

ON THE DISCOVERY OF A NEW *VOLUTOPSIUS* (GASTROPODA, BUCCINIDAE) FROM THE NORTH-EASTERN ATLANTIC OCEAN

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Abstract During an ongoing research programme to investigate fishing grounds on and around the Rockall Plateau and along the continental slope to the west of Scotland the scientific staff on board of R/V Scotia collected a number of Mollusca as a by-catch, among them several Buccinidae. Two of the larger species deserve more attention: *Beringius bogasoni* Warén & Smith 2006 and specimens of an unknown *Volutopsius*. The latter can be distinguished from *Volutopsius norvegicus* (Gmelin 1791) by the spiral sculpture and is added to the British Fauna as *Volutopsius scotiae* sp. nov.

Key words Atlantic, Rockall, Buccinidae, *Beringius*, *Volutopsius*, new taxon

INTRODUCTION

The area of Rockall has been an important place for early oceanographic and biological surveys since the 19th century. For an account on the history of the investigation we refer to Gordon (2003). Photos of the seafloor of Rockall Bank taken by submersibles were published as early as in the seventies (Vadus, 1977). Like many offshore banks and ridges, Rockall Bank and Rockall Trough represent a unique fauna with ecosystems of cold-water coral and marine benthos (JNCC, 2010; Jason *et al.*, 2009; Hall-Spencer *et al.*, 2002, 2009).

The Marine Laboratory, Aberdeen has had an ongoing research programme to investigate the bathymetry, epibenthic fauna, and fish stocks on and around the Rockall plateau since 1973. The SAMS Dunstaffnage Laboratory, Oban did considerable work on the Benthos and fish fauna of the Rockall Trough in the 1970s and 1980s. The Royal Netherlands Institute for Sea Research (RIOZ) has worked on the fauna from this area. A considerable number of new species have been described from this area during the past few years, all but one are micro-shells (for examples see Hoffman *et al.*, 2008, 2009, 2010, 2011). It was therefore a surprise that a large species new to science belonging to the macro-benthos, *Beringius bogasoni* Warén & Smith 2006, was described. The discovery of another large species is perhaps more surprising, given that it lives in the same geographic area. Species belonging to

the Buccinidae are among the larger molluscs in general, and gastropods in particular, in both Boreal and Arctic waters. No additional new Buccinidae were discovered prior to these two, despite intensive research by Marine Scotland (formerly Fisheries Research Services), the Scottish Association for Marine Science (SAMS) and by the Royal Netherlands Institute for Sea Research (RIOZ). The description of the new species in the present paper is the result of studying morphological details, such as spiral sculpture, over a large number of specimens (of *V. norvegicus* and *N. cf. norvegicus*) covering a wide geographic range, in order to acquire a better understanding of the variability and biogeography of Buccinidae in this area.

MATERIALS AND METHODS

Since 1998 the FRV Scotia has undertaken fisheries surveys of the deeper waters of the Rockall Trough and the surrounding areas on behalf of Marine Scotland. These surveys utilized a Jackson 460 Trawl fishing at a range of depths down to 1800 m to estimate fish abundance and diversity. Recent multidisciplinary deepwater projects such as ECOSDEEP and OFFCON had an additional benthic component and fished the Jackson 460 in tandem with a small bagnet for macrobenthos capture. Designed to pick up material going under the groundgear of the larger net, the bagnet was fitted with 100 mm disks on the groundrope and a 20 mm blinder in the codend. It had an estimated wingspread of approximately

3 m and worked behind the groundgear directly underneath the bottom panel of the larger net. Towing time was 30–60 minutes at 1.7–1.8 ms⁻¹. All macrobenthos from both nets were identified and quantified at sea or preserved and returned to the Marine Laboratory. Using this method in 2008, during the ECOSDEEP project, we collected *Volutopsius* from soft sediments on the Hebridean Slope and in 2001 and 2012, during the OFFCON project, we found *Volutopsius* and *Beringius* along the NE and W of Rockall Bank. All specimens cited in the present paper were captured by the bagnet only.

All specimens were stored dry (empty shells, dead collected or cleaned), the holotype placed in the National Museum of Scotland, paratypes in the collection of the first and second author and in the Marine Laboratory of Marine Scotland, and the additional specimens from Iceland in the collection of the first author. All Buccinidae are compared with the original description of the species and related (homologous) or possibly related (similar) species, the type species when available for study and with other specimens of the same species collected elsewhere. For *Volutopsius* we could compare the new species with about 200 specimens of *V. norvegicus* in the collection of the first and second author and with 170 specimens of Volutopsiinae from the Northern Pacific in the collection of the first author.

SYSTEMATICS

Family Buccinidae Rafinesque 1815

Subfamily Volutopsiinae Habe & Sato 1972

Genus *Volutopsius* Mörch 1857

Type species *Fusus largillierti* Petit de la Saussaye 1851 = *Volutopsius norvegicus* (Gmelin 1791)

Description Shell medium to large for the family, up to 155 mm in the Atlantic, occasionally larger in the Pacific; broadly fusiform with medium to moderately high spire and large, broad body whorl. Aperture large when compared to shell size, semi-oval with smooth, glossy columellar callus, gently curved outer lip with slightly flared edge. Colour ranging from white over yellowish or pale pink to pale brown, in Pacific occasionally dark reddish brown. Protoconch large, bulbous, first whorl minute, flattened. Teleoconch

glossy or with fine spiral sculpture; axial sculpture absent except in teratological specimens.

Remarks Specimens belonging to this genus are easily recognized by the smooth shell with large protoconch in combination with a large, gently curved outer lip.

For an account on the history of the designation of the type species of the genus we refer to Kantor (1982).

Volutopsius norvegicus (Gmelin 1791)

Plate 2, Figs 14–21

Strombus norvegicus Chemnitz, 1788: 218, pl. 157, fig. 1497–1498 (rejected work).

Strombus norvegicus Gmelin, 1791: 3520–3521.

Fusus largillierti Petit de la Saussaye, 1851: 254–255, pl. 7, fig. 6.

Fusus norvegicus Sowerby, 1880: 88 (misspelling for “*norvegicus*”).

Neptunea (Volutopsius) norvegica Tryon, 1881: 119.

Neptunea (Volutopsius) largillierti Tryon, 1881: 119.

Neptunea (Volutopsius) norvegica Kobelt, 1887: 66–68

Volutopsius norvegica var. *dautzenbergi* Schlesch, 1929: 194–195, 196, pl. 11, fig. 7–8.

Volutopsius norvegicus, Macpherson, 1971: 69–70.

Volutopsius norvegicus Tiba & Kosuge, 1979: 1–2.

Volutopsius norvegicus Bouchet & Warén, 1985: 200–201.

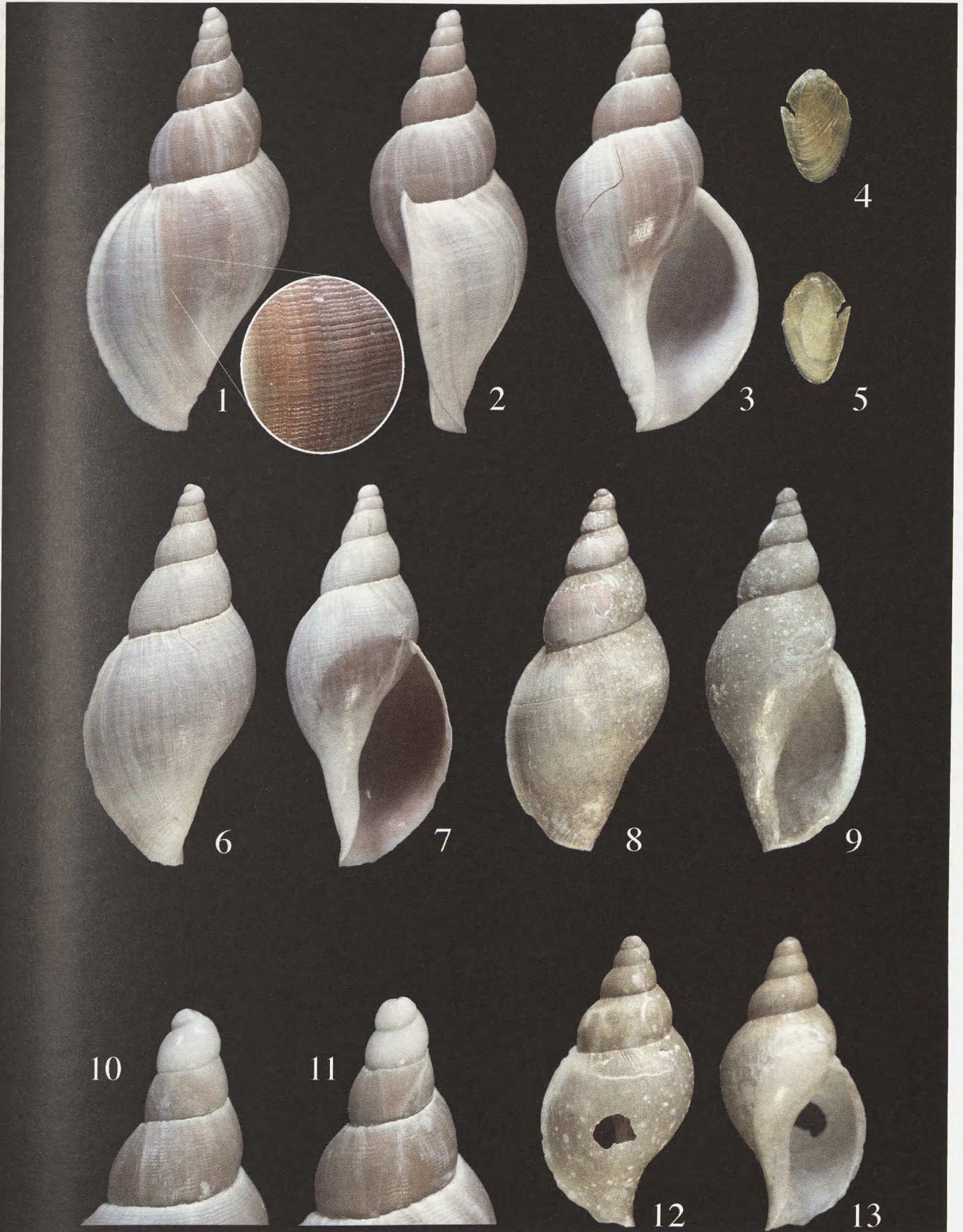
Volutopsius norvegicus Kantor, 1990: 85–90.

Volutopsius norvegicus Kantor & Sysoev, 2006: 207.

Synonyms *Fusus largillierti* Petit de la Saussaye 1851, type locality Newfoundland.

Volutopsius norvegica var. *dautzenbergi* Schlesch 1929, type locality: NW Iceland, Isaljördur.

Bouchet & Warén (1985) suggested that *Volutopsius middendorffi* (Dall 1891) (type locality “Albatros” station 3216 & 3253, Unimak Pass, Alaska, 66 – 112 m) may be a synonym of *V. norvegicus*. Kantor (1986), in his study on the subfamily Volutopsiinae, concluded that both species are not conspecific, based on conchological and anatomical evidence. The type figure by Dall (1895: pl. 28, fig. 1) and the holotype figured by Kosuge (1972: pl. 25, fig. 7)



Figures 1–13 *Volutopsius scotiae* sp. nov.: 1–3 holotype, 84.2 mm, NW off St Kilda, 58°26'N, 09°28'W, 1000 m deep, in National Museum of Scotland, Department of Zoology, reg.nr.-NMSZ:2012053; 4–7 paratype 2, 89.6 mm, operculum 14.6 mm, Rockall Through, 57°34'N, 12°27'W, 1750 m deep, coll. D. W. McKay; 8 paratype 4, 82.7 mm, NW Rockall, 58°33'N, 14°42–45'W, 1146 m deep, coll. Marine Scotland Marine Laboratory; 9 paratype 6, 102.8 mm, NW Rockall, 57°40–42'N, 15°24'W, 1047 m deep, coll. Marine Scotland Marine Laboratory; 10–11 apex of holotype; 12–13 62.6 mm, Iceland, coll. K. Fraussen nr. 4343.

show fine spiral sculpture and we conclude that the opinion of Kantor is correct. After studying sufficient specimens of similar looking species from the northern Pacific we can add to this conclusion, that no other Pacific species (known yet) is conspecific.

Type locality Norway, "ad Norwegiae littorae".

Range North Atlantic. Known from eastern Canada (Fox Basin, Baffin Bay and off Nova Scotia) in the east along Greenland, Iceland, Svalbard (Spitzbergen Sea and Barents Sea), Franz Josef land (Barents Sea and Polar Ocean), Novaya Zemlya (Barents Sea and Kara Sea) and the New Siberian Islands (Kara Sea and Laptev Sea) in the west, to Norway and Great Britain (North Sea) in the south. Kantor (1990) also recorded the species from the east Siberian Sea and from the Chukchi Sea (both records near Wrangel Island).

Discussion *Volutopsius norwegicus* is characterized by the smooth surface of the shell in combination with a large, higher than broad, semi-oval body whorl with the base adapically stretched forward. Occasionally an obscure spiral fold may be present.

Intraspecific variability is high (Plate 2): the shape may range from oval to slender; the shell from thin and fragile to heavy and solid; the colour from snow-white through pale yellowish or pinkish to pale brown. It is beyond the scope of the present paper to discuss variability in *V. norwegicus* but we mention these aspects again in the comparison with the new species described below.

***Volutopsius scotiae* sp. nov.**

Plate 1, Figs 1–13

Holotype 1 sh, NW of St Kilda, 58°26'N, 09°28'W, 1000 m deep, 14/09/2009; 84.2 mm, in National Museum of Scotland, Department of Zoology, reg.nr.-NMSZ:2012053.

Paratype 1 1 sh, NW of St Kilda, 58°26'N, 09°28'W, 1000 m deep, 14/09/2009; 81.2 mm, coll. D.W.McKay.

Paratype 2 1 sp, Rockall Through, 57°34'N, 12°27'W, 1750 m deep, 30/062011; 89.6 mm, coll. D. W. McKay.

Paratype 3 1 sh, Rockall Through, 57°36'N, 12°41'W, 1500 m deep, 1/07/2011; 85.9 mm, coll. K. Fraussen KF-6694.

Paratypes 4–5 2 sp, NW Rockall, OFFCON Rockall Survey 0712S, haul 273, 58°33'N, 14°42–45'W, 1146 m deep, 6/2012; 82.7–86.6 mm, coll. Marine Scotland Marine Laboratory.

Paratype 6 1 sp, NW Rockall, OFFCON Rockall Survey 0712S, haul 279, 57°40–42'N, 15°24'W, 1047 m deep, 6/2012; 102.8 mm, coll. Marine Scotland Marine Laboratory.

Type locality Atlantic Ocean, Scotland, NW of St Kilda, 58°26'N, 09°28'W, 1000 m deep, on mud.

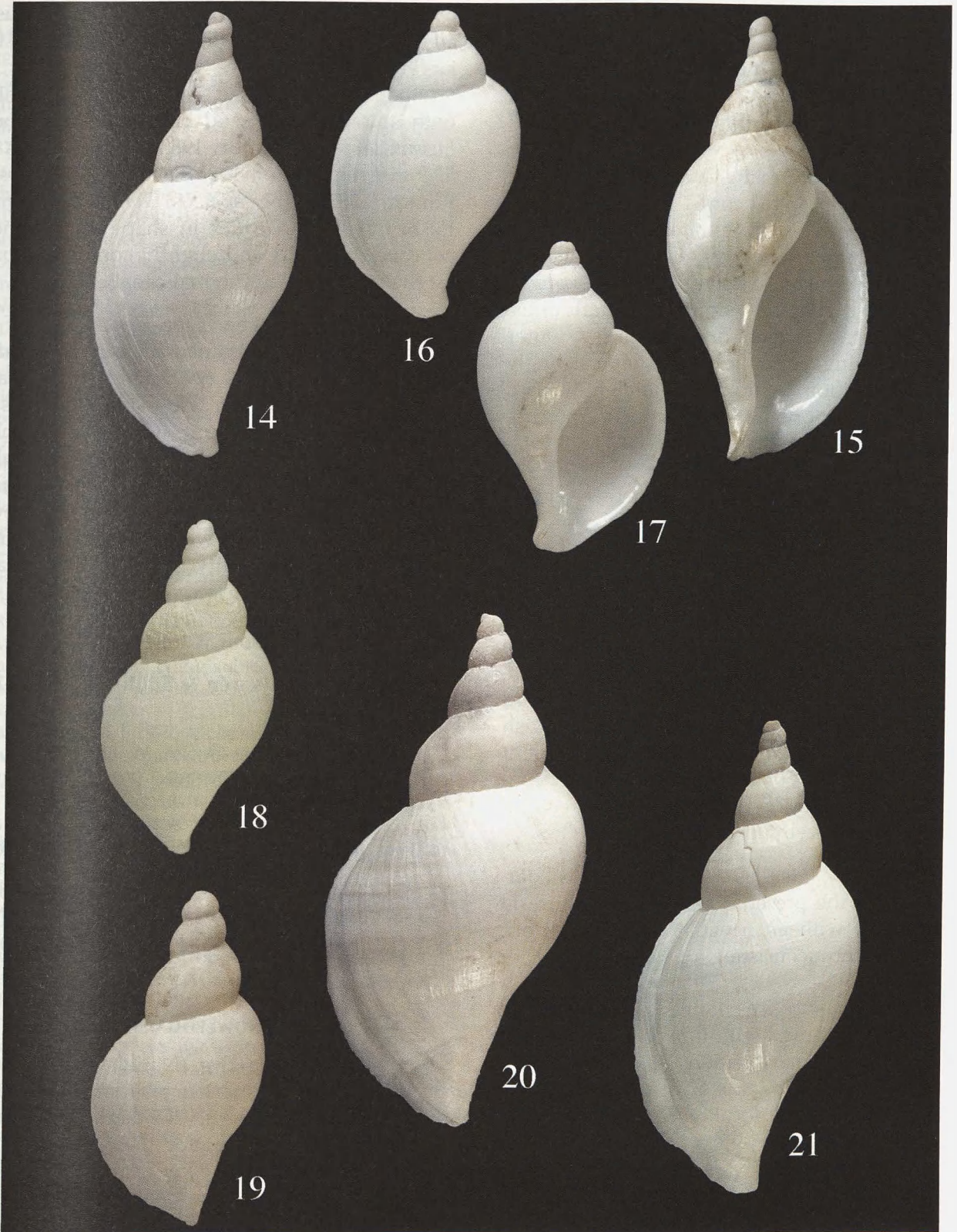
Material examined and range Apart from the 7 known type specimens (3 sh, 4 lv sp) we studied 2 additional specimens (2 sh) from an unknown locality offshore near Iceland. The type specimens were all trawled, as described in the chapter above, on a muddy bottom.

Description Shell of medium size, up to 102.8 mm in length; thick, solid, rather heavy. Shape typical of genus, volutopsoid, with broad, slightly flaring lip. Colour greyish with pale purplish brown axial zones; subsuturally with narrow, paler band.

Protoconch with about 2 whorls; shape papilli-form, higher than broad; tip small, curled inwards, first $\frac{1}{4}$ whorl rapidly increasing in size; surface smooth, glossy but with numerous, obscure, subsuturally prosocyr curves, incremental folds, or traces of them; colour snow white. Transition to teleoconch indistinct, marked by the presence of some fine incremental lines and the start of fine spiral sculpture.

Teleoconch with $3\frac{3}{4}$ whorls. Shape convex, suture distinct, simple. Body whorl large, higher than broad, semi-oval, base adapically stretched forward.

First whorl starting with 21 fine, flattened spiral cords with weakly convex top; interspaces narrow, forming a fine line. Spiral cords slightly broader abapically. Second whorl with 23 such spiral cords. Spiral cords occasionally growing broader along second and third whorl; with a fine secondary spiral groove appearing, situated in middle on spiral cords, gradually growing deeper and splitting spiral cord in two. Third



Figures 14–21 *Volutopsis norvegicus* (Gmelin 1791): 14–15 87.9 mm, Faeroe Islands, trawled in deep water, coll. Koen Fraussen nr. 0145; 16–17 69.6 mm, broad form, Barentz Sea, 200 m, coll. K. Fraussen nr. 3151; 18 80.3 mm, yellowish colour, S of Svaldbard, SE of Hopen Island, 75°40′-76°20′N, 27°50′-32°10′E, 350–400 m, coll. K. Fraussen nr. 1666; 19 79.8 mm, pinkish colour, same locality, coll. K. Fraussen nr. 1667; 20 111.5 mm, weakly banded form, North Sea, Bressay, coll. K. Fraussen nr. 0931; 21 116.5 mm, with weak spiral folds, North Sea, Bressay East Ground, 160 m, coll. K. Fraussen nr. 0846.

whorl with about 30 such spiral cords. Spiral interspaces growing slightly broader along penultimate whorl. Body whorl with slightly more than 130 spiral cords, 4 adapical cords obscure, abapical ones on siphonal canal broad; interspaces narrow.

Axial sculpture absent. Obscure incremental folds present on spiral cords, fine incremental lines hardly visible in spiral interspaces.

Aperture large, semi-oval. Columella gently curved, weakly concave with weakly convex adapical and abapical (siphonal canal) ends; callus thin, transparent, smooth, glossy. Outer lip thick, flaring, curled outside; shape strongly convex, transition to siphonal canal indistinct. Siphonal canal short, broad, wide open. Aperture with siphonal canal slightly more than 1/2 of total shell length.

Operculum (paratype 2) corneous, semi-transparent, yellowish brown; shape semi-oval with terminal nucleus.

Periostracum and animal unknown.

Derivation of name *Volutopsius scotiae* sp. nov. is named after the research vessel FRV *Scotia* (built in 1998 by Ferguson Shipboulders, 68 m, 2619 tons, DWT 850 tons), operating from Leith (home port) for the Marine Scotland (Scottish Government). The type material of the present new species was obtained during cruises conducted by the Marine Laboratory, Aberdeen on board of this vessel.

Comparisons *Volutopsius scotiae* sp. nov. is characterized by the presence of spiral sculpture in combination with an irregular but axially orientated pattern consisting of broad bands or blotches.

Volutopsius norwegicus differs in the smooth surface lacking spiral sculpture and the uniform colour without axial zonation.

Lussivolutopsius strelzovae Kantor 1990 from the northern Pacific (type locality: 58°35'N, 151°40'E, Okhotsk Sea, 120 m) differs in the weaker and more obscure spiral cords, the shorter protoconch, the upper spiral whorls which grow bigger more rapidly (while the upper spire whorls of *V. scotiae* sp. nov. stay narrow), the apertural lip which stays straight along the siphonal canal (instead of curling slightly upwards) and the colour which tends to yellow rather than pink.

Volutopsius middendorffi Dall 1907 from the northern Pacific is similar in sculpture but differs

by the broader shape with shorter spire, the usually orange protoconch (instead of white) and the larger adult size.

Other *Volutopsiinae* species ornamented with spiral sculpture all belong to the genera *Lussivolutopsius* Kantor 1983 (type species *L. hydractiferus* Kantor 1983) and *Habevolutopsius* Kantor 1983 (type species *Volutopsius hirasei* Pilsbry 1907) and differ in shape by the more concave columella and slightly constricted base (at the transition to siphonal canal).

Discussion The seven type specimens of *V. scotiae* sp. nov. are elegant with a slender shape while the 2 additional specimens from Iceland are broader and smaller. We may assume, especially when taking account of the small number of specimens known, that intraspecific variability may be rather high. Intraspecific variability is high in the related *V. norwegicus* and, even though this is no proof, we can assume that in *V. scotiae* sp. nov. variability may behave similarly to what we see in *V. norwegicus*.

Beringius bogasoni Warén & Smith 2006

Beringius bogasoni Warén & Smith 2006: 188–191, figs. 5–13.

Type locality Atlantic Ocean, W of Scotland, AT (=Agassiz trawl) 419, 56°56'N, 09°50'W, 1908.

Range Atlantic, from off southwestern Iceland to west of Scotland, between 56°33' and 64°45' N.

Material studied We record 3 additional specimens: Rockall Trough 57°36'N, 12°41'W, 1500 m, 1/7/2011, 2 sh and 57°34'N 12°27'W, 1750 m, 30/06/2011, 1 sp juv.

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