

***Retusa pellucida* (Brown, 1827) (Gastropoda: Opisthobranchia: Cephalaspidea) from the Barents Sea – a new species for the fauna of Russian Arctic seas**

***Retusa pellucida* (Brown, 1827) (Gastropoda: Opisthobranchia: Cephalaspidea) из Баренцева моря – новый вид для фауны арктических морей России**

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*Retusa pellucida* (Brown, 1827) recorded the first time for the recent fauna of the Russian Arctic. New data on morphology of its soft part are given. Shell sculpture of *Retusa pellucida* is discussed in comparison with *R. truncatula* (Bruguière, 1792) and related forms.

*Retusa pellucida* (Brown, 1827) впервые отмечена для современной фауны арктических морей России. Приведены новые данные по морфологии головного копулятивного аппарата и пластинок жевательного желудка этого вида. Обсуждается скульптура раковины *Retusa pellucida* в сравнении с *R. truncatula* (Bruguière, 1792) и близкими к ней формами.

**Key words:** Barents Sea, morphology, shell sculpture, male copulatory system, Gastropoda, Cephalaspidea, Retusidae, *Retusa pellucida*

**Ключевые слова:** Баренцево море, морфология, скульптура раковины, головной копулятивный аппарат, Gastropoda, Cephalaspidea, Retusidae, *Retusa pellucida*

## INTRODUCTION

Retusids with a semi sunken truncated spire were collected from off the Murmansk coast of the Barents Sea. We believe that this is the same species as the one described by Sars (1878: 285, Tab. 17, Fig. 18) under the name *Utriculus truncatulus* var. *pellucida* attributed to Brown.

*Volvaria pellucida* Brown, 1827 which had been described as a distinct species was later considered to be a variety of *Retusa truncatula* (Bruguière, 1792) (Jeffreys, 1867; G.O.Sars, 1878; Pilsbry, 1893; Odhner, 1907) and was included into the list of synonyms of *R. truncatula*, which is the most

complete in Lemche (1948). However even Lemche (1948: 83) distinguished *pellucida* as a “shell variety”. At present some authors still consider *Retusa pellucida* (Brown, 1827) to be a synonym of *Retusa truncatula* (Jensen & Knudsen, 1995; Hoisaeter, 1986, 2009) while others – as a distinct form or species but attributed to Sars (Nordsieck, 1972; Cervera et al., 1988; Bouchet et al., 2001; Gofas, 2009; Garsía & Bertsch, 2009). Morphological features of the material collected off the Murmansk Coast of the Barents Sea correspond to those given in the descriptions and illustrations of *Volvaria pellucida* in Brown (1827, 1844) and *Utriculus truncatulus* var. *pellucida* in Sars (1878).

We consider *R. pellucida* to be a valid species because of significant differences of its shell sculpture from the sculpture of *R. truncatula*. The descriptions given by Brown and Sars are very short, so we provide below a detailed description of the shell, copulatory apparatus and gizzard plates of *R. pellucida*.

## MATERIAL AND METHODS

The specimens of *R. pellucida* (Brown, 1827) was collected during expeditions of the Murmansk Marine Biological Institute of the Kola Scientific Centre of the Russian Academy of Sciences (MMBI KSC RAS) from the Murmansk coast of the Barents Sea (Fig. 1): 1. Ura-Guba, 29–31 Aug. 2007, 11 specimens from 6 lots, collected with Petersen grab (0.04 m<sup>2</sup>); 2. Teriberka Bay, 22 Oct. 2010, 1 specimen from lot of 0.625m<sup>2</sup>, diving collection; 3. Yarnishnaya Bay, 3 June 2009, 1 specimen, van-Vin grab 0.1m<sup>2</sup>, 80.5m, R/V “Dal’niye Zelentsy”. The specimens were firstly fixed in 4% formaldehyde and then transferred to 70% alcohol for storage. The specimens have been deposited at ZIN and MMBI KSC.

*Comparative material.* Sixteen dry specimens with well preserved shell sculpture from off Tropani, Mediterranean Sea, collected and identified by Monterosato as *Coleophysis semisulcata* var. *pellucida* Brown, 1827, deposited at the Zoological Institute, Russian Academy of Sciences, St. Petersburg (ZIN), no. 1/23286. Four dry specimens of *R. truncatula* from Jersey Island, off the northwest coast of France, collected and identified by Milaschewitsch, deposited at ZIN, no. 2/23290. Two dry specimens of *Retusa truncatula* from Crimea, the Black Sea, collected by S.A. Zernov on 15 August – 15 September 1909, station 10, R/V “Meotida”, identified by Milaschewitsch, deposited at ZIN, uncatalogued.

A scanning electron microscope HITACHI S-570 (SEM) and a light microscope Leica DMLS-2 were used. Whole penises were mounted in balsam with carmine staining using a standard procedure for examining with a light microscope.

## SYSTEMATIC PART

Order **CEPHALASPIDEA** Fischer, 1883

Family **RETUSIDAE** Thiele, 1926

***Retusa*** Brown, 1827

***Retusa pellucida*** (Brown, 1827)

(Figs 1, 2–5, 11–14)

*Volvaria pellucida* Brown, 1827: pl. 38, figs 45–46; 1844: 4, pl. XIX, figs 45–46.

*Utriculus truncatulus* var. *pellucida* – Jeffreys, 1867: 422; G.O. Sars, 1878: 285, tab. 17, fig. 18.

*Retusa truncatula* var. *pellucida* – Pilsbry, 1893: 206.

*Rerusa truncatula* (shell variety *pellucida* Brown) – Lemche, 1948: 55–56, 83, fig. 57.

*Retusa truncatula* (non Bruguière, 1792) – Thompson, 1976: fig. 55h.

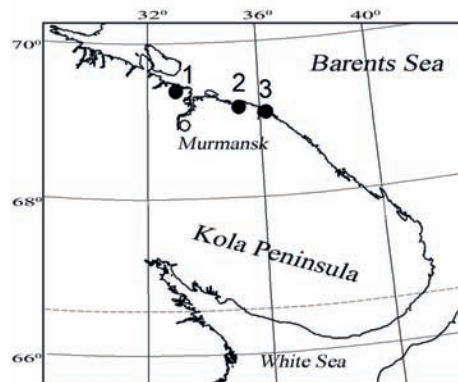
*Retusa (Coleophysis) truncatula* form *pellucida* G.O. Sars, 1878 – Nordsieck, 1972: 34, taf. V, fig. 5.

*Retusa pellucida* (G.O.Sars, 1878) – Cervera et al., 1988: 13; Bouchet et al., 2001: 199; Garsía & Bertsch, 2009: S3; Gofas, 2009.

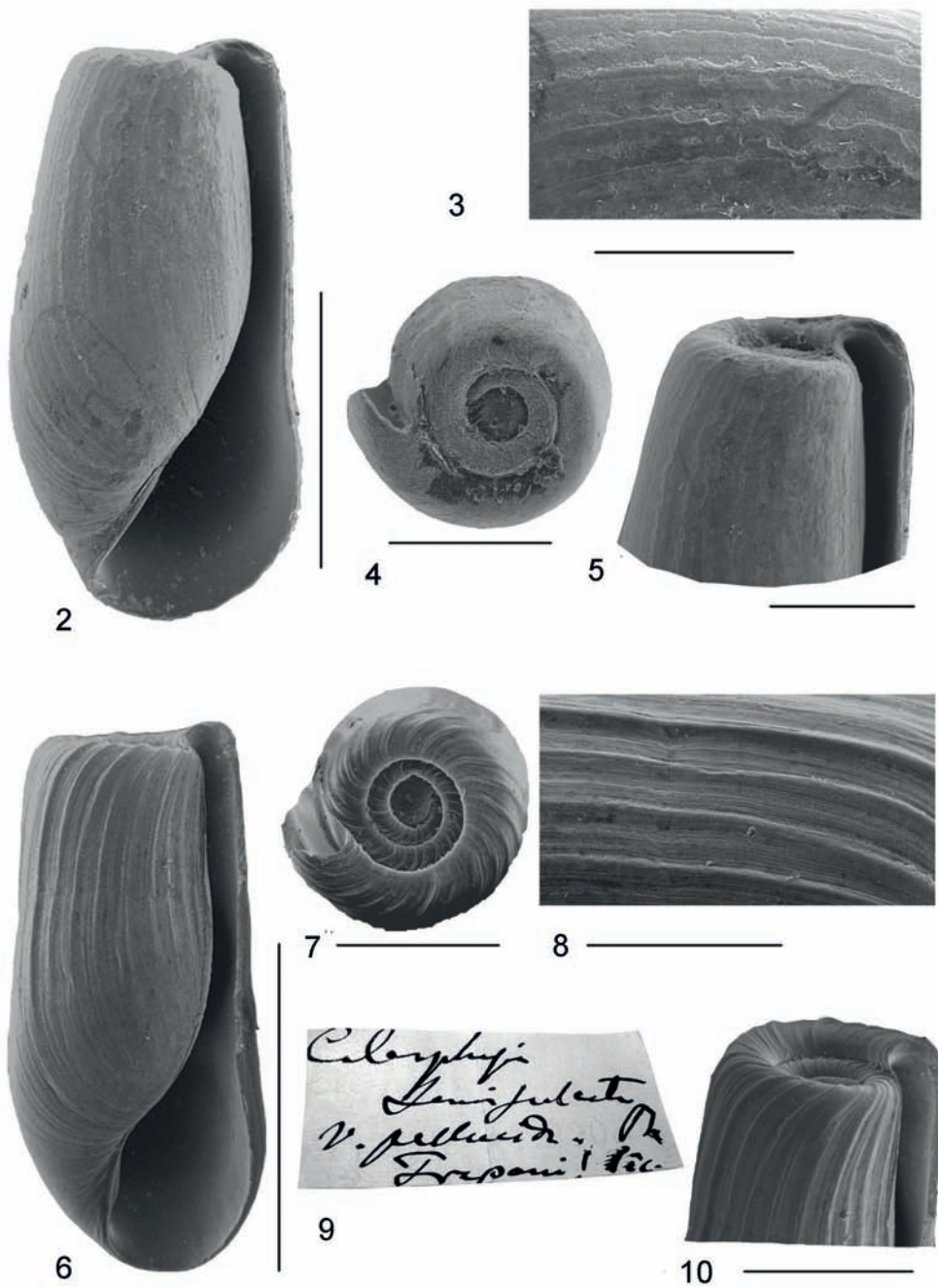
*Type material.* Whereabouts unknown.

*Type locality.* “On the beach at Dunbar”, [the southeast coast of Scotland, the North Sea] (Brown, 1827).

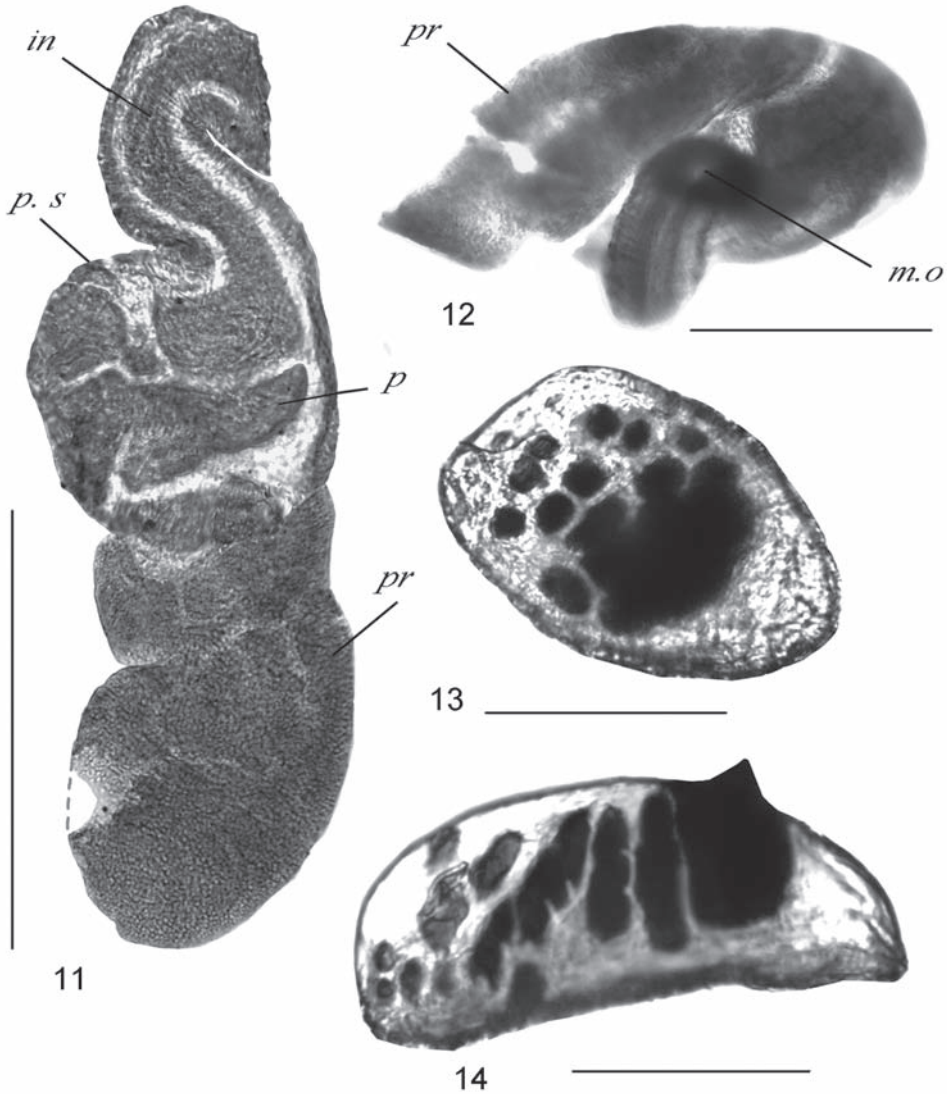
*Material examined.* Barents Sea, Kola Peninsula, Ura-Guba: 31 Aug. 2007, 5 m depth, No. 1 – 1 specimen; 31 Aug. 2007, 25 m, No. 2 – 2 specimens; 29 Aug. 2007,



**Fig. 1.** New recorded localities of *Retusa pellucida* in the Barents Sea. 1 – Ura-Guba, 2 – Teriberka Bay, 3 – Yarnishnaya Bay.



**Figs 2–10.** *Retusa pellucida*, Ura-Guba, northern coast of the Kola Peninsula, Barents Sea: **2**, shell, ventral view; **3**, details of sculpture; **4**, shell, apical view; **5**, posterior end of the shell. *Retusa semisulcata*, specimen collected and identified by Monterosato as *Coleophysis semisulcata* var. *pellucida*: **6**, shell, ventral view; **7**, shell, apical view; **8**, details of sculpture; **9**, original label by Monterosato; **10**, posterior end of the shell. Scale bar: 1 mm (2, 6), 0.5 mm (3–5, 7, 8, 10).



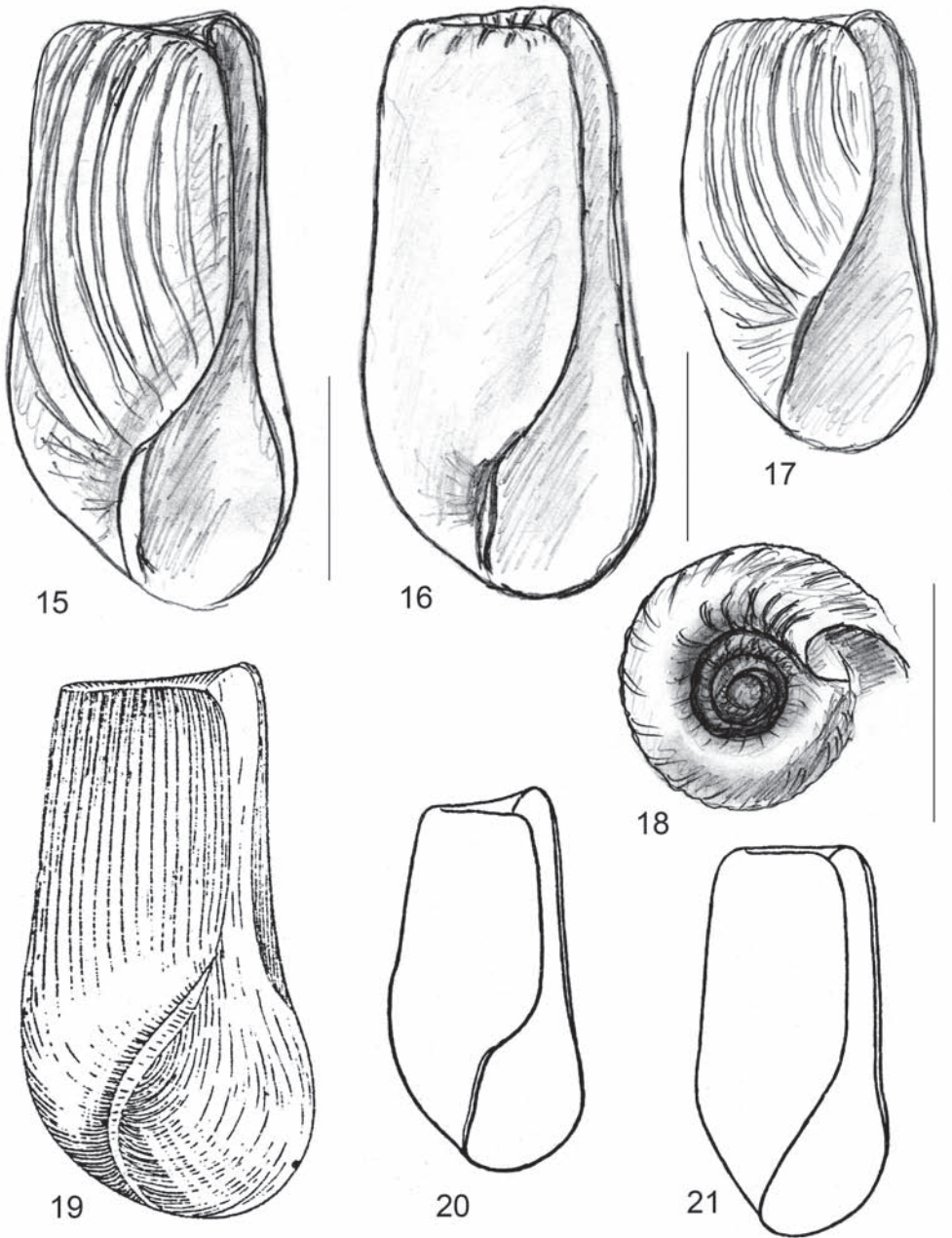
**Figs 11–14.** *Retusa pellucida*, Ura-Guba, northern coast of the Kola Peninsula, Barents Sea. **11**, unpaired gizzard plate, inner view; **12**, paired gizzard plate, lateral view; **13**, male copulatory system, dorsal view, specimen 2.6 mm in length; **14**, male copulatory system, ventral view, specimen 2.0 mm in length; *in* – incurrent sperm groove, *m.o* – opening of the male copulatory system, *p* – penis, *pr* – prostate, *ps* – penis sheath. Scale bar: 0.10 mm (13, 14), 0.25 mm (12), 0.40 mm (11).

5 m, No. 3 – 1 specimen; 29 Aug. 2007, No. 4 – 1 shell; 28 Aug. 2007, No. 5 – 6 specimens. Yarnishnaya Bay: 3 June 2009, 80.5 m depth – 1 specimen.

*Description. Shell morphology.* Length from 1.8 to 2.8 mm; width up to 1.4 mm in the largest specimen examined. Shell fragile,

elongated, posteriorly truncate with slightly conical sides (Fig. 2). Spire concave with 2.0–2.5 whorls (Figs 4–5). Protoconch circular, not protruding from the first whorl, about 0.18mm in diameter. Umbilicus very narrow. Columella simple, with no folds. Aperture lip forming a rounded wing pos-





**Figs 15–21.** *Retusa truncatula*. **15, 16, 18**, from Jersey Island, near northwest coast of France, collected and identified by Milaschewich: **15**, specimen with well-preserved sculpture, shell, ventral view; **16**, worn shell, ventral view **18**, the same, apical view. **17**, specimen from Crimea, Black Sea, identified by Milaschewich. **19**, shell, ventral view, Black Sea, Romania (after Grossu, 1956, Fig. 99, as *R.truncatula* var. *opima*, 4.5–7 mm). **20**, shell, ventral view, Denmark, (after Lemche, 1948, Fig. 55, 3 mm). Fig. **21**, *Retusa pellucida*, shell, ventral view, Denmark (after Lemche, 1948, Fig. 57, 3 mm, as a shell variety *pellucida* of *Retusa truncatula*). Scale bar: 1.0 mm (15–18).

teriorly rising above the body whorl. Anterior end of the shell rounded. Columellar margin not S-shaped, it is almost straight. Sculpture with several conspicuous growth lines with traces of secondary sculpture visible as 2–3 shallow grooves between neighboring growth lines (Fig. 3). Spiral sculpture absent. Colour uniformly whitish. Periostracum pellucid thin when present.

**Anatomy.** Digestive system containing three oval gizzard plates. Plates convex with dark tubercles, mostly small, with few larger and higher tubercles posteriorly (Figs 13–14). Unpaired plate oval (Fig. 13), paired plates elongated and more convex (Fig. 14). Male copulatory organ on right side of oesophagus in specimen 2.6 mm in length; atrium long, with seminal groove, prostate short and wide, lies parallel to body axis, filled with shining cells (Fig. 11). Penis composed of muscle folds in penis sheath. Penis not developed in specimen 2.0 mm length, its copulatory organ curved, prostate perpendicular to internal seminal groove and to body axis (Fig. 12).

**Ecology.** Collected from 5–80.5 m in the Barents Sea on sand and mud with a few dry shells and sometimes stones.

**Distribution.** Described from the south-east coast of Scotland, the North Sea, collected from Lofoten, the Norwegian coast, the Norwegian Sea (Sars, 1878) and from the Murmansk coast of the Barents Sea (present study), noted for Atlantic and Mediterranean coasts of Spain (Cervera et al., 1988).

**Note.** Molluscs of the *truncatula* group was recorded for the Post-Pliocene fauna of the Murmansk coast of the Barents Sea by Knipowitsch (1900). He identified specimens collected by V. Faussek in 1887 from Port Vladimir, Ura-Guba, 9 m and by B. Popov on 28 July 1899 from depths of 17–14 and 75 m as *Utriculus truncatulus*. It seems that findings of *R. truncatula* along the Norwegian coast including the Varangerfjord area (Hoisaeter et al., 1997; Høisaeter, 2009) may also refer, at least partly, to *R. pellucida*.

## DISCUSSION

Brown described his species *Volvaria pellucida* from the North Sea as “...smooth, thin, pellucid” in contrast to *Volvaria truncata* [?= *Bulla truncata* J. Adams, 1800; = *Bulla truncata* sensu Montagu (1803: 223, tab. 7, fig. 5)] (“...upper part longitudinally striated, for about a third its length”) (Brown, 1844:4). Sars (1878: 285) identified his specimens from Lofoten as *Utriculus truncatulus* var. *pellucida* by reference to *Volvaria pellucida* Brown; he described the specimens as “*superficie laevisima, plicis nullis*” in contrast to *Utriculus truncatulus* forma *typica* (“*superficies in parte dimidia superiore dense longitudinaliter plicata, plicis angustis, acutis*”). The descriptions and images of *pellucida* by the two authors do not contradict each other. The indication by some authors of G.O. Sars as the author of *pellucida* apparently came from Nordsieck: “Form: *pellucida* G.O. Sars, 1878. Norwegen” (Nordsieck, 1972: 34).

The description of *R. truncatula* in Bruguiere (1792, in *Bulla*) does not contain information about the sculpture of the shell (“*Bulla, testa cylindrica laevi candida, apertura sublineari, spira truncata*”). The description of *Retusa truncata* (Adams, 1800: tab. 1, figs 1, 2, in *Bulla*), a junior objective synonym of *R. truncatula* (International Commission Opinion No. 549) is even shorter (“*B. [Bulla] testa subovali apice truncata*”), and its pictures do not show any signs of longitudinal sculpture. Nevertheless *R. truncatula* has been described as usually having numerous longitudinal striae or ribs on the upper half of the shell (Jeffreys, 1867; Pilsbry, 1893; Milaschewich, 1916; Pruvot-Fol, 1954). Truncated shells with well definite longitudinal folds but different from *R. truncatula* by the shell proportion were described as species or varieties. For example, *Bulla semisulcata* Philippi, 1836 having “...*superne longitudinaliter sulcata, ... vertice truncato*...” (Philippi, 1836: 123, t. VII, fig. 19) was considered as a distinct valid species (Monterosato, 1884: 142) “...*more elon-*

gated than *Retusa truncatula*, with straighter longitudinal folds, and a wide transparent zone” (Pilsbry, 1893: 206) or a synonym of *R. truncatula* (Vayssière, 1885; Lemche, 1948); it is not included in the list of European molluscs (Bouchet et al., 2001). *Retusa truncatula* var. *opima* Milaschewich, 1909 “... differs from the typical form by a wider cylindrical shape” (Milaschewich, 1916; Grossu, 1956: fig. 19). Similarly, *R. pellucida* was earlier considered to be a variety of *R. truncatula*: “Smaller, shorter, thinner and more transparent, slightly less strongly ribbed or sometimes quite smooth...” (Jeffreys, 1867: 422; Pilsbry, 1893: 206) or, later, as a valid species (Cervera et al., 1988; Bouchet et al., 2001). However, Thompson (1976) described *R. truncatula* as having “sculpture consisting of fine longitudinal striae” referring to Lemche (1948: Figs 55, 57) (shown here in Figs 20, 21) and to Meyer and Möbius (1865).

This makes identification of *R. truncatula* ambiguous and taxonomic status of *R. pellucida* debatable.

The examined specimens from Ura-Guba have no pronounced differences in structure of the gizzard plates (Figs 13–14) and in penial morphology (Fig. 11–12) in comparison with *R. truncatula* as described in Mikkelsen (1995: 206, Fig. 2F). However, their sculpture is considerably different. We compared the shell sculpture of our specimens from the Barents Sea with *R. truncatula* from the Black Sea and the north-western coast of France identified by Milaschewich. At low magnification, the shell of *R. pellucida* looks smooth with irregular growth lines. *Retusa truncatula* from the Black Sea and from off the Jersey Island have prominent ribs gradually smoothed out to the base of the shell as described by Milaschewich (1916) and Pruvot-Fol (1954). Even if the shell is worn (Fig. 16), its apex is still bearing the well visible ribs (Fig. 18). The ribs are well pronounced even in relatively small specimens (Fig. 17). When the shell sculpture is examined using a SEM, the difference between *R. pellucida* on one hand and *R. truncatula* and

close forms on the other hand becomes much more evident. We compared the specimens of *R. pellucida* from the Barents Sea with the specimens of *R. semisulcata*, identified by Monterosato as *Coleophysis semisulcata* var. *pellucida* (Figs 6–10). *Coleophysis* Fischer, 1883 is synonym of *Retusa*, or sometimes referred to as its subgenus. *Retusa semisulcata* may be a distinct species or a synonym of *R. truncatula*; with regards to the shell sculpture morphology they are very similar in the upper 2/3 of the shell. Among specimens examined by us the specimens of *R. semisulcata* possess better integrity. Longitudinal growth lines of the specimens from the Barents Sea run through the entire length of the shell; two or three secondary grooves, interspaced between two next growth lines, are slightly visible at the SEM images (Fig. 3). “*Retusa semisulcata* var. *pellucida*” from Tropani has longitudinal folds (ribs) on the upper part of the shell, pellucid transverse band (not seen on scanned images) and S-shaped line of the inner lip of the mouth. At the SEM images we can see the secondary longitudinal sculpture looking like five-six closely spaced grooves located between two adjacent ribs. These grooves run along the entire length of the shell. The pattern of the sculpture with its primary and secondary elements are revealed also for the *R. truncatula* – group by Berger (1953). The two species also differ by the configuration of the inner lip. The inner lip in the specimens from the Barents Sea is almost straight as it is illustrated for *pellucida* by Sars (1878: Tab. 17, Fig. 18) in contrast to the Tropani specimens with a S-shaped inner lip.

In the revision of the types of the opisthobranch gastropods described by Monterosato, Oliverio & Tringali (2001) have found the type material of *Coleophysis effusa* Monterosato, 1890. It is a weakly sculptured form (Oliverio & Tringali, 2001: Figs 31, 32) which considered by the two authors to be close to “*pellucida*” Brown, 1827. *Coleophysis effusa* is quite similar to our specimens, but it has a different S-shaped line of the inner lip. Oliverio and Tringali noted

that it was hard to say whether *effusa* could represent merely a form, or a distinct species within the probable complex of *R. truncatula*, all this group being poorly known.

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