

New and rarely reported gastropods and bivalves on shipwrecks in the Dutch North Sea

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The small caenogastropods *Cerithiopsis tubercularis* and *Crisilla semistriata* are reported living on shipwrecks in the southern part of the Dutch Continental Shelf. These are the first autochthonous records for The Netherlands. This paper also lists recent records from these wrecks of some rarely reported molluscs, viz. *Kellia suborbicularis*, *Sphenia binghami*, *Nassarius incrassatus*, *Trivia arctica* and *Trivia monacha*.

Het bruin sponshorentje *Cerithiopsis tubercularis* en het gestreept traliedrijfhorentje *Crisilla semistriata* werden levend aangetroffen op scheepswrakken in het zuidelijke deel van het Nederlands Continentaal Plat. Dit zijn de eerste autochtone vondsten van deze kleine slakjes in Nederland. Ook vermelden we enkele vondsten op wrakken van weekdieren die zelden worden gerapporteerd, te weten de holteschelp *Kellia suborbicularis*, de kleine gaper *Sphenia binghami*, de verdikte fuikhoren *Nassarius incrassatus*, het ongevlekt koffieboontje *Trivia arctica* en het gevlekt koffieboontje *Trivia monacha*.

Key words: distribution, Southern Bight, Netherlands, hard substratum, *Cerithiopsis tubercularis*, *Crisilla semistriata*, *Kellia suborbicularis*, *Sphenia binghami*, *Nassarius incrassatus*, *Trivia arctica*, *Trivia monacha*.

INTRODUCTION

In recent years, diver-biologists have investigated a relatively large number of wrecks on the Dutch Continental Shelf (DCS). This resulted in the in situ discovery of several species new for the Dutch fauna, such as the caenogastropod *Simnia patula* (Pennant, 1777)(Schrieken et al., 2011) and the corallimorpharian *Corynactis viridis* Allman, 1846 (Gittenberger et al., 2013). Samples collected from wrecks by divers contained small crustaceans new to the Dutch fauna as well (Van Moorsel et al., 2014; Faasse et al., 2014). These samples also included some small caenogastropods and heterodont bivalves considered new or are rarely reported for the Dutch fauna. They are listed in the results below, together with other data on their autochthonous occurrence in the Southern North Sea and beyond. Some allochthonous records from The Netherlands are mentioned as well.

METHODS

In 2013, divers of Bureau Waardenburg visited ten wrecks on the southern part of the DCS in the North Sea. Table 1 lists co-ordinates of the six wrecks visited and other Dutch wrecks mentioned in this paper. For co-ordinates of Belgian wrecks we refer to Zintzen & Massin (2010). The locations of all wrecks mentioned

in this paper are shown in Fig. 1. In addition to direct visual observations, on each wreck, ten samples were collected by scraping the epifauna from a standard surface area (20 x 28 cm). Fixation was in 4% formaldehyde in sea water and subsequent conservation in ethanol 70%. Specimens in these samples were identified by the first two authors. The samples contained 129 different taxa with 29 molluscan species (Lengkeek et al., 2013): 10 heterodont bivalves, 4 pteriomorphian bivalves, 8 caenogastropods and 7 heterobranch gastropods.

Unless otherwise stated, collected specimens referred to in this paper are deposited in the reference collection of Bureau Waardenburg bv, Culemborg.

RESULTS

GASTROPOD SPECIES NEW FOR THE DUTCH FAUNA

Cerithiopsidae

Cerithiopsis tubercularis (Montagu, 1803) (Fig. 2)

Only one specimen (shell height 24.1 mm) was found on the wreck of the SS Nautilus (for locations of wrecks see Table 1 and Fig. 1). It differs from other cerithiopsid species of neighbouring countries by a brown, stout shell, thickly covered by tubercles and a spiral sculpture on the last whorl. It lives on the sponges *Hymeniacidon perleve* and *Halichondria panicea* (breadcrumb sponge). The latter was also found on the SS Nautilus.

Cerithiopsis tubercularis is not mentioned as autochthonous in the recent atlas of Dutch marine molluscs (De Bruyne et al., 2013). However, it is mentioned in annex 4 of this atlas, in a list of species represented by empty but recent shells and freshly imported or stranded living specimens. For example, 1.x.1950, a fragment of *C. tubercularis* was found on a bundle of corks at the former beach of 'De Beer', province of Zuid Holland (Bloklander & Lucas, 1952). Most probably this bundle had a southern origin.

In Belgium, *C. tubercularis* was recorded in recent years on four out of ten wrecks (Zintzen & Massin, 2010). These wrecks (BRK, CAL, KLM & BRQ) are located offshore or at the southern border of the Belgian continental shelf (Fig. 1).

The distribution of *Cerithiopsis tubercularis* is mainly Lusitanic (Cape Verde islands, Mediterranean, Azores, Portugal, Ireland, U.K., Belgium), but the species has also been reported from Norway (Gofas, 2014a).



Fig. 1. Location of wrecks in the Southern Bight of the North Sea mentioned in this paper.

Table 1. Co-ordinates of the wrecks on the Dutch Continental Shelf (DCS) mentioned in the text.

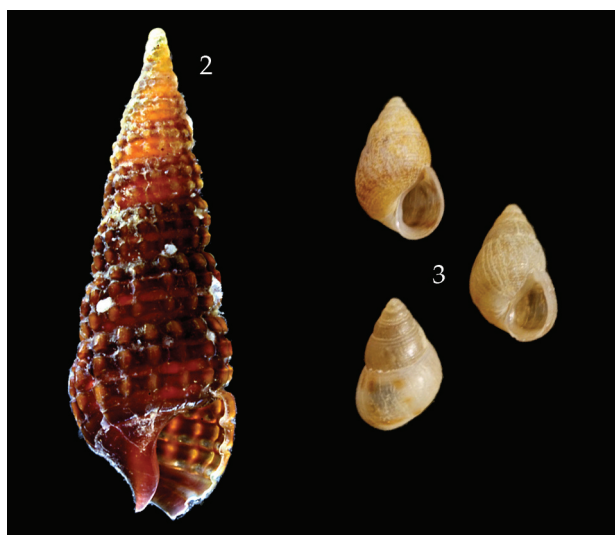
Wreck	date visited	latitude N	longitude E	depth
Amerskerk	10 IX 2013	53° 35' 15"	006° 10' 09"	14-22 m
SS Nautilus	8 X 2013	53° 07' 13"	004° 12' 24"	20-32 m
Poppetjeswrak	7 X 2013	52° 35' 45"	003° 30' 14"	30-32 m
HMS Hogue	12 VII 2013	52° 15' 19"	003° 41' 19"	28-32 m
HMS Aboukir	9 IX 2013	52° 15' 13"	003° 41' 31"	26-28 m
SS Tubantia	12 IX 2013	51° 49' 48"	002° 49' 02"	24-28 m
Voorpostenboot	30 VII 1991	52° 18' 42"	004° 15' 30"	17-22 m
Twin (M)	26 / 27 VI 1989	52° 30' 31"	003° 19' 18"	26-32 m
M'	7 IX 1989	52° 29' 46"	003° 17' 00"	30-34 m

Rissoidae

Crisilla semistriata (Montagu, 1808) (Fig. 3)

Four specimens (shell height 2 mm) were found on the wreck of the SS Tubantia in two samples. *Crisilla semistriata* differs from other rissoid species of surrounding countries by a shell height of twice the width at most, almost flat whorls with fine spiral lines, transverse colour bands and no dark comma-shaped mark on the last whorl.

This caenogastropod is not mentioned as autochthonous in the recent atlas of marine molluscs (De Bruyne et al., 2013). However, these authors mention it in annex 4 of this atlas, i.e. in the list of species rep-



Figs 2-3. Gastropod species new for the Dutch fauna. **2**, *Cerithiopsis tubercularis* from the wreck of the SS Nautilus, shell height 24.1 mm; **3**, *Crisilla semistriata* from the wreck of the SS Tubantia, shell height 2 mm.

resented by empty but recent shells and freshly imported or stranded living specimens. Two examples suggest a southern origin of such specimens, viz. records (listed as *Cingula semistriata*) from Terschelling and Ameland on egg clusters of the whelk *Buccinum undatum* L., 1758, most likely originating from the English Channel (Bloklander, 1949), and from 1964 to 1969, several specimens (listed as *Putilla semistriata*) in lumps of tar. These lumps were always found during periods of beaching of the thongweed *Himanthalia elongata* (Doeksen & Buizer, 1978), also suggesting an origin in the English Channel. See De Bruyne & De Boer (2008) for additional records.

Crisilla semistriata is not reported from Belgian wrecks (Zintzen & Massin, 2010). However, live specimens were found on stones of the scour protection around the Westhinder measurement mast, 30 km off the Belgian coast (Kerckhof, 2002).

Distribution mostly Lusitanic (Mediterranean, Ireland, UK, Belgium), but also Norway (Gofas, 2014b) and Kattegat (De Bruyne & De Boer, 2008).

RARELY OBSERVED BIVALVES AND GASTROPODS FOR THE DUTCH FAUNA

Bivalvia, Kelliidae

Kellia suborbicularis (Montagu, 1803) (Fig. 4)

This small heterodont bivalve (shell height 2-3 mm) was present in samples from four Dutch wrecks, viz. SS Tubantia, HMS Aboukir, SS Nautilus and Amerskerk. It is characterized by a length < 9 mm,

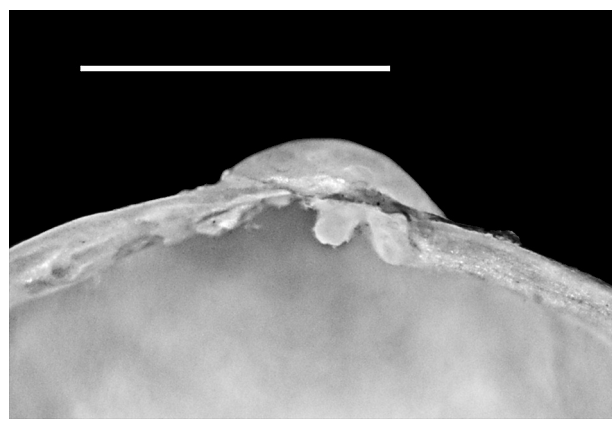


Fig. 4. *Kellia suborbicularis* from the wreck of the SS Nautilus. Hinge line of left valve, scale bar 5 mm.

weak siphons widely separated on anterior and posterior sides, an almost circular outline, beaks just in front of the midline, and a sculpture of fine concentric lines. Each valve has a single posterior lateral tooth.

Kellia suborbicularis usually lives in small crevices (Yonge & Thompson, 1976). Records from the DCS are rare. The first Dutch (beach) records are from 1928 at Noordwijk aan Zee and 1930 at Katwijk (Henrard, 1935). Bloklander (1949) mentions this species from Ameland on floating objects, such as egg masses of the whelk *Buccinum undatum*. Autochthonous populations of *K. suborbicularis* were present near Den Helder until 1950, at Flushing until 1959 (De Bruyne et al., 2013) and off Texel and Terschelling (Eisma, 1966). De Bruyne et al. (2013) also list four records after 1985, viz. two coastal (Westkapelle and Petten), one north of Terschelling, and one at the Borkum Reef Ground. The MWTL (Monitoring van de Waterstaatkundige Toestand des Lands) programme of the Dutch Ministry of Infrastructure and Environment adds three records on the central Oyster grounds in 2006 (OYS 33; Tempelman et al., 2009a), 2007 (OYS10; Tempelman et al., 2009b) and 2008 (OYS 31; Tempelman et al., 2009c). In Belgium, *K. suborbicularis* is regularly found on floating objects (Kerckhof, personal communication) and autochthonous in stone depressions at the Westhinderbank (Kerckhof & Houziaux, 2006).

Kellia suborbicularis is mainly Lusitanic (Angola, Mauritania, Mediterranean, Azores, Portugal, Ireland, UK, Belgium), but has also been reported from Norway and Sweden, Gulf of Mexico, and the NW Atlantic (Gofas, 2014c).

Bivalvia, Myidae

Sphenia binghami Turton, 1822

One specimen of this heterodont bivalve was present

in a sample from the wreck of the SS Tubantia. *Sphe-
nia binghami* differs from other Myidae of the sur-
rounding countries by its small size (< 20 mm), brittle
shell, and a relatively small chondrophore.

An autochthonous population of *S. binghami* may
have been present near Den Helder before 1964. A
few offshore records are mentioned as well, the last
one in a grab sample from the northern part of the
DCS in 1980 (Eisma, 1966; De Bruyne et al., 2013). In
1991, *S. binghami* was recorded on the wreck of a Vor-
postenboot (Van Moorsel & Waardenburg, 1992). It
was found in the scope of the MWTL-programme in
2008 at the Frisian Front (station OYS08; Tempelman
et al., 2009c) and in 2010 at the northern part of the
Oyster grounds (station OYS03; Verduin et al., 2012).
This bivalve was also found on and near wind tur-
bines in the Belgian part of the North Sea (Degraer et
al., 2013). Remarkably, in 1975 five juveniles were
recorded from wentletraps *Epitonium clathratulum*
(Kammacher, 1798), fished a few miles off the Belgian
coast at De Panne, close to the French border (Kerck-
hof & Nolf, 2006). These authors also mention the oc-
currence of *S. binghami* on buoys off the Belgian coast,
on boulders, e.g. in the Westhinder area and on
wreckage of the MV Tricolor that sank in the Strait of
Dover. Therefore, they suppose that the species is
more common than the limited number of records
suggest.

*Sphe-
nia binghami* is mainly Lusitanic (West Africa,
Mediterranean, Ireland, UK, Belgium), but is also
known from Sweden (Gofas, 2014d).

Gastropoda, Nassariidae

Nassarius incrassatus (Ström, 1768) (Fig. 5)

Thirty specimens (shell height 1.6 – 3.4 mm) of this
small caenogastropod were found in three samples
from the SS Tubantia, among them the two samples
containing *Crisilla semistriata*. Specimens have been
deposited in Naturalis collection
(RMNH.MOL.338228 and 338229). *Nassarius incrassa-
tus* differs from other Nassariidae by costae that are
higher than the spiral ridges and a penultimate whorl
with eight to ten spiral striae. The whorls are more
tumid than in *N. reticulatus* (L., 1758). The siphonal
fasciole, i.e. the protruding part of the shell at the left
side of the siphon, is also distinctive: in our speci-
mens it has approximately 10 spiral striae, whereas in
other *Nassa-rius* species there are six striae at most
(Graham, 1988). As we found only juveniles, a varix
had not yet developed on the outer lip. For excellent
photographs of similar shells, see Scaperrotta et al.
(2010: 89). Additional varices, often present in *N. pyg-
maeus* (Lamarck, 1822), are absent.



Fig. 5. *Nassarius incrassatus* from the SS Tubantia, scale bar 1 mm.

De Bruyne et al. (2013) record the species from the
Cleaver Bank and 'west of Texel Rough'. It was also
recorded in 1983 at the L-10Delta platform (Van Buu-
ren, 1984) and (as *Hinia incrassata*) in 1989 from two
offshore wrecks, viz. M (Twin) and M' (Van Moorsel
et al., 1991). One specimen was found on a wind tur-
bine in the Prinses Amaliawindpark, about 25 km off
IJmuiden (Vanagt & Faasse, 2014). In the Belgian part
of the North Sea, the species was recorded on six out
of ten wrecks, viz. offshore (BRK, CAL, GAR, DUC
and KLM) and on SPR (Fig. 1), close to Oostende
(Zintzen & Massin, 2010); it was also found on wind
turbines on the Thornton Bank (Kerckhof et al., 2010;
Degraer et al., 2013), close to the SS Tubantia.

Nassarius incrassatus is distributed in the Mediter-
ranean, the Azores, Ireland, U.K., and Belgium, as
well as in the German Bight, Norway, Sweden and
Iceland (Gofas, 2014e).

Gastropoda, Triviidae

Trivia arctica (Pulteney, 1799)

One specimen of this small cowry (shell length c. 10
mm) was observed by the research divers on the
wreck Poppetjeswrak and another one on the HMS
Aboukir. They were not sampled and no photograph
is available. The characteristic convolute shell is
sculptured with prominent ridges and is devoid of
black spots. The mantle has spots, however, and the
siphon is pale yellow.

T. arctica feeds on compound ascidians like *Diplo-
soma listerianum*, which was found on both wrecks.

A live *Trivia* was already found in 1915, on the
beach of Zandvoort (Van Benthem Jutting, 1933). As
she considered *T. arctica* and *T. monacha* synonymous,
but mentioned that only 'var. *arctica*' was found in
The Netherlands, this early record probably applies
to *T. arctica*. However, when no species-specific char-
acters are indicated, allocating early records to either
T. arctica or *T. monacha* remains problematic. The first
Dutch autochthonous records of *T. arctica* are quite



Fig. 6. *Trivia monacha* from the wreck of the HMS Hogue, scale bar 2 mm.

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recent: 2000 and 2001 in the Eastern Scheldt. Soon after this discovery, several records from the Dutch delta area were published (Holsteijn, 2004) and in the following years this cowry was reported in increasing numbers from dykes along the Eastern Scheldt (De Bruyne et al., 2013). Possibly its increasing abundance is related to the availability of its food source.

It is unknown whether this population reproduces locally. Settling larvae may also originate from populations on wrecks or on more distant rocky coasts.

Trivia arctica is mainly Lusitanic (Mediterranean, Portugal, Spain, Ireland, U.K., and Belgium), but it is also known from Norway and Sweden (Gofas, 2014f).

Trivia monacha (da Costa, 1778) (Fig. 6)

One specimen of this small cowry (shell length 11.7 mm) was collected from the wreck of the HMS Hogue. The convolute shell has three black, dorsal spots, and a sculpture of prominent ridges. The siphon is orange.

Trivia monacha feeds on compound ascidians, like *Diplosoma listerianum*, which was found on the wreck of the HMS Hogue.

Live specimens were found on a piece of rubber on the beach of Scheveningen in 1954 (Entrop, 1972). The species was also found alive on the DCS, 28 km NW of

the isle of Texel (Eisma, 1966: 159). Two years before the present record, on 5.xi.2011, one of us (WL) found a *Trivia* at the wreck of the HMS Aboukir, close to the HMS Hogue. The shell lacked ribs, so this clearly was a juvenile, but due to its length (9 mm) we believe that it was *T. monacha*. We assume that a 9 mm long *T. arctica* would have shown riblets.

Like *T. arctica*, *T. monacha* has been reported from dykes along inshore waters in the southwest of The Netherlands, but more recently - from 2003 onwards - and less frequently (De Bruyne et al., 2013). *Trivia monacha* was found on one of the ten Belgian wrecks (KLM, Fig. 1; Zintzen & Massin, 2010) and on wind turbines in the Belgian part of the North Sea (Degraer et al., 2013). Possibly, its increasing occurrence is related to the availability of its food source.

It is unknown whether the Dutch population reproduces locally. Settling larvae may also originate from populations on wrecks or on more distant rocky coasts.

Trivia monacha has a Lusitanic distribution pattern. The species occurs in the Mediterranean, Portugal, Spain, Ireland, U.K. and Belgium (Gofas, 2014g).

DISCUSSION AND CONCLUSIONS

Other recently-discovered molluscs on wrecks on the DCS include the pteriomorphian bivalve *Musculus subpictus* (Cantraine, 1835) (Gittenberger et al., 2013), the caenogastropod *Simnia patula* (Schrieken et al., 2011) and the heterobranch gastropods *Polycera faeroensis* Lemche, 1929, and *Doto dunnei* Lemche, 1976 (Gittenberger et al., 2011).

A considerable number of new and rare molluscan species was reported in recent years for the DCS. It is doubtful, however, whether the molluscan diversity has increased abruptly. Before 2013, the research efforts in this section of the North Sea have been relatively modest. Therefore, it is not possible to elucidate the real changes in molluscan diversity on the DCS.

The seven species that are reported as new or rarely mentioned for the DCS in this paper are exclusively or predominantly southern species that are common in the English Channel. Their northern limits depend on the Gulf Stream and do not extend beyond Scandinavia. Three species also occur along the Atlantic coast of Africa. The SS Tubantia, the southernmost of the ten wrecks investigated, yielded the highest percentage of these species, i.e. four of the seven species. The extension of southern species in the North Sea during recent decades is a well-known phenomenon (Dulvy et al., 2008).

Since many of the species treated in this paper had already reached The Netherlands on floating objects, some may have reached the wrecks by rafting. How-

ever, most species probably reached the Dutch (and Belgian) wrecks in watermasses from the English Channel as larvae. The expansion of southern species is probably a consequence of increasing seawater temperature. The deployment of new hard substrates, such as wind turbines, may also facilitate a northward shift of distribution borders. When a species reproduces successfully on these substrates, they may serve as stepping stones for dispersal.

Thanks to observations and collecting by divers on wrecks on the DCS we now know that the molluscan diversity is higher than previously accepted. Wrecks may be important for the survival of molluscan populations in the Southern Bight of the North Sea.

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