straight-edged lyrula developed just within the proximal border of the orifice. *Microporella svalbardensis* is distinguished by a large, crescentic ascopore, crossed by thin radial bars, with a prominent umbo situated just proximal to it. Colonies of both species encrusted pebbles, and *M. svalbardensis* occurred additionally on biogenic carbonate substrata.

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Keywords: Arctic; Bryozoa; new species.

### INTRODUCTION

The Bryozoa of the boreal and Arctic regions of the northeast Atlantic have attracted very little attention since the publication of Kluge's (1962, 1975) monograph, which incorporated and updated the work of earlier European taxonomic specialists (e.g. Smitt 1868, 1871; Bidekap 1897, 1900a, b; Nordgaard 1900, 1918; Waters 1900, 1904; Norman 1903a, b, 1906). The work of Kluge (1962, 1975) and the papers of these early authors remain indispensable to present-day specialists, but the surveys on which they were based mostly consisted of few sampling points and sampling depths, over often extremely broad geographical ranges, and samples usually comprised small volumes of material, each yielding comparatively few bryozoan species. That the abundance and taxonomic diversity of the Bryozoa of north European seas is grossly underestimated was demonstrated by the BIOFAR campaign (1987–1990) during the course of which more than 600 benthic stations were sampled around the Faroe Islands. More than 180 species of Bryozoa were recorded (Hayward 1994), many in abundance, including 15 new species, and the known bryozoan fauna of the islands was more than doubled. Bryozoa constitute one of the most numerous macrofaunal groups in the Svalbard waters, being exceeded in abundance only by the polychaetes (Gulliksen & al. 1999), but have

been the subject of comparatively few papers (Smitt 1871; Bidekap 1897, 1900a, b; Nordgaard 1900, 1918; Gontar & al. 2001; Kukliński 2002a, b). Given the very low sampling effort represented by these few papers, it is to be expected that the bryozoan fauna of Svalbard will prove to be far more diverse, and individual species far more abundant, than is presently apparent. From 1997 up to the present, extensive sampling of bryozoans has been conducted in Svalbard waters. From just one region, Kongsfjorden (West Spitsbergen), no fewer than 143 taxa have been recognized (Kukliński 2002a), and the total number of species for the whole of Svalbard is suspected to be even greater (Gulliksen & al. 1999). This total will include numerous species formerly unrecorded for the region, and is very likely to include a proportion of new species. In this preliminary account two new species of cheilostome Bryozoa are described, one in the formerly monotypic northeast Atlantic–Mediterranean genus *Pentapora*, and the other in the speciose and geographically widespread genus *Microporella*.

### SYSTEMATICS

*Pentapora boreale* sp. nov. (Fig. 1A–C; Table 1)

#### Material

Holotype. NHM (The Natural History Museum in

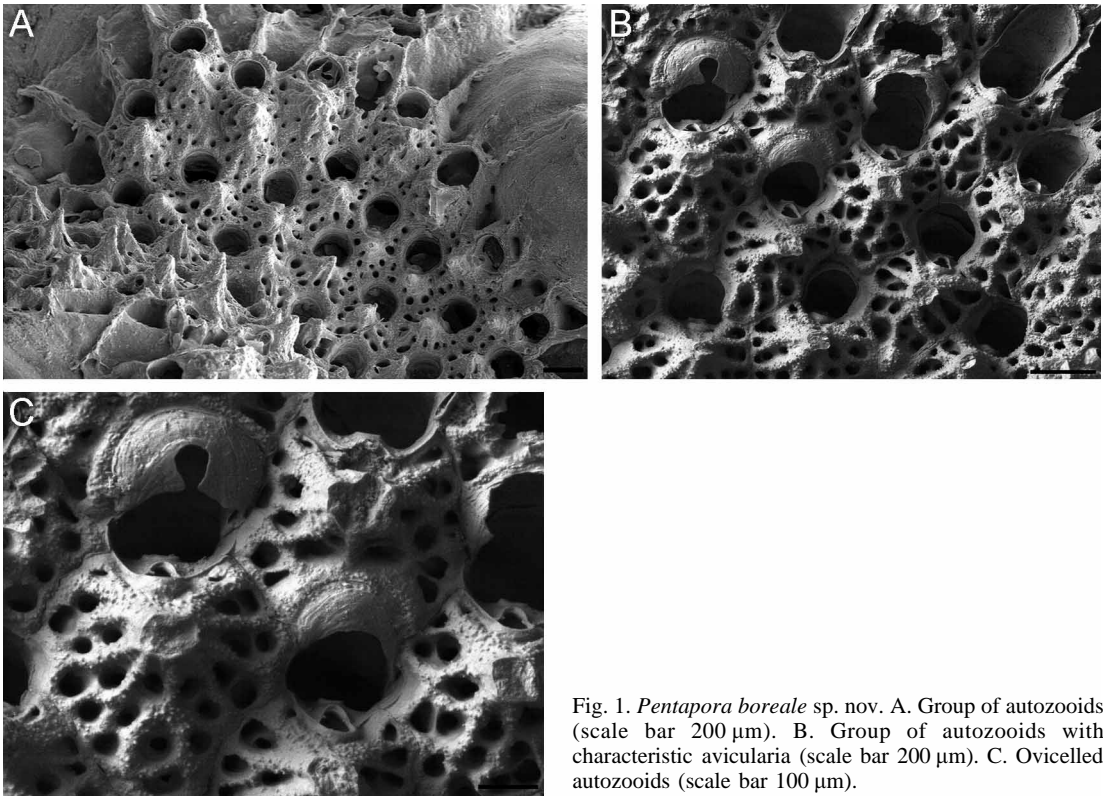


Fig. 1. *Pentapora boreale* sp. nov. A. Group of autozooids (scale bar 200  $\mu$ m). B. Group of autozooids with characteristic avicularia (scale bar 200  $\mu$ m). C. Ovicelled autozooids (scale bar 100  $\mu$ m).

London) 2003.3.10.1. a mature colony of less than 1 cm<sup>2</sup> on pebble from Kongsfjorden, West Spitsbergen (79°03.5'N 11°39.4'E), 10 m depth (06 August 2001; coll. P. Kuklinski).

Paratypes. NHM 2003.3.10.2-6. collected from Kongsfjorden, West Spitsbergen (79°01.8'N 11°49.8'E) at 12 m depth (03 August 2002).

#### Description

Colonies developing as small, robust, unilaminar sheets encrusting pebbles. Autozooids irregularly hexagonal,

the margins of each marked by distinct grooves. Frontal shield steeply convex, thickly calcified, granular; evenly perforated by large pores; with ontogenetic thickening the pores become thick-rimmed and deeply immersed, the calcification is increasingly coarse, and a tall, columnar umbo develops proximal to the orifice, and perpendicular to the frontal plane. Primary orifice as wide as long; with a short, thick, straight-edged lyrula just within the proximal border, occupying less than half its total width; condyles minute, round; a thin peristome apparent in early ontogeny, enclosing the proximal and lateral borders of the orifice, and most pronounced distally in non-ovicellate autozooids. No oral spines. A single small avicularium enclosed within the peristome; rostral plane acute to orifice plane; broadest and rounded distally. Ovicell slightly wider than long, the frontal surface smooth, imperforate except for a single median lacuna which closes in later ontogeny; the ovicell becomes surrounded and eventually obscured by a thickening ooeial cover derived from the frontal shields of distally adjacent autozooids. Vertical walls of autozooids with large multiporous septula.

Table 1. *Pentapora boreale*: measurements of the holotype (mm).

	n	Mean $\pm$ standard deviation
Autozooid length	20	0.58 $\pm$ 0.030
Autozooid width	20	0.41 $\pm$ 0.039
Primary orifice length	20	0.15 $\pm$ 0.016
Primary orifice width	20	0.16 $\pm$ 0.010
Ovicell length	20	0.18 $\pm$ 0.016
Ovicell width	20	0.25 $\pm$ 0.027

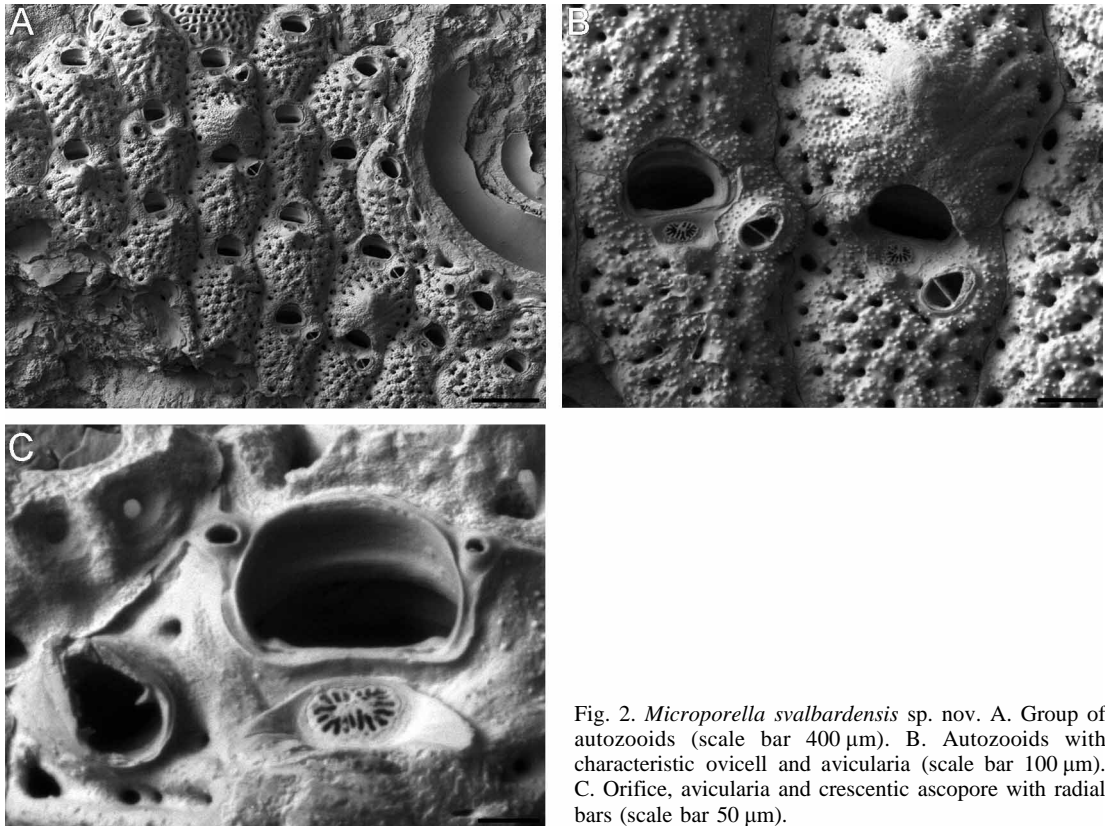


Fig. 2. *Microporella svalbardensis* sp. nov. A. Group of autozooids (scale bar 400  $\mu\text{m}$ ). B. Autozooids with characteristic ovicell and avicularia (scale bar 100  $\mu\text{m}$ ). C. Orifice, avicularia and crescentic ascopore with radial bars (scale bar 50  $\mu\text{m}$ ).

### Ecology

Among 43 stations sampled, *P. boreale* was found at four of them, with depths 6, 10 and 12 m; these stations were located in the outer part of the Kongsfjorden, an environment characterized by low sedimentation. At all four stations the species encrusted pebbles, with an abundance ranging from 4 (Stn 9: 79°03.5'N 11°39.4'E) to 28 (Stn 7: 78°59.5'N 11°58.9'E) colonies per  $\text{m}^2$  of the seafloor. The colonies were individually small, almost none exceeding a surface area of  $1 \text{ cm}^2$ . The temperature during the sampling ranged from 2.50 °C (Stn 7) to 4.62 °C (Stn 9), while salinity was between 33.43 psu (Stn 7) and 33.77 psu (Stn 9).

### Etymology

Latin, *borealis*: northern.

### Remarks

The evenly and coarsely punctured frontal shield and its striking ontogenetic thickening, the morphology of the

orifice and the ovicell, and the multiporous septula in the vertical walls of the autozooids, all suggest that this new taxon is appropriately assigned to the genus *Pentapora* Fischer, 1807 (Hastings & Ryland 1968). *Pentapora boreale* is especially characterized by the large umbo that forms on the distal part of the frontal shield in later ontogeny, and by its comparatively large pores and rugose calcification. It is further distinguished from the type species, *P. fascialis*, by the primary orifice, which is proportionately longer in the latter and by the proximal rim, which may be convex in *P. fascialis* but does not bear the distinct lyrula seen in *P. boreale*.

*Pentapora* was formerly monotypic for *P. fascialis* (Pallas, 1766), a species distributed from the north-western British Isles, southwards to the western English Channel, the western Mediterranean and the Adriatic as the junior synonym *P. foliacea* (Ellis & Solander). The poorly known *Eschara ottomuelleriana* Moll, reported from localities in the western Mediterranean and the Adriatic, was frequently accommodated with *P. fascialis* in “*Hippodiplosia*”, and recent opinion attributes it



Table 2. *Microporella svalbardensis*: measurements of the holotype (mm).

	n	Mean $\pm$ standard deviation
Autozoid length	20	0.66 $\pm$ 0.056
Autozoid width	20	0.40 $\pm$ 0.049
Primary orifice length	20	0.10 $\pm$ 0.009
Primary orifice width	20	0.13 $\pm$ 0.014
Ovicell length	20	0.29 $\pm$ 0.029
Ovicell width	20	0.38 $\pm$ 0.043
Avicularium length	20	0.09 $\pm$ 0.016
Avicularium width	20	0.05 $\pm$ 0.006

to *Pentapora* (e.g. Zabala 1986). *Pentapora fascialis* is found especially in rocky sublittoral habitats, where it forms perennial colonies, with a rigid, three-dimensional coralliform habit, and diameters often greater than 50 cm. However, in coarse, current-swept shell gravel habitats in the central English Channel, *P. fascialis* grows as unilaminar encrusting sheets, similar to the colony form described here for *P. boreale*. It is perhaps reasonable to speculate that the colony form of the new species thus reflects the habitat of the type locality, and that on stable, rocky substrata it might adopt the erect form seen in *P. fascialis*. However, *P. ottomuelleriana* is not known to develop erect colonies, but only small, encrusting sheets.

*Microporella svalbardensis* sp. nov. (Fig. 2A–C; Table 2)

#### Material

Holotype. NHM 2003.3.10.7. a mature colony of less than 1 cm<sup>2</sup> on pebble from Kongsfjorden, West Spitsbergen (79°03.5'N 11°39.4'E), 10 m depth (06 August 2001; coll. P. Kuklinski).

Paratypes. NHM 2003.3.10.8-9. collected from Kongsfjorden, West Spitsbergen (79°01.8'N 11°49.8'E) at 12 m depth (03 August 2002).

#### Description

Colony encrusting, developing extensive unilaminar sheets. Autozooids oval to hexagonal, convex, separated by deep grooves. Frontal shield thickly calcified, coarsely granular, perforated by numerous rather large pores; nodular calcification develops between the pores as the frontal shield thickens through ontogeny. Primary orifice wider than long, more or less semicircular, proximal border straight, above a slightly convex inner rim with a distinct condyle in each proximolateral corner. Two to four erect spines disposed around the

distal and lateral borders of the orifice, often missing in older autozooids; four spines may be present on some autozooids at the margin of the colony, but frequently only a single pair develops. Ascopore large, transversely oval to crescentic and crossed by thin radial bars; situated close to the proximal rim of the orifice, within a broader concave area of smooth calcification; a large umbo develops on the proximal edge of the smooth area, and may be especially prominent in later ontogeny. Avicularium single or absent, lateral, on the right or left, level with the ascopore or just slightly proximal to it; rostrum triangular, acute to the frontal plane of the autozoid, directed laterally or distolaterally, supporting a short, setiform mandible, of varying length. Ovicell prominent, about as wide as long; frontal surface coarsely granular, developing a stout and median umbo, with distinct marginal pores but imperforate centrally.

#### Ecology

*Microporella svalbardensis* was found at four of the 43 stations sampled, encrusting pebbles, shells of *Chlamys islandica* and the cirripede *Balanus balanus*, from 10 to 20 m depth. Abundance varied from 4 (Stn 8: 79°01.8'N 11°49.8'E) to 240 (Stn 9: 79°03.5'N 11°39.4'E) colonies per m<sup>2</sup> of seafloor. The surface area of individual colonies ranged from less than 1 cm<sup>2</sup> to very large colonies exceeding 10 cm<sup>2</sup>. The temperature during the sampling ranged from 2.50 °C (Stn 7) to 4.99 °C (Stn 8), while salinity was between 33.43 psu (Stn 7) and 34.17 psu (Stn 2).

#### Etymology

Latin, *-ensis*: place, with reference to the type locality.

#### Remarks

The genus *Microporella* occurs in all of the world's seas, including the polar oceans. All species presently known are remarkably similar but are readily distinguished by the size and proportions of the primary orifice, the number of oral spines, and the morphology of the ascopore, and its position relative to the primary orifice. The perforation of the frontal shield and the size, position and frequency of the adventitious avicularia are useful secondary characters. Only one species, *M. arctica* Norman, 1903b, has been described from the western Arctic realm. Although it was not figured by Norman (1903b), it was precisely described, and Norman's description matches that of Kluge (1962, 1975), and can be recognized in Kluge's careful figure (Kluge 1962, 1975: fig. 362). *Microporella arctica* has



a more finely granular frontal shield than the new species described here, and the ascopore is a slender, non-reticulate crescent separated from the proximal edge of the primary orifice by a distance almost as great as the length of the orifice. It mostly lacks spines, except for four or five present only in newly budded autozooids. *Microporella svalbardensis* sp. nov. is especially characterized by its large, reticulate ascopore, set in a conspicuous, dished area of smooth calcification close to the proximal rim of the orifice. It is quite probable that *M. svalbardensis* sp. nov. was part of the material attributed by Kluge (1962, 1975) to *M. ciliata* (Pallas), as his description refers to a large “denticulate” ascopore borne close to the orifice rim and associated with a “sort of tubercle” (umbo) developing in later ontogeny. *Microporella ciliata* is a temperate northeast Atlantic and Mediterranean species characterized by a denticulate, crescentic ascopore widely separated from the primary orifice, four or five oral spines and a finely granular frontal shield perforated by small, inconspicuous pores.

In a broad study of *Microporella* from Hokkaido, Japan Suwa & Mawatari (1998) described seven species. Most of them have the crescentic ascopore, but in none is it crossed by thin radial bars, as in *M. svalbardensis* sp. nov., and only in *M. formosa* Suwa & Mawatari do autozooids approach the size of those of *M. svalbardensis* sp. nov.

The frontal shield of *M. svalbardensis* sp. nov. is superficially similar to that seen in *M. alaskana* and *M. germana* described by Dick & Ross (1988), but both species differ from *M. svalbardensis* in autozoid dimensions, and in the morphology and relative size of the ascopore, which is largest in the latter species.

#### CONCLUSION

There is no published account of the bryozoan fauna of Svalbard, but recent surveys suggest that it is likely to be particularly diverse (Gulliksen & al. 1999; Gontar &

al. 2001; Kukliński 2002a), and this preliminary taxonomic study, revealing a new species in each of two genera common in the northeast Atlantic, indicates that a perhaps significant proportion might prove to be undescribed species. This is not unexpected, considering the low intensity of sampling over much of the boreal and Arctic northeast Atlantic through the past century, and it is certain that much greater effort is required before the taxonomic diversity of cheilostome Bryozoa in these regions can be reasonably estimated. At present the only monographic account of the Bryozoa of the north polar regions is that of Kluge (1962, 1975), and recent research (Hayward 1994; present paper) indicates that this is in urgent need of revision. Furthermore, it is also clear that there are substantial numbers of “boreal” taxa described by, among others, A. M. Norman (Hayward, unpublished) which are not treated in Kluge (1962, 1975) or in the synopses of the British Bryozoa (Hayward & Ryland 1998, 1999), and have not been redescribed or revised since they were originally introduced. Further intensive sampling and further taxonomic research are essential to the revision of these faunas.

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#### REFERENCES

- Bidenkap O. 1897. Bryozoen von Ostspitzbergen. *Zoologische Jahrbucher. Abteilung für Systematik, Geographie und Biologie der Tiere* 10:609–639.
- Bidenkap O. 1900a. Die Bryozoen: 1 Teil Die Bryozoen von Spitsbergen und König-Karls-Land. *Fauna Arctica* 1:503–540.
- Bidenkap O. 1900b. Zoologische Ergebnisse einer Uteersuchungsfahrt des Deutschen Seefischerei-Vereins nach der Bäreninsel und Westspitzbergen, ausgeführt im Sommer 1898 auf S.M.S. “Olga”. III. Die Bryozoen. *Wissenschaftliche Meeresuntersuchungen (N.F.)* 4:249–263.
- Dick MH, Ross JRP. 1988. Intertidal Bryozoa (Cheilostomata) of the Kodiak vicinity, Alaska. *Center for Pacific Northwest Studies, Western Washington University, Occasional Paper* 23:1–133.
- Gontar VI, Hop H, Voronkov AY. 2001. Diversity and distribution of Bryozoa in Kongsfjorden, Svalbard. *Polish Polar Research* 22(3–4):187–204.
- Gulliksen B, Palerud R, Brattegaard T, Sneli J. 1999. Distribution of marine benthic macroorganisms at



- Svalbard (including Bear Island) and Jan Mayen. Research report for DN 1999-4. Directorate for Nature Management, Trondheim. 148 p.
- Hastings AB, Ryland JS. 1968. Characters of the polyzoan genera *Pentapora* and *Hippodiplosia*, with redescrptions of *P. foliacea* (Ellis & Solander) and *H. verrucosa* Canu. *Journal of the Linnean Society of London, Zoology* 47:505–514.
- Hayward PJ. 1994. New species and new records of cheilostomatous Bryozoa from the Faroe Islands, collected by BIOFAR. *Sarsia* 79:181–206.
- Hayward PJ, Ryland JS. 1998. Cheilostomatous Bryozoa Part I. Aeteoidea–Cribrilinoidea. In: *Barnes RSK, Crothers JH, editors. Synopses of the British fauna (new series), no. 10, 2nd edn.* Shrewsbury. Field Studies Council p 1–366.
- Hayward PJ, Ryland JS. 1999. Cheilostomatous Bryozoa Part II. Hippothooidea–Celleporoidea. In: *Barnes RSK, Crothers JH, editors. Synopses of the British fauna (new series), no. 14, 2nd edn.* Shrewsbury. Field Studies Council p 1–416.
- Kluge GA. 1962. Mshanki severnykh morei SSSR. *Opredeliteli po Faune SSSR. Izdavaemye Zoologicheskim Muzeem Akademii Nauk* 76:1–548.
- Kluge GA. 1975. *Bryozoa of the northern seas of the USSR.* New Delhi: Amerind Publishing. 711 p.
- Kukliński P. 2002a. Fauna of bryozoans in Kongsfjorden, West Spitsbergen. *Polish Polar Research* 23(2):193–206.
- Kukliński P. 2002b. Bryozoa of the high Arctic fjord—a preliminary study. In: *Wyse Jackson PN, Buttler CJ, Spencer Jones ME, editors. Bryozoan studies 2001. Proceedings of the Twelfth International Bryozoology Association Conference, Dublin, Ireland, 16–21 July 2001.* Balkema. p 175–183.
- Nordgaard O. 1900. Polyzoa. *The Norwegian North-Atlantic Expedition 1876–1878* 7:1–30.
- Nordgaard O. 1918. Bryozoa from the Arctic regions. *Tromsø Museums Aarshefter* 40(1917):1–99.
- Norman AM. 1903a. Notes on the natural history of East Finmark. Polyzoa. *Annals and Magazine of Natural History* 7(11):567–598.
- Norman AM. 1903b. Notes on the natural history of East Finmark. Polyzoa. *Annals and Magazine of Natural History* 7(12):87–128.
- Norman AM. 1906. Greenlandic Polyzoa. *Annals and Magazine of Natural History* 7(17):90–93.
- Pallas PS. 1766. Elenchus Zoophytorum sistens generum adumbrationes generatioris et specierum cognatarum succinctas descriptiones cum selectis auctorum synonymis. *Hagae Comitum*: 1–451.
- Smitt FA. 1868. Bryozoa marina in regionibus arcticis et borealibus vivientia recensuit. *Öfversigt af Vetenskap-Akademiens Forhandlingar* 6:443–487.
- Smitt FA. 1871. Kritisk Forteckning ofver Skandinaviens Hafs-Bryozoeer. V. *Öfversigt af Kongliga Vetenskaps-Akademiens Forhandlingar* 27(9):1115–1134.
- Suwa T, Mawatari SF. 1998. Revision of seven species of *Microporella* (Bryozoa, Cheilostomatida) from Hokkaido, Japan, using new taxonomic characters. *Journal of Natural History* 32:895–922.
- Waters A. 1900. Bryozoa from Franz Josef Land, collected by the Jackson–Harmsworth Expedition, 1896–97: Part I. Cheilostomata. *Journal of the Linnean Society of London, Zoology* 28:43–105.
- Waters A. 1904. Bryozoa from Franz Josef Land, collected by the Jackson–Harmsworth Expedition, 1896–97: Part II. Cyclostomata, Ctenostomata and Endoprocta. *Journal of the Linnean Society of London, Zoology* 29:161–184.
- Zabala M. 1986. *Fauna dels Briozous dels Països Catalans.* Barcelona: Institut D'Estudis Catalans. 833 p.

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