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MOLLUSCS OF THE GENUS *ONOBA* H. ADAMS ET A. ADAMS, 1852 FROM THE BARENTS SEA AND ADJACENT WATERS (GASTROPODA: RISSOIDAE)

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ABSTRACT

Four species of *Onoba* H. Adams et A. Adams, 1852 are reported from the Barents Sea and adjacent waters of Arctic Basin and White Sea: *O. aculeus* (Gould, 1841), *O. semicostata* (Montagu, 1803), *O. leptalea* (Verrill, 1884) and *O. improcera* Warén, 1996. *Onoba karica* Golikov, 1986 is considered as a synonym of *O. leptalea*. Both *O. mighelsi* (Stimpson, 1851) and *Alvania jeffreysi* (Waller, 1864) were erroneously recorded from the Russian waters by previous authors.

Key words: Arctic, Barents Sea, Gastropoda, fauna, *Onoba*, Rissoidae, shell morphology

МОЛЛЮСКИ РОДА *ONOBA* H. ADAMS ET A. ADAMS, 1852 В БАРЕНЦЕВОМ МОРЕ И ПРИЛЕГАЮЩИХ ВОДАХ (GATROPODA: RISSOIDAE)

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РЕЗЮМЕ

В Баренцевом море и в прилегающих водах Арктического бассейна и Белого моря известно четыре вида рода *Onoba* H. Adams et A. Adams, 1852: *O. aculeus* (Gould, 1841), *O. semicostata* (Montagu, 1803), *O. leptalea* (Verrill, 1884) и *O. improcera* Warén, 1996. *Onoba karica* Golikov, 1986 является синонимом *O. leptalea*. Предыдущие сообщения о находках *O. mighelsi* (Stimpson, 1851) и *Alvania jeffreysi* (Waller, 1864) в российских водах ошибочны.

Ключевые слова: Арктика, Баренцево море, Gastropoda, фауна, *Onoba*, Rissoidae, морфология раковины

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INTRODUCTION

The representatives of marine molluscan genus *Onoba* H. Adams et A. Adams, 1852 are distributed almost worldwide. Ponder (1984) defined *Onoba* as rissoids with dominance of spiral striation on teleoconch, one metapodial tentacle, presence of prostate in males and only two basal denticles on the central radular tooth. The generic position of North Atlantic rissoid species was specified by Warén (1996) based only on shell characters. Fourteen species of *Onoba* are present in this region (Fretter and Graham 1978; Bouchet and Warén 1993; Warén 1996; Rolán 2008; Ávila et al. 2012).

Except for a few species of *Alvania* Risso, 1826 and *Boreocingula* Golikov et Kussakin, 1974 which were wrongly referred to *Onoba,* only three *Onoba* species – *O. aculeus* (Gould, 1841), *O. semicostata* (Montagu, 1803) and *O. mighelsi* (Stimpson, 1851) had been known from the Barents Sea (Herzenstein 1885; Filatova and Zatsepin 1948; Bryazgin et al. 1981; Høisæter 1986; Kantor and Sysoev, 2006). Recently *O. improcera* Warén, 1996 from Iceland was described and a several specimens from the Varangerfjorden were attributed to that species (Warén 1996). *Onoba karica* Golikov, 1986 described from the adjacent area of Kara Sea is still known only from the type locality (Golikov 1986; Kantor and Sysoev 2006).

Recent investigations of the Barents Sea led to a discovery of one species of *Onoba,* which had been previously overlooked from this region as well as new findings of *O. improcera,* which was unknown from Russian waters. The aim of this study is to give account for all *Onoba* species found in the Barents Sea and adjacent Russian waters.

MATERIALS AND METHODS

The material studied was collected during cruises in 1996–2012 using different types of grabs and by SCUBA diving. Almost all samples were fixed by 4% buffered formaldehyde and were placed in 70–80% alcohol after sorting. Collections stored in the Zoological Institute of the Russian Academy of Sciences (ZIN), in the Swedish Museum of Natural History (SMNH) and in the Zoological Museum of Copenhagen (ZMC) were partly examined.

The specimens were studied under a Carton SPZT50 stereomicroscope with a DCM-510 eyepiece-camera. The following standard measurements were taken for certain populations using an eyepiece-micrometer: shell height, shell width, body whorl height, aperture height, aperture width, protoconch diameter, width of the initial part of protoconch (nucleus) (Warén 1974; Verduin 1984).

The scanning electron microscopy images were taken with a TescanVEGA TS 5130 MM.

SYSTEMATICS

Family Rissoidae Gray, 1847

Genus *Onoba* H. Adams et A. Adams, 1852

Onoba semicostata (Montagu, 1803)

(Figs 1A–B; 4A, D; Table 1)

Turbo semicostatus Montagu, 1803: 326–327;
Turbo striatus J. Adams, 1797:66 (non Da Costa, 1778: 86).

Material. 96 spms, Murman Coast, Dolgaya Bay, 13 m, 69°10′13.8′′N, 34°57′23.5′′E, 29 May 2009, R/V Dalnie Zelentsy; 15 spms, same region, 19 m, 69°11′30.1′′N, 34°58′17′′E, 29 May 2009, R/V Dalnie Zelentsy; 3 spms, same region, 84 m, 69°11′58.2′′N, 34°58′34.2′′E, 25 May 2008, R/V Dalnie Zelentsy; 3 spms, same region, 31 m, 69°12′46.8′′N, 34°59′29′′E, 25 July 2008, R/V Dalnie Zelentsy; 18 spms, same region, 42 m, 69°13′32.3′′N, 35°1′14.2′′E, 26 July 2008, R/V Dalnie Zelentsy; 25 spms, Murman Coast, Dalne-Zelenetskaya Bay, 10 m, 69°7′16.5′′N, 36°5′15.6′′E, 03 July 2009, SCUBA diving; 433 spms, same region, 8 m, 69°7′17.2′′N, 36°5′12.8′′E, 06 July 2009, SCUBA diving; 100 spms, same region, 10 m, 69°7′10.4′′N, 36°4′19.4′′E, 07 July 2009, SCUBA diving; 12 spms., same region, 80 m 69°7′48′′N, 36°02′07′′E, 03 June 2009, R/V Dalnie Zelentsy; 1 spm., Murman Coast, Yarnyshnaya Bay, 35 m, 69°5′22.9′′, 36°2′55.9′′, 6 July 2009; 1 spm., Murman Coast, Ivanovskaya Bay, 54 m, 68°22′27.3′′N, 38°32′17.9′′E, 30 July 2008, R/V Dalnie Zelentsy; 2 spms., Murman Coast, Teriberskaya Bay, 12 m, 69°10′41.5′′N, 35°10′1.20′′E, 10 October 2010; 30 spms, same region, 29 m, 69°10′41.5′′, 35°7′44.0′′ 12 October 2010; 1 spm., Murman Coast, Varangerfjord, 213 m, 69°55′12.0′′N, 31°32′35.9′′E, 02 March 2007, R/V Dalnie Zelentsy; 123 spms., Murman Coast, Ura Bay, 5–25 m, 69°20′N, 32°54′E, August 2007, SCUBA diving.

Description. The shell is ovate-conic, relatively thick, from white to yellowish, consists of 5–5.5 moderately flattened whorls divided by deep submerged

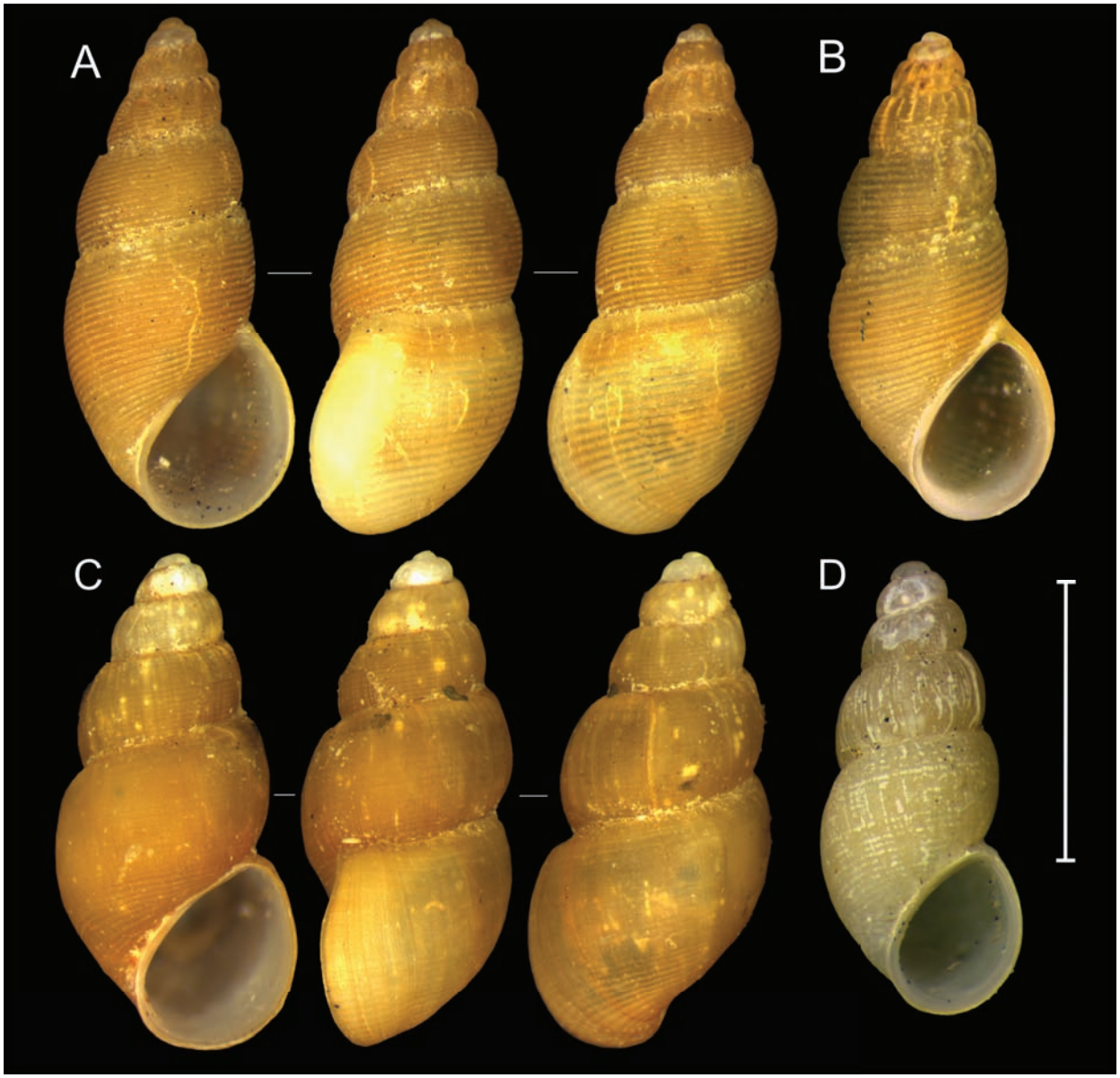

Fig. 1. Shells of *Onoba semicostata* (A–B) and *O. aculeus* (C–D): A–B – Murman Coast, Ura Bay, 69°20´N, 32°54´E; C – Murman Coast, Ivanovskaya Bay, 68°17´38.3´´N, 38°37´56´´E; D – Murman Coast, Varangerfjord, Bolshoy Aynov Isl., 69°50´ 31°34´; scale bar = 2 mm.

sutures. There is a more or less marked flattening on the upper part of each whorl. The sculpture of the adult shell consists of rare poorly developed axial ribs strongly marked on the upper whorls and on the subsuture area of the last whorl. The spiral striation consists of frequent, clearly visible ribs and poorly marked striation between them. The subsuture area is covered only by spiral striation. There are 20–24 spiral ribs on the body whorl. The aperture is drop-shaped, with a blunt angle; the inner lip is straightened whereas outer is rounded. The umbilicus is poorly marked, covered by the inner lip. The embryonic shell has a diameter of about 300 μm with the width of the initial part of 70–85 μm. Protoconch I consists of approximately one half of the whorl with an ornament of five or six spiral liblets and irregular tubercles between them; protoconch II has about one whorl, smooth or with few thin spiral lines.

Table 1. Morphometric characters of *Onoba* shells from Barents Sea.

	SH, mm	AH, mm	BWH, mm	SW, mm	AW, mm	SH/SW	BWH/SH	AH/SH	AW/AH
Onoba semicostata Murman Coast, Dalne-Zelenetskaya Bay, 69°7′17.2′′N, 36°5′12.8′′E, n=27									
Mean	2.50	0.99	1.65	1.24	0.74	2.01	0.66	0.40	0.59
σ	0.30	0.10	0.20	0.13	0.09	0.12	0.03	0.02	0.05
Max	3.00	1.18	2.03	1.48	0.88	2.36	0.72	0.43	0.69
Min	1.85	0.78	1.30	1.00	0.55	1.72	0.61	0.37	0.49
Onoba aculeus Murman Coast, Varangerfjord, Bolshoy Aynov Isl., 69°50′ 31°34′, n=10									
Mean	2.41	0.95	1.46	1.14	0.67	2.12	0.61	0.40	0.59
σ	0.22	0.20	0.25	0.11	0.07	0.16	0.09	0.09	0.05
Max	2.70	1.45	1.70	1.30	0.78	2.45	0.66	0.63	0.67
Min	2.05	0.73	0.85	1.00	0.55	1.94	0.37	0.33	0.49
Onoba aculeus Murman Coast, Ivanovskaya Bay, 68°17′38.3′′N, 38°37′56′′E, n=31									
Mean	3.14	1.18	2.04	1.51	0.94	2.08	0.65	0.38	0.62
σ	0.29	0.12	0.16	0.13	0.09	0.09	0.03	0.03	0.04
Max	3.88	1.43	2.30	1.80	1.13	2.27	0.70	0.46	0.71
Min	2.40	0.93	1.68	1.25	0.75	1.91	0.59	0.29	0.57
Onoba improcera off Bear Island, 74°41′29.9′′N, 19°34′41.9′′E, n=23									
Mean	1.98	0.81	1.32	1.15	0.65	1.72	0.67	0.41	0.56
σ	0.22	0.06	0.11	0.13	0.06	0.09	0.03	0.03	0.03
Max	2.45	0.88	1.50	1.53	0.75	1.96	0.74	0.45	0.61
Min	1.65	0.68	1.13	0.98	0.55	1.46	0.58	0.35	0.49
Onoba improcera Murman Coast, Dolgaya Bay, 69°11′58.2′′N, 34°58′34.2′′E, n=5									
Mean	2.54	1.04	1.69	1.47	0.85	1.72	0.67	0.41	0.57
σ	0.23	0.09	0.11	0.09	0.06	0.07	0.02	0.01	0.01
Max	2.90	1.15	1.83	1.60	0.93	1.81	0.69	0.43	0.59
Min	2.30	0.93	1.53	1.38	0.78	1.64	0.63	0.40	0.56

Notes. AH – aperture height; AW – aperture width; BWH – body whorl height; SH – shell height; SW – shell width.

Comparison. *Onoba semicostata* is the only species of *Onoba* in the Northern Atlantic, which has both protoconch II and axial striation in the upper part of the whorls (Warén 1996). *O. semicostata* has the most flattened whorls among the Barents Sea species of *Onoba*.

Distribution. Eastern Atlantic. The species was found in the Maderira Archipelago, Mediterranean Sea, Portugal (Ávila et al. 2012), Spain (Rolán 2008), British Islands (Fretter and Graham 1978), Faroes (Warén 1996; Sneli et al. 2005), Iceland (Warén 1996), Norway (Høisæter 2009), coast of

Kola Peninsula (Golikov and Kussakin 1978; this paper).

Ecology. The maximal density found at the 8 m depth on the rocky substrate in Zelenetskaya Bay was 2309 specimens/m^2. Specimens from the subtidal usually above 80 m were present in the material seen whereas Golikov and Kussakin (1978) recorded *O. semicostata* from the intertidal zone of the Murman coast. A single specimen found at 213 m depth had an abnormal shell of a common size.

Onoba aculeus (Gould, 1841)

(Figs 2C–D; 4B, E; Table 1)

Cingula aculeus Gould, 1841: 266, fig. 172.
Rissoa saxatilis Møller, 1842: 82.

Material. 68 dry spms, W Greenland, 1840, leg. H.P.C. Møller and C.P. Holbøll, ZMC GAS-88 (syntypes of *Rissoa saxatilis*); 17 spms, Murman Coast, Dolgaya Bay, 84 m, 69°11′58.2′′N, 34°58′34.2′′E, 25 July 2008, R/V Dalnie Zelentsy; 2 spms, same region, 31 m, 69°12′46.8′′N, 34°59′29′′E, 25 July 2008, R/V Dalnie Zelentsy; 2 spms, same region, 42 m, 69°13′32.3′′N, 35°1′14.2′′E, 26 July 2008, R/V Dalnie Zelentsy; 35 spms, Murman Coast, Yarnyshnaya Bay, 80 m, 69°7′48.1′′N, 36°2′6.83′′E, 03 June 2009, R/V Dalnie Zelentsy; 37 spms, same region, 26 m, 69°7′19.1′′N, 36°2′7.19′′E, 03 June 2009, R/V Dalnie Zelentsy; 4 spms, same region, 28 m, 69°7′5.99′′N, 36°2′50.3′′E, 03 June 2009, R/V Dalnie Zelentsy; 41 spms, same region, 20 m, 69°5′26.5′′N, 36°2′58.6′′E, 14 August 2006; 1 spm, same region, 12 m, 69°6′39.2′′N, 36°2′39.4′′E, 14 August 2006; 9 spms, Murman Coast, Teriberskaya Bay, 54 m, 69°10′46.8′′N, 35°9′27.2′′E, 11 September 2010; 50 spms, same region, 6 m, 69°10′52.5′′N, 35°9′45.6′′E, 10 September 2010; 14 spms, same region, 9 m, 69°11′0.45′′N, 35°9′34.8′′E, 10 September 2010; 29 spms, Murman Coast, Ivanovskaya Bay, 6 m, 68°18′28.2′′N, 38°25′29.8′′E, 18 August 2011, M/S Viking-1; 730 spms, same region, 3 m, 68°17′38.3′′N, 38°37′56′′E, 19 August 2011, M/S Viking-1; 290 spms, Varangerfjord, Bolshoy Aynov Isl., tidal, 69°50′N, 31°34′E, June 2008, leg. I. Nekhaev; 42, Murman Coast, Ura Bay, tidal, 69°22′N, 32°54′E, 29 August 2007, leg. A. Frolov; 4 spms, Svalbard, Grønfjorden, tidal, 77°59′15′′, 14°12′00′′, 5 July 2011, leg. I. Nekhaev.

Description. The shell is ovate-conic, coloured from white to yellowish, semi-transparent. There are 5.6 (usually 4.5–5) convex whorls, divided by a deep submerged suture. The apex is rounded, the apical angle is about 80–90°. The adult shell has rapid wide flattened spiral ribs and poorly marked striation between them. There are 17–20 ribs on the body whorl. The growth lines are equally straight. The aperture is drop-shaped with a marked angle; the umbilicus is narrow, covered by the inner lip. The embryonic shell consists of about 1.4–1.6 whorls and is 420–460 μm in diameter; the size of the initial part varies from 166 to 250 μm. The protoconch is decorated with few thin spiral ridges.

The examined shells of *O. aculeus* from Greenland are larger (up to 4.5 in height and 2 mm in width with 5.6 whorls) than snails from the Barents Sea, but there are no differences in the shell shape or in the sculpture pattern. The giant specimens with an abnormal shell shape caused by a trematode invasion were described by Warén (1974) and Gorbushin and Levakin (1999) and were also found by us in the Barents Sea.

Comparison. *Onoba aculeus* can be distinguished from all other species inhabiting the Barents Sea by the widest initial part of the protoconch. It can be differentiated from *O. semicostata* by more convex whorls, less developed spirals and the absence of quite divided axial ribs. This species is usually more stunned than *O. semicostata* or *O. leptalea*.

Distribution. *O. aculeus* lives along the American Atlantic coast (Gould 1841), Greenland (Møller 1842; Schiøtte and Warén 1992), Faroes (Sneli et al. 2005), Iceland (Ingólfsson 1996; Warén 1996). In Europe it is distributed from the British Islands (Fretter and Graham 1978) to Northern Norway (Høisæter 2009), Kola Peninsula and White Sea (Golikov 1987), but absent in Spain (Rolán 2008). A record from Franz Josef Land (Nekhaev 2008) is based on misidentification of *O. leptalea*. The finding of *O. aculeus* in the Kara Sea (Lubin 2003) needs re-examination but this material is lost. Middendorff (1849) also reported this species from the Sea of Okhotsk. The sample mentioned by him and stored in the ZIN (10164/34) contains a single abnormal shell probably belonging to *O. russica* Golikov, 1986.

Ecology. The species occurs both in the intertidal and upper subtidal. The highest registered density during our investigation on littoral was 1955 specimen/m^2. The subtidal density of *O. aculeus* reaches 3893 individuals/m^2 on sandy bottoms at 3 m, where this species was predominant among macrobenthic

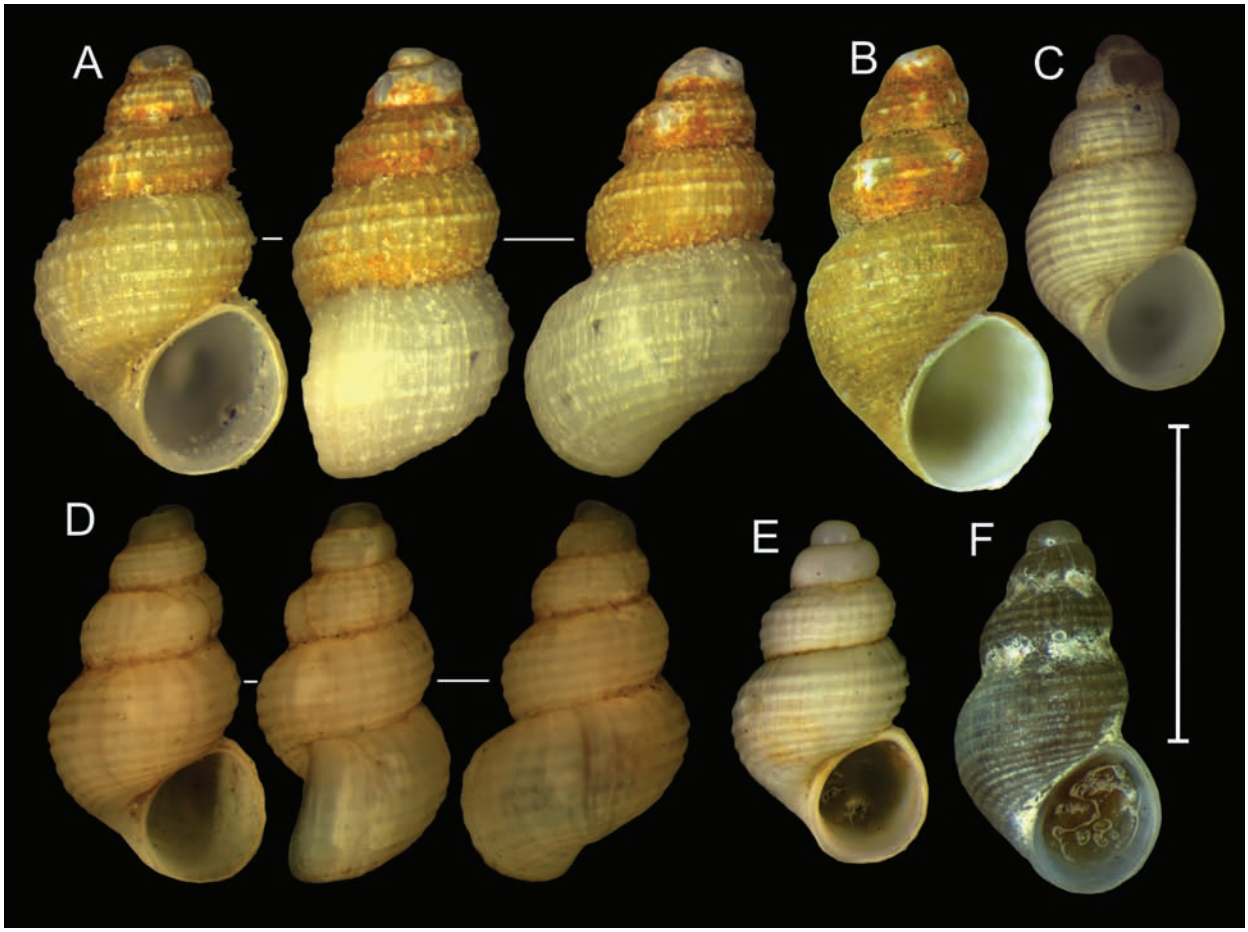

Fig. 2. Shells of *Onoba improcera*: A–B – Murman Coast, Dolgaya Bay, 69°11´58.2´´N, 34°58´34.2´´E; C – Franz Joseph Land, 80°13.504´´N, 50°27.931´´E; D – White Sea, ZIN 35979/7; E–F – off Bear Island, 74°41´29.9´´N, 19°34´41.9´´E; scale bar = 2 mm.

species (Lyubina et al. 2013). Detailed study of ecology and breeding of *O. aculeus* from the Barents Sea was carried out by Matveeva (1974).

***Onoba improcera* Warén, 1996**
(Figs 2; 4 G–I; Table 1)

Onoba improcera: Warén, 1996: 238, figs 16 D, 23 F–G, J–K; 26 C.

Material. 6 dry shells, off northern Iceland, 203 m, 66°59´01.19´´N, 18°49´58.1´´E, 1992, SMNH 4751 (paratypes of *Onoba improcera*); 4 spms, Murman Coast, Dolgaya Bay, 45 m, 69°10´19.9´´N, 34°56´32.5´´E, 29 May 2009, R/V Dalnie Zelentsy; 25 spms, same region, 84 m, 69°11´58.2´´N, 34°58´34.2´´E, 25 July 2008, R/V Dalnie Zelentsy; 1 spm., same region, 31 m, 69°12´46.8´´N, 34°59´29´´E, 25 July 2008, R/V Dalnie Zelentsy; 1 spm., Murman Coast, Ivanovskaya Bay, 54 m, 68°22´27.3´´N, 38°32´17.9´´E, 30 July 2008, R/V Dalnie Zelentsy; 4 spms and 1 empty shell, same region, 72 m, 68°23´58.8´´N, 38°24´16.6´´E, 16 August 2011, M/S Viking-1; 2 spms, same region, off Kola Peninsula, 63 m, 68°33´24.7´´, 38°03´52.4´´, 17 August 2003, R/V R. Muklevich; 1 empty shell, Franz Joseph Land, 60 m, 80°13.504´´N, 50°27.931´´E, 24 August 2006, R/V Dalnie Zelentsy; 36 spms and 26 empty shells, off Bear Island, 49 m, 74°41´29.9´´N, 19°34´41.9´´E, 27 August 2006, R/V Fridtjof Nansen; 7 spms, off Hope Island, 49 m, 76°11´02´´N, 23°11´46´´E, 21 August 2008, R/V Dalnie Zelentsy; 1 spm., Spitsbergen, Horsund, 49 m, 76°59´52´´N, 16°01´16´´E, 22 August 2008, R/V Dalnie Zelentsy; 120 spms, White Sea, 8

June 1926, R/V Persey, ZIN 35979; 4 spms, White Sea, 17 August 1963, R/V Professor Mesyacev, ZIN 35978; 7 spms, White Sea, Lov Bay, 17 June 1974, leg. Naumov.

Description. The shell is tall, white or yellowish, often semi-transparent. The teleoconch consists of about 3.5–4 moderately convex whorls divided by a deep suture. The apical angle is about 70–85°. The sculpture consists of straight growth lines, which vary in intensity, and of spiral sharply marked ribs; the subsutural rib is usually marked relatively low. There are 9–13 spiral ribs on the body whorl. Slender spiral striation that covers all the teleoconch surface and is barely discernible under a stereomicroscope, is also present. The aperture is oval with a poorly marked angle in its upper part. The umbilicus is narrow and is partly covered by the inner lip. The protoconch has 1–1.3 whorls; its sculpture consists of numerous small irregularly-shaped tubercles, which form a weak pattern of spiral striation. The protoconch diameter is 400–500 μm, the width of the initial part is 100–140 μm.

Despite the original description, *O. improcera* has a significant variability in both the shell shape and the degree of spiral striature (Fig. 3 A–H). The specimens collected along the coast of Kola Peninsula are usually yellowish and larger than snails from other localities (Table 1), which are colourless and often semi-transparent. The protoconch size, shape and sculpture as well as the number of spiral ribs seems to be constant within all the material studied.

Comparison. *O. improcera* can be distinguished from *O. semicostata*, *O. aculeus* and *O. leptalea* by its thick spiral lines as well as by the absence of regular prominent spiral lines on the protoconch.

A low pattern of spiral striation on the embryonic shell of *O. improcera* may be found under a stereomicroscope as Warén (1996) noted also for *O. mighelsi* (Stimpson, 1851). Having examined some specimens of *O. mighelsi* from Greenland (SMNH 1008), we doubt that it is possible to distinguish these species unambiguously, except by using details of protoconch microsculpture, which in *O. mighelsi* consists of regular pointed spiral lines.

Distribution. The species is known from Iceland, Svalbard, coastal waters of Norway and Kola Peninsula; a single empty shell was found off Franz Joseph Land (Warén 1996; Høisæter 2009; this paper).

Ecology. Individuals of *O. improcera* were usually found on sand and stones. The highest number and biomass (83.3 spec./m^2 and 0.136 g/m^2) were observed at 84 m on sandy bottom with broken bivalve shellsand stones in the Dolgaya Bay (Kola Peninsula). In the coastal waters of Bear Island at 47 m depth on the same substrate the density was 70 spec./m^2 and biomass was 0.056 g/m^2. *O. improcera* occurs sympatrically with both *O. aculeus* and *O. semicostata*. According to Warén (1996), *O. improcera* inhabits depths up to 300 m.

Remarks. The study of material from ZIN collections shows that records of *Alvania jeffreysi* (Waler, 1864) from the White Sea (Golikov 1987, 1995) were based on wrongly identified *O. improcera*. Material from other regions partly belongs to *Onoba leptalea* and partly to other rissoid species. Hence there are no reliable records of *A. jeffreysi* from Russian waters.

Onoba leptalea (Verrill, 1884)

(Figs 3; 4 C, F; Table 1)

Cingula leptalea: Verrill, 1884: 182–183 pl. XXXII fig. 10; *Onoba karica*: Golikov, 1986: 86–87, fig. 2 – syn. nov.

Material. 1 empty shell, NE Kara Sea, 300 m, 1934, leg. Ivanov, ZIN 42541/1 (holotype of *Onoba karica*); 3, spms and 4 empty shells, Franz Joseph Land, 251 m, 80°44´11.1´´N, 53°36´50.8´´E, 24 August 2006, R/V Dalnie Zelentsy; 10 empty shells, E to Franz Joseph Land, 80°11´30´´N, 75°02´E, 18 August 1934, M/S Sedov; 2 spms, Murman Coast, Varangerfjord, 213 m, 69°55´12.0´´N, 31°32´35.9´´E, 2 March 2007, R/V Dalnie Zelentsy; 1 empty shell, Murman Coast, Kola Bay, 43 m, 69°18´N, 33°29´E, 22 September 2012, M/S Viking-2; 11 empty shells, Murman Coast, Motovskiy Bay, 197 m, 69°36´N, 32°16´E, 26 May 1996, M/S GS-440; 9 spms, N Greenland, Jørgen Brønlund Fjord, W to Mundingsholm, 52 m, 14 August 1983, leg. J. Just and T. Schiøtte, ZMC.

Description. The shell is tall, not transparent, with brownish periostracum. There are 4–4.5 notably convex rounded whorls; the suture is deep. The apical angle is about 70–80°. The ornament of the adult shell consists of straight growth lines, spiral ribs and very thin spiral striation poorly visible under a stereomicroscope. The body whorl has 14–16 spiral ribs divided by wider grooves. The aperture is oval with a rounded angle; the inner lip is convex, clearly prosocline in the side view. The umbilicus is narrow, partly covered by the inner lip. The protoconch has about 1.2 whorls and is 540–600 μm in diameter; the

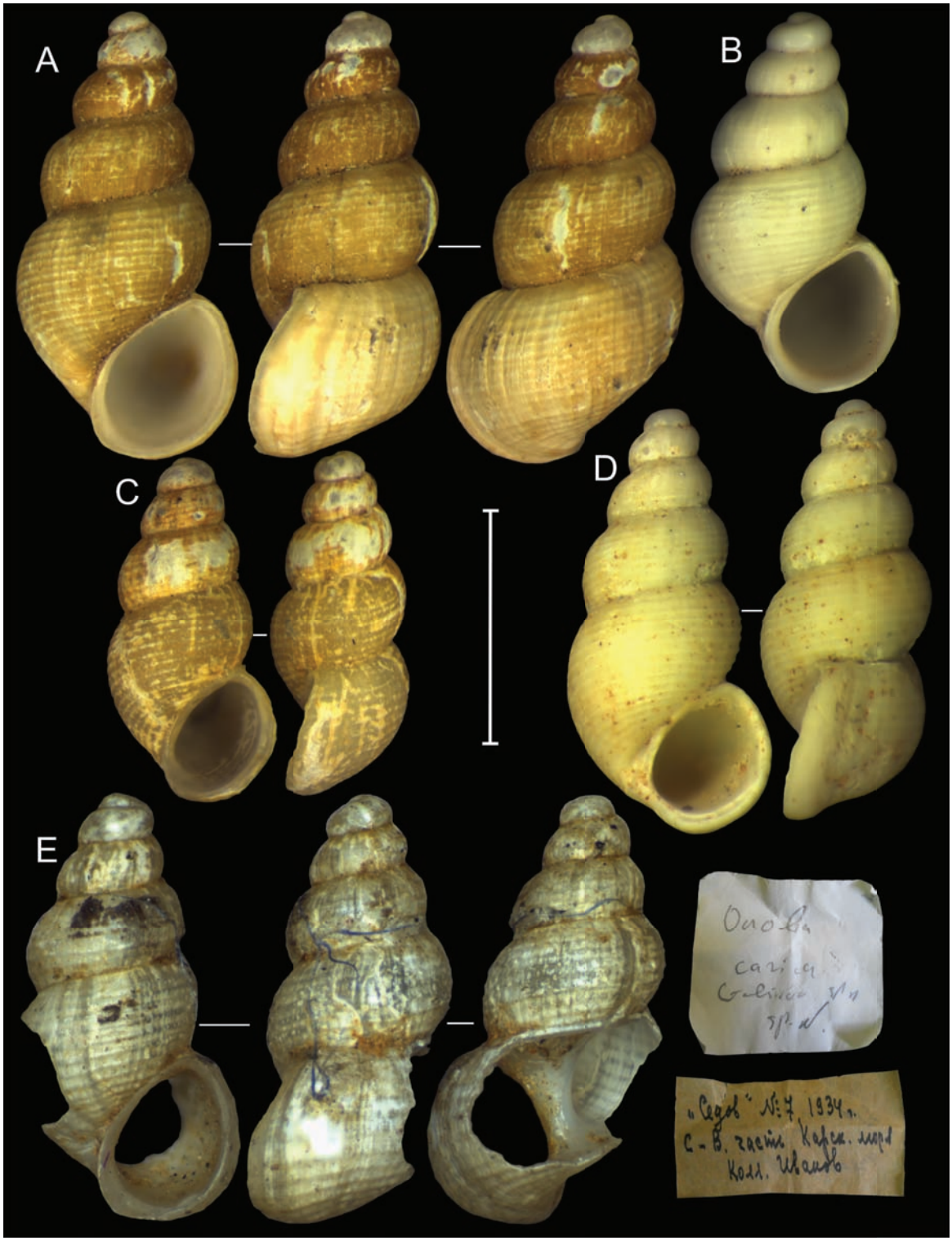

Fig. 3. Shells of *Onoba leptalea*: A – Franz Joseph Land, 80°44´11.1´´N, 53°36´50.8´´E; B – East to Franz Joseph Land, 80°11´30´´N, 75°02´E; C – Murman Coast, Varangerfjord, 69°55´12.0´´N, 31°32´35.9´´E; D – Murman Coast, Kola Bay, 69°18´N, 33°29´E; E – holotype of *Onoba karica*; scale bar = 2 mm.

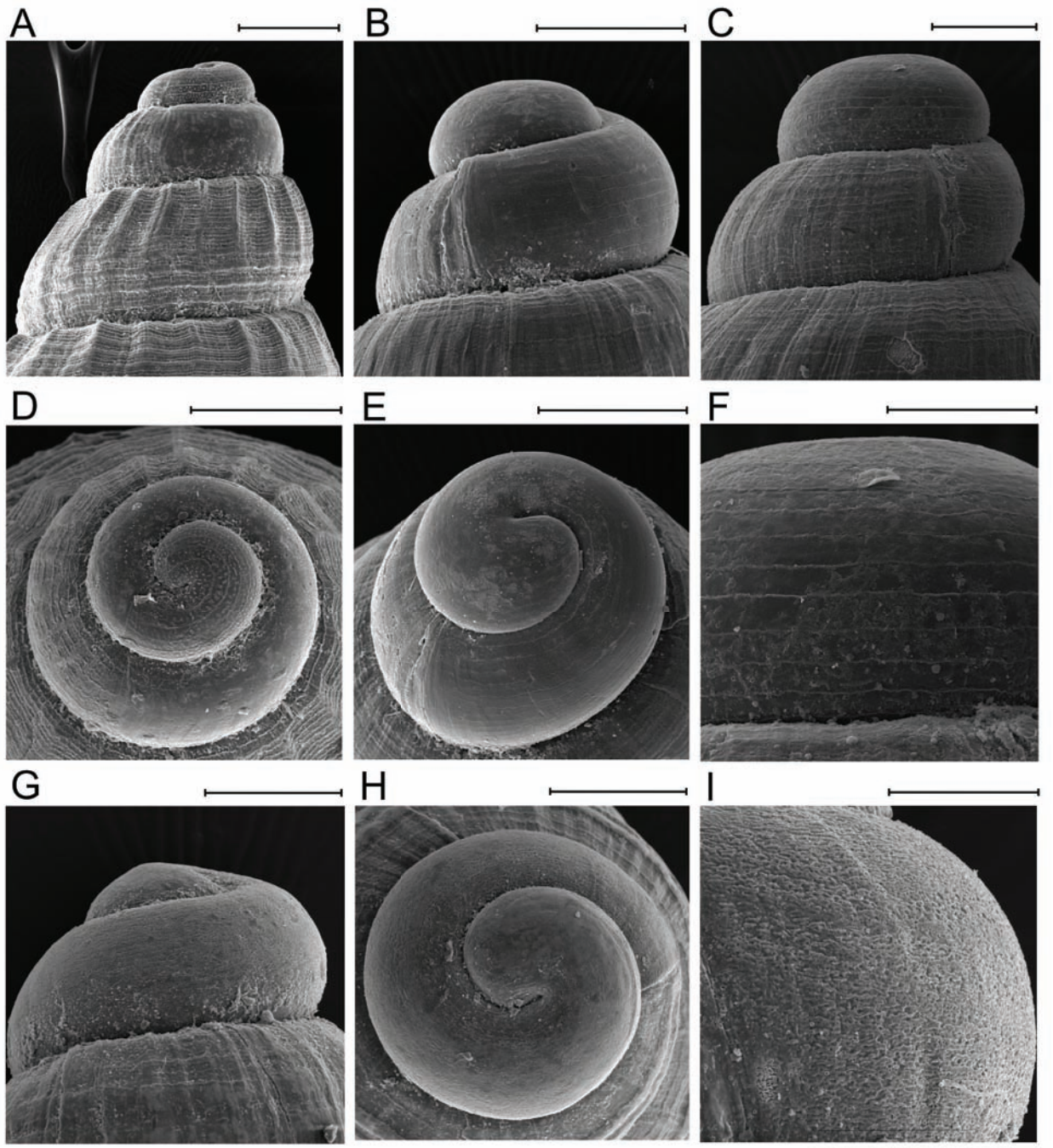

Fig. 4. Protoconch details of *Onoba* specimens from the Barents Sea: A – *Onoba semicostata,* Murman Coast, Dalne-Zelenetskaya Bay, 69°7′17.2′′N, 36°5′12.8′′E; B – *Onoba aculeus*, Murman Coast, Ivanovskaya Bay, 68°17′38.3′′N, 38°37′56′′E; C – *Onoba leptalea*, Franz Joseph Land, 80°44′11.1′′N, 53°36′50.8′′E; D – *Onoba semicostata*, Murman Coast, Dalne-Zelenetskaya Bay, 69°7′17.2′′N, 36°5′12.8′′E; E – *Onoba aculeus*, Murman Coast, Ivanovskaya Bay, 68°17′38.3′′N, 38°37′56′′E; F – *Onoba leptalea*, Franz Joseph Land, 80°44′11.1′′N, 53°36′50.8′′E; G–I – *Onoba improcera*, off Bear Island, 74°41′29.9′′N, 19°34′41.9′′E; scale bars: A–D, E–H = 200 μm, F, I = 100 μm.

initial part is about 170 μm. Its sculpture consists of rare slender wavy lines.

The largest shell found has a size of 3.4×1.85 mm with the aperture size of 1.25×1.85 mm; the body whorl height is 2.1 mm.

Comparison. Among the species of *Onoba* known from the Barents Sea, *O. leptalea* has the most convex whorls, the largest protoconch and clearly prosocline inner lip in the side view.

Distribution. From the American coast (Verrill 1884) to Greenland (Schiøtte 1989 as "*Cingula ?arenaria*"), Jan Mayen, Iceland (Warén 1996), Murman Coast, Franz Joseph Land and Kara Sea (this paper).

Ecology. On stony and silty substrates. The temperature at the collection site of living specimens in Franz Joseph Land was –1.08°C. This species inhabits a depth range of 40–1600 m (Warén 1996; this paper).

Remarks. *O. karica* Golikov, 1986, which was described from the north part of Kara Sea (Golikov 1986), was considered as a junior synonym of *O. aculeus* by Warén (1996) based only on the original description. The holotype (empty shell) of *O. karica* is similar to *O. leptalea* in both the shell shape and sculpture pattern and we do not find a reason for dividing these species. It is also remarkable that *Onoba aculeus* is a typical coastal species, which was not found in the Kara Sea whereas empty shells of *Onoba leptalea* were found in Arctic waters close to the Kara Sea.

DISCUSSION

Apart from the species listed below, Kantor and Sysoev (2006) also reported *O. mighelsi* (Stimpson, 1851) from the Russian Arctic and Far East. These records from the Barents and Kara Seas are based on "*Cingula arenaria* (Mighels et Adams) var. *multilineata* (Stimpson)" by Filatova and Zatsepin (1948) mistakenly cited as "*C. arenaria*". The name *C. arenaria* Mighels et Adams, 1842 is a synonym of *O. mighelsi* (see Warén 1974 for details) whereas *Rissoa multilineata* Stimpson, 1851 does not seem to be closely related with that species. Unfortunately, a short original description of *R. multilineata* by Stimpson (1851) does not allow us to identify its taxonomical position exactly, its types are probably destroyed in fire together with other Stimpson's material (Mayer 1918). Warén (1974) considered this species as a synonym of *O. aculeus*. The specimen figured by Filatova and Zatsepin (1948) resembles *O. improcera* more than *O. aculeus*. *Cingula arenaria* var. *multilineata* was recorded from Franz Joseph Land (Averintzev 1993). A single damaged specimen from this region identified as *Cingula arenaria* and stored in the ZIN probably belongs to *Onoba leptalea*. It is very likely that the name *C. arenaria* used by Bryazgin et al. (1981) is also synonymous with *C. arenaria* var. *multilineata* sensu Filatova and Zatsepin (1948).

The record of *O. mighelsi* from the Russian Far East is based on *O. castanella* (Dall, 1886), which in some cases (Warén 1974; Gulbin and Chaban 2012) is considered as a synonym of *O. mighelsi* or as a distinct species (Golikov 1995; Warén 1996; Gulbin 2004). Therefore, there are no reliable findings of *O. mighelsi* in the Barents Sea and its presence in the Russian waters is quite questionable.

Alvania jeffreysi was not recognized in the material studied; all samples stored in the ZIN attributed to that species are misidentified. For this reason, the previous records of this species based on collection material are erroneous (Golikov 1987, 1995; Golikov et al. 2001). However, *A. jeffreysi* was reported from the Northern Norway (Høisæter 2009) and therefore it likely occurs along the Kola Peninsula.

Four more *Onoba* species – *O. islandica, O. torelli* Warén, 1996 *O. exarata* (Stimpson, 1851) and *O. mighelsi* are known from adjacent waters of the Norway coast, Svalbard, Iceland and Faroes (Warén 1996; Sneli et al. 2005; Høisæter 2009), any of which also may occur in the Barents Sea. Diagnostics of all species mentioned is discussed by Warén (1996). *O. leptalea* is only known species of *Onoba* in the Kara Sea and adjacent Arctic waters. Both *O. aculeus* and *O. improcera* occur in the White Sea (Golikov 1987; this paper).

The north Atlantic *Onoba* species can be subdivided into two groups: "*O. semicostata*" group and "*Onoba improcera*" group. The first group includes species with frequent spiral lines covered the teleoconch and prominent continuous spiral lines on the embryonic shell. It includes *O. semicostata*, *O. aculeus*, *O. leptalea*, and *O. islandica*. The species with more southern distribution such as *O. galaica* Rolán, 2008, *O. breogani* Rolán, 2008 and probably North Pacific *O. russica* Golikov, 1986 are also close to this group.

The protoconchs of "*O. improcera*" group has an irregular sculpture, the spiral lines are doted, and the spiral sculpture of the adult shells is stronger than in the "*O. aculeus*" group. Apart from *O. improcera,* this group in the North Atlantic also includes *O. mighelsi* (Stimpson, 1851) and *O. torelli* (Warén, 1996). Simi-

lar Pacific species such as *O. aurivillii* (Dall, 1886), *O. castanella* (Dall, 1886), *O. laticingulata* Golikov et Kussakin, 1978 and some others possibly belong to this group, but the examination of their protoconchs is necessary.

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