

MOSS ANIMALS OF THE DUTCH PART OF THE NORTH SEA AND COASTAL WATERS OF THE NETHERLANDS (BRYOZOA)

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Bryozoa or moss animals constitute a conspicuous and species-rich component of hard-substrate benthic communities in marine and estuarine habitats. To gain insight into the biodiversity of these habitats, knowledge of bryozoan species is indispensable. Since the last comprehensive publication on Dutch species in 2004 much new information has become available. Particularly from the Dutch part of the Continental Flat of the North Sea, the largest natural area of the Netherlands, many new records have been collected. Other reasons to present an updated review are changes in nomenclature, the arrival of some exotic species and identification issues.

INTRODUCTION

A large part of the outer coast of the Netherlands consists of a shallow sandy seabed, backed by sandy beaches and dunes. Locally, groyne provide some rocky substrate into the shallow sublittoral, viz. down to a few meters below the low-water mark. Presently, that is about all rocky substrate on the North Sea coast of the Netherlands. Salinity is influenced by freshwater influx, and turbidity by erosion and resuspension of mud and sand. Apparently, this is not a favourite bryozoan

habitat. Around marine inlets and estuaries, dykes have been constructed with boulder slopes continuing into the deeper sublittoral, down to a depth of about 40 m. Most Dutch bryozoans have been recorded from the latter habitats. In view of the requirements of many bryozoans with respect to temperature, salinity and turbidity, many more species may be expected to occur in deeper offshore waters. These additional species may be expected on shelly and stony substrates, offshore constructions like wind parks and wrecks.

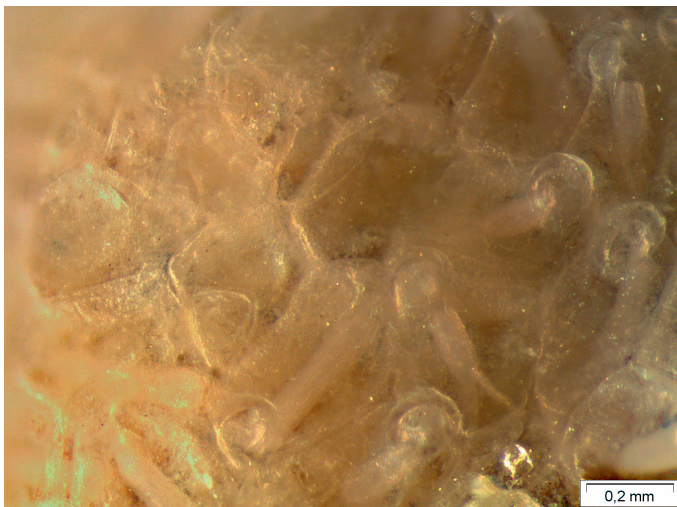


Figure 1. *Alcyonidioides albidum*, off the Walcheren coast. Photo David Tempelman.
Figuur 1. *Alcyonidioides albidum*, voor de kust van Walcheren. Foto David Tempelman.

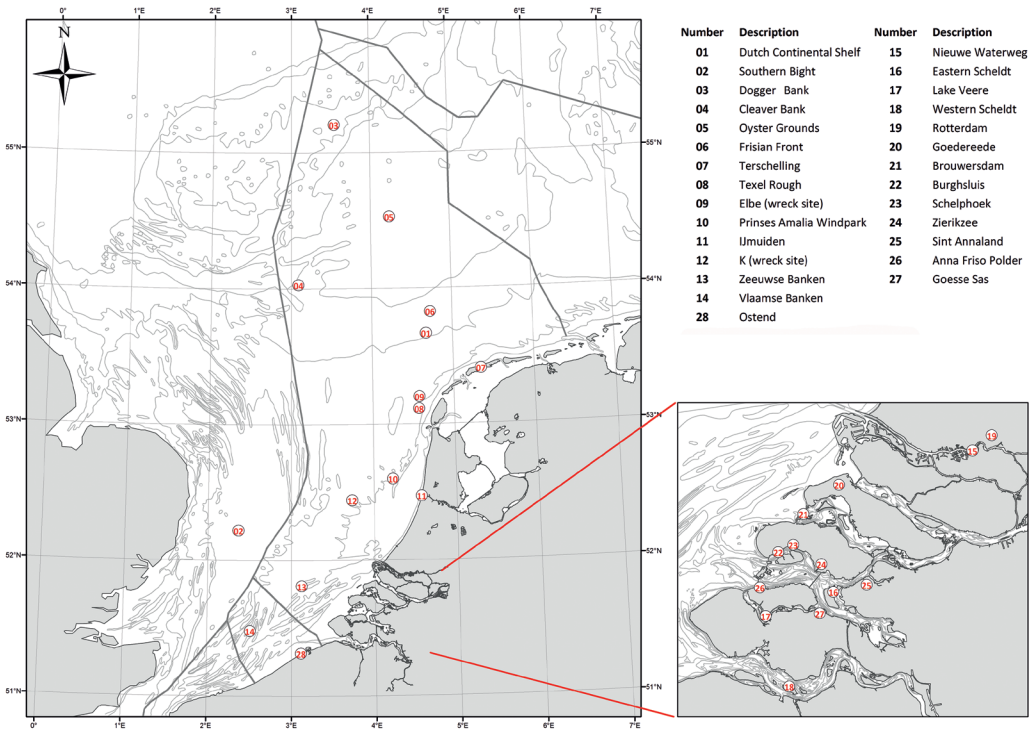


Figure 2. Dutch Continental Flat (DCF), with areas and localities mentioned in the text. Assembled by Edwin Verduin (Grontmij).

Figuur 2. Nederlands Continentaal Plat, met gebieden en locaties genoemd in de tekst. Samengesteld door Edwin Verduin (Grontmij).

Until recently, bryozoan surveys were only conducted in the shallow estuarine and coastal waters of the delta area in the southwestern part of the country. Traditionally, Dutch surveys of sandy and silty seabeds in the North Sea (MWTL) have omitted to report on epifaunal organisms of hard substrates, such as Bryozoa. As a result of the paucity of survey data further offshore, only a limited number of species has been recorded from the Dutch part of the Continental Flat of the North Sea (DCF). The majority of these species has not been found in coastal waters. In nearby Belgium, a survey of shelly sandbanks led to a marked increase in the number of native species known from that country, several even new to science (De Blauwe 2006a, De Blauwe et al. 2006). In similar habitats, the DCF may

be expected to harbour an equally rich bryozoan fauna.

Four recent offshore surveys in North Sea waters of the Netherlands (fig. 2) yielded important additions to the bryozoan fauna of the Netherlands. Van Moorsel (2003) investigated the fauna of the Cleaver Bank. The seabed in this area is locally rich in gravel and boulders and provides a better habitat for most Bryozoa than sandy-silty seabeds. Although Bryozoa are not reported in the reports of the MWTL project (Tempelman et al. 2009, Verduin et al. 2012), the ongoing monitoring of the DCF yielded some additions to the bryozoan fauna of the area. During a survey of hard substrates in the Prinses Amaliawindpark, about 25 km offshore from IJmuiden, an additional

species was found and several which have been rarely recorded from the Netherlands (Vanagt et al. 2013). Finally, wreck surveys during recent years by Stichting 'Duik de Noordzee Schoon' yielded some important bryozoan records from the DCF.

Since the last review of bryozoans of coastal waters (Faasse & De Blauwe 2004) three additional exotic bryozoans have been recorded and the specific identity of two other exotic species has been established. More introductions are to be expected.

In a manual on bryozoans of the Southern Bight of the North Sea (De Blauwe 2009), the richness of shapes in the Bryozoa has been aptly illustrated, especially in the many SEM photos. For identification of Bryozoa in the area concerned the reader is referred to this work.

Below, we present a review of bryozoan species in marine and estuarine waters of the Netherlands. Species only found washed ashore are not taken into account. A new list of 58 species is presented, followed by brief treatments of species new to

the list (13 species) or subject to nomenclatural changes. Most species mentioned by Faasse & De Blauwe (2004) as doubtful have now been omitted: *Hornera lichenoides* (Linnaeus, 1758), *Stegohornera violacea* (M. Sars, 1863), *Spathipora sertum* Fischer, 1866, *Eucratea loricata* (Linnaeus, 1758), *Scrupocellaria reptans* (Linnaeus, 1767) and *Cribrilina punctata* (Hassall, 1841). We refrain from giving a detailed higher classification of the Bryozoa with infraorders and superfamilies. This classification is presently in a state of flux and not without controversy. Drastic changes may be necessary in the near future (e.g. Waeschenbach et al. 2012). On the genus level recent nomenclatural changes caused much confusion within the genus *Alcyonidium*. Some of the most well-known names in this genus like *A. gelatinosum* were shown to have been used for different species (Ryland & Porter 2006). There is some controversy concerning the correctness of these changes (pers. comm J.-L. d'Hondt). To avoid more confusion, for the time being, we utilise the same names for *Alcyonidium* species as in Faasse & De Blauwe (2004) and De Blauwe (2009), except for *Alcyonidium mytili*.

SPECIES LIST

Dutch vernacular names according to De Blauwe (2009).

Species treated in the text following the list have been indicated with an asterisk.

Class Stenolaemata

Order Cyclostomatida

Family Crisiidae

Crisia aculeata Hassall, 1841

ivoormosdiertje

Family Tubuliporidae

Tubulipora cf. *liliacea* (Pallas, 1766)

purper mosdiertje

Family Diastoporidae

* *Plagioecia patina* (Lamarck, 1816)

wrattig mosdiertje

Family Lichenoporidae

* *Disporella hispida* (Fleming, 1828)

Class Gymnolamata

Order Ctenostomatida

Family Alcyonidiidae

* *Alcyonidioides albidum* (Alder, 1857)

witte zeevinger

* *Alcyonidioides mytili* (Dalyell, 1848)

mosselmosdiertje

| | |
|--|------------------------|
| <i>Alcyonidcelleporeium condylocinereum</i> Porter, 2004 | grijze zeevinger |
| <i>Alcyonidium diaphanum</i> (Hudson, 1778) | bruine zeevinger |
| <i>Alcyonidium gelatinosum</i> (Linnaeus, 1761) | gladde zeevinger |
| <i>Alcyonidium hirsutum</i> (Fleming, 1828) | ruwe zeevinger |
| <i>Alcyonidium hydrocoalitum</i> Porter, 2004 | penneschaft-mosdiertje |
| <i>Alcyonidium mamillatum</i> Alder, 1857 | bultige zeevinger |
| <i>Alcyonidium parasiticum</i> (Fleming, 1828) | overwoekerd mosdiertje |
| <i>Alcyonidium polyoum</i> (Hassall, 1841) | wierzeevinger |
| Family Flustrellidridae | |
| <i>Flustrellidra hispida</i> (Fabricius, 1780) | |
| Family Arachnidiidae | |
| <i>Arachnidium fibrosum</i> Hincks, 1880 | |
| * <i>Arachnidium lacourti</i> d'Hondt & Faasse, 2006 | |
| Family Panolicellidae | |
| * <i>Panolicella nutans</i> Jebram, 1985 | |
| Family Nolellidae | |
| <i>Anguinella palmata</i> van Beneden, 1845 | slangmosdiertje |
| Family Victorellidae | |
| <i>Victorella pavidata</i> Saville Kent, 1870 | |
| Family Walkeriidae | |
| <i>Walkeria uva</i> (Linnaeus, 1758) | druifmosdiertje |
| Family Triticellidae | |
| * <i>Triticella flava</i> Dalyell, 1848 | molkreeftmosdiertje |
| <i>Farrella repens</i> (Farre, 1837) | bekermosdiertje |
| Family Vesiculariidae | |
| * <i>Vesicularia spinosa</i> (Linnaeus, 1767) | zijdemosdiertje |
| <i>Bowerbankia citrina</i> (Hincks, 1877) | |
| <i>Bowerbankia gracilis</i> Leidy, 1855 | |
| <i>Bowerbankia imbricata</i> (Adams, 1798) | |
| Family Buskiidae | |
| <i>Buskia nitens</i> Alder, 1856 | |
| Order Cheilostomatida | |
| Family Scrupariidae | |
| <i>Scruparia ambigua</i> (d'Orbigny, 1841) | |
| Family Membraniporidae | |
| <i>Membranipora membranacea</i> (Linnaeus, 1767) | ledermosdiertje |
| <i>Membranipora tenuis</i> Desor, 1848 | |
| Family Electridae | |
| <i>Aspidelectra melolontha</i> (Landsborough, 1852) | |
| <i>Conopeum reticulum</i> (Linnaeus, 1767) | zeekantwerk |
| <i>Conopeum seurati</i> (Canu, 1928) | brakwaterkantwerk |
| * <i>Einhornia crustulenta</i> (Pallas, 1766) | palingbrood |
| <i>Electra monostachys</i> (Busk, 1854) | |
| <i>Electra pilosa</i> (Linnaeus, 1767) | harig mosdiertje |
| Family Flustridae | |
| <i>Flustra foliacea</i> (Linnaeus, 1758) | breedbladig mosdiertje |

| | |
|---|--------------------------|
| Family Calloporidae | |
| <i>Amphiblestrum auritum</i> (Hincks, 1877) | |
| <i>Callopora dumerilii</i> (Adouin, 1826) | |
| Family Bugulidae | |
| <i>Bicellariella ciliata</i> (Linnaeus, 1758) | wimpermosdiertje |
| * <i>Bugula neritina</i> (Linnaeus, 1758) | paars vogelkopmosdiertje |
| <i>Bugula plumosa</i> (Pallas, 1766) | spiraalmosdiertje |
| <i>Bugula simplex</i> Hincks, 1886 | geel vogelkopmosdiertje |
| <i>Bugula stolonifera</i> Ryland, 1960 | vogelkopmosdiertje |
| * <i>Bugula turbinata</i> Alder, 1857 | oranje spiraalmosdierje |
| Family Candidae | |
| <i>Scrupocellaria scruposa</i> (Linnaeus, 1758) | steenmosdiertje |
| <i>Tricellaria inopinata</i> d'Hondt & Occhipinti Ambrogi, 1985 | onverwacht mosdiertje |
| Family Cribrulinidae | |
| <i>Cribrilina cryptooecium</i> Norman, 1903 | |
| Family Hippothoidae | |
| * <i>Celleporella hyalina</i> (Linnaeus, 1767) | |
| Family Romancheinidae | |
| <i>Escharella immersa</i> (Fleming, 1828) | |
| Family Smittinidae | |
| * <i>Smittoidea prolifica</i> Osburn, 1952 | |
| Family Bitectiporidae | |
| <i>Schizomavella linearis</i> (Hassall, 1841) | empingmosdiertje |
| Family Pacificincolidae | |
| * <i>Pacificincola perforata</i> (Okada & Mawatari, 1937) | |
| Family Cryptosulidae | |
| <i>Cryptosula pallasiana</i> (Moll, 1803) | Pallas' mosdiertje |
| Family Microporellidae | |
| * <i>Microporella ciliata</i> (Pallas, 1766) | |
| * <i>Fenestulina delicia</i> Winston, Hayward & Craig, 2000 | venstermosdiertje |
| Family Celleporidae | |
| * <i>Cellepora pumicosa</i> (Pallas, 1766) | puijsteenmosdiertje |

SPECIES TREATMENT

Plagioecia patina (wrattig mosdiertje)

Plagioecia patina has been collected on the Cleaver Bank (Van Moorsel 2003). In 2013 this species was collected for the first time on the coast of the Netherlands, near Westkapelle (unpublished observation Marco Faasse).

Disporella hispida

Disporella hispida has been collected on the Cleaver Bank (Van Moorsel 2003).

Alcyonidioides albidum (witte zeevinger)

Alcyonidioides albidum (fig. 1) has not been recorded from the Netherlands before. The single colony collected is attached to an empty shell of



Figure 3. *Arachnidium lacourti*, Nieuwe Waterweg. Photo Marco Faasse.

Figuur 3. *Arachnidium lacourti*, Nieuwe Waterweg. Foto Marco Faasse.

a netted dogwhelk *Nassarius reticulatus* (Linnaeus, 1758), which was occupied by a hermit crab, as may be judged from the presence of an attached hydrozoan *Hydractinia echinata* (Fleming, 1828). The shell was found in a box core sample, taken on 2 March 2010, 30 km offshore the coast of Walcheren (51°43'06"N, 003°06'43"E, depth 30 m). Identification is based on random orientation of zooids where colony lobes meet, open spaces filled in with kenozooids as large as and much smaller than autozooids, slightly raised peristome in the shape of a shallow disc surrounded by a fold in preserved state, transparent frontal surface, and clearly visible side walls of the zooids (Hayward 1985). *Alcyonidium condylocinereum* is another species known to overgrow shells inhabited by hermit crabs in the Southern Bight (De Blauwe 2009). In contrast to *A. condylocinereum* (De Blauwe 2004) height of zooids is less than width and it is not easy to peel off the colony from its substrate.

Up to now, this species has always been mentioned as *Alcyonidium albidum*, but is now placed in *Alcyonidioides* d'Hondt, 2001. D'Hondt (2001) based the description of the genus *Alcyonidioides* mainly on larval anatomy. Reproductive and larval characters are considered to be conservative in Bryozoa and therefore warrant generic distinction.

Alcyonidioides species produce so-called cyphonautes larvae with a bivalved shell. These larvae are supposed to be planktotrophic. By contrast, species in the genus *Alcyonidium* do not produce cyphonautes, but barrel-shaped larvae with lecithotrophic habits, developing on yolk. *Alcyonidioides albidum* should not be referred to the genus *Alcyonidium*, as Prouho (1892) established that fertilised eggs of the species develop into cyphonautes larvae.

Alcyonidium species with unknown larvae should formally be mentioned as *Alcyonidiidae* incertae sedis. However, for faunistic purposes this is unpractical and they are reported here as *Alcyonidium*.

Alcyonidioides mytili (mosselmosdiertje)

Alcyonidioides mytili is the type species of the genus *Alcyonidioides* d'Hondt, 2001. Faasse & De Blauwe (2004) mentioned this species as *Alcyonidium mytili*.

Arachnidium lacourti

Arachnidium lacourti (fig. 3) was mentioned by Faasse & De Blauwe (2004) as *Arachnidium* sp. This species is known from oligohaline waters of



Figure 4. *Triticella flava*, on *Upogebia stellata* antenna, catch of fishing boat. Photo Bert Pijs.
 Figuur 4. *Triticella flava*, op antenne van *Upogebia stellata*, vangst viskotter. Foto Bert Pijs.

the Western Scheldt and the Nieuwe Waterweg. In the Western Scheldt *A. lacourti* has not been found after 2003, in the Nieuwe Waterweg a small colony was found in 2011.

Panolicella nutans

Faasse & De Blauwe (2004) mentioned *Nolella pusilla* (Hincks, 1880) from the Netherlands. Reverter-Gil & Fernández-Pulpeiro (2006) concluded that the description of *Nolella pusilla* is inadequate for reliable identification. Type specimens probably no longer exist. Reverter-Gil & Fernández-Pulpeiro (2006) concluded that material from the Netherlands, mentioned under this name, belongs to the species *Panolicella nutans* Jebram, 1985, like numerous colonies collected in Galicia (Spain).

Triticella flava

Triticella flava (fig. 4) has been recorded from the North Sea (Northumberland) before (Roper 1913) and Tunberg (1986) recorded it from the west coast of Sweden (as *Triticella koreni*). Since 2006 several records have been become available from the Frisian Front, near Terschelling and north of Den Helder (Tempelman et al. 2013). It lives mainly on burying decapodes, like *Upogebia*.

Vesicularia spinosa (zijdemosdiertje)

Vesicularia spinosa was found during the MWTL programme on the Oyster Grounds. The loose colonies leave some doubt whether they lived at the exact box core locations (MWTL 2006: 54°49'24"N, 003°22'00"E, depth 42 m, 2009: 53°30'00"N, 03°00'00"E, depth 36 m).

Einhornia crustulenta (palingbrood)

Since 2007, one of the best-known bryozoans of the Netherlands, *Electra crustulenta* (Pallas, 1766), the so-called 'palingbrood' ('celbread') is referred to *Einhornia*. This new genus is characterised by a single proximal spine and a calcified operculum. Molecular research confirms that the species in this genus stand out from other *Electra* species (Nikulina 2007).

Bugula neritina (paars vogelkopmosdiertje)

Bugula neritina (fig. 5) is widespread in warmer waters of the world. Already between 1904 and 1912, the species was recorded at Plymouth, southern England (Ryland & Hayward 1977). *Bugula neritina* was first found in the Netherlands in April 2007, in the marina of Burghsluis (Faasse 2007). This observation concerns fresh



Figure 5. *Bugula neritina*, Burghsluis. Photo Marco Faasse.
 Figuur 5. *Bugula neritina*, Burghsluis. Foto Marco Faasse.

outgrowths on old stolons. Therefore, the species was probably already present in 2006. Since 2008, the species has been found in 'Roompot Marina' near Wissenkerke as well. The species survived until 2012, in spite of the fact that during winter colonies were not found. In Belgium, it has been found once in 1999, on a recreational vessel in the Mercator marina in Ostend (Kerckhof 2000). Material from the Cleaver Bank collected in 2002 and mentioned as *B. neritina* (Van Moorsel 2003) has been re-studied. The material is insufficient to identify it unambiguously. In view of the apparent preference of *B. neritina* for marinas in the Netherlands its presence on the Cleaver Bank seems unlikely. *Bugula neritina* consists of at least two sibling species (Davidson & Haygood 1999). This means that the name of the species recorded here is provisional and may have to be changed accordingly in the future.

Bugula turbinata

Bugula turbinata has been recorded by Van Moorsel & Waardenburg (1992) from wreck 'K' off the west coast of the Netherlands on 2 August 1991 at a depth of 25 m (52°26'15"N, 03°44'04"E). The colony is about 2.5 cm high and atypical in shape as it is a dense non-spiralling tuft. Sometimes there is an atypical number of two spines

on the outer margin of inner zooids just below a bifurcation. Other characters studied agree with *B. turbinata*: in all other zooids there is a single spine on the outer and inner margin, outer avicularia are larger than inner ones, avicularia are subglobular with a short, rectangularly hooked beak, attached just below the spines, ooecia are subglobular and zooids arranged in two series proximally, becoming multiseriate distally. These characters do not fit any other *Bugula* species known from the area.

Celleporella hyalina

Celleporella hyalina (fig. 6) has been found on hard substrates of the offshore Prinses Amaliawindpark near IJmuiden (Vanagt et al. 2013). It was unknown from the southeastern North Sea.

Smittoidea prolifica

Smittoidea prolifica is mentioned by Faasse & De Blauwe (2004) from the southwest of the Netherlands as *Smittoidea* sp. Its specific identity has been established by De Blauwe & Faasse (2004). Examination of reference material in the collection of Bureau Waardenburg revealed that *S. prolifica* has already been collected on 26 October 1995 at Schelphoek by Van Moorsel (1996) - reported as

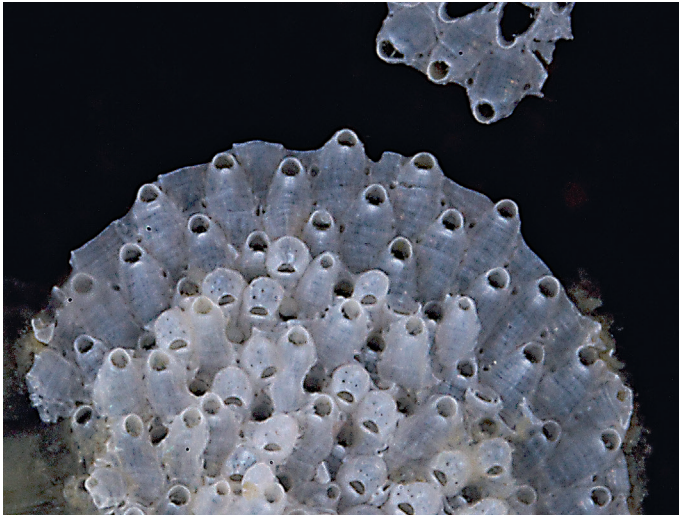


Figure 6. *Celleporella hyalina*, Prinses Amaliawindpark. Photo Marco Faasse.

Figuur 6. *Celleporella hyalina*, Prinses Amaliawindpark. Foto Marco Faasse.

S. reticulata. This is three years earlier than the first record of De Blauwe & Faasse (2004). *Smittoidea prolifica* has been collected in the harbour region of Rotterdam in 2008 (unpublished results Marco Faasse & Marianne Ligthart) and in the Prinses Amaliawindpark off IJmuiden in 2011 (Vanagt et al. 2013). It is native to the Pacific coast of North America. In Europe, only records from the Netherlands are known to us.

Pacificincola perforata

Pacificincola perforata was first collected on an empty mussel shell at a depth between 5 and 10 m near Goesse Sas, Eastern Scheldt on 26 August 2004. This species originates from the western Pacific (Japan, China) and since 2001 it has been recorded from Arcachon (southwestern France) (De Blauwe 2006b). Currently the species is common in the eastern part of the Eastern Scheldt, where other encrusting bryozoans occur only sparingly. Elsewhere in this marine embayment and in Lake Veere, *P. perforata* has been found as well (unpublished results Marco Faasse).

Microporella ciliata

Microporella ciliata has been collected for the first time on the DCF on the Cleaver Bank (Van Moor-

sel 2003). In 2011, it has been collected in the Prinses Amaliawindpark (Vanagt et al. 2013). The latter material has ovicells sometimes with radial ribs, not described for *M. ciliata*.

Fenestrulina delicia (venstermosdiertje)

This species (fig. 7) was only recognised in 1994 and described in 2000 from the east coast of North America (Maine). Later it was found on the west coast (Alaska, San Francisco) as well. In 2005, living colonies of this species were collected on empty mussel shells at depths between 5 and 10 m near Goesse Sas (De Blauwe 2008, 2009). In 2011 it has been collected on empty bivalve shells at similar depths near the Anna Frisopolder, more westward in the Eastern Scheldt (unpublished results Marco Faasse). In 2012 it was collected near Zierikzee and St. Annaland between 10 and 15 m depth (unpublished results Marco Faasse) and therefore is now probably widespread in the entire Eastern Scheldt. In 2011, it has also been collected in the Prinses Amaliawindpark (Vanagt et al. 2013). Since 1 January 2011 the species has been found washed ashore the Dutch coast near Goedereede (Van der Wende 2011) and the Brouwersdam (pers. comm. K. van der Wende). From 2007 onwards, *F. delicia* is found in Normandy and Brittany as well (De Blauwe 2009).

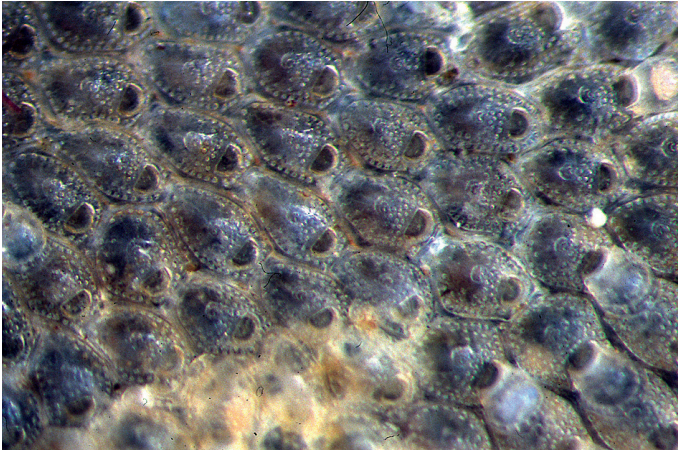


Figure 7. *Fenestrulina delicia*, Goesse Sas. Photo Marco Faasse.
 Figuur 7. *Fenestrulina delicia*, Goesse Sas. Foto Marco Faasse.



Figure 8. *Cellepora pumicosa*, Pointe de Conguel, Brittany, France. Photo Marco Faasse.
 Figuur 8. *Cellepora pumicosa*, Pointe de Conguel, Bretagne, Frankrijk. Foto Marco Faasse.

Cellepora pumicosa (puumsteenmosdierkje)

Cellepora pumicosa (fig. 8) has been collected in 1989 on the Dogger Bank, growing on *Abietinaria abietina* (Linnaeus, 1758) at object 'Z', just west of the DCF (Van Moorsel & Waardenburg 1990). In 2011, *C. pumicosa* was found again at probably the same object viz. the remains of the platform 'Ocean Prince' (unpublished record Wouter Lengkeek). The first record within the DCF originates from the Cleaver Bank (Van Moorsel 2003). In 2010, the species has been recorded by Wouter Lengkeek from the wreck of the 'Elbe' closer inshore, west of Texel (Anonymous 2010).

DISCUSSION

These additions to the Dutch species list demonstrate that the bryozoan fauna is much richer in species than previously known. Despite this list of additions, especially species of rough sea beds with shells and boulders remain poorly known. Bryozoan records of the stony area Texel Rough (Texelse Stenen) are non-existent. A single investigation on rough substrates on the Cleaver Bank yielded four new species for the DCF (Van Moorsel 2003). *Vesicularia spinosa* (Linnaeus, 1767) was found on the North Sea as well, although the loose colonies leave some doubt whether the colonies

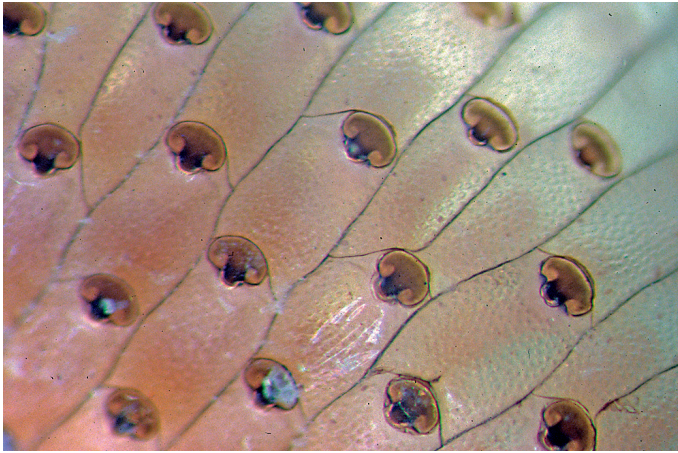


Figure 9. *Watersipora subtorquata*,
St. Jacut, Brittany, France.

Photo Marco Faasse.

Figuur 9. *Watersipora subtorquata*,
St. Jacut, Bretagne, Frankrijk.

Foto Marco Faasse.

lived at the box core locations. A specialised group of bryozoans, among them many species of the genus *Puellina*, forms small patches on the inner sides of empty bivalve shells and on small stones (Bishop & Househam 1987). Although this group is present in nearby Belgium (De Blauwe 2009), not a single species of this group is known from the Netherlands. Another Belgian study (Zintzen & Massin 2010) proved the importance of wrecks for bryozoans and other hard-substrate invertebrates in sandy areas. The limited research effort on wrecks on the DCF indicates that there is much potential for new discoveries here (Van Moorsel & Waardenburg 1990, 1992, Anonymous 2010).

Some figures may illustrate that the DCF has been barely investigated with respect to sessile invertebrates of hard substrates. In this paper we add nine exclusively offshore bryozoan species to the list of bryozoans occurring in the Netherlands, originating from only three surveys, neither of them aimed at bryozoans in particular. On sandbanks off the coast of Belgium, at least twenty species have been recorded that are not known from the Netherlands (De Blauwe 2009), most of them on empty bivalve shells. Some of those may also occur on the adjoining sandbanks off the coast of the Netherlands (Zeeland Banken). Additional species have been recorded off the coast of east England (e.g. Hamond 1973), not far from the DCF. Probably some of those occur on the DCF as well.

A subject deserving attention is the possible extinction of bryozoan species in our area. Living colonies of several species have rarely been recorded in the area since some decades and De Blauwe et al. (2006) consider them as threatened in the Southern Bight. Some of the species concerned build relatively large colonies with a small attachment base and are easily detached from the substrate by e.g. beam trawls. *Flustra foliacea* and *Alcyonidium diaphanum* are the most important of these sensitive species and together with these bryozoans other species may disappear as well. *Flustra foliacea* is a species with a rich associated fauna of other bryozoans, hydrozoans, molluscs, worms, barnacles, tunicates and others (Stebbing 1971). *Alcyonidium diaphanum* has an associated fauna as well, albeit less varied, with the nudibranch *Acanthodoris pilosa* (Abildgaard, 1789) and the porcelain crab *Pisidia longicornis* (Linnaeus, 1767) and other species. In the past *Membranipora tenuis* used to construct thick layers on shells and similar substrates in the area (Lacourt 1949). Probably, this species is sensitive to disturbance of the seabed as well. Only a few young colonies have been recorded recently in the Southern Bight (De Blauwe et al. 2006).

One more subject to be stressed is the increasing prominence of exotic species. Two exotics, *Smittoidea prolifica* and *Fenestrulina delicia*, dispersed about 60 and 110 km, respectively, from

the delta area in the southwest of the Netherlands to the north (Vanagt et al. 2013). As mentioned in the introduction, the arrival of new exotic species in coastal waters continues at an unabating pace. *Watersipora subtorquata* (fig. 9), recorded from Brittany and the Channel Isles in 1999 and 2007, respectively (Ryland et al. 2009), has been found washed ashore the coast of the Netherlands from 2009 onwards (Faasse & de Ruijter 2010, pers. comm. K. van der Wende) and may eventually colonise marine inlets in the southwest of the Netherlands. Monitoring of sites prone to introductions of exotic species is necessary to gain insight in the process of colonisation and species-specific details.

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SAMENVATTING

Mosdiertjes van het Nederlandse deel van de Noordzee en van de kustwateren (Bryozoa)

Een nieuwe lijst van Nederlandse mariene en estuariene mosdiertjes wordt gepresenteerd. De lijst van Faasse & De Blauwe (2004) is aangevuld met *Plagioecia patina*, *Disporella hispida*, *Alcyonidioides albidum*, *Arachnidium lacourti*, *Panolicella nutans*, *Triticella flava*, *Vesicularia spinosa*, *Bugula neritina*, *Bugula turbinata*, *Celleporella hyalina*, *Smittoidea prolifica*, *Pacificincola perforata*, *Microporella ciliata*, *Fenestulina delicia* en *Cellepora pumicosa*. De nieuw toegevoegde soorten zijn vooral afkomstig van het Noordzeegebied uit de kust. De biodiversiteit van mosdiertjes in dit gebied is nog onvoldoende bekend, zeker als het gaat om gebieden met stenen en schelpen. In België zijn van dergelijke bodems recent zelfs diverse nieuwe soorten voor de wetenschap beschreven (De Blauwe 2006a). Enkele grotere mosdiersoorten zijn in de Zuidelijke Bocht van de Noordzee mogelijk uitgestorven door aantasting van de zeebodem, met name door de boomkorvisserij. Exotische mosdiertjes arriveren geregeld in ons land. In de meest gevallen worden de soorten te laat gesignaleerd om nog te kunnen nagaan via welke route ze zijn binnengekomen.

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