NEW AND LITTLE KNOWN MOLLUSCA FROM ICELAND AND SCANDINAVIA. PART 3.

ANDERS WARÉN

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This paper is a continuation of WARÉN's articles in *Sarsia* volumes 74, 76, and 78.

Mikro globulus gen. et sp.n. (Archaeogastropoda, provisionally in Skeneidae) is described from the Icelandic shelf and *Anekes giustii* NOFRONI & BOGI, 1989 from the Mediterranean is transferred to this genus.

Protolira thorvaldsoni sp.n. (Archaeogastropoda, Skeneidae) is described from decaying whale bone found off southwestern Iceland.

Coccopigya lata sp.n. (Archaeogastropoda, Cocculinidae), *Alvania angularis* sp.n. and *A. incognita* (Mesogastropoda, Rissoidae) are described from sunken drift wood from deep water off Iceland. *Onoba improcera* sp.n. and *O. torelli* sp.n. (Mesogastropoda, Rissoidae) are described from northern Iceland.

'Cingula' globuloides WARÉN, 1972 (formerly in Rissoidae) is transferred to *Elachisina* (Mesogastropoda, Elachisinidae). *Alvania alaskana* (DALL, 1887) and *Alvania dinora* (BARTSCH, 1917), both from Alaska, are synonymised with *Onoba mighelsi* (STIMPSON, 1851) (Mesogastropoda, Rissoidae).

Brookesena turrita sp.n. (Heterobranchia, Mathildidae) is described from several localities around the Icelandic upper continental slope and *Turritellopsis stimpsoni* DALL, 1919 (formerly known as *T. acicula* (STIMPSON, 1851), Mesogastropoda, Turritellidae) is transferred to the Mathildidae.

All northeast Atlantic species of Rissoidae (Mesogastropoda) except the genera *Rissoa* and *Pusillina* are reviewed, and their distribution and habitat is given.

Substantial extension of the distributional range is given for the following Gastropoda:

Granigyra inflata (WARÉN, 1992), off southwestern Iceland ca 1000 m.

Lissotesta turrita (GAGLINI, 1987), off southwestern Iceland ca 1200 m.

Xyloskenea naticiformis (JEFFREYS, 1883), on sunken driftwood, off southwestern Iceland ca 1200-1800 m.

Basilissopsis watsoni DAUTZENBERG & FISCHER, 1897, off southwestern Iceland ca 1000 m.

Cingula trifasciata (J. ADAMS, 1800), Swedish west coast, Gullmarsfjorden (empty shells).

Pseudosetia turgida (JEFFREYS, 1870), off southeastern Iceland.

Boreocingula castanea (MØLLER, 1842), Varangerfjord, northern Norway.

Boreocingula globulus (MØLLER, 1842), restricted to southwestern Greenland.

Benthonella tenella (JEFFREYS, 1867), off southern Iceland.

Alvania moerchi (COLLIN, 1886), northern and eastern Iceland.

Alvania subsoluta (ARADAS, 1847), northern and southwestern Iceland.

Alvania pseudosyngenes WARÉN, 1973, northern Iceland, 400-200 m.

Manzonia crassa (KANMACHER, 1798), Swedish west coast (empty shells) and Norway to 60.5° N

Crisilla semistriata (MONTAGU, 1808), Swedish west coast (empty shells) and western Norway to 63.5° N.

Onoba exarata (STIMPSON, 1851) is recorded from northern Iceland.

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KEYWORDS. Gastropoda; systematics; new taxa; distribution; Scandinavia; Iceland.

CONTENTS

INTRODUCTION

This paper is a continuation of WARÉN (1989a, 1991, 1993), with descriptions of new gastropod taxa from the northeastern Atlantic and reviews of poorly known groups. The covered area includes the northeastern Atlantic, from western Iceland and eastern Greenland to Svalbard and Scandinavia. The upper part of the continental slope south of the Faeroes, Iceland and Greenland constitutes the southern limit.

I will describe new species that have been found in material sent to me for identification and I will review the species of Rissoidae (Mesogastropoda) except for the classical genus '*Rissoa*', which is treated elsewhere (WARÉN in press). All the rissoids are illustrated, and I have attempted to place species that are easy to confuse on the same plate.

MATERIALS AND METHODS

'Materials and Methods' have mainly been described in WARÉN (1989a) where most of the Icelandic locality names were mapped. Additional specimens of many little known species have become available from the BIOFAR program (under the direction of A. Nørrevang, Thorshavn, Faeroes), and the BIOICE program (under direction of Gudmundur Gudmundsson, Sigmar Steingrimsson, and Gudmundur Helgasson, Reykjavik).

The station data for BIOFAR were listed by NØRREVANG & al (1994). The station list of BIOICE has not yet been published. These start with number 2000 to avoid confusion with BIOFAR stations.

For the review of the rissoids, I carried out some work in the intertidal part of the shores in northern Norway (1992), from about 69° N, 17° E, and eastwards, along Vangerhalvøya and into the innermost part of the Varangerfjord. Stones, algae and other suitable substrates were washed and the residues kept and sorted under a stereomicroscope. This was also done with samples of shell gravel. These collections (now in SMNH) yielded large quantities of a few rissoid species, but evidently the fauna is impoverished this far north. Similar intertidal collections were also made all around Iceland in 1988.

The collections in ZMC, ZMO and ZMB have been examined to verify the distribution of the rissoids.

To simplify the text and to shorten the list of references, I have not given full synonymies and references for the rissoid and skeneid taxa treated by WARÉN (1974, 1992), BOUCHET & WARÉN (1993), PONDER (1985a); only a reference to appropriate pages in these papers.

ABBREVIATIONS

IMNH - Icelandic Museum of Natural History, Reykjavik. Other abbreviations used in the text were listed (WARÉN 1989a:2, 1991:54, and 1993:159).

SYSTEMATIC PART

'ARCHAEOGASTROPODA'

Family Skeneidae

Remarks. The concept Skeneidae is here maintained in a very broad sense, as discussed by WARÉN (1992, 1993), WARÉN & BOUCHET (1993) and MARSHALL (1988, 1994). Of the genera treated here, only *Protolira* shows close affinity to *Skenea* although this has not been fully demonstrated for the new species described here. Other genera are provisionally placed in Skeneidae awaiting more explorative work among the small archaeogastropods.

Genus *Mikro* n.gen.

Type species. *Mikro globulus* sp.n.

Diagnosis. Very small, skeneid-like gastropods with smooth protoconch, apically keeled first teleoconch whorl, and intraumbilical keel. Tentacles united by skin-fold across very small snout; with sensory papillae. Mouth small, cruciform. Radula absent.

Etymology. *Mikros* (Greek), small.

Remarks. The genus *Levella* MARWICK, 1943 (type species *L. tersa* MARWICK, 1943) from Lower Miocene deposits in New Zealand) has some resemblance in the indistinct keel on the most apical whorl, but lacks the intraumbilical rib and has strong spiral cords on the protoconch.

Species of *Lissotesta* have some resemblance to those in *Mikro* in the shape of the shell and the umbilicus. The former, however, have a very distinctive protoconch with no whorls visible externally (Fig. 1A-B) and they have a seguenziid type radula (WARÉN 1992).

Mikro becomes another genus to add to the long list of 'skeneid' genera of uncertain position among the so-called archaeogastropods. Its position in Archaeogastropoda is, however, well founded by the presence of sensory papillae on the tentacles (Fig. 2C).

Mikro globulus sp.n.
(Figs 1C-F, 2, 7D, 8D, 10D)

cf. Anekes giustii: Warén 1992:183, fig. 39D (not Bogi & Nofroni, 1989).

Type locality. Off southern Iceland, BIOICE 2237, 62°27.00' N, 12°55.00' W, 1099 m.

Type material. Holotype and 6 paratypes IMNH numbers 1996.04.24.1, and 1996.04.24.2-7; 5 paratypes SMNH 4655 (3 specimens used for radula and critical point drying).

New records. Off western Iceland, 65°06' N, 26°42' W, 241 m, 1 sh (JB). – Off southwestern Iceland, BIOICE 2215, 64°15.68' N, 24°26.05' W, 213 m, 2 spms (IMNH). - Reykjanes Ridge, 400 m, 1 spm (JT). - Off eastern Iceland, BIOICE 2273, 65°01.00' N, 12°00.00' W, 195 m, 4 spms (IMNH).

Distribution. Only known from the material listed, all around Iceland, 200-1100 m.

Etymology. *Globulus* (Latin), globular.

Description. Shell (Fig. 1C-F, 8D) very small, globular, smooth bluish semitransparent. The protoconch (Fig. 7D) has slightly more than half a whorl with a weak sculpture of branched tubercles on its initial part and a slightly flexuous outer lip. Diameter 195 µm. Adult specimens have 3-3.3 evenly convex teleoconch whorls sculptured with an indistinct, blunt, apical keel on the first one; later only scattered incremental lines. Inside the umbilicus there is a steeply ascending spiral rib (Fig. 1F) connecting to the lower, central corner of the peristome. The peristome is round, distinctly indented by the preceding whorl; not thickened in adult specimens. The outer lip is orthocline, the inner one strongly prosocline. Dimensions, height of holotype 1.06 mm (maximum size).

Operculum (Fig. 10D). Thin, transparent, colourless, oligospiral with subcentral nucleus, and short, distinct growth zone.

Radula. Absent.

Soft parts (Fig. 2). The foot is broad and flat, rounded posteriorly, distinctly bilobed anteriorly with a small propodium. The head has very short and broad tentacles, but their shortness is probably an artifact from preservation. Eyes and eye-lobe absent. The tentacles are joined across the snout via a skin-fold. The snout is very small and has an apical, cross-like mouth opening. The right neck lobe consists of a large skin fold, the left one has not been examined. There are at least three pairs of epipodial tentacles on each side behind the neck lobe. The cephalic and epipodial tentacles have sensory papillae. The pallial cavity extends half a whorl back and its margin has scattered sensory papillae. No structure resembling a gill was found, and (possibly due to the state of preservation), no ciliary tracts.

Remarks. Warén (1992) recorded a young specimen of *M. globulus* from western Iceland as '*Anekes*' cf. *giustii* Bogi & Nofroni, 1989. Examination of the new BIOICE material shows that *A. giustii* differs from *M. globulus* by having a more distinct subsutural shelf and by having the same number of whorls at 2/3 of the size of *M. globulus*. *Mikro giustii* is therefore known only from southern Europe.

Another somewhat similar species is *Trochus* (*Margarita*) *minima* Seguenza, 1876(:186), from Italy, near Messina, fossil in Plio-Pleistocene deep-water deposits (= *Trochus minutulus* Jeffreys, 1883, from off southwestern Portugal, deep water, see Warén 1992:171). It may be congeneric.

Genus *Granigyra* Dall, 1889

Type species. *Cyclostrema* (*Granigyra*) *limatum* Dall, 1889.

Remarks. For information about this genus, see Warén 1992, 1993.

Granigyra inflata (Warén, 1992)
(Figs 5E, F; 8A-C)

Anekes inflata nom. nov. Warén 1992:165.

New records. Off southwestern Iceland, Reykjanes Ridge, BIOICE 2254, 63°14' N, 26°03' W, 999 m, 1 spm.

Distribution. Only known from the Reykjanes Ridge and off southwestern Portugal, ca 1000-2000 m.

Remarks. Warén (1992) classified shells of this species as probably belonging to the genus *Anekes*. This was based on similarities in sculpture. Examination of a specimen with dried soft parts showed that the radula is identical with that of *Granigyra* (Warén 1992, 1993) and that the species evidently feeds on foraminifera, since the rectum was full of them.

The sculpture of *Granigyra inflata* differs conspicuously from previously described species of *Granigyra*, when adult specimens are compared. In *Granigyra pruinosa* (Jeffreys, 1883) the sculpture does, however, start with irregular spiral lines (Warén 1992, fig. 32C) which gradually changes to a fine granulation (fig. 33C). I have therefore transferred *inflata* to *Granigyra* instead of making a new genus for it.

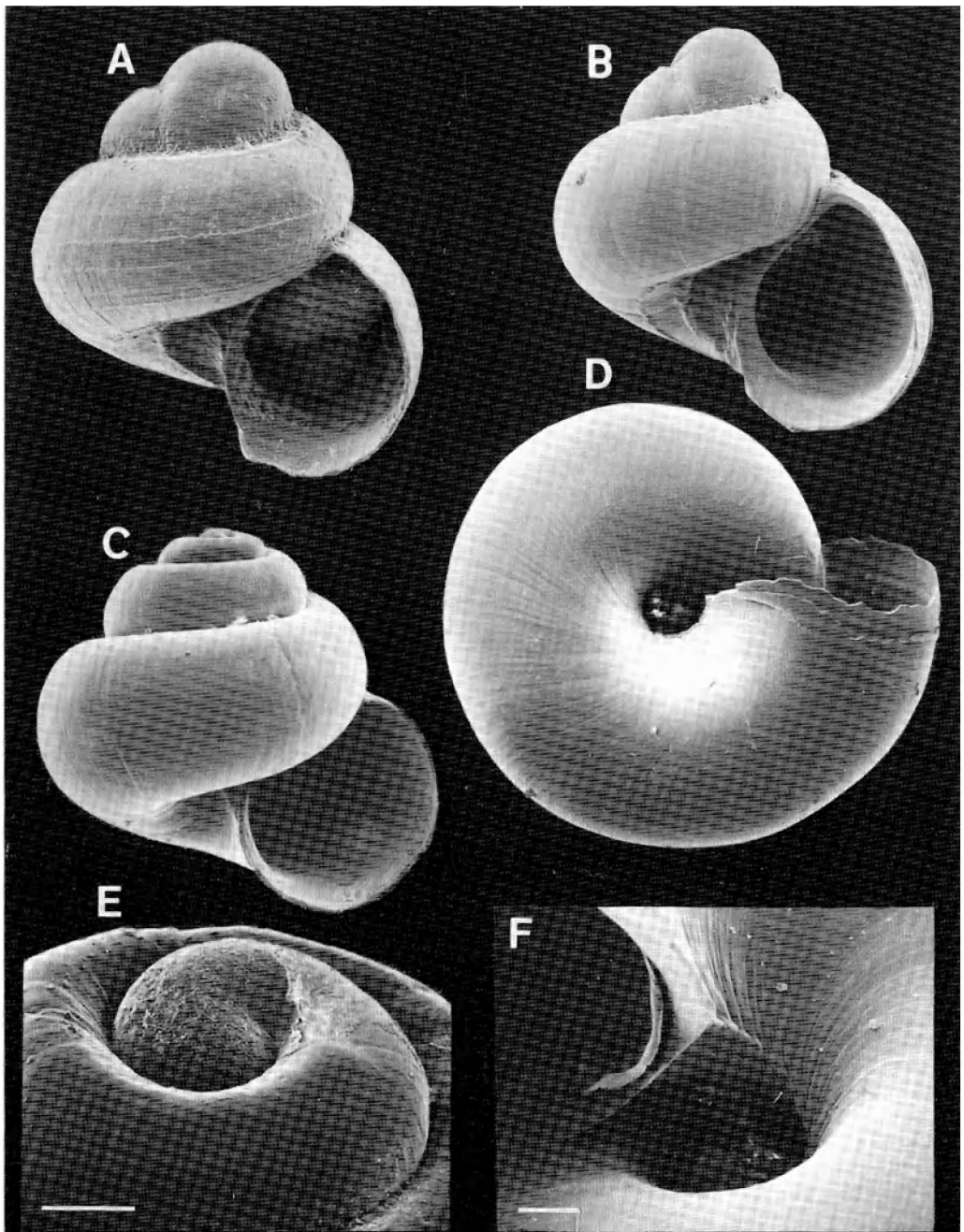

Fig. 1. A, B. *Lissotesta turrita* (GAGLINI, 1987), Reykjanes Ridge, 1152-1294 m, diameter 0.5 and 0.7 mm. C-F. *Mikro globulus* sp.n., paratypes. C, E, Reykjanes Ridge, 400 m, 1.0 mm. D, F, diameter 0.98 mm. Scale lines 50 µm.

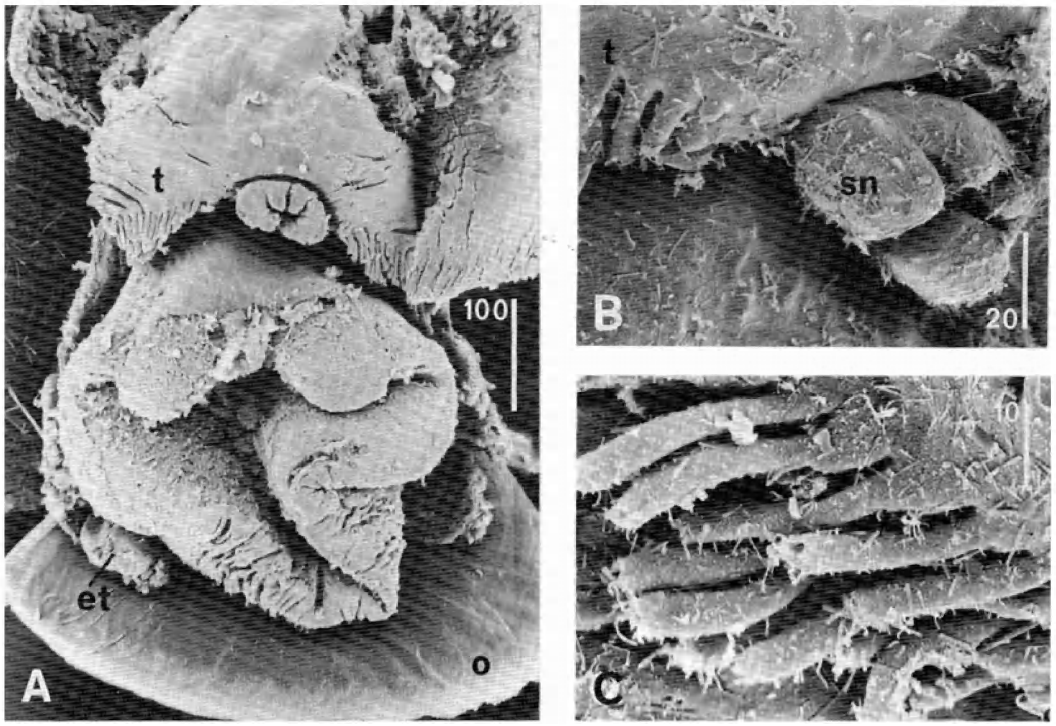

Fig. 2. *Mikro globulus* sp.n., paratypes. A. Head-foot and operculum. B. Detail of A, showing the snout in a different angle. C. Sensory papillae on cephalic tentacles. Scale lines in µm. et - epipodial tentacle; o - operculum; sn - snout; t - cephalic tentacle.

Genus *Lissotesta* IREDALE, 1915

Remarks. For a review of the genus, see WARÉN (1992).

Lissotesta turrita (GAGLINI, 1987)
(Fig. 1A, B)

Lissotesta turrita: WARÉN 1992:172, figs 26B, 30A-F.

New material. Iceland, Reykjanes Ridge, 61°01.8' N, 27°25.06' W, March 1993, 1152-1294 m, 2 shs (JB).

Distribution. From southwestern Iceland and western Norway, south to and throughout the Mediterranean, depth range 100-1300 m.

Remarks. *Lissotesta turrita* is a variable species and I figure two sculptural extremes.

Genus *Protolira* WARÉN & BOUCHET, 1993

Type species. *P. valvatoides* WARÉN & BOUCHET, 1993, hydrothermal vents on the Mid-Atlantic Ridge, by original designation.

Remarks. This genus was described from hydrothermal vents on the Mid-Atlantic ridge, and constitutes a parallel to *Bruceiella* WARÉN & BOUCHET, 1993, described from hydrothermal vents off Fiji and soon after found on whale bone by MARSHALL (1994) off New Zealand. Whale skeletons as habitats for gastropods are now starting to become better known (summary in MARSHALL 1994) and there is a clear connection to the fauna of chemosynthetic environments. The type species of *Protolira* has a propodial penis, and its classification in the Skeneidae seems well founded.

Protolira thorvaldsoni sp.n.
(Figs 3E-F, 4A-D)

Type locality. Off southwestern Iceland, Skeidarardypi, a few hundred meter depth, on a piece of whale bone, obtained in a bottom trawl, Jón Thorvaldsson.

Type material. Holotype SMNH 4656, 1 paratype, Jón Thorvaldsson, Reykjavik.

Distribution. Only known from the type locality,

Etymology. Named after Jón Thorvaldsson, who found this species.

Description. Shell (Fig. 3E-F) tall skeneiform, large for the group, smooth, opaque, colourless. The protoconch is not known. The teleoconch whorls are more than 2.5 in number, lack visible sculpture, but are neither polished nor glossy. The parietal callus is well developed in the adult, thin in the subadult specimen. The suture is deep, the whorls are tangentially cemented to the preceding whorl. The cross section of the whorls is round and not indented by the preceding whorl. The peristome is not thickened, prosocline, more tangential than radial. The umbilicus is wide and deep, narrower in subadults. Dimensions, diameter of holotype 2.3 mm, maximum size 2.5 mm (2 specimens).

Operculum (Fig. 4D) moderately thin, yellowish, multispiral with central nucleus and short growth zone.

Radula (Fig. 4A-C). c 35 - 3 - 1 - 3 - c 35. The central tooth has a large, triangular, finely serrate cutting plate and broadly expanded lateral supports. The laterals have sharp, finely serrate cutting plates, broader in the outermost one. The marginals are rather broad and flat, tightly appressed to each other, and apically truncated. The apical part is denticulated; in the more central teeth, the inner edge has an apical major cusp, followed by half a dozen smaller cusps along the inner vertical margin. The apical margin in these teeth is oblique, slanting outwards, and has about eight denticles. Towards the outermost marginals this asymmetry disappears, replaced by more uniformly oar-shaped, weakly denticulate teeth.

Remarks. The shell of *P. thorvaldssoni* is very similar to that of *P. valvatoides*, although there may be differences in the protoconch, which remains unknown in *P. thorvaldssoni*. The type species, however, has a thick periostracum (hardly noticeable in *thorvaldssoni*). and longer and more finger-like denticles on the marginal radular teeth compared with *thorvaldssoni*.

Genus *Xyloskenea* Marshall, 1988

Type species. *Xyloskenea costulifera* Marshall, 1988, from off White Island, New Zealand, 1075-1100 m, on sunken drift-wood.

Remarks. The genus comprises numerous species in abyssal and bathyal depths, world wide, mostly undescribed, and in every case where the substratum is known, associated with sunken wood. Closely related genera are *Trenchia* Knudsen, 1964 (on sunken wood, southwestern Pacific) and *Ventsia* Warén & Bouchet, 1993 (hydrothermal vents off Fiji). *Xyloskenea naticiformis* is to some extent intermediate between *Xyloskenea* and *Trenchia*, by having the same protoconch sculpture as *Xyloskenea* but an otherwise fairly smooth shell (sculptured in *Xyloskenea*, smooth in *Trenchia*)

The family allocation is probably erroneous, but I can not see much reason for moving the genus from its provisional allocation in the Skeneidae.

Species of *Xyloskenea* and especially *Trenchia* resemble those of young specimens of *Choristella* (Choristellidae), but these latter have a smooth protoconch with a granulated, apical zone and a very distinctive radula with no marginals and a highly modified central field (see McLean 1992).

Xyloskenea naticiformis (Jeffreys, 1883)
(Figs 3A-D, 5A-D, 6A-D, 7C)

Cithna naticiformis sp.n. Jeffreys 1883:112, pl. 20, fig. 11.
Adeorbis umbilicata sp.n. Locard 1897:11, pl. 2, figs 1-4.
Cithna excavata sp.n. Sykes 1925:190, pl. 11, fig. 5-5a.

Type localities. *C. naticiformis*, *Porcupine* Expedition station 17a, off Portugal, 1350 m; *A. umbilicatus*, *Travailleur* Expedition 1880, dragage 14, Bay of Biscay, 677 m; *C. excavata*, *Porcupine* Expedition station 17, 1100-2000 m.

Type materials. *C. naticiformis*, 3 syntypes BMNH 1885.11.5.1615-17; *A. umbilicatus*, holotype in MNHN; *C. excavata*, 14 syntypes in BMNH.

New records. Off southwestern Iceland, 63°55.3' N, 27°19.5' W, 1198 m, several spms on a sunken piece of drift-wood (JB, SMNH). - South of Iceland, 61°30' N, 22°30' W, 1836 m, *Ingolf* Expedition station 67, 28 spms (ZMC).

Distribution. From off southwestern Iceland to off Portugal, ca 40° N. Depth range 600-2000 m.

Redescription. Shell (Fig. 3A-D) large for the group, skeneiform, rather sturdy, semitransparent, colourless. The protoconch (Fig. 7C) has 2/3 of a whorl, of which the first half has 4 spiral ribs, the remaining part is smooth. The aperture is slightly expanded. The teleoconch has 2.5 whorls, with fine incremental lines and on its initial part distinct, later indistinct axial ribs. The basis of shell has an indistinct, periumbilical spiral keel. The initial 0.2-0.3 teleoconch whorl is set off by the presence of stronger axial ribs and a weak spiral keel. All the surface is covered by very small and indistinct riblets of mainly spiral orientation. The peristome is obliquely D-shaped with a distinct inner basal corner, it is prosocline, more radial than tangential, and its outer lip is not thickened. The parietal callus is poorly developed. The umbilicus is wide and partly concealed by a strong intraumbilical rib ascending from the basal corner of the aperture. Dimensions, maximum diameter 3.0 mm.

Operculum (Fig. 5D) corneous, stiff, distinctly concave, multispiral with fairly long growth zone and subcentral nucleus.

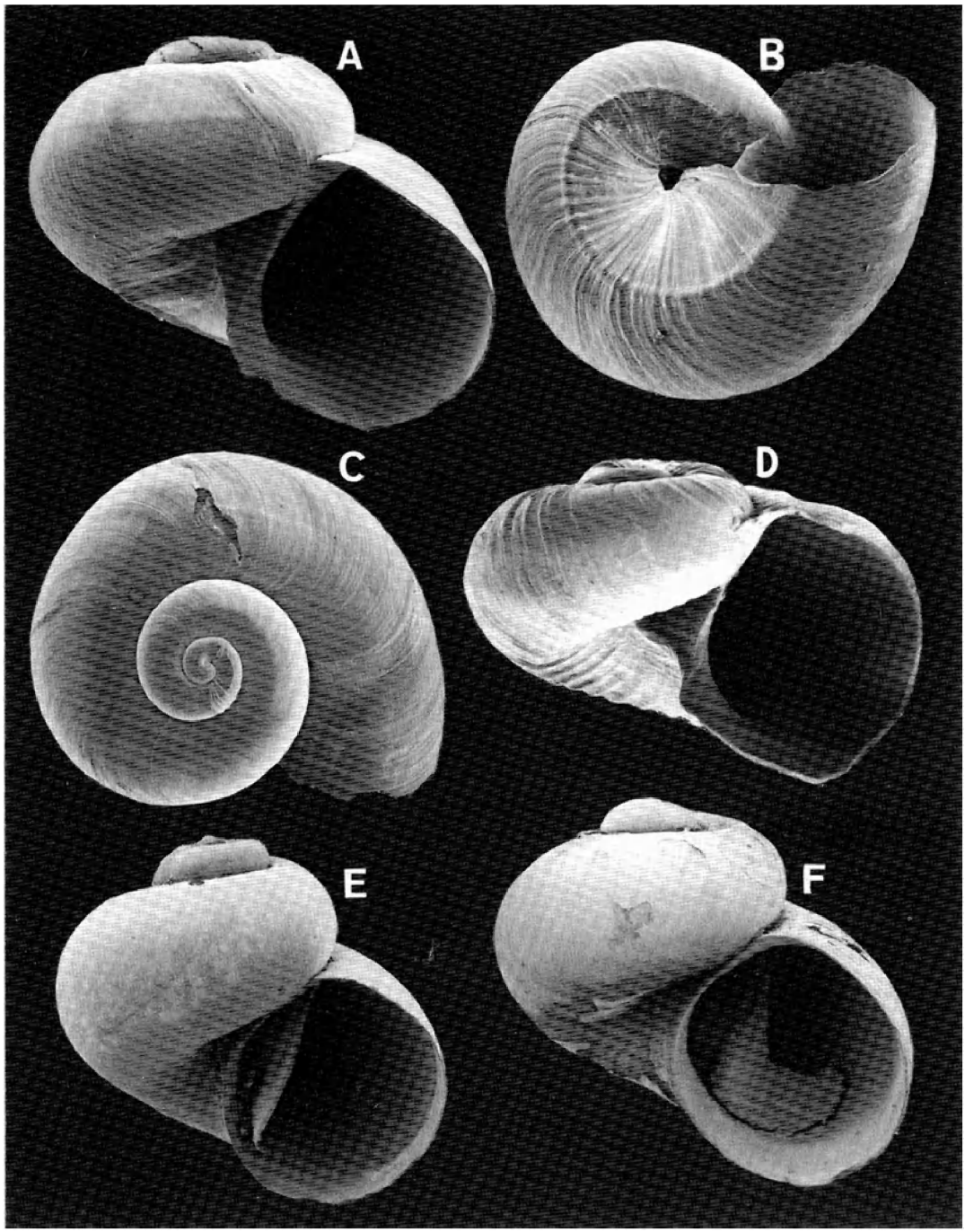

Fig. 3. A-D. *Xyloskenea naticiformis* (JEFFREYS, 1883), Reykjanes Ridge, 2.5, 2.5, 2.3 and 1.1 mm diameter. E-F. *Protolira thorvaldsoni* sp.n., holotype (E) and paratype (F), diameter 2.3 and 2.5 mm.

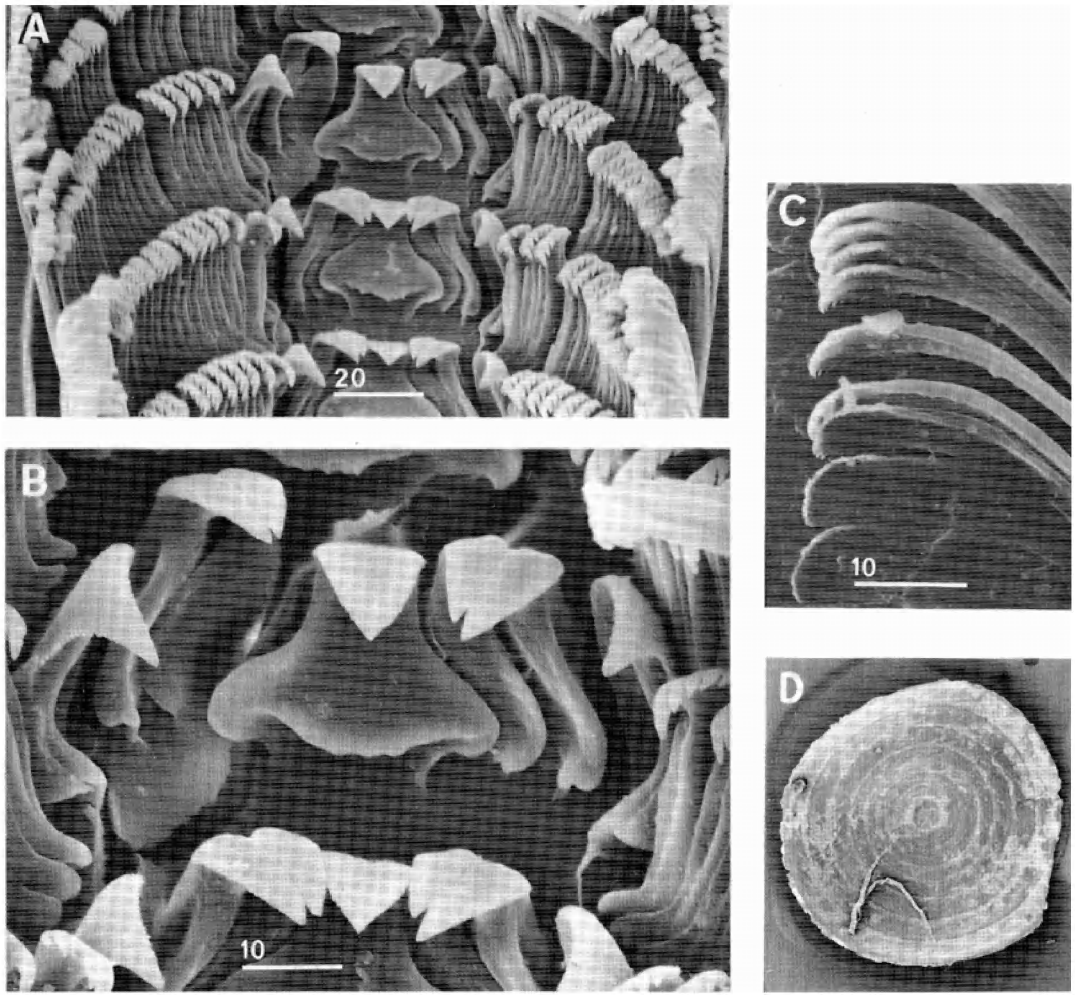

Fig. 4. *Protolira thorvaldsoni* sp.n., radula and operculum. A. Whole width of radula. B. Central field. C. Outermost marginal teeth. D. Operculum, diameter 1.3 mm. Scale lines in µm.

Jaws (Figs 5C, 6A-B) composed of numerous flattened elements.

Radula (Figs 5A-B, 6C-D) n - 2 - C - 2 - n. The central tooth is low, simple with short interlocking slits between its body and the anterolateral supports. The cutting plate has some cusps. The first lateral is tall and slender with a long interlocking slit between its body and lateral support; the cutting plate has one main cusp and several denticles. The second lateral is similar but taller and more sturdy. The marginals are tall and slender, the inner ones with hand-shaped, cuspidate, cutting plate; the outer ones are filiform with serrated apical part.

Remarks. None of the old descriptions can be used for identification at species level, so I have redescribed *X. naticiformis*, based on the new material and the type material listed above.

McLean (1992) tentatively referred this species to *Trenchia*, I prefer a placement in *Xyloskenea* basing this on the similarities in protoconch sculpture and radula, which characters were unknown to McLean.

Xyloskenea naticiformis differs from most other species of *Xyloskenea* in its weaker sculpture and larger size. *Trenchia agulhasae* (Clarke, 1961) and *T. argentinae* (Clarke, 1961) from the abyssal plains of the South Atlantic both have a smoother shell (see McLean 1992 for illustrations of these species).

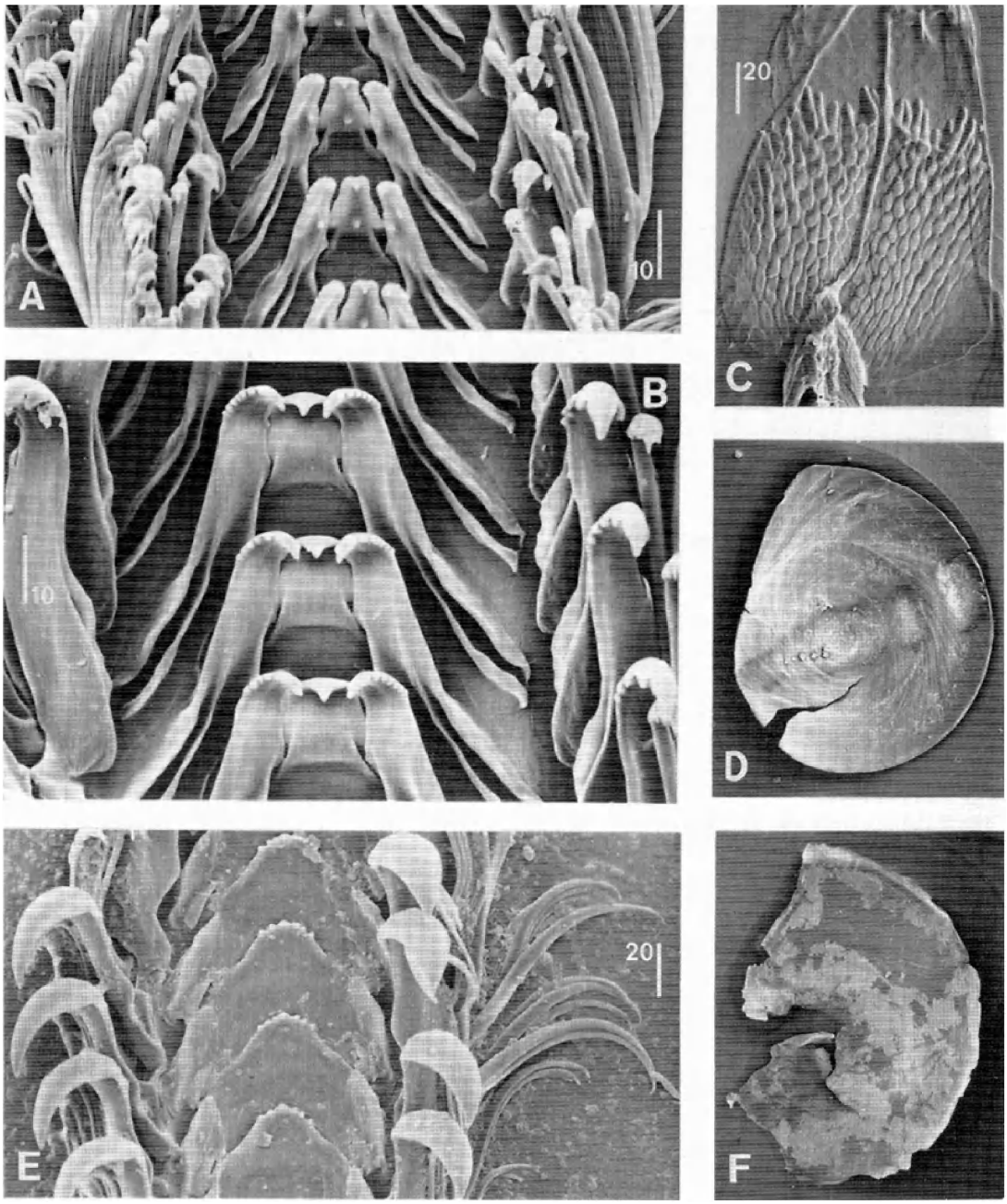

Fig 5. A-D. *Xyloskenea naticiformis* (JEFFREYS, 1883), off southwestern Iceland, 1198 m. A. Radula, half-grown specimen, whole width. Notice tubercle on central and first lateral tooth. B. Large specimen, central field. C. Jaw of young specimen. D. Operculum of adult, diameter 1.3 mm. E, F. *Granigyra inflata* (WARÉN, 1992), Reykjanes Ridge, 999 m. E. Radula. F. Operculum, diameter 1.25 mm.

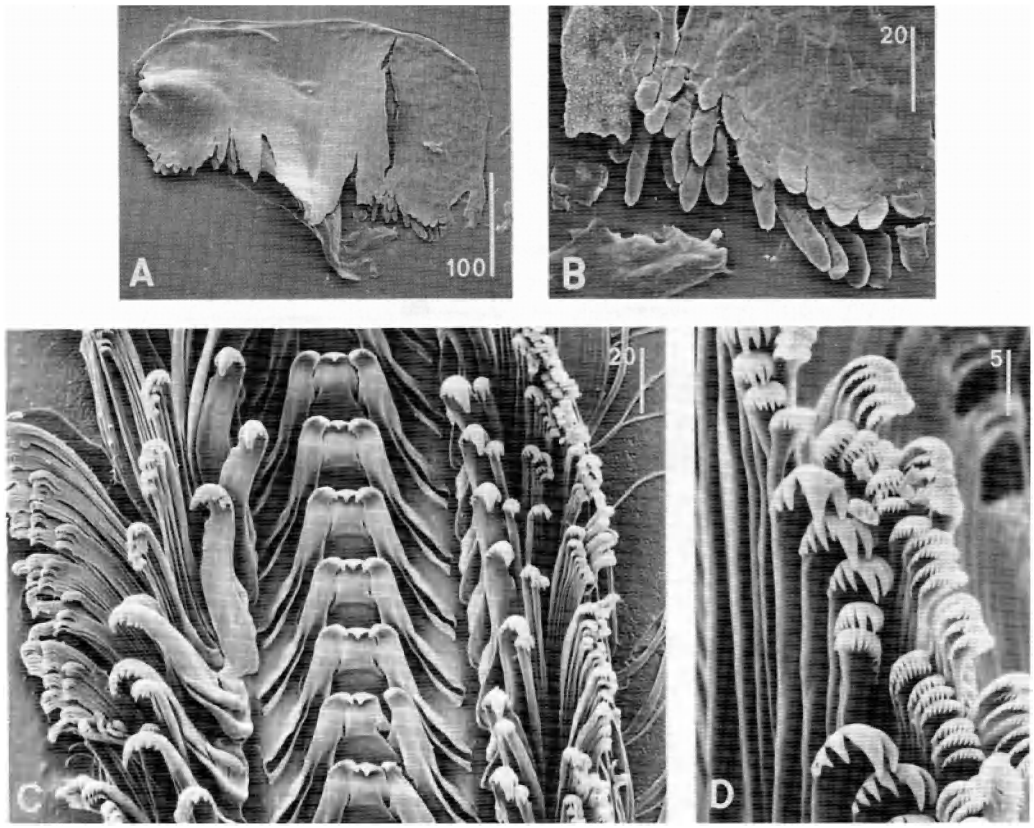

Fig. 6. A-D. *Xyloskenea naticiformis* (JEFFREYS, 1883), off southwestern Iceland, 1198 m. A, B. Jaw. C. Radula, whole width. D. Detail of marginals. Scale lines in µm.

Family Seguenziidae

Genus *Basilissopsis* DAUTZENBERG & FISCHER, 1897

Type species. *B. watsoni* DAUTZENBERG & FISCHER, 1897, the Azores in 1165-1600 m, by monotypy.

Remarks. QUINN (1983) and MARSHALL (1991) have discussed this genus, species of which resemble those of *Ancistrobasis* DALL, 1889, a genus already recorded from Iceland (WARÉN 1991). Both genera are restricted to the continental slopes.

Basilissopsis watsoni DAUTZENBERG & FISCHER, 1897 (Figs 8E-F)

Basilissopsis watsoni sp.n. Dautzenberg & Fischer 1897:163.

Type locality. Not designated; several stations around the Azores in 1165-1600 m.

Type material. In Musée Oceanographique, Monaco, not examined.

New material. Reykjanes Ridge, from mud caught in the bobbins of a bottom trawl, ca 1000 m, 1 sh (HL).

Distribution. From Iceland to the Azores in 1000-1600 m.

Remarks. *Basilissopsis watsoni* resembles *Ancistrobasis reticulata* (see WARÉN 1991, fig. 1A) but is smaller, more tall-spired and has a coarser sculpture at the same size. The species has not been reported since the description.

Genus *Ancistrobasis* DALL, 1889

Type species. *Basilissa costulata* WATSON, 1889, by subsequent designation, DALL 1927:109, Caribbaean, 750 m.

Ancistrobasis reticulata (PHILIPPI, 1844)

Ancistrobasis reticulata: WARÉN 1991: 56, fig. 1A.

New record. Off southwestern Iceland, 63°30.7' N, 26°41.8' W, 1450 m, 29 May 1992, 1 sh (JB).

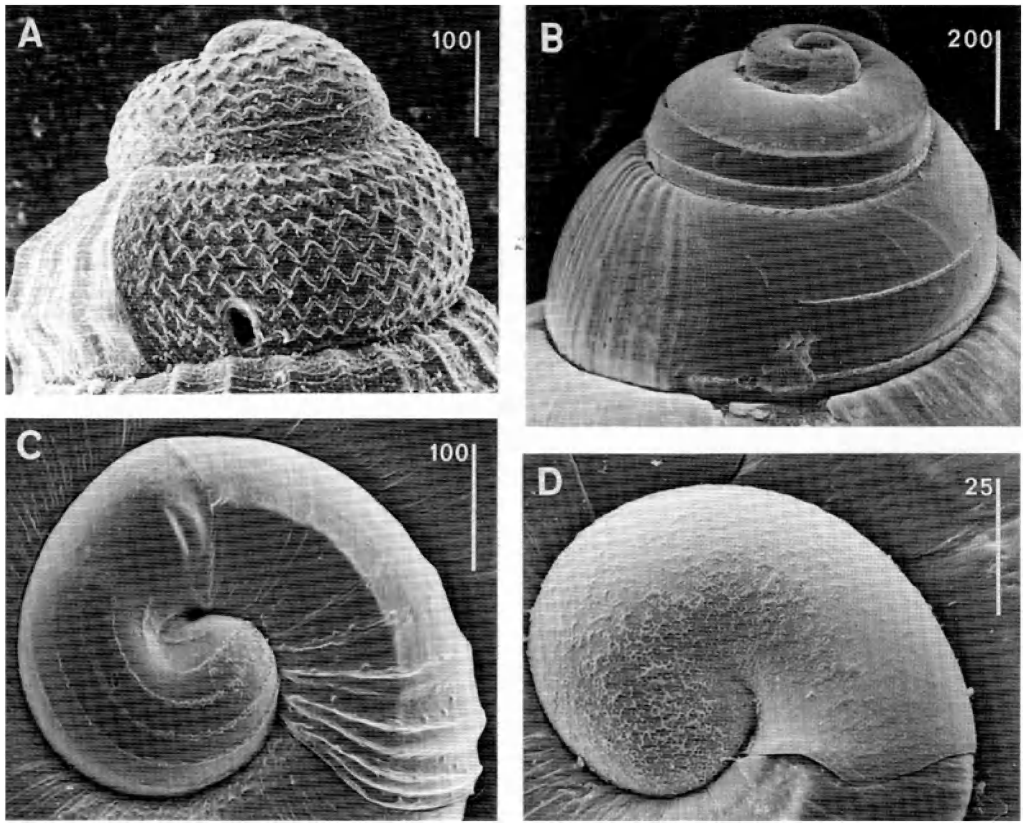

Fig. 7. Protoconchs. A. *Alvania jeffreysi* (WALLER, 1864), western Norway, Korsfjord, 200 m. B. *Benthonella tenella* (JEFFREYS, 1867), off southwestern Great Britain, Porcupine Seabight. C. *Xyloskenea naticiformis* (JEFFREYS, 1883), off southwestern Iceland, 1198 m. D. *Mikro globulus* sp.n., paratype. Scale lines in µm.

Remarks. *Ancistrobasis reticulata* was described from Plio-Pleistocene deposits in Sicily. Philippi's type is lost and the identity of the recent specimens and the fossil ones remains uncertain. Despite intensive search in several private collections, (at present the best source for this fauna) no additional specimens have appeared. Nevertheless, PHILIPPI's (1844) figure is good, a large percentage of that fauna still exists, and I continue the old use of the name.

Family Cocculinidae

Genus *Coccopigya* MARSHALL, 1986

Type species. *Cocculina spinigera* JEFFREYS, 1883, northeastern Atlantic, on sunken drift-wood, by monotypy.

Remarks. There has been some controversy about the central field of the radula of *Coccopigya spinigera*, the type species of *Coccopigya* (MCLEAN & HARASEWYCH 1995). DALL (1882, fig. 9) figured a radula with a broad, three cusped rachidian, and MCLEAN & HARASEWYCH suggested that MARSHALL's (1986) preparation of the radula had been folded in the middle, hiding this structure. It is true that there are often problems among cocculinids with shrinkage and longitudinal folding of the central field as shown here (Fig. 10A), and in MARSHALL's figure of *C. spinigera* (1986, fig. 12C). I have never seen a trace of a central tooth (6 radulae of *C. spinigera* examined), and the lateral shrinkage of the radula figured by MARSHALL (1986) (and also DANTART & LUQUE 1994; figs 6-7 and 12-13) is in my opinion a result of the absence of a central tooth, which leaves the radular membrane unsupported and prone to shrinking. DALL's figure of a three cusped rhachidian (prepared 114 years ago) can therefore, in my opinion, be ascribed to a combination of this folding and the optical equipment of his time.

MARSHALL's (1986) designation of the largest tooth in the radula as number 5 seems justified. So is also his description of a small lateral tooth as number 4, and two

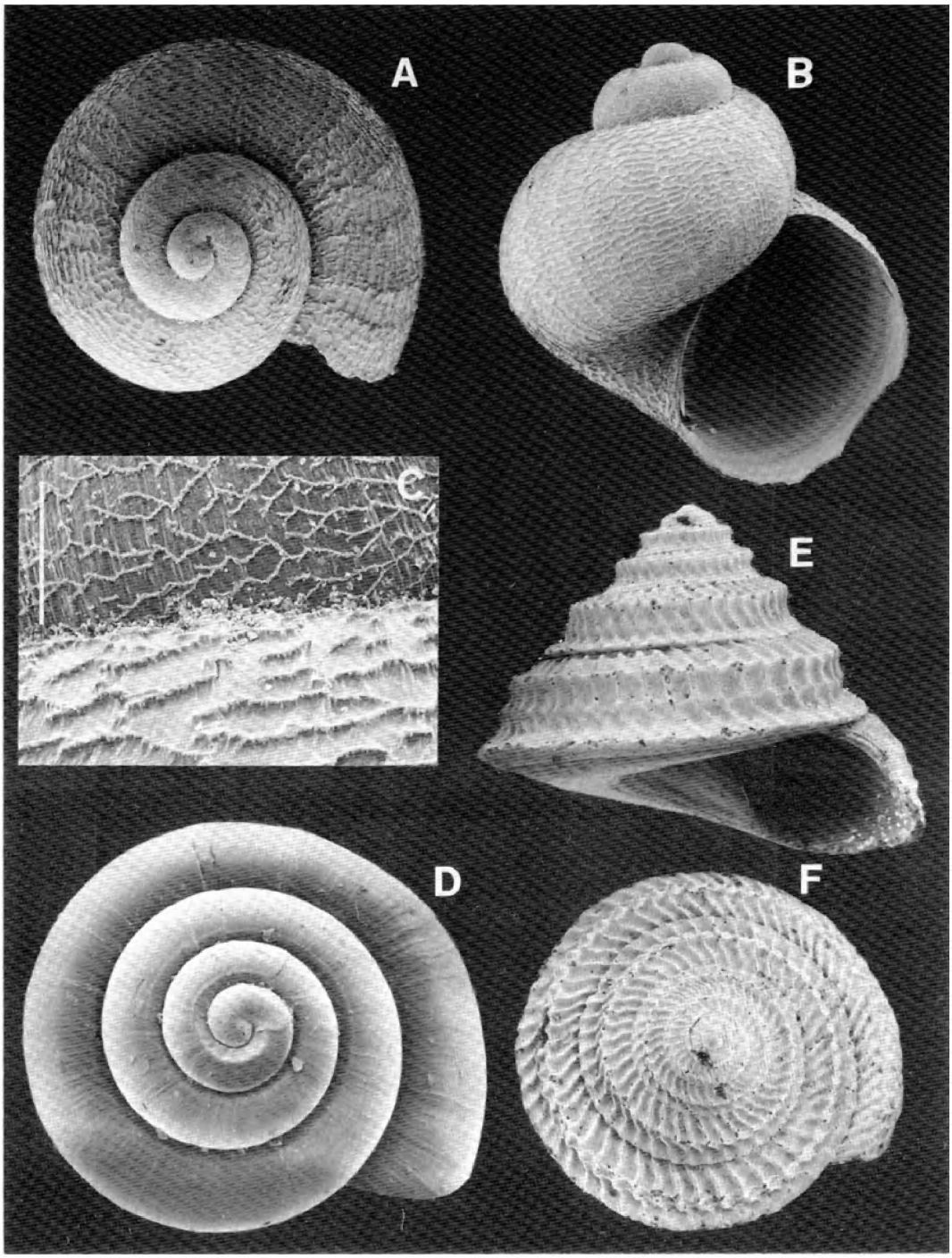

Fig. 8. A-C. *Granigyra inflata* (Warén, 1992), Reykjanes Ridge, 999 m. A, B. Height 1.8 mm. C. Detail of sculpture of first and second teleoconch whorl. Scale line 100 µm. D. *Mikro globulus* sp.n., paratype, apical view, 1.0 mm diameter. E-F. *Basilissopsis watsoni* Dautzenberg & Fischer, 1897, Reykjanes Ridge, ca 1000 m, diameter 2.8 mm.

larger laterals towards the centre, numbers 3 and 2. In some specimens of *C. spinigera* there is a smaller, vestigial lateral tooth number 1, in others there is no trace of it and this may vary from one transverse row to another within the same radula.

The reduction of the central field and gradual loss of teeth, starting from the centre (see also HICKMAN 1983, figs 14-15) I believe to be a parallel to the simplification of the central field of the radula in many lepetelloids.

Coccopigya lata sp.n.
(Figs 9A-E, 10A-C)

Type locality. Off southwestern Iceland, 63°55.3' N, 27°19.5' W, 28 May 1992, 1198 m, on sunken driftwood (JB).

Type material. Holotype SMNH 4704, 1 paratype SMNH 4705, several in coll. Jón Bógason.

Etymology. *Latus* (Latin), broad.

Description. Shell (Fig. 9A-E) of medium size for the group, opaque, finely setose from a thin periostracum, bowl-shaped, inflated, with subcentral apex. The protoconch is corroded in all specimens. The position of the apex is at about 1/3 of the length and the width of the shell is 80-85% of the length The teleoconch is sculptured with fine, concentric growth lines and broad, very shallow, and indistinct radial furrows. Between these furrows are arranged, in radial rows, small pits (Fig. 9D-E) corresponding to the periostracal bristles. The shell margin is thin; the shell muscle scars are distinct, anteriorly slightly recurved. Dimensions. Holotype 6.1 x 4.9 mm, height 3.0 mm.

Soft parts dried and partly rotten.

Radula (Fig. 10A-C). Typical for the genus. There is no central tooth. Lateral tooth number 1 present in one specimen. Lateral teeth 2-3 with three denticles. Lateral tooth 4 is smaller than 2-3 and more or less cusp-less. Lateral tooth 5 (Fig. 10C) is large and broad, anteriorly striated. The marginal teeth are laterally compressed, several times longer than broad, apically abruptly more slender, with a recurved point and about half a dozen denticles at each side. The outermost marginals are more slender and of more uniform length and lack the apical constriction.

Remarks. *Coccopigya lata* differs from *C. spinigera* in its broader shell with more central apex. *Coccopigya mikkelsenae* MCLEAN & HARASEWYCH, 1995 from the Western Atlantic is much flatter and has a finer but more conspicuous sculpture. Furthermore, it has a membranous, broad central tooth.

MESOGASTROPODA

Family Elachisinidae

Remarks. This family was erected by PONDER (1985b) for some species previously classified in the Naticidae and Rissoidae. The separation was made because of differences in anatomy, but also the shell is quite distinctive with a sharp corner at the lower, central part of the peristome.

Genus *Elachisina* DALL, 1918

Type species. *Elachisina grippi* DALL, 1918, western North America, by original designation.

Remarks. See family Elachisinidae.

Elachisina globuloides (WARÉN, 1972)
(Figs 11F, 13A-B)

Cingula globuloides sp.n. WARÉN 1972:191, fig. 1A-B.
Cingula globuloides: WARÉN 1974:124.

New records. Northern Iceland , Eyjafjordur and Skjalfandi, 30-60 m, 2 shs (JHB, HL). - *Dagny* SI70, stn 3, 67°01' N, 18°57' W, 250 m, 22 June 1979 (JB). - *Dagny* SI70 stn 5, 67°39' N, 19°04' W, 250 m, 22 June 1979 (JB). - BIOICE 2162, 66°27.0' N, 19°35.5' W, 294 m, 11 shs (SMNH). - Western Iceland, 64°46.08' N, 26°19.5' W, 28 May 1992, 1198 m, 1 juv. (JB).

Distribution: Gulf of St Lawrence, Canada, to Svalbard, in about 100-400 m. Not known from Greenland.

Habitat. Not known.

Remarks. '*Cingula*' *globuloides* is so far known only from empty shells (which also is characteristic for most elachisinids despite that shells may be common), but the shell morphology is very close to species known to belong to the family. The depressed, dome-shaped protoconch has a sculpture which differs from rissoids, especially from the rissoid radiations dominating the arctic area.

Elachisina globuloides can be recognised by the smooth shell, broad shape, and distinct corner of the left anterior part of the aperture.

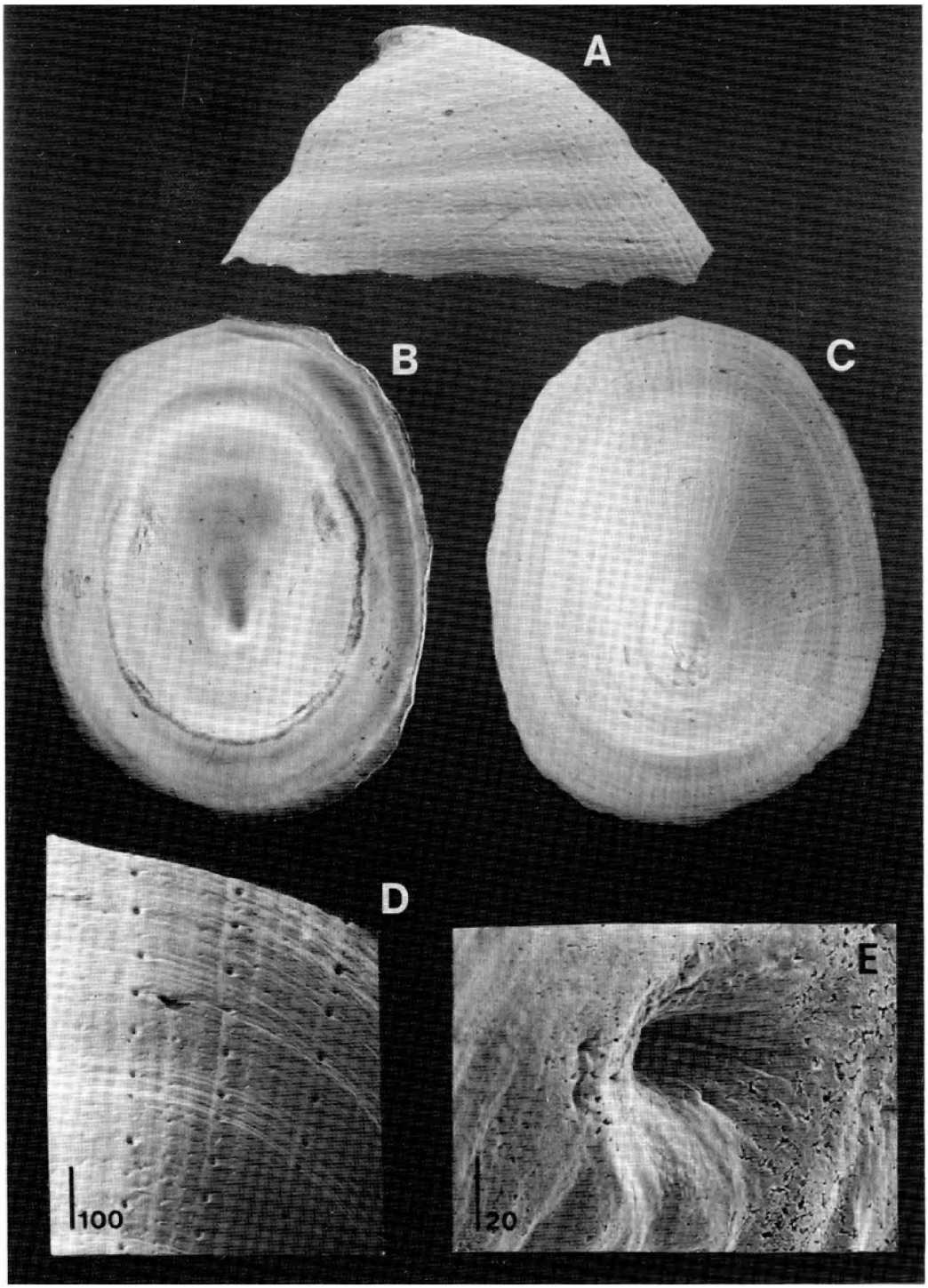

Fig. 9. *Coccopigya lata* sp.n. A-C. Holotype, diameter 6.1 mm. D. Detail of shell showing rows of pits. E. Single pit. Scale lines in μm.

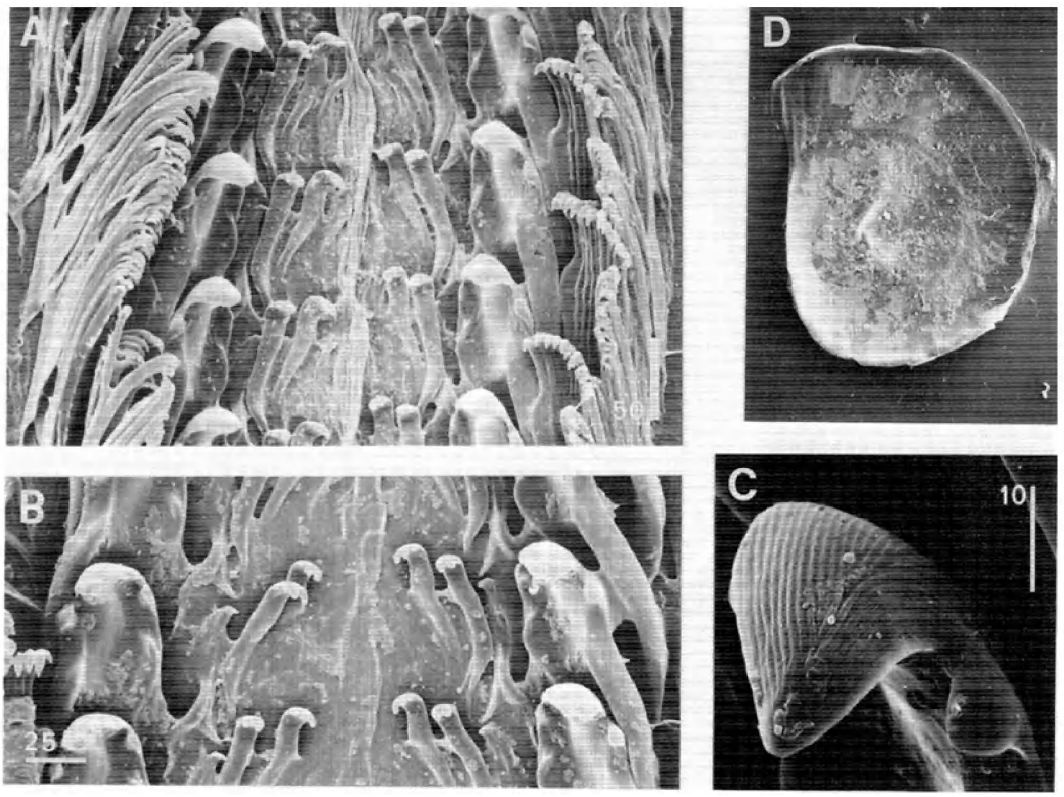

Fig. 10. A-C. *Coccopigya lata* sp.n., holotype. A. Radula, whole width. B. Central field. C. Innermost marginal tooth. D. *Mikro globulus* sp.n., paratype, operculum, diameter 0.52 mm.

Family Iravadiidae

Hyala vitrea (Montagu, 1803)
(Fig. 11A-C)

Hyala vitrea: Bouchet & Warén 1993: 701, figs 1651-1654, 1657.

New records. Southeastern Norway, Oslofjord, off Solbergsstrand, ca 50 m, 1 spm (lost at examination).

Distribution. From the British Isles, the Kattegat and the Skagerrak south to the Mediterranean. Depth range 5-300 meters.

Habitat. Muddy bottoms from a few meters depth, usually not deeper than 100 m. It lives in the burrows of *Nephrops norwegicus* (Linné, 1758) (Norwegian lobster) and perhaps other similar burrows (Ponder 1984:52).

Remarks. *Ceratia proxima* (Forbes & Hanley, 1850) (Fig. 11D) has also been recorded from Norway, but all specimens in museums turned out to be wrongly identified *Onoba aculeus* (Bouchet & Warén 1993:703). *Ceratia proxima* has not been found in Scandinavia.

Family Rissoidae

Remarks. Warén (1974) revised the boreal and Arctic rissoids. A revision of the northeastern Atlantic deep-sea rissoids was recently published (Bouchet & Warén 1993). Ponder (1985a) has revised the generic classification. His generic concepts are largely used here. Recently additional material has become available, mainly from the BIOICE project, which made it possible to add new information, on distribution and variation. I have therefore listed all rissoids from the area except the species of *Rissoa* and *Pusillina* which are discussed in a separate article (Warén in press). I also illustrate all species to make identification feasible for those not having access to the rather voluminous literature otherwise needed for this.

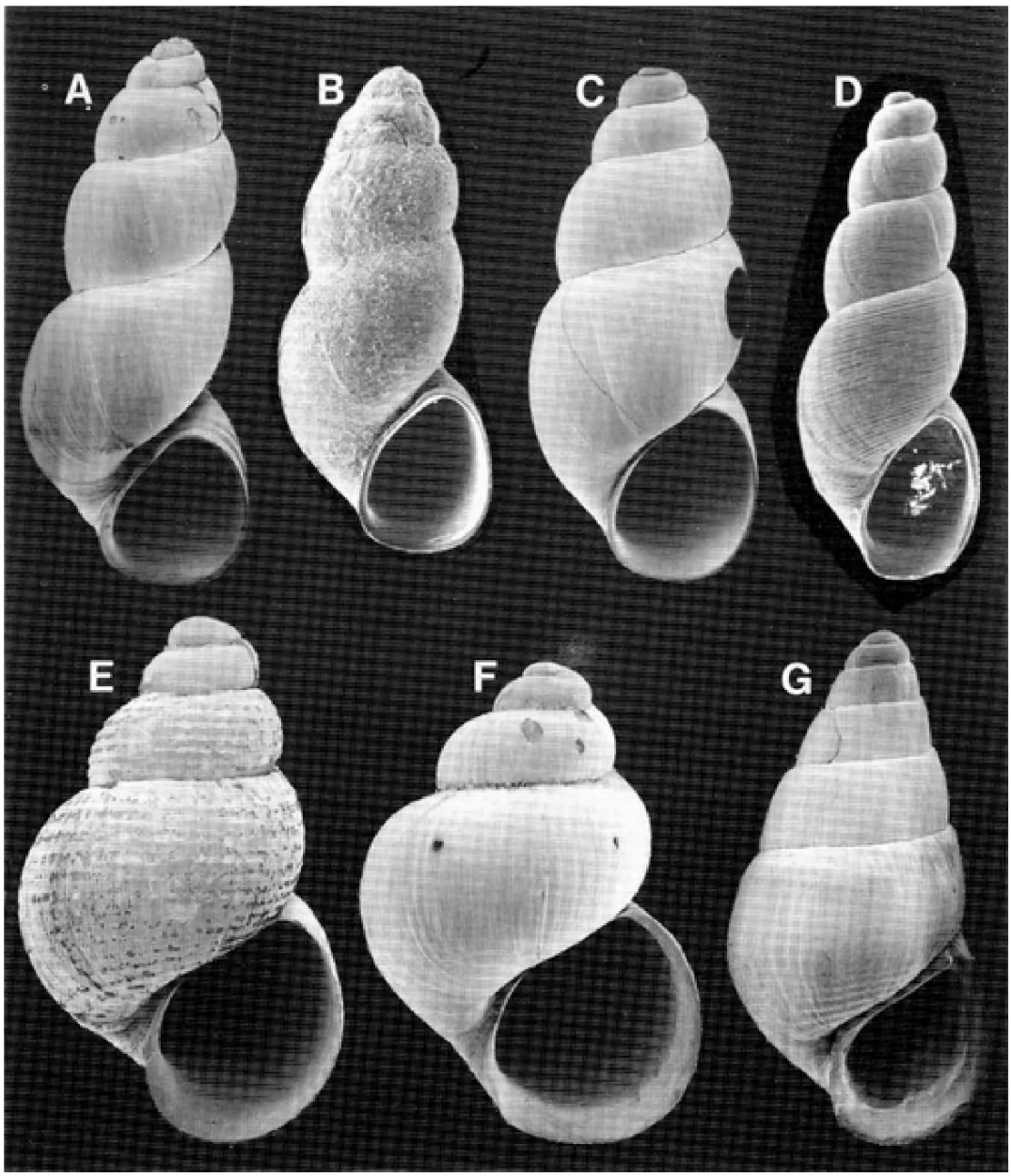

Fig. 11. A-C. *Hyala vitrea* (Montagu, 1803), Swedish west coast, Koster Area. A. Adult, shell cleaned, height 4.0 mm. B. Adult, 3.6 mm, with ferrugineous deposits. C. Immature specimen, cleaned, 3.1 mm. D. *Ceratia proxima* (Forbes & Hanley, 1850), Mediterranean, off Pantellaria, 710 m, 2.9 mm. E. *Boreocingula castanea* (Møller, 1842), Svalbard, Spitsbergen, Icefjord, 3.4 mm. F. *Elachisina globuloides* (Warén, 1972), Denmark Strait, 294 m, 3.3 mm. G. *Cingula trifasciata* (J. Adams, 1800), Atlantic Spain, 4.4 mm.

Genus *Cingula* Fleming, 1818

Type species. *Turbo cingillus* Montagu, 1803 (= *C. trifasciata* (J. Adams, 1800)), western Europe, subsequent designation (Gray 1847:152).

Remarks. *Cingula* s.str. at present contains only the type species (Ponder 1985a).

Cingula trifasciata (J. Adams, 1800)
(Fig. 11G)

Turbo trifasciatus sp.n. J. Adams 1800:2, pl. 1, figs 12-13.
Turbo cingillus sp.n. Montagu 1803:328, pl.12, fig.7.

Type localities. *T. trifasciatus*, in sand at the Wash, southern Great Britain; *T. cingillus*, Plymouth and Salcombe, Great Britain.

Type materials. *T. trifasciatus*, presumably lost; *T. cingillus*, 4 syntypes, Royal Albert Memorial Museum, Exeter, no 4213.

New records. Western Norway, Tjernagel, Kvitingsøy (Bukken), Florøy, 6 lots, several spms (ZMO). - Bergen area several lots, many spms (SMNH). - Outer part of Trondheimsfjord, 1 fresh sh (SMNH). Swedish west coast, Gullmarsfjorden, 1 sh (SMNH, Lovén 1846:156) and 1 sh from the 1870's (SMNH).

Distribution. From western Norway, 63.5° N, south to the Mediterranean. Not known from Iceland and the Faeroes.

Habitat. *Cingula trifasciata* lives under rocks with some water circulation in the upper intertidal zone. It is usually found only under widely scattered rocks but often in large groups.

Remarks. The occurrence at the Swedish west coast must be considered uncertain since the specimens look old and may be fossils from the Atlantic Stade (Postglacial).

Genus *Pseudosetia* Monterosato, 1884

Type species. *Rissoa turgida* Jeffreys, 1870, deep water, western Europe, subsequent designation (Crosse 1885:140).

Pseudosetia turgida (Jeffreys, 1870)
(Fig. 12G)

Pseudosetia turgida: Warén & Bouchet 1993:691, figs 1380, 1598-1602, 1605-1608.

New record. Southeast of Iceland, Rosengarten, ca 64° N, 11.5° W, ca 400 m, from a trawl, 1 spm, J. Thorvaldsson, Reykjavik.

Distribution. Northern Norway from *Vøringen* stn 267 ca 72° N, 37° E, 271 m) and the Iceland-Faroe Ridge, southwards along the European continental slopes to northern Spain. Depth range 90-1500 meters.

Habitat. *Pseudosetia turgida* is often common on deep, 100-600 m, slightly current swept, muddy to silty bottoms. It is more rare when the bottoms are pure mud or start to get sandy.

Remarks. *Pseudosetia* has always been considered very rare, but this may be due to problems with the identification. Fresh shells are transparent and smooth, somewhat similar in shape and appearance to *Pusillina inconspicua* (Alder) but with a larger and blunter protoconch. Species of *Pseudosetia* never have axial sculpture or colour patterns but often there is a very thin spiral rib forming a continuation of the suture all around the body whorl.

Pseudosetia semipellucida (Friele, 1879)
(Fig. 12F)

Pseudosetia semipellucida: Bouchet & Warén 1993:690, figs 1590, 1597.

Habitat. Muddy bottoms in the abyssal part of the Norwegian Basin.

Distribution. The abyssal parts of the Norwegian Basin. Depth range 700-3200 m.

Remarks. *Pseudosetia semipellucida* closely resembles *P. turgida* but is 1.5 times the size of that species and has a protoconch of 2.0 whorls instead of 1.5 as in all other species of *Pseudosetia*.

Genus *Boreocingula* Golikov & Kussakin, 1974

Type species. *Cingula robusta* var. *martyni* Dall, 1887, North Pacific, by original designation.

Remarks. The genus *Boreocingula* is well characterised by its among rissoids unique, pitted protoconch sculpture. It comprises a few highly northern, Pacific and Atlantic species, not very similar to other rissoids.

The position of *Rissoa globulus* Møller in *Boreocingula* proposed by Ponder (1985a) is here confirmed, since *R. globulus* has the pitted sculpture of the protoconch characteristic for *Boreocingula* (Fig. 13C-D).

Boreocingula castanea (Møller, 1842)
(Figs 11E, 13E-F)

Cingula castanea: Warén 1974:124, figs 4-6.

New records. Southeastern Iceland, Höfn, 85 m, 1 sh (HL).

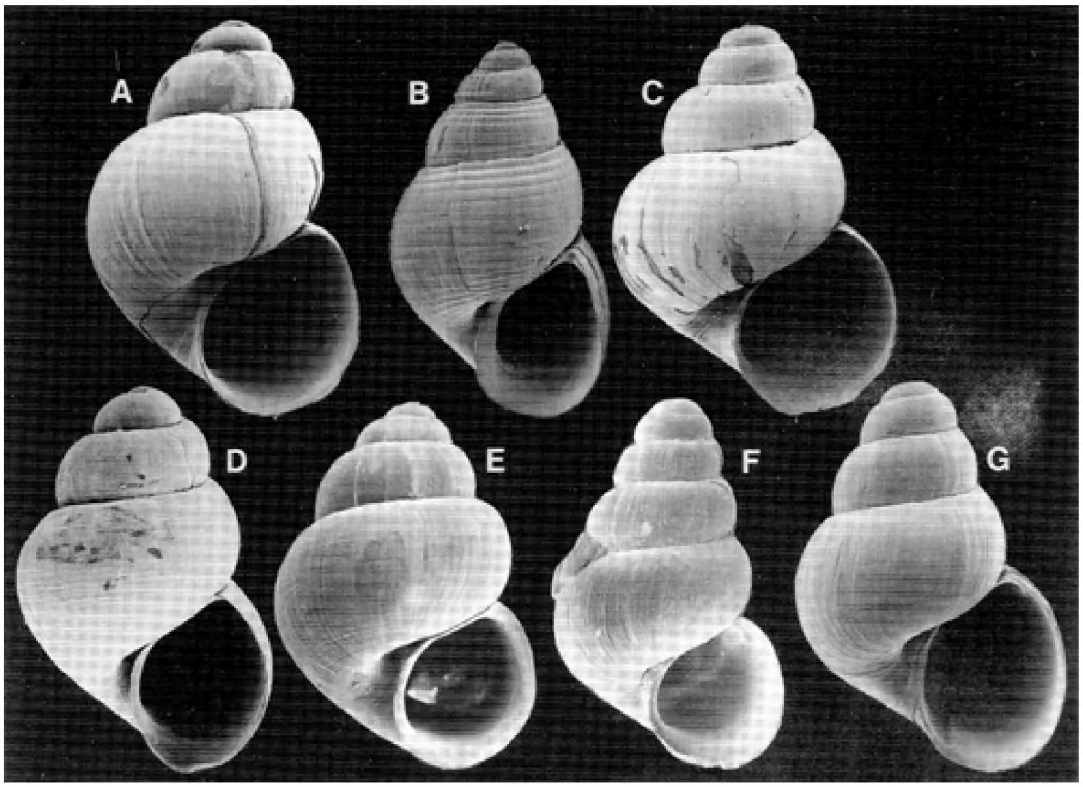

Fig. 12. A. *Boreocingula globulus* (MØLLER, 1842), Greenland, Godthaab, 3.2 mm. B. *Crisilla semistriata* (MONTAGU, 1808), Trondheimsfjord, 2.2 mm. C. *Benthonella tenella* (JEFFREYS, 1867), off southwestern Great Britain, Porcupine Seabight, 3.4 mm. D. *Obtusella tumidula* (G.O. SARS, 1878), North Iceland, Tjörnes, 1.8 mm. E. *O. intersecta* (S.V. WOOD, 1857), Swedish west coast, Koster Area, 2.0 mm. F. *Pseudosetia semipellucida* (FRIELE, 1879), Norwegian Sea, 3.1 mm. G. *Pseudosetia turgida* (JEFFREYS, 1870), Western Norway, 1.9 mm.

Northern Norway, Varangerfjord, Byluft, 70°04' N, 29°03' E, 25 m, 1 sh (SMNH).

Distribution. Canada, Greenland, northern and eastern Iceland, northern Norway, Svalbard, western Siberia, in 10-200 m, usually 20-60 m (mainly after WARÉN 1974).

Habitat not known in detail.

Remarks. The chestnut coloured shell makes *B. castanea* easily recognised among the arctic rissoids with spiral sculpture. *Menestho albula* (FABRICIUS, 1780) and *M. truncatula* (ODHNER, 1915) (Pyramidellidae, see WARÉN 1991) invite to confusion, but their whorls are less evenly rounded and more or less shouldered, their larval shell is hyperstrophic, and the spiral furrows are crossed by fine axial lamellae.

Earlier records from Norway were based on erroneous identifications (WARÉN 1974), but the species is here reintroduced in the known Norwegian Fauna.

Boreocingula globulus (MØLLER, 1842)
(Figs 12A, 13C-D)

Cingula globulus: WARÉN 1972:129, fig. 1C-D.
Cingula globulus: WARÉN 1974:125.

New records. None.

Distribution: With certainty known only from southwestern Greenland, in 10-450 m.

Habitat: Not known in detail.

Remarks. The species is not known from Iceland or eastern Greenland, but is figured here for comparison. It has a smaller, evenly rounded aperture, compared with *Elachisina globuloides*. It can also be confused with *Obtusella tumidula*, but that species has a spirally striated protoconch of almost 1.5 whorls and the surface of the teleoconch is indistinctly spirally striated.

A record of *Boreocingula globulus* from southwest of the Faeroes in 900 m (Warén 1974) has at reexamination of the shells proved to be based on *Benthonella tenella* (Jeffreys, 1867).

Genus *Benthonella* Dall, 1889

Type species. *Benthonella gaza* Dall, 1889, Caribbean deep water, by original designation.

Remarks. There are problems with the demarcation of species in *Benthonella* in more southern areas, but *B. tenella* was described from north of the Hebrides and these problems start only at about 37° N.

Benthonella tenella (Jeffreys, 1867)
(Fig. 7B, 12C)

Benthonella tenella: Bouchet & Warén 1993:697, figs 1636-1650.

New records. Off southwestern Iceland, BIOICE 2291, 62°27.82' N, 22°40.35' W, 1206 m, 3 shs (IMNH). - BIOICE 2297, 62°53.74' N, 22°39.33' W, 981 m, 1 spm (IMNH).

Distribution. Off southern Iceland, southwest of the Faeroes and south, throughout the Atlantic; southern limit uncertain. Depth range normally 500-4000 m, occasionally more shallow.

Habitat. Deep, fine muddy or silty bottoms.

Remarks. This is probably the most common gastropod in the Atlantic. It accounts for 50 % of the shells and specimens from the deep parts of the Bay of Biscay, 83 % of live taken gastropod specimens below 1500 m in the Mediterranean and 52 % of the specimens from below 3000 m on a transect between Bermuda and North America (Rex & Warén 1982). Fresh shells can easily be recognised from the distinctly brownish yellow protoconch.

Genus *Obtusella* Cossmann, 1921

Type species *Rissoa obtusa* Cantraine (= *Obtusella intersecta* S.V. Wood, 1857), Europe, by monotypy.

Remarks. *Obtusella intersecta* (Wood, 1857) and *O. tumidula* (G.O. Sars, 1878) were discussed and figured by Warén (1989a).

Obtusella intersecta (S.V. Wood, 1857)
(Fig. 12E)

Obtusella intersecta: Bouchet & Warén 1993:693, figs 1626-1627, 1633.

New records. Iceland, all coasts, numerous records (JB). - Northeastern Iceland, BIOICE 2061, 66°00.63' N, 17°32.15' W, 49 m, many spms (IMNH). - Western Iceland, BIOICE 2198, 64°18.80' N, 22°23.30' W, 63 m, many spms (SMNH). - BIOICE 2308, 63°15.02' N, 22°47.37' W, 263 m, many spms (IMNH).

Norway north to Tromsøsundet (69°42' N, 19°00' E, 10-50 m, 5 spms), numerous records (SMNH).

Distribution. All coasts of Iceland and northern Norway (69°42' N), south to and throughout the Mediterranean. Depth range, intertidal to 40 m, occasionally deeper, especially in the southern part where it usually is found in 100-200 m.

Habitat. Often in large quantities on sandy and silty bottoms with scattered algae (stable bottoms, not disturbed by wave action).

Remarks. Judging from its rare occurrence in collections, *Obtusella intersecta* is usually overlooked because of its small size (1.2-1.5 mm, rarely 2 mm), although it often occurs in large quantities. It may be recognised from its rounded shape, distinct umbilicus, and fine spiral striation.

Obtusella instersecta is more well known under the names *Cingula alderi* (Jeffreys, 1858) and *Cingula soluta* (not Philippi, 1836).

Obtusella tumidula (G.O. Sars, 1878)
(Fig. 12D)

Obtusella tumidula: Warén 1989a:11, fig. 8C-D, F-G.
Punctulum minutum sp.n. Golikov & Fedjakov 1987:82, fig. 34.

New records. Off Eastern Iceland, BIOICE 2348, 63°36.00' N, 12°15.00' W 407 m, 3 spms (IMNH). - BIOICE 2349, 63°70.00' N, 12°17.00' W, ca 400 m, 12 spms (IMNH). - BIOICE 2332, 62°55.00' N, 12°13.00' W, 563 m, 3 spms (IMNH).

Southeast of the Faeroes, BIOFAR 0137, 61°02.5' N, 07°11.9' W, 542 m, 3 spms.

Distribution. The White Sea, northern Norway, the Faroe-Iceland Ridge, and north of Iceland. Depth range ca 10-500 m.

Habitat. Not known in detail.

Remarks. Golikov & Fedjakov (1987) described *Punctulum minutum* from the White Sea, 50 m. The description and figure clearly show that the name is based on *O. tumidula*, whose true identity they presumably not were aware of.

The depth range is uncertain because there is an obvious bias in the depth range of the collecting efforts due to the BIOICE and BIOFAR programs.

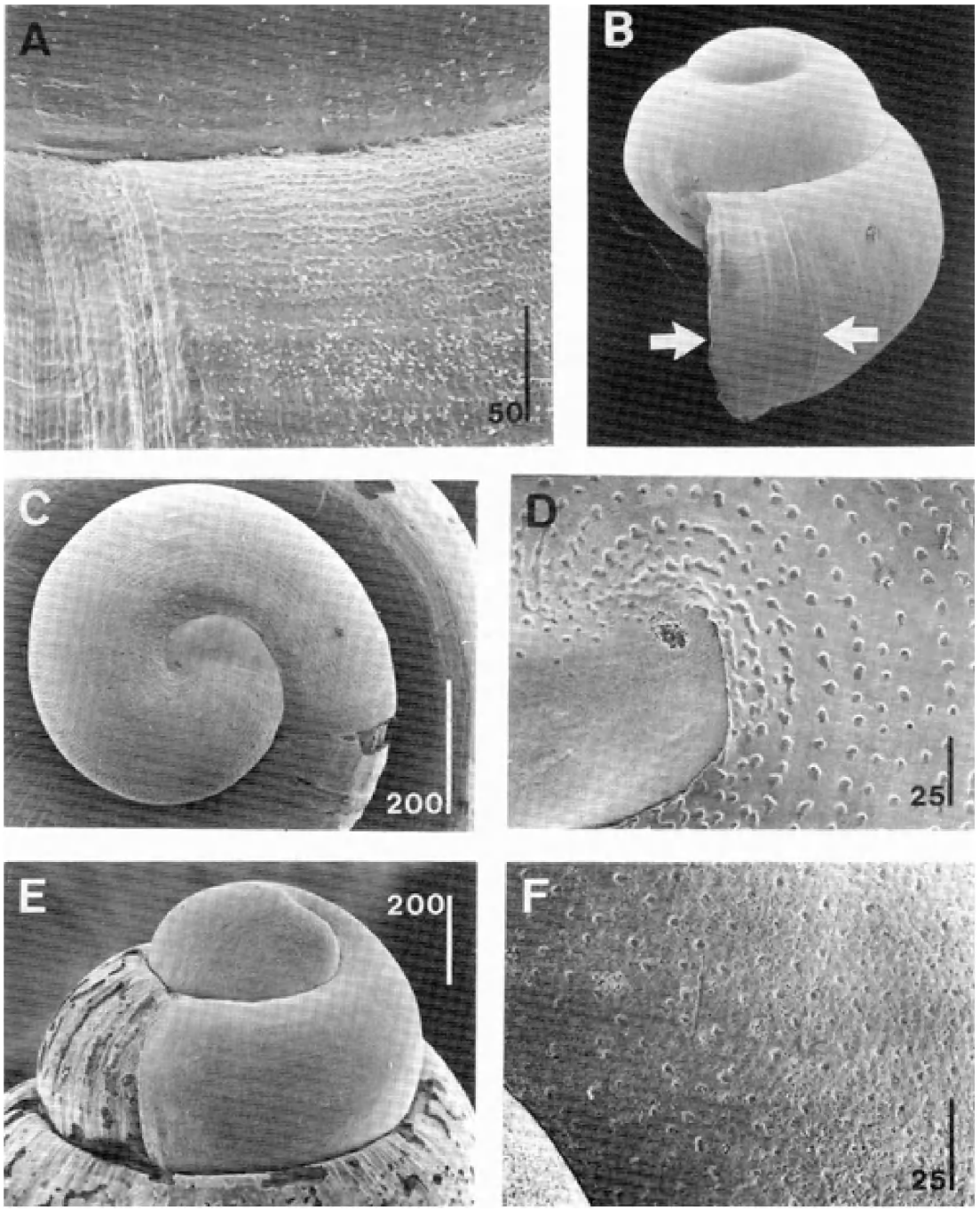

Fig. 13. A, B. *Elachisina globuloides* (Warén, 1972), off western Iceland, 1198 m. A. Detail of shell at transition to teleoconch. B. Juvenile with some teleoconch growth (indicated by arrows), shell height 0.95 mm. C, D. *Boreocingula globulus* (Møller, 1842), Greenland, Godthaab, apical view of protoconch and detail of protoconch sculpture. E, F. *Boreocingula castanea* (Møller, 1842), Svalbard, Spitsbergen, Icefjord, protoconch and detail of protoconch sculpture. Scale lines in µm.

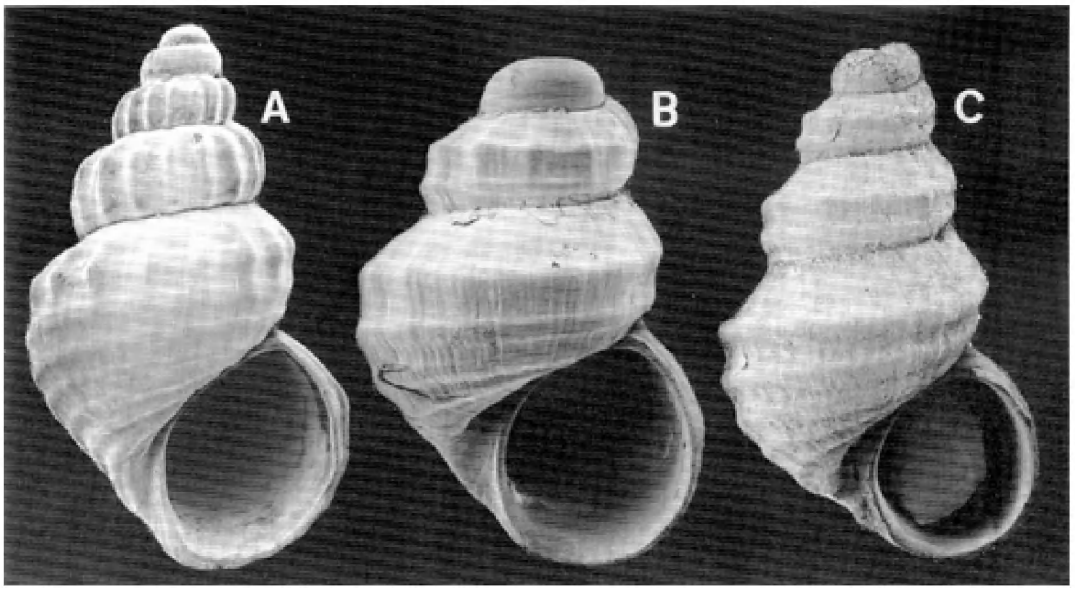

Fig. 14. *Frigidoalvania* spp. A. *F. janmayeni* (Friele, 1878), Svalbard, Spitsbergen, Kings Bay, 5.8 mm. B, C. *F. cruenta* (Odhner, 1915), Svalbard, Spitsbergen, Advent Bay, 2.0 mm (shell cleaned) and 2.9 mm.

Genus *Frigidoalvania* Warén 1974.

Type species *Rissoa janmayeni* Friele, 1878, Arctic, by original designation.

Remarks. This group of rissoids is restricted to the Atlantic Arctic area and medium deep parts of the northern North Atlantic (Ponder 1985a).

Frigidoalvania janmayeni (Friele, 1878)
(Fig. 14A)

Frigidoalvania janmayeni: Warén 1974:125, figs 47-48.

New records. Northern Greenland, Jørgen Brønlund Fjord, 180 m (Schiøtte 1989), several spms (ZMC).
Jan Mayen, *Ingolf* Expedition stn 115, 70°50' N, 08°29' W, 156 m, 1 sh (ZMC).

Off Northern and Eastern Iceland, 120-520 m, 6 records (JB). - Skjalfandi, several spms (JHB). - BIOICE 2057, 66°27.30' N, 16°52.86' W, 243 m, 3 spms (IMNH).

Western Norway, off Korsfjorden, a few subfossil shs (SMNH).

Distribution: Northeastern Canada, Greenland, northern Iceland, northern Norway, Svalbard, the White Sea and the Kara Sea, to 75° E, in 10 - 520 m (Warén 1974, Golikov & Fedjakov 1987, Warén 1989a).

Habitat. Not known in detail.

Remarks. *Frigidoalvania janmayeni* is highly characteristic with its very coarse sculpture of rounded ribs and thick, dark brown, ferrugineous periostracum, often covered by similarly coloured rust deposits.

There is a question about whether to use the name of Friele or that of Leche (*Rissoa sibirica*), since both can be considered to have been published 31 December 1878 (Warén 1989b:258). The former name has, however, won general acceptance and should therefore be preferred.

Frigidoalvania cruenta (Odhner, 1915)
(Fig. 14B-C)

Frigidoalvania cruenta: Warén 1974:127, figs 59-60.

Distribution. High arctic, from eastern Canada to Svalbard. Depth range 40-300 m.

Habitat. Not known in detail.

Remarks. *Frigidoalvania cruenta* resembles *F. janmayeni* in the coarse sculpture and dark reddish brown periostracum, but is smaller, maximum height 3 mm, has almost no axial ribs, and its protoconch is finely striated under the thick periostracum and ferrugineous deposits.

Genus *Alvania* Risso, 1826

Type species. *Alvania europea* Risso, 1826 (= *Alvania cimex* Linné, 1758), Mediterranean, subsequent designation Nevill 1885:105.

Remarks. The generic name *Alvania* is here used in a rather broad sense, as did Bouchet & Warén (1993).

Alvania incognita sp.n.
(Figs 15C-D, 16A)

Type locality. Off southwestern Iceland, 63°23' N, 27°04.6' W, 1230 m, several spms on a sunken piece of drift-wood (JB).

Type material. Holotype and 3 paratypes SMNH 4653 and 4654, several paratypes JB.

Material examined. Off northwestern Iceland, 66°31.6' N, 25°37.5' W, 659 m, several spms (JB). - 68°04.1' N, 21°33.0' W, 894 m, several spms (JB).

Distribution. So far only known from the material listed, off western and northwestern Iceland in about 600-1200 m depth.

Etymology. *Incognitus* (Latin), featureless.

Description. Shell (Fig. 15B-C) of medium size for its group, transparent, thin and fragile, smooth, often with ferrugineous deposits. The protoconch (Fig. 16A) has 1.25 dome-shaped whorls with about a dozen slightly undulating or zigzagging spiral ribs. The teleoconch has 2-2.5 whorls with weak incremental lines and very indistinct, low spiral cords, better visible under a stereomicroscope then with SEM. No microsculpture. The peristome is rounded, not thickened. Height of shell 2.24 mm (holotype, largest specimen).

Radula (Fig. 16A). Taenioglossate, short and broad. The central tooth has basal denticles and indistinctly denticulate cutting plate. The lateral tooth has a horizontal, short rib below main cusp. The marginals are broad, apically denticulate.

Remarks. This new rissoid is unusually featureless and has very few indications of relations to any of the recognised rissoid groupings. The protoconch has some resemblance to *Obtusella griegi*, but the teleoconch does not resemble that of species of *Obtusella*, and the protoconch sculpture is not unique enough to give reason for a placement in *Obtusella*. The teleoconch is even less diagnostic, as is the radula, which was prepared mainly to exclude a totally different systematic position.

Alvania angularis sp.n.
(Figs 15A-B, 19C)

Type locality. Off northwestern Iceland, 66°31.6' N, 25°37.5' W, 659 m, several specimens on a sunken piece of drift-wood, leg. JB.

Type material. Holotype and 3 paratypes SMNH 4651 and 4652, several paratypes JB.

Distribution. Only known from the type locality.

Etymology. *Angularis* (Latin), with an angle.

Description. Shell (Fig. 15A-B) of medium size and shape for its group, angular, transparent, smooth-looking with spiral keels. The protoconch (Fig. 19C) has ca 1.7 whorls, with sharp, fine spiral ribs. The teleoconch has ca 3.0 whorls, covered by an extremely fine spiral striation; with 2 keels above, one at and covered by, and 3 below suture. The parietal callus is thin. The peristome is sharp, rounded, and about as high as wide. Dimensions, height of shell 3.0 mm (maximum, holotype).

Remarks. The tall, angular, and smoothly keeled appearance makes this species possible to recognise. *Alvania moerchi* has some resemblance, but has a more distinct incremental sculpture and a more plump shape. Furthermore, the spiral sculpture on the protoconch of *A. angulata* consists of distinctly undulated striae instead of straight ones. I have seen no other really similar species of the family.

Alvania sp.
(Figs 23C, 25A)

Material examined. Off southwestern Greenland, *Ingolf* Expedition station 25, 63°30' N, 54°25' W, 1045 m, 2 spms, ZMC.

Remarks. This species bears some resemblance to *A. angularis* in the stout and broad shape of the shell, as well as in the shape and number of whorls in the protoconch. The sculpture is, however, drastically different and there is no risk of confusion. It is known from two not very well preserved specimens, and it should not be described it until better preserved material is available.

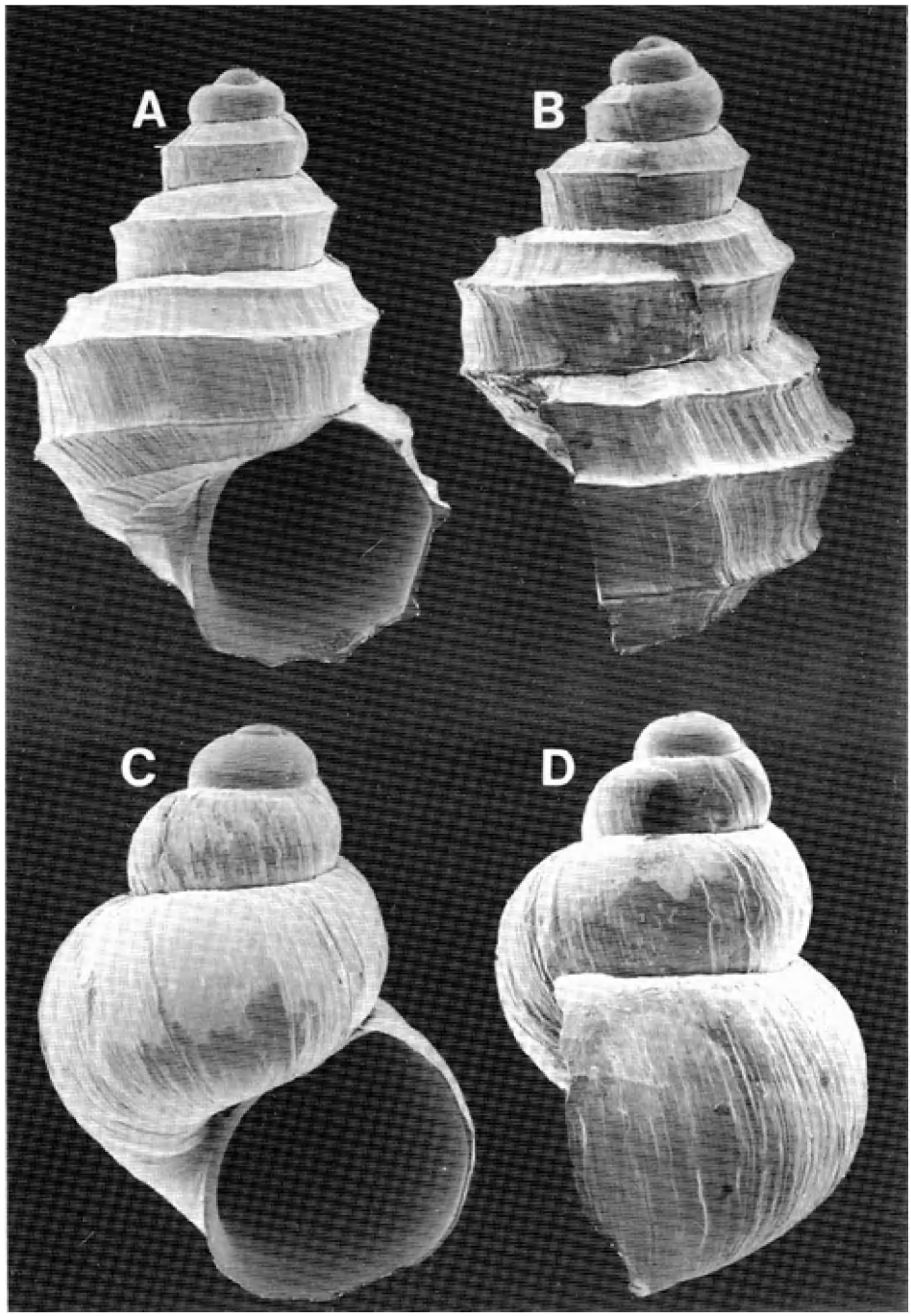

Fig. 15. *Alvania* spp. A, B. *A. angularis* sp.n., paratype, 2.78 mm. C, D. *A. incognita* sp.n., paratype, 1.93 mm.

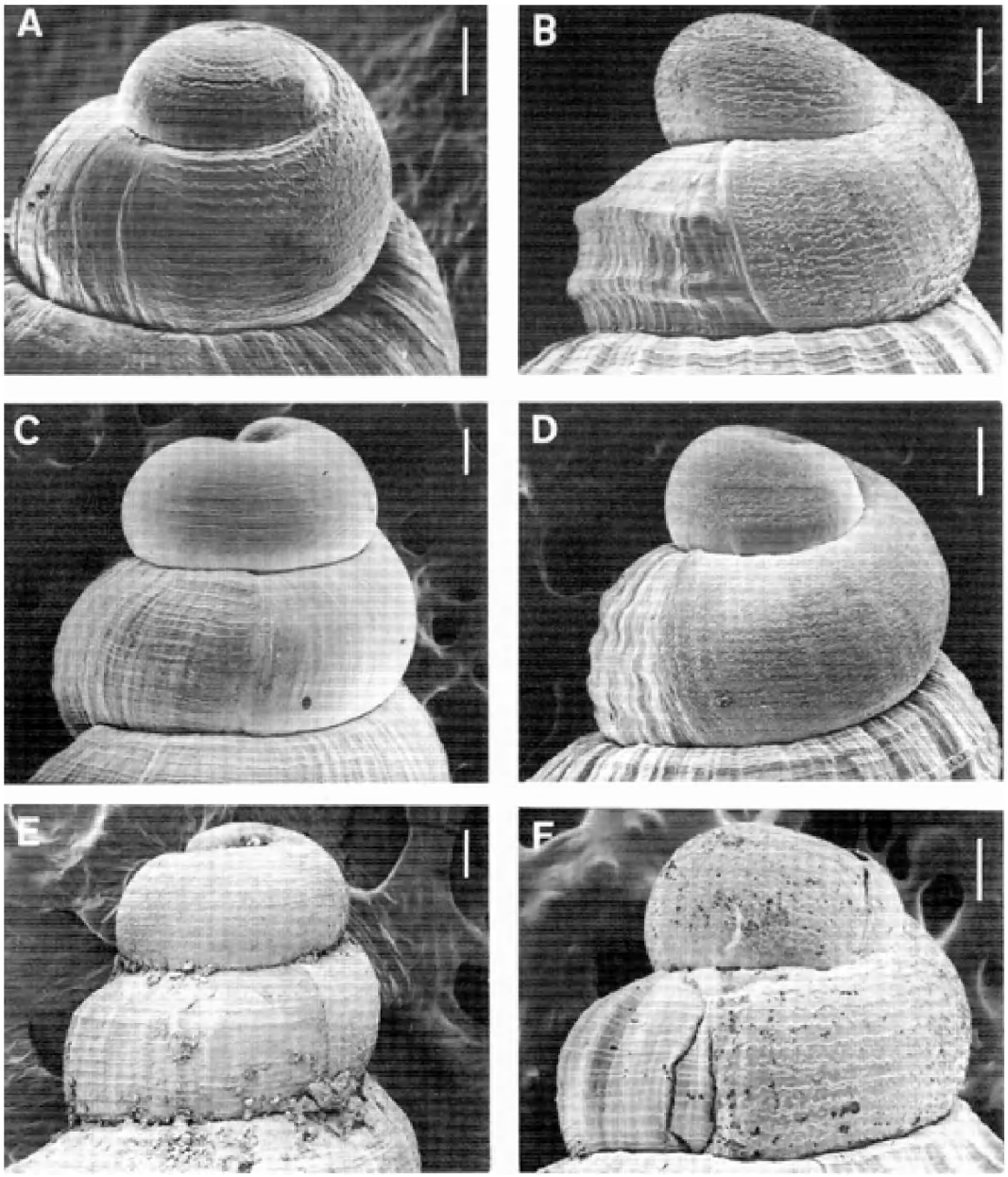

Fig. 16. Protoconchs. A. *Alvania incognita* sp.n., paratype. B. *A. scrobiculata* (Møller, 1842), north of Iceland, 208 m, BIOICE 2126. C. *Onoba leptalea* (Verrill, 1884), northeastern Greenland, J. Brønlund Fjord. D. *O. improcera* sp.n., BIOICE 2128. E. *O. obliqua* (Warén, 1974), off southeastern Iceland, 400 m. F. *O. exarata* (Stimpson, 1851), BIOICE 2137. Scale lines 100 µm.

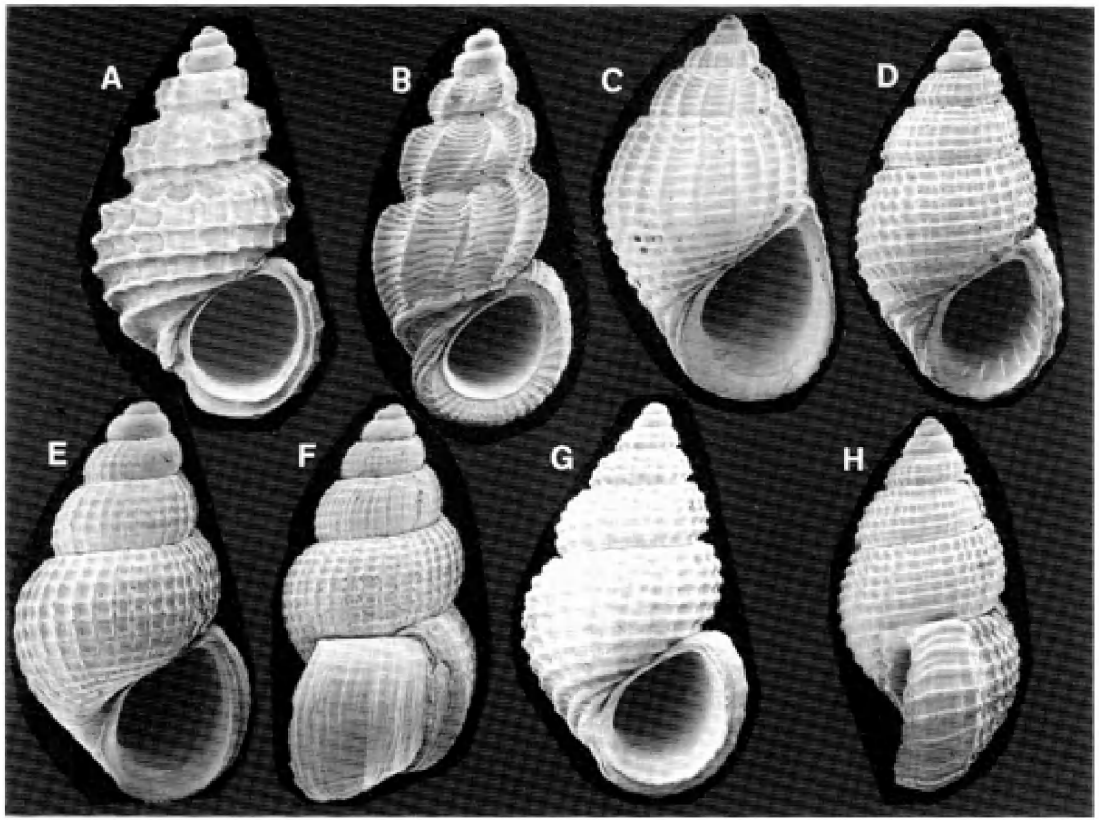

Fig. 17. *Alvania* spp., *Manzonia* sp. A. *A. zetlandica* (Montagu, 1815), western Norway, Korsfjorden, 3.4 mm. B. *M. crassa* (Kanmacher, 1798), southern Spain, Ceuta, 2.7 mm. C. *A. lactea* (Michaud, 1830), Swedish west coast, Hamburgön, Postglacial fossil, 4.6 mm. D, H. *A. beani* (Hanley, 1844), Swedish west coast, Koster Area, 3.8 and 2.95 mm. E, F. *A. punctura* (Montagu, 1803), western Norway, Trondheimsfjord, 2.3 and 2.6 mm. G. *A. cimicoides* (Forbes, 1844), western Norway, Korsfjorden, 5.3 mm.

Alvania wyvillethomsoni (Friele, 1877)
(Fig. 18A)

Alvania wyvillethomsoni: Bouchet & Warén 1993:651, figs 1480-1481, 1515.

New records. Northern Iceland, BIOICE 2078, 67°40.60' N, 17°06.30' W, 1043 m, several spms (IMNH).- BIOICE 2081, 67°22.30' N, 17°23.05' W, 893 m, 2 spms (IMNH). - BIOICE 2100, 68°00.06' N, 19°25.26' W, 1141 m, 75 spms (IMNH). - BIOICE 2119, 67°07.08' N, 19°52.39' W, 284 m, 1 spm (IMNH). - Eastern Iceland, BIOICE 2317, 64°07.00' N, 09°03.00' W, 996 m, 27 spms (IMNH). - BIOICE 2319, 64°01.00' N, 09°37.00' W, 776 m, 21 spms (IMNH).

North and northeast of the Faeroes, several localities, 800-1200 m, BIFAR.

Distribution. The Norwegian Sea and the Polar Basin in 300-2800 m. Not known south of the Shetland-Faroe Ridge.

Habitat. Not known in detail (muddy bottoms?), often in large numbers.

Remarks. The rather large and strongly sculptured shell with a smooth, unusually conical protoconch makes this species easy to recognise. It never forms a labial varix and can thus be considered neotenous, although it is one of the largest species of Rissoidae in the area.

Two egg capsules from BIOICE 2100 (data above) were identified by SEM of embryos with complete shells. The capsules are hemispherical, slightly larger than the embryo, with a simple, transparent, smooth wall. The flat, basal surface is wrinkled and demarcated by and angle with a flange. There is no preformed exit hole and the capsules contain each a single embryo, only slightly smaller than the capsule.

Alvania wyvillethomsoni is the type species of *Punctulum* Jeffreys, 1884, regarded as a subgenus by Ponder (1985a).

Alvania moerchi (Collin, 1886)
(Fig. 18F, 19A-B)

Alvania moerchi: Warén 1974:133, fig. 44, 55, 56.
Cingula moerchi: Schiøtte 1989:10.

New records. Northern Iceland, Eyjafjordur, 60 m, 1 sh (NA). – Skjalfandi, 2 spms (HM). - Northwest of Kolbeinsöy, 400 m, 1 spm (JHB). - BIOICE 2135, 66°44.37' N, 18°57.32' W, 418 m, 1 spm (JT). - BIOICE 2075, 67°11.65' N, 17°32.04' W, 563 m, 1 spm (IMNH). - BIOICE 2088, 67°14.32' N, 17°51.41' W, 617 m, 6 spms. - BIOICE 2089, 67°13.08' N, 17°50.34' W, 517 m, 4 spms (IMNH). - BIOICE 2093, 67°11.85' N, 17°45.30' W, 407 m, 2 spms (IMNH). - BIOICE 2094, 67°02.03' N, 17°34.18' W, 303 m, 5 spms (SMNH). - BIOICE 2096, 67°01.10' N, 17°34.66' W, 300 m, 13 spms (SMNH). - BIOICE 2122, 67°10.69' N, 19°33.62' W, 346 m, 2 spms (IMNH). - BIOICE 2129, 66°45.88' N, 18°41.75' W, 678 m, 1 spm (IMNH). - BIOICE 2137, 66°43.11' N, 19°19.49' W, 297 m, 1 spm (IMNH). - Eastern Iceland, 65°08'N, 12°08' W, 247-260 m, 3 Apr 1981 (JB). - 66°16.5' N, 12°14.5' W, 415 m, 22 March 1983 (JB). - BIOICE 2321, 63°56.00' N, 10°00.00' W, 639 m, 1 spm (IMNH). - BIOICE 2323, 63°55.00' N, 10°05.00' W, 623 m, 4 spms (IMNH). - BIOICE 2330, 63°05.00' N, 11°20.00' W, 453 m, 1 spm (IMNH).

Distribution. High Arctic, Northeastern Canada, Eastern Greenland, northern and eastern Iceland, Svalbard, Kara Sea, east to the New Siberian Islands. Depth range 15-678 m. (Warén 1974, Schiøtte 1989).

Habitat. Not known in detail.

Remarks. The stout shape, strong spiral keels, absence of axial ribs, and large aperture make *A. moerchi* easy to recognise among the Arctic rissoids.

Alvania subsoluta (Aradas, 1847)
(Fig. 18G)

Alvania subsoluta: Bouchet & Warén 1993:645, figs 1377, 1453-1461, 1464-1474.

New records. Off northern Iceland, BIOICE 2077, 67°40.51'N, 17°10.38'W, 1048 m, 15 spms (IMNH). - Off southwestern Iceland, BIOICE 2297, 62°53.74'N, 22°39.33'W, 981 m, 6 spms (IMNH). - BIOICE 2299, 63°00.10'N, 22°39.61'W, 775 m, 7 spms (SMNH). - BIOICE 2300, 62°59.62'N, 22°39.38'W, 810 m, 3 spms (IMNH).

Distribution. From Iceland and northern Norway (northernmost records *Vøringen* sta 195, 70° 55'N, 18° 38'E, 196 m, and *J. Ruud* 1233-81, 67°43'N, 13°35'E, 250 m, 2 spms), along the European west coast, throughout the Mediterranean and to the Canary Islands. Depth range usually 200-2000 m.

Habitat. Muddy or slightly silty bottoms from about 150 m and deeper. It sometimes occurs in large numbers (several hundred specimens in an Ockelmann sled).

Remarks. There are no great problems with the identification of *A. subsoluta*; the somewhat similar *A. testae* has almost two strongly sculptured whorls in the protoconch, *A. subsoluta* has 1.5 whorls with a spiral striation that just barely can be seen with a stereomicroscope (in perfect specimens).

Alvania testae (Aradas & Maggiore, 1844)
(Fig. 18E)

Alvania testae: Bouchet & Warén 1993:628, figs 1386-1387, 1400-1405.

New records. Western Norway and the eastern part of the North Sea, north to Trondheimsfjorden 50-300 m, numerous lots (SMNH, ZMO, ZMB).

The Kattegat, 'Hauch' stations 101,104, 184, 237, 310, 369, 370,421, 463; North of the point of Sjaelland; south of Trindelen altogether 200 spms, depth 17-100 m (ZMC, cf. Petersen 1888:95, as '*Rissoa abyssicola*').

The Skagerrak, Bohuslän and Gullmarsfjorden (*R. sculpta* Lovén 1846, not Philippi, 1844), numerous lots (SMNH).

Distribution. From western Norway (Trondheimsfjord) southwards along the European west coast, throughout the Mediterranean and south to ca 31° N in Morocco. Depth range usually 100-800 m, more shallow (50-300 m) in the north.

Habitat. Silty to slightly muddy bottoms from about 50 m depth. It seems to prefer slightly current swept bottoms. It is never as numerous as *A. subsoluta*.

Remarks. For differences from *A. subsoluta*, see that species. *Alvania puntura* can be distinguished by its orthocline (parallel to the shell axis, seen from the side) outer lip, more pointed larval shell with 2.5-3 whorls, and distinctly brownish colour.

In old Scandinavian literature the name *Alvania abyssicola* (Forbes, 1853) is used for this species.

Alvania jeffreysi (Waller, 1864)
(Figs 7A, 18D)

Alvania jeffreysi: Bouchet & Warén 1993:641, figs 1375-6, 1396-7, 1439-41.

New records. Off southeastern Greenland, 65°51' N, 35°07' W, 264 m, 10 Sept 1980, 1 spm (JB).

Northern Iceland, Skjálfandi, from haddock stomach, 1 spm (JHB). - Off western Iceland, BIOICE 2219, 64°12.57' N, 25°16.78' W, 265 m, 4 spms (IMNH). - BIOICE 2221, 63°55.01' N, 25°16.39' W, 240 m, 13 spms (IMNH). - BIOICE 2241, 63°21.07' N, 25°21.78' W, 305 m, 3 spms (IMNH). - BIOICE 2282, 63°08.26' N, 23°55.61' W, 390 m, 2 spms (IMNH). - Iceland except the north coast 75-545 m, 17 records (JB).

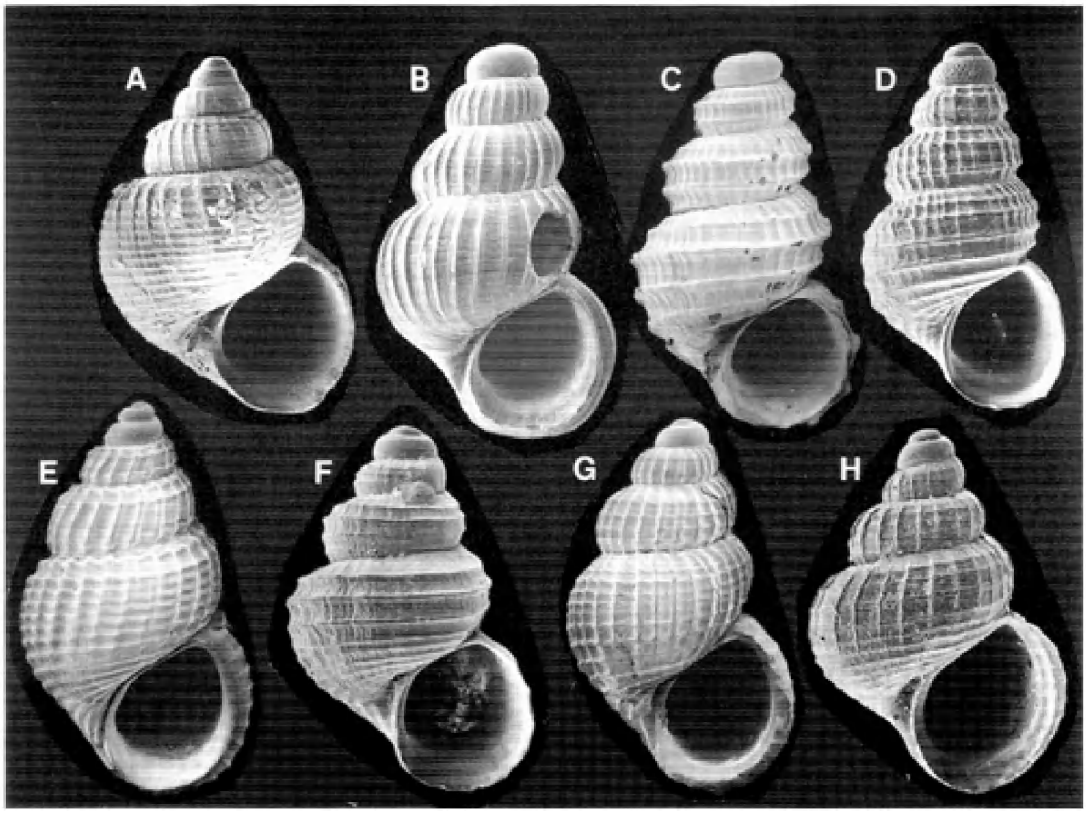

Fig. 18. *Alvania* spp. A. *A. wyvillethomsoni* (Friele, 1877), off eastern Iceland, 309 m, *Ingolf* Expedition stn 59, 4.9 mm. B. *A. verrilli* (Friele, 1886), off northern Norway, *Vøringen* stn 192, 2.9 mm. C. *A. scrobiculata* (Møller, 1842), BIOICE 2126, 2.8 mm. D. *A. jeffreysi* (Waller, 1864), western Norway, Korsfjorden, 300 m, 2.3 mm. E. *A. testae* (Aradas & Maggiore, 1844), Swedish west coast, Gullmarsfjorden, 3.0 mm. F. *A. moerchi* (Collin, 1886), northeastern Greenland, Jørgen Brønlunds Fjord, 3.8 mm. G *A. subsoluta* (Aradas, 1847), Swedish west Coast, Koster Area, 3.1 mm. H. *A. pseudosyngenes* (Warén, 1973), eastern Greenland, Kung Oscars Fjord, 3.2 mm.

The Faeroes, several localities, BIOFAR; 5 lots.

Norway, (north to *Vøringen* stn 195, 70° 55' N, 18° 38' E, 196 m, and Vardø) 50-600 m, 30 lots, numerous spms (SMNH, ZMO, ZMB).

The Kattegat, northwest of Hanstholm, 254 m, 1 lot (ZMC).

Distribution. From southeastern Greenland, northern and northwestern Iceland, and northernmost Norway, southwards to Portugal, ca 40° N, usually in 75-300 m, occasionally deeper.

Habitat. Silty and sandy bottoms from about 100 meters depth and deeper. It is common on slightly current swept bottoms.

Remarks. *Alvania jeffreysi* is most easily recognised by the rather distinct, zigzagging spiral cords on the protoconch (Fig. 7A, visible in a stereo microscope at 50 x).

Alvania scrobiculata (Møller, 1842) (Figs 16B, 18C)

Alvania scrobiculata: Warén 1974:133, figs 16-18, 53-54.

New records. Eastern Greenland, 62°29' N, 40°42' W, 22 September 1976, 156 m, 20 shs and spms (JB).

Northern and eastern Iceland, from west of Patreksfjordur, northwards, eastwards along the northern coast and south to Hornafirdirmid, 23 records, about 64°30' N at the eastern coast, in 120 - 571 m, 50 spms and shs (JB, JHB, NA). - BIOICE 2074, 66°40.40' N, 17°55.12' W, 201 m, 1 spm (IMNH). - BIOICE 2084, 67°15.61' N, 17°24.91' W, 743 m, 1 spm (IMNH). - BIOICE 2096, 67°01.10' N, 17°34.66' W, 300 m, 1 spm (IMNH). - BIOICE 2126, 66°59.51' N, 18°49.82' W, 208 m, 35 spms (SMNH). - BIOICE 2128, 66°59.02' N, 18°49.97' W, 203 m, 30 spms (IMNH). - BIOICE 2178, 66°21.93' N, 18°18.25' W, 100 m, 1 spm (IMNH).

Western Norway, outer part of Korsfjorden, 2 shs, Glacial fossil (SMNH).

Distribution. High Arctic, Greenland, northern and eastern Iceland, northern Norway (only known live from Varangerfjord and its side branch Bugøyfjord, 70° N, 28°30' E) and Svalbard, usually in 10-300 m (Warén 1974).

Habitat. Not known in detail.

Remarks. *Alvania scrobiculata* resembles the more southern *A. jeffreysi*, but that species can be recognized by the distinct zigzagging sculpture on the larval shell. The teleoconch sculpture is sharper and coarser in *A. scrobiculata* than in *Onoba mighelsi* which species has only weak axial sculpture. *Alvania pseudoareolata* has a more dominating axial sculpture on the teleoconch and its protoconch has a less conspicuous initial whorl.

Alvania pseudosyngenes Warén, 1973
(Figs 18A, 19F)

Alvania pseudosyngenes: Bouchet & Warén, 1993:650, figs 1476-1477, 1489.

New records. Northern Iceland, Northwest of Kolbeinsöy, 400 m, 1 spm (JHB). - BIOICE 2176, 66°30.96' N, 18°32.30' W, 213 m, 1 spm (IMNH).
Distribution. Eastern Greenland and the Denmark Strait; western, northern and eastern Iceland; and Norway north of Lofoten. Depth range ca 200-2200 m.

Habitat. Not known in detail.

Remarks. *Alvania pseudosyngenes* may be recognised by its rather broad shape and reticulate sculpture, very neatly and regularly demarcated by axial and spiral ribs of about the same strength.

Alvania pseudoareolata (Warén, 1974)
(Fig. 19E, 23D)

Alvania pseudoareolata: Bouchet & Warén 1993:641, figs 1436-1438, 1490, 1492.

New records. Northern Iceland, Kolbeinseyarmid, 200-400 m, 2 spms (JHB). - BIOICE 2094, 67°02.03' N, 17°34.18' W, 303 m, 4 spms (IMNH). - BIOICE 2074, 66°40.40' N, 17°55.12' W, 201 m, 2 spms (IMNH). - BIOICE 2091, 67°11.38' N, 17°46.44' W, 405 m, 3 spms (IMNH). - BIOICE 2096, 67°01.10' N, 17°34.66'W, 300 m, 6 spms (IMNH). - BIOICE 2097, 66°36.92' N, 18°14.42' W, 110 m, 8 spms (IMNH). - BIOICE 2126, 66°59.51' N, 18°49.82' W, 208 m, 20 spms (SMNH). - BIOICE 2128, 66°59.02' N, 18°49.97' W, 203 m, 48 spms (IMNH). - BIOICE 2150, 66°41.95' N, 20°02.49' W, 149 m, 50 spms (IMNH). - BIOICE 2152, 66°41.88' N, 20°02.98' W, 148 m, 29 spms (IMNH). - BIOICE 2177, 66°30.50' N, 18°31.92' W, 201 m, 30 spms (IMNH). - BIOICE 2178, 66°21.93' N, 18°18.25' W, 100 m, 1 spm (IMNH).

Distribution. From Maine to New Foundland, off southeastern Greenland, and northern Iceland. Depth range 40-900 m, usually 100-300 m.

Habitat. Not known in detail.

Remarks. For differences from *A. scrobiculata*, see that species.

Alvania verrilli (Friele, 1886)
(Figs 18B, 19D)

Alvania verrilli: Bouchet & Warén 1993:651, figs 1463, 1478-1479.

Distribution. Off northern Norway (*Vøringen* sta 192, 60°46' N, 16°15' E, 1187 m); arctic circumpolar in 180-1200 m.

Habitat. Not known in detail.

Remarks. This species has so far not been found during the BIOFAR and BIOICE programs. Perhaps it has an even more northern distribution. It may be recognised by the conspicious and uniform spiral microsculpture and absense of larger spiral ribs.

Alvania cimicoides (Forbes, 1844)
(Fig. 17G)

Alvania cimicoides: Bouchet & Warén 1993:624, figs 1381-1385.

New records. Northwestern to southern and southeastern Iceland, 60-25 m, 17 records (JB).
Northern Kattegat, 10 lots (ZMC).
Norway, north to Hammerfest, 25 lots (ZMB and ZMO).

Distribution. From the Denmark Strait, northwestern, western, southern, and southeastern Iceland, the Faeroes, northernmost Norway (Hammerfest), and south along the European west coast, throughout the Mediterranean, the Azores and the Canary Islands. Depth range usually 100-1000 m, more shallow in the north.

Habitat. Rocky, sandy and silty, current swept bottoms from about 35 meters and deeper, never in great numbers.

Remarks. *Alvania cimicoides* may resemble *A. beani*, but can be distinguished by having a larger aperture and a distinctly yellowish protoconch.

Alvania punctura (Montagu, 1803)
(Fig. 17E-F)

Turbo puncturus Montagu 1803:320, pl. 12,fig. 5.
Alvania punctura: Graham 1988:244, fig. 94.

Type locality. Several localities in southern Great Britain.

Type material. 4 syntypes in the Royal Albert Memorial Museum, Exeter, no 4222.

New records. Northern Norway, Kvaløya, Forsol, 70°43' N, 23°48' E, intertidal crevices, 1 spm (SMNH). - Norway north to Lofoten, several lots (ZMO, ZMB, SMNH).
The Kattegat and the Skagerrak, numerous lots (ZMC, SMNH).
The Faeroes, a few samples with shs and spms (ZMC, SMNH).

Distribution. From northeastern Norway, along the European coasts, south to and into the central Mediterranean. Depth range, intertidal to about 40 m, in the southern part also slightly deeper. Not known from Iceland.

Habitat. Often common, undisturbed bottoms with fine sand or silt, also on algae and under low intertidal rocks with good water circulation.

Remarks. *Alvania punctura* can be recognised by its brownish shell with finely reticulate sculpture and pointed larval shell with about 2.5-3 whorls.

Alvania beani (Hanley, 1844)
(Fig. 17D, H)

Turbo reticulatus sp.n. Adams 1797:66, pl. 1, figs 19-20 (not Solander, 1766).
Turbo reticulatus sp.n. Montagu 1803:322.
Rissoa beani sp.n. Hanley 1844:XLI, fig. 43.
Alvania beani: Graham 1988:232, fig. 88.

Type localities. *T. reticulatus*, Pembrokeshire, southern Great Britain; *R. beanii*, Scarborough, Great Britain.

Type materials. *T. reticulatus*, presumably lost; *R. beani*, not known.

New records. About 100 Scandinavian lots with about one thousand spms, western Norway, from Hitra Island (off Trondheimsfjorden) and southwards (SMNH).

Distribution. Western Norway from ca 63.5°N and southwards, into the Skagerrak and the northern Kattegat, south to the Mediterranean where the distribution becomes incompletely known due to taxonomic problems. Depth range, lowermost intertidal to ca 40 m. Not known from Iceland and the Faeroes.

Habitat. Rocky and gravelly bottoms with algae. Never in large numbers.

Remarks. *Alvania beani* may be recognised by its strongly sculptured and sturdy shell with an orthocline, strongly thickened and internally ribbed outer lip.

An old record from Finnmark (Jeffreys 1884:112) is probably based on a misidentification.

Alvania zetlandica (Montagu, 1815)
(Fig. 17A)

Alvania zetlandica: Bouchet & Warén 1993: 655, figs 1494-1496, 1502.

New records. None.

Distribution. Northern Norway from ca 69-70°to the western Mediterranean, in about 30-300 m. Not known from Iceland and the Faeroes. Depth range usually 30-300 m. Only empty shells known from the Skagerrak.

Habitat. Sandy, gravelly and silty bottoms, swept by currents, in 50-300 m. Never in great numbers.

Remarks. *Alvania zetlandica* may be recognised by its very strongly sculptured shell and large aperture.

Alvania lactea Michaud, 1830
(Fig. 17C)

Rissoa lactea: Michaud 1830:7, figs 11-12.
Alvania lactea: Graham 1988:242, fig. 93.

Type locality. Several localities in southern France (Mediterranean).

Type material. Not known.

New records. Swedish west coast, Bohuslän, Fjällbacka, Porsholmen, 5 shs on a beach (SMNH). - Hamburgön, 12 shs in a shell deposit with warm water fauna from the Atlantic Stade (SMNH). - Tjärnö, 2 shs in a shell deposit with the same warm water fauna (SMNH).

Distribution. Southern Great Britain and along the European coasts southwards, to and into the Mediterranean. Depth range intertidal to a few meters depth.

Habitat. Intertidal to a few meters depth, under deeply buried rocks, often in groups of several specimens just at the border to anoxic conditions (S. Gofas pers. commn).

Remarks. *Alvania lactea* can be recognised by the large, ovate shell with a tall pointed aperture.

Alvania lactea has also previously been recorded from Bohuslän (Malm 1863:125, shells) and it can not be excluded that it still lives at the Swedish west coast. In

Bohuslän most of the normally intertidal marine invertebrates occur slightly deeper, 5-15 m because of the variations in salinity in the surface water (10-30 ppm) and because the water level can drop about one meter below normal for extended periods of time. That makes this fauna difficult to access, and it remains poorly known along the Swedish west coast.

Genus *Manzonia* Brusina, 1870

Type species. *Turbo costatus* J. Adams, 1797 (= *Turbo crassus* Kanmacher, 1798), western Europe, by original designation.

Remarks. I follow Ponder (1985a) in the usage of the name *Manzonia*, except that *Alvania zetlandica* is here kept in *Alvania*, for reasons presented by Bouchet & Warén (1993).

Manzonia crassa (Kanmacher, 1798) (Fig. 17B)

Turbo costatus sp.n. J. Adams 1797:2, pl. 1, figs 13-14 (not Salis-Marschlins, 1793).
Turbo crassus sp.n. Kanmacher 1798:638, fig. 20.
Manzonia crassa: Graham 1988:250, fig. 97.
Type localities. *T. costatus*, Pembrokeshire, southern Great Britain; *T. crassus*, Sandwich, southern Great Britain.

Type material. Presumably lost.

New records. Western and southern Norway, Raunefjorden (SMNH) and Oslofjorden (Asbjørnsen leg., SMNH), a few shs. Swedish west coast, Koster Area, and Gullmarsfjorden, several shs (SMNH).

Distribution. From southwestern Norway (ca 60.5° N), southwards to and throughout the Mediterranean. Depth range usually 0-30 m. Not known from Iceland and the Faeroes.

Habitat. Incompletely known.

Remarks. *Manzonia crassa* can be recognised by the very strong and oblique axial ribs and the double rim of the peristome.

Some of the shells above are quite fresh and the species may live in southern Scandinavia.

Genus *Crisilla* Monterosato, 1917

Type species. *Turbo semistriatus* Montagu, 1808, western Europe, by monotypy.

Remarks. Following Bouchet & Warén (1993) I have used *Crisilla* as a genus.

Crisilla semistriata (Montagu, 1808) (Fig. 12B)

Turbo semistriatus sp.n. Montagu 1808:136, pl 21, fig. 5.
Alvania semistriata: Graham 1988:236, fig. 90.

Type locality. British Isles, southern Devonshire.

Type material. Lost.

New records. Western Norway, north to Trondheimsfjorden, intertidal under rocks, several lots, numerous spms (SMNH). Swedish west coast, Bohuslän, scattered shs (SMNH).

Distribution. Southern Scandinavia from ca 63.5° N, to and throughout the Mediterranean, intertidal to a few meters depth. Not known from Iceland and the Faeroes.

Habitat. Low intertidal, under rocks with good water circulation.

Remarks. *Crisilla semistriata* may be recognised from its shining, yellowish or brownish shell with a weak spiral striation.

Crisilla semistriata has in Scandinavia not been found living in the Kattegat-Skagerrak area, only along the western coast of Norway.

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

Type species. *Turbo striatus* J. Adams, 1797, preoccupied (= *Onoba semicostata* (Montagu, 1803)), northwestern Europe, by monotypy.

Remarks. The genus is conchologically not very clearly demarcated from some of the groups in *Alvania* (e.g. *Alvania subsoluta* and relatives).

The two shallow water species, *O. aculeus* and *O. semicostata* have a tendency of abnormal growth. After forming a complete shell with a labial varix, they may start growth again and form up to three additional whorls, usually deviating from the earlier ones in sculpture or direction of the axis of the shell. The reason for this is not known, but one possible explanation is known from hydrobiid gastropods (Rotschild 1936, Wesenberg-Lund 1934), where castration by trematodes causes the snail to grow to a much larger size, often with abnormal shell morphology. A similar phenomenon is also know from species of *Rissoa* and *Pusillina* (Warén in press).

Onoba semicostata (Montagu, 1803) (Figs 20A-D, 21A-C)

Turbo striatus sp.n. J. Adams 1797:66 (not Da Costa, 1778).
??*Turbo shepeianus* sp.n. Kanmacher 1798:638, fig. 22 (nomen dubium).
Turbo striatus: Montagu 1803:312, 342.

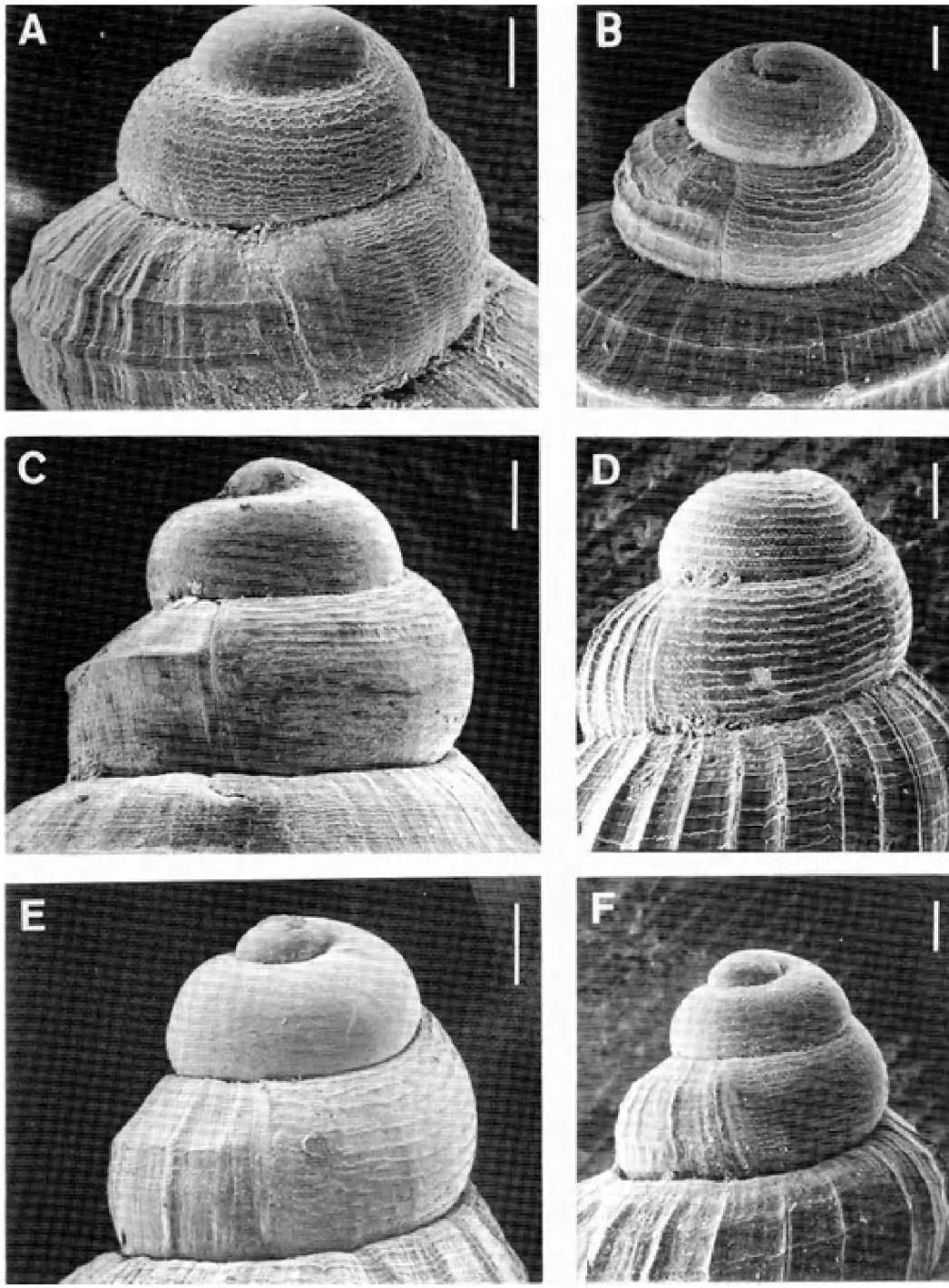

Fig. 19. *Alvania* spp, protoconchs. A. *A. moerchi* (Collin, 1886), northern Greenland, Jørgen Brønlunds Fjord, 50 m. B. *A. moerchi*, Swedish west coast, Fjällbacka, Glacial fossil. C. *A. angularis* sp.n., paratype. D. *A. verrilli* (Friele, 1886), off northern Norway, *Vøringen* sta 192. E. *A. pseudoareolata* (Warén, 1974), BIOICE 2126. F. *A. pseudosyngenes* (Warén, 1973), eastern Greenland, Kung Oscars Fjord. Scale lines 100 µm.

Turbo semicostatus sp.n. MONTAGU 1803:326
Turbo semicostatus: MONTAGU 1808:129, pl. 21, fig. 5.
Type localities. *T. striatus*, Pembrokshire, southern Great Britain; *T. semicostatus*, southern coast of Devonshire, Great Britain.

Type materials. *T. striatus*, presumably lost; *T. semicostatus*, nothing left in Royal Albert Memorial Museum, Exeter, or BMNH, although JEFFREYS (1878) commented: '*T. semicostatus*. *Rissoa striata*, ADAMS; young'. This indicates that at that time there was a specimen in the first mentioned collection.

New material. Northern Iceland, Skjalfandi, 11 shs, HM. - Raufarhöfn, 25 shs (SMNH).

The Faeroes, several localities with numerous shs and spms, 0-100 m, C. Schander leg. (SMNH).

Northern Norway, numerous records north to Senja (Straumsnes, 69°24' N, 17°18' E, many shs and spms, SMNH).

Mediterranean Spain, Bay of Algeciras, 12 shs (SMNH).

Distribution. Northern Iceland, the Faeroes, and northern Norway, south to just inside the Mediterranean (Algeciras, Spain, cf. 'new records' and van AARTSEN & al. 1984) possibly further. south in Morocco. Common in the Skagerrak and Kattegat; absent in inner Danish waters and the Baltic.
Habitat. Common on sandy or rocky bottoms with algae, from the lowermost intertidal to about 40 m depth. In the Kattegat-Skagerack area it does not occur in the uppermost 1-5 m, presumably depending on the variation in salinity, which at the surface may drop to 10-15 ppm.

Remarks. I have only recorded the geographically extreme findings in the material I have examined. The northernmost records of G.O. SARS (1878, ca 70.5° N) may be questioned since his identifications of species of *Onoba* were very haphazard, and such northern localities could not be confirmed in ZMO.

Records from inner Danish waters and the description of reproduction in *O. semistriata* (RASMUSSEN 1951, 1973) are based on *O. aculeus*. This has been confirmed by examination of material in ZMC and discussion with E. Rasmussen. Also the descriptions by LEBOUR (1934, 1937) are based on *O. aculeus*, judging from the size of the hatching larva and absence of a veliger state.

Onoba aculeus and *O. semicostata* are common in shallow water in southern Scandinavia, often sympatrically. *Onoba aculeus* however continues northwards well into the Arctic area and it also lives in brackish water, for example in Denmark, where *O. semicostata* is absent from the inner waters. The two species may be close to impossible to distinguish, but *O. aculeus* usually lacks the axial ribs, which almost always are present on the apical whorls of *O. semicostata*. The most important difference, however, is the larval shell, which in *O. aculeus* consists of slightly more than one, finely striated whorl of a diameter of up to 560 µm (Fig. 21D-E) and lacks every trace of protoconch 2. *Onoba semicostata*, has a larval shell consisting of protoconch 1 and 2, of 0.7 and 1.2-1.3 whorls respectively, clearly indicating planktotrophic larval development (Fig. 21A-C). This difference in reproductive ecology also results in the apex of *O. semicostata* being more pointed.

Onoba aculeus (GOULD, 1841)
(Figs 20E-H, 21D-E)

Onoba aculeus: WARÉN 1974:125.
Onoba karica sp.n GOLIKOV 1986: 87, fig. 4.

Material examined. Tens of thousands of spms from all around Iceland, Norway, the Kattegat and the Skagerack (SMNH, ZMO, ZMB, ZMC).

Distribution: Arctic, south to the New England area and northwestern Spain (Vigo Bay, ROLAN 1983). Common in Iceland, the Faeroes, the Skagerack, the Kattegat, and the southernmost Baltic.

Habitat. Intertidal, sheltered rocky shores to a few meters depth, under stones or in *Zostera* beds, often in very large numbers.

Remarks. *Onoba aculeus* lives in more shallow water than *O. semicostata* and also in areas with brackish water. I have found it in large quantities under intertidal, sheltered rocks with good water circulation or in *Zostera* beds.

The southern limit is uncertain. JEFFREYS (1867) considered it more characteristic for the northern parts of the British Isles, but ROLAN (1983) figured shells from the Vigo Bay, (northwestern Spain) and VAN AARTSEN & al. (1984) listed *O. aculeus* from the Bay of Algeciras, just east of the Strait of Gibraltar. Examination of material in MNHN and from my own field work along the Spanish and Portuguese Atlantic coasts did not reveal a single specimen south of Vigo Bay.

MOOLENBEEK & HOENSELAAR (1987) and HOENSELAAR & MOOLENBEEK (1987) described three new species of *Onoba* from the Bay of Algeciras and it is possible that the records of VAN AARTSEN & al. (1984) are based on one of these species.

Onoba karica GOLIKOV, 1986, described from the Kara Sea, 300 m depth, seems not to differ from *O. aculeus*.

Onoba obliqua (WARÉN, 1974)
(Figs 16E, 22D-F)

Onoba obliqua: BOUCHET & WARÉN 1993:662, figs 1514-1515.

New records. Northern Iceland, Northwest of Kolbeinsöy, 400 m, 1 spm (JHB). - BIOICE 2075, 67°11.65' N, 17°32.04' W, 563 m, 3 spms (IMNH). - BIOICE 2090, 67°13.34' N, 17°48.94' W, 539 m, 2 spms (IMNH). - Eastern Iceland, Reidarfirdir, off Eskifjördur, 1 spm (JHB). - Southeast of Iceland, Rosengarten, ca 64° N, 11.5° W, ca 400 m, from a trawl, several spms (JT, SMNH).

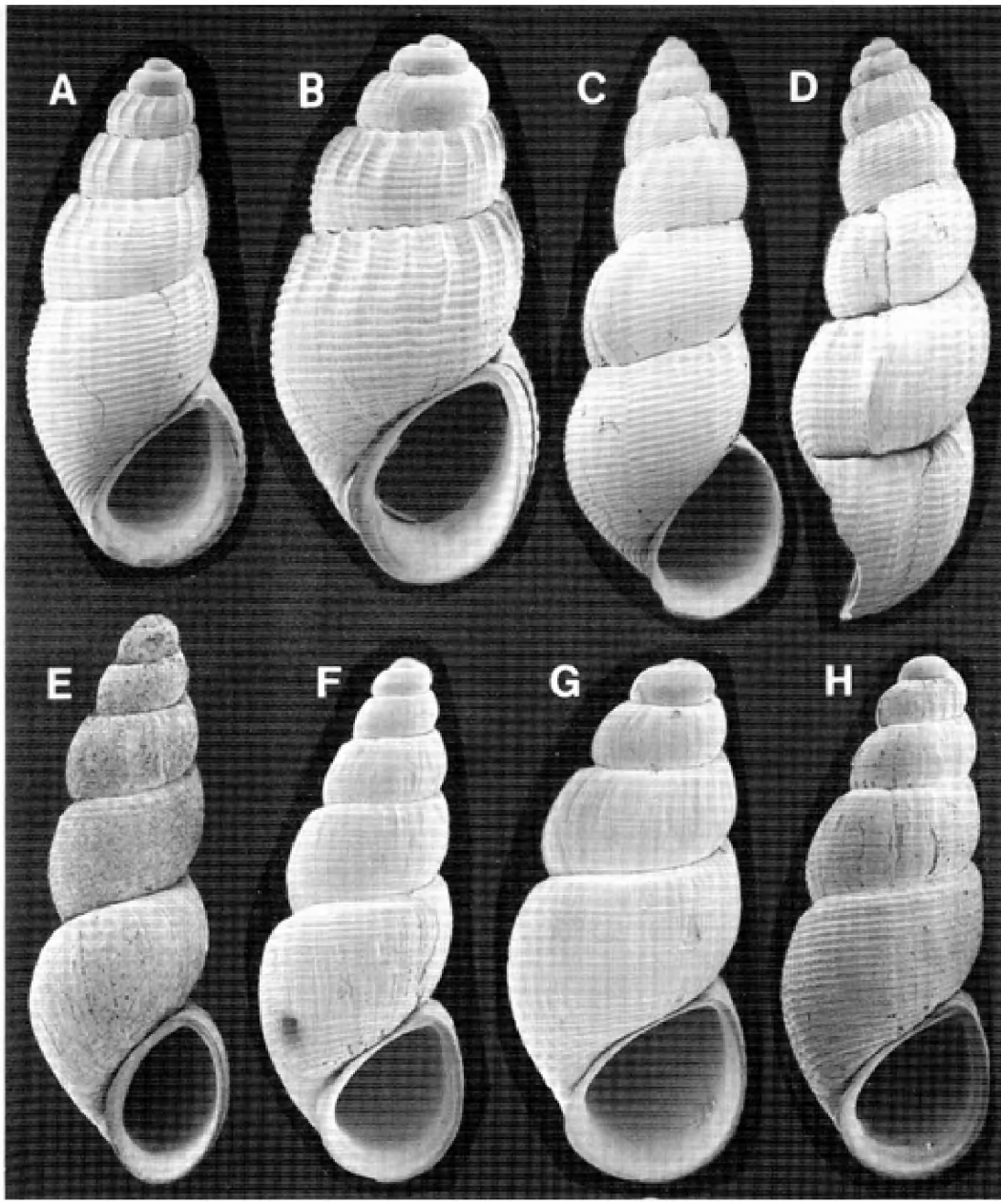

Fig. 20. *Onoba* spp. A-D. *O. semicostata* (Montagu, 1803), western Norway, A. 3.1 mm. B. 1.9 mm. C, D. 5.4 mm. E-H. *O. aculeus* (Gould, 1841), Iceland, Reykjavik, Seltjarnes. E. 3.4 mm. F. 3.3 mm. G. 2.1 mm. H. 2.9 mm.

Distribution. Off northern and eastern Iceland, Eastern Greenland and Jan Mayen, in 63-686 m.

Habitat. Not known in detail.

Remarks. *Onoba obliqua* differs from *O. leptalea* in having axial ribs and a coarser sculpture. *Onoba leptalea* also has a smaller and less protruding initial whorl in the protoconch, which has finer spiral sculpture than in *obliqua*.

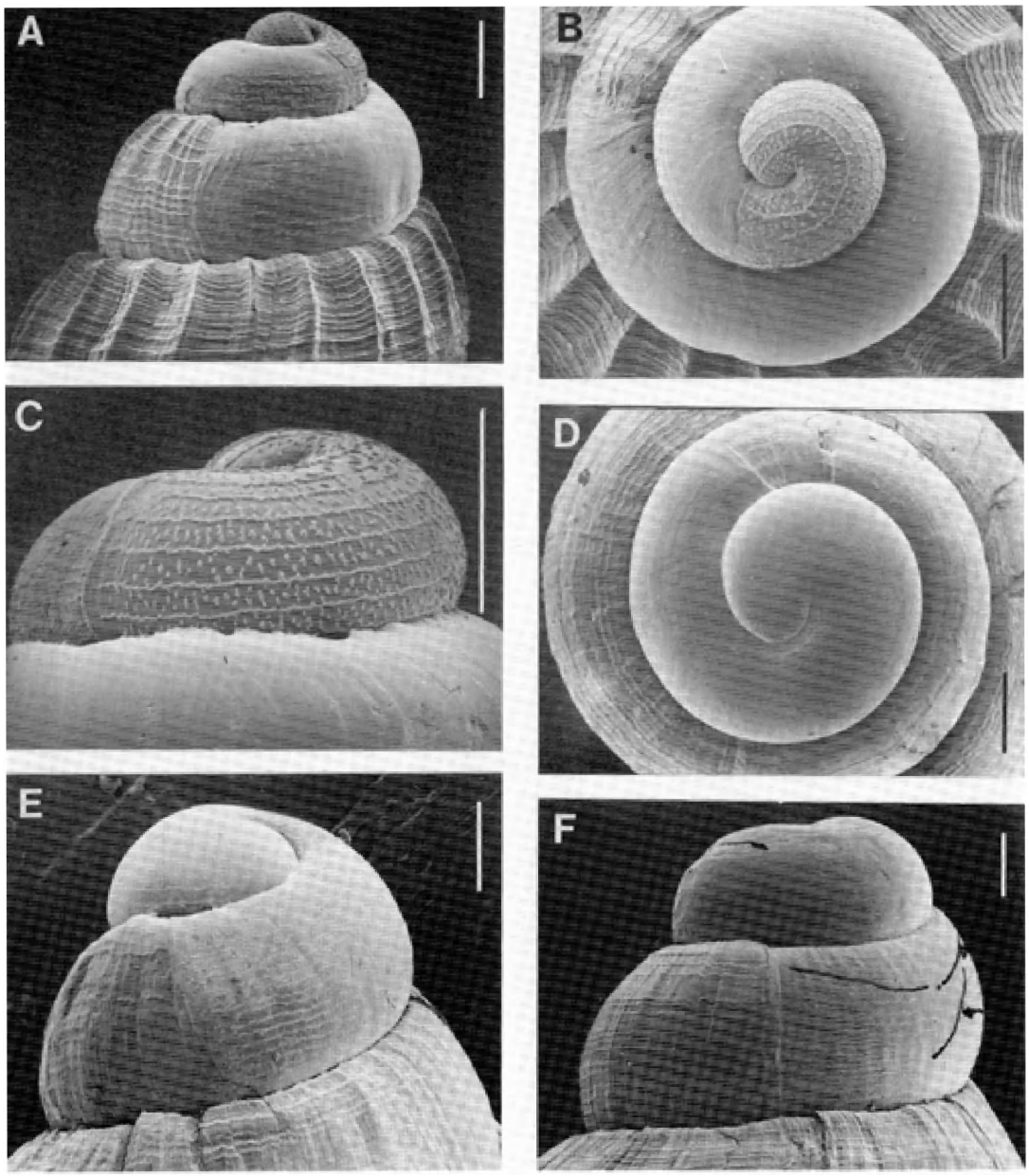

Fig. 21. *Onoba* apices. A-C. *O. semicostata* (Montagu, 1803), western Norway. D, E. *O. aculeus* (Gould, 1841), Iceland, Reykjavik, Seltjarnes. F. *O. islandica* (Friele, 1886), holotype. Scale lines 100 µm.

Onoba leptalea (Verrill, 1884)
(Figs 16C, 22A-C)

Onoba leptalea: Bouchet & Warén 1993:663, figs 1512-1513, 1516-1517, 1527.

New records. Western and southwestern Iceland, Reykjanes Ridge, 200-400m, 1 sh (HL). - Jökultunga, 260-400 m, 1 sh (HL).

Northeastern Greenland, Jørgen Brønlunds Fjord, 38 m, 11 spms; 40-45 m, 15 spms; 50 m, 43 spms, 2 egg capsules (ZMC).

Distribution. Off Massachusettes to northern Greenland, Jan

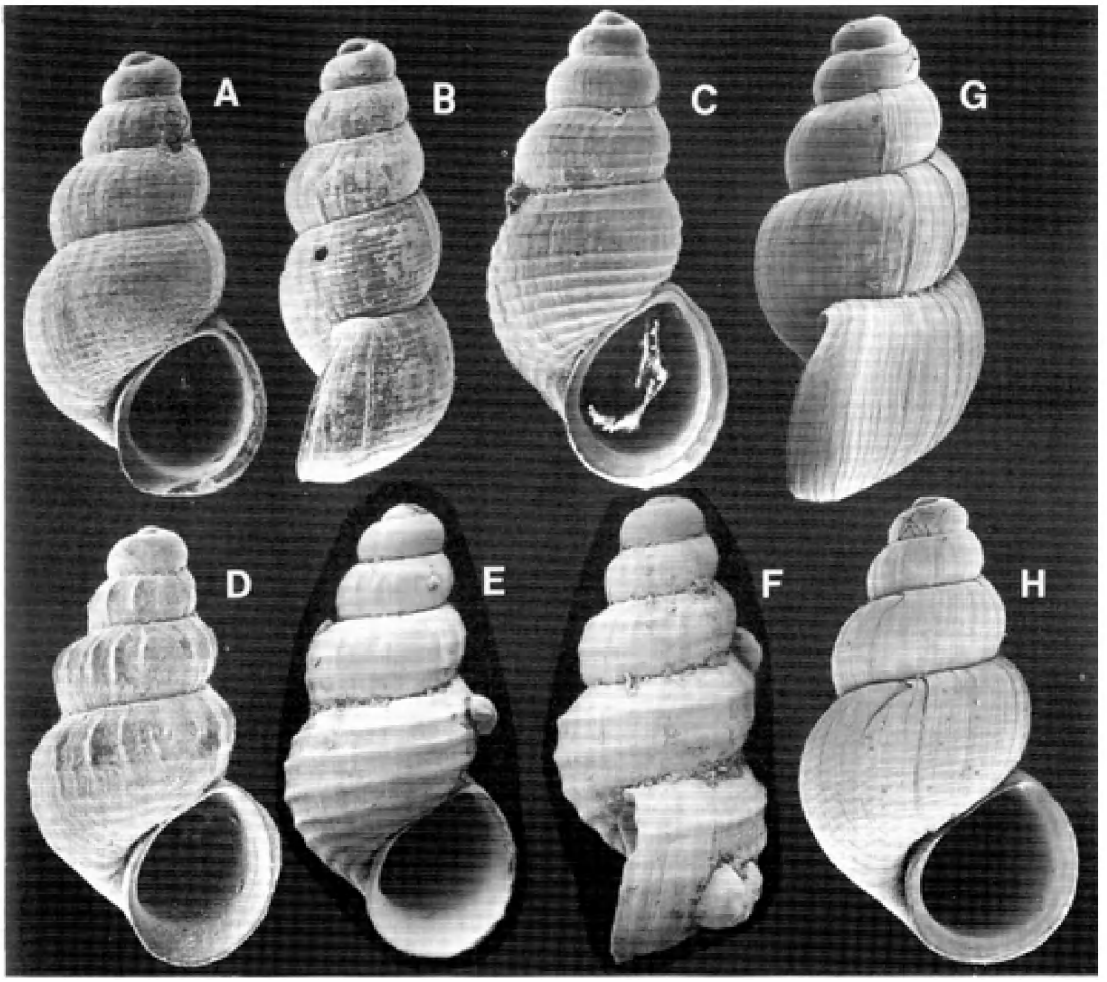

Fig. 22. *Onoba* spp. A, B. *O. leptalea* (VERRILL, 1884), south of Jan Mayen, 1800 m, *Ingolf* Expedition stn 116, 3.7 mm. C. *O. leptalea*, Jorgen Bronlunds Fjord, 50 m, 3.3 mm. D. *O. obliqua* (WARÉN, 1974), south of Jan Mayen, 1800, *Ingolf* Expedition stn 116, 2.9 mm. E, F. *O. obliqua*, southeast of Iceland, 400 m, 3.0 and 2.6 mm. G, H. *O. islandica* (FRIELE, 1886), holotype, 2.87 mm.

Mayen, northern, western and southwestern Iceland. Depth range 50-1600 m.

Habitat. Not known in detail.

Remarks. For differences from *O. obliqua*, see that species.

The egg capsules have a diameter of about 0.9 mm, have a simple smooth wall without preformed area for escape. They are attached to some firm substratum and contain a single young specimen of a size and sculpture perfectly corresponding to the larval shells figured, with no trace of teleoconch sculpture.

Onoba islandica (FRIELE, 1886)
(Figs 21F, 22G-H)

Onoba islandica: Bouchet & WARÉN 1993:659, figs 1493, 1508-1511.

New records. Off southwestern Iceland, BIOICE 2231, 63°43.10' N, 24°24.50' W, 212 m, 2 spms (IMNH). - Off eastern Iceland, BIOICE 2321, 63°56.00' N, 10°00.00' W, 639 m, 2 spms (IMNH). - BIOICE 2323, 63°55.00' N, 10°05.00' W, 623 m, 9 spms (SMNH). - BIOICE 2330, 63°05.00' N, 11°20.00' W, 453 m, 1 spm (IMNH).

Distribution. Off western, southern and eastern Iceland and south of the Faeroes, 130-730 m.

Habitat. Not known in detail.

Remarks. *Onoba islandica* may be very similar to *O. aculeus*, but is generally more stout and has half a whorl more in the protoconch. Furthermore, it is a clear deep water species, while *O. aculeus* mainly occurs intertidally, rarely below 10 m depth.

Onoba exarata (Stimpson, 1851)
(Figs 16F, 23E, 23H-I, 24C)

Rissoa exarata sp.n. Stimpson 1851a:15.
Rissoa exarata: Stimpson 1851b:34, pl. 1, fig. 3.
Alvania mighelsi: Warén 1974:129 (partim), figs 57-58.

Type locality: Massachusettes, Boston Harbor.

Type material. Lost.

Material examined: Northeastern North America, Maine to New Brunswick, 12 lots, 70 spms, MCZ 14053, 18847, 34445, 34446, 34447, 151874, 163208, 203502, 279429, 293182, 293185, 316039.

Off northern Iceland, BIOICE 2137, 66°43.11' N, 19°19.49' W, 297 m, 3 spms (IMNH, SMNH).

Distribution. Maine to New Brunswick and northern Iceland, 'shallow water' to ca 300 m.

Habitat. Not known in detail.

Remarks. *Onoba exarata* can be recognised by the small and oblique aperture, convex whorls, prickly sculpture, and the distinct axial ribs. The sculpture of the protoconch needs examination by SEM, but the distinct spiral lines with wide, smooth interspaces give a final confirmation.

The species was previously known only from the New England area.

Onoba mighelsi (Stimpson, 1851)
(Figs 24A, B, D, 26F, 27E-K)

Cingula arenaria: Mighels & Adams 1842:49, pl. 4, fig. 24 (not *Helix arenarius* Maton & Rackett, 1807).
Rissoa mighelsi sp.n. Stimpson 1851a:15.
Alvania castanea var. *alaskana* var.n. Dall 1887:307, pl. 4, fig. 9.
Alvania dinora sp.n. Bartsch 1917:678.
Alvania mighelsi: Warén 1974:129 (partim), figs 28-31.

Type localities. *R. mighelsi*, Maine, Casco Bay (neotype); *A. castanea* var *alaskana*, Alaska, Nunivak Island (60° N); *A. dinora*, Alaska, Forrester Island (55°N);

Type materials. *R. mighelsi*, neotype, here designated, MCZ 34444; *A. castanea* var *alaskana*, holotype USNM 213686; *A. dinora*, holotype USNM 268740.

Material examined: The types mentioned above and: Northeastern North America, Maine to Newfoundland, 11 lots, 32 spms (MCZ 18844, 34497, 34498, 34499, 149772, 149817, 149833, 163209, 259054, 293179, 293180, 293181).

Davis Strait, 63°47' N, 52°26' W, 35 fms, shelly bottom, 4 spms (SMNH).

Greenland, Prøven 21 + 15 + 11 spms (SMNH 1008, dry and wet). - Godthaab, 80 fms, 25 spms (SMNH). - Jacobshavn, 18-27 m, 1 spm (SMNH). - Claushavn, 10 fms, algae, 5 spms (SMNH). - Sukkertoppen, 100 fms, shelly bottom, 7 spms (SMNH). - Ritenbenk, 10 fms, algae, 3 spms (SMNH).

Iceland, Berufjord, shell sand, 1 sh (SMNH).

Svalbard, Spitsbergen, Bellsund, 5-12 fms, 2 spms (SMNH).

Alaska, Prince William Sound, Elrington Island (59° N), 2 lots, 5 spms (SMNH).

Distribution. Here confirmed from 55° N and northwards in Alaska; Maine to Newfoundland and western Greenland; northeastern Iceland and Svalbard, in 0-150 m depth.

Habitat. Not known in detail.

Remarks. The nomenclatorial history of this species is somewhat confusing. The first record of it was by Mighels & Adams (1842) who quoted it as '*Cingula arenaria* = *Turbo arenarius* Montagu'. No such species has ever been described, but the name probably refers to *Helix arenarius* Maton & Rackett, 1807 (= *Chrysallida decussata* (Montagu, 1804), an European pyramidellid. Stimpson (1851a) evidently recognised this mistake and renamed the species *Rissoa mighelsi*, referring to Mighels & Adams' description and figure.

Mighels & Adams' specimen is lost and to stabilise the name Warén (1974) designated a neotype but did not describe or illustrate it. To validate the designation I describe and figure it here.

The neotype (MCZ 34444, Figs 26F, 27H) is 2.86 mm high, has a protoconch sculpture of spirally arranged microtubercles (Fig. 26F), evenly rounded whorls, 5 spiral ribs of equal size and a weaker apical one on the penultimate whorl, and weak axial ribs on the first two teleoconch whorls.

Numerous sculptured rissoid species have been described from the North Pacific and Alaska. Some of these closely resemble *Onoba mighelsi* and were examined in connection with the work on the new species described herein and since they have not been figured after their original description, I take this opportunity to give a brief review of those most similar to *O. mighelsi*:

Alvania dalli (Bartsch, 1927) (Figs 23B, 26D) described from Shuyak Strait, Afognak Island, Alaska, resembles *A. mighelsi* and *A. torelli*, especially the latter species but can be recognised by its sharply and finely striated protoconch with a sculpture visible under a stereomicroscope at 50x. I figure the holotype (Fig. 23B) and the protoconch (Fig. 26D) of a better preserved specimen from the type locality.

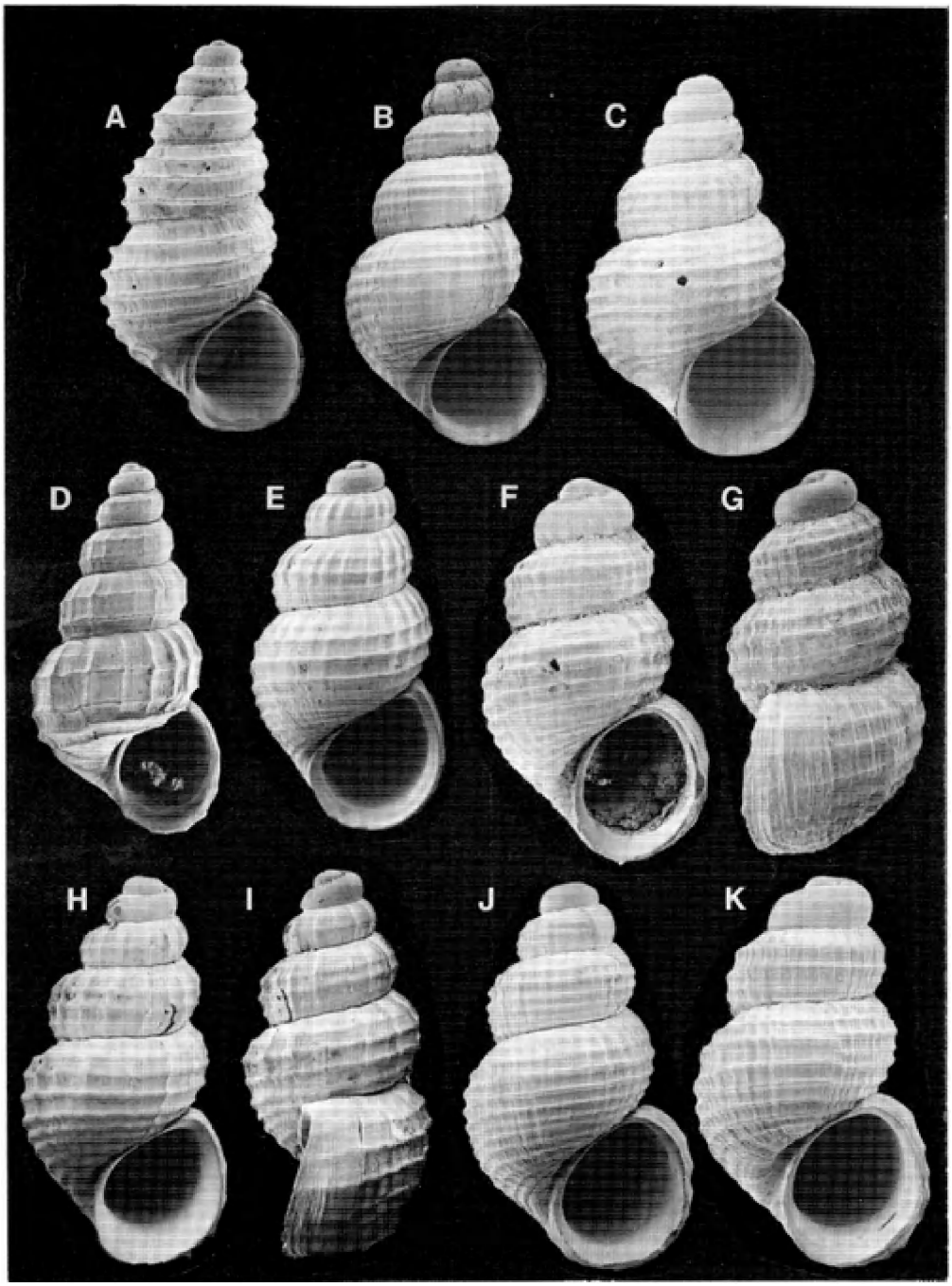

Fig. 23. *Onoba* and *Alvania* spp. A. *O. aurivilli* (Dall, 1886), holotype, USNM 213680, 4.2 mm. B. *O. dalli* (Bartsch, 1927), holotype, USNM 362154, 2.7 mm. C. *Alvania* sp., off southwestern Greenland, *Ingolf* Expedition sta 25. D. *A. pseudoareolata* (Warén, 1974), off western Iceland, 3.6 mm. E. *O. exarata* (Stimpson, 1851), Maine, Eastport, 2.9 mm. F, G. *O. improcera* sp.n., northern Norway, Varangerfjord, 25 m, 2.3 mm. H, I. *O. exarata*, BIOICE 2137, 3.5 mm. J, K. *O. improcera*, BIOICE 2128, 2.6 and 1.7 mm.

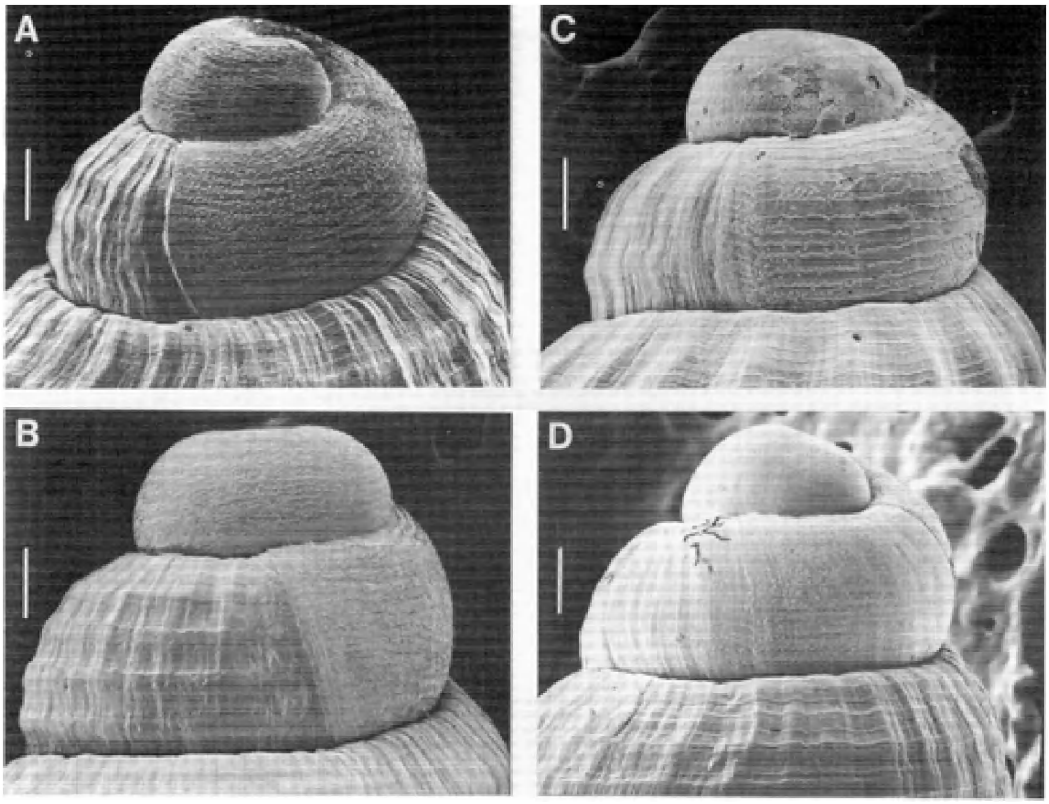

Fig. 24. *Onoba* spp., protoconchs. A. *O. mighelsi* (Stimpson, 1851), neotype, MCZ 34499. B. *O. mighelsi*, Maine, Eastport. C. *O. exarata* (Stimpson, 1851), Maine, Eastport. D. *O. mighelsi*, Alaska, Prince William Sound, Elrington Island (59° N). Scale lines 100 µm.

Alvania aurivilli (Dall, 1887) (Figs 23A, 25B, 26B) is larger, about 4 mm and has some fine axial riblets in the interspaces between the spiral ribs. Its protoconch (Figs 25B, 26B) has a sculpture similar to *Alvania bakeri* and *O. torelli*, but much finer.

Alvania castanella (Dall, 1887) (Fig. 27L) is quite similar to *O. mighelsi*, and even more so compared with *O. torelli*. The holotype is not in good condition and its protoconch sculpture can not be figured. It differs from *A. mighelsi* by having a much sharper sculpture on the teleoconch and no trace of axial sculpture. It differs from *O. torelli* by having more convex whorls, deeper suture, and a taller aperture.

Alvania bakeri (Bartsch, 1910) (Fig. 25D, 27D) from Port Graham, Alaska, has a protoconch sculpture identical with that of *O. torelli*, but the shape of the teleoconch is quite different, smaller and with fewer and more convex whorls and a stunted shape. Nevertheless this is the North Pacific species most similar to *O. torelli* and I can not exclude the possibility that they are conspecific. The absence of material to show its variation and to follow its distribution has led me to regard them as distinct species.

Alvania alaskana (Dall, 1887) (Fig. 24D; 27F, G) is very similar to *O. mighelsi*. The holotype has no sculpture left on the protoconch and I figure a better specimen from Alaska, Elrington Island (Fig. 27G), which has a protoconch microsculpture (Fig. 24D) identical with that of *A. mighelsi*. I can therefore see no reason to distinguish between them.

Alvania dinora (Fig. 27E). The holotype is not in good condition and the protoconch sculpture is worn off. The type, however, is so similar to *O. mighelsi*, so I do not hesitate to synonymise it.

Alvania alaskana has several times been recorded from the northwestern Pacific, from the Kuriles and northwards. Such an occurrence seems very likely but considering the close similarity between many of the species, as is shown in this paper, those records should be revised.

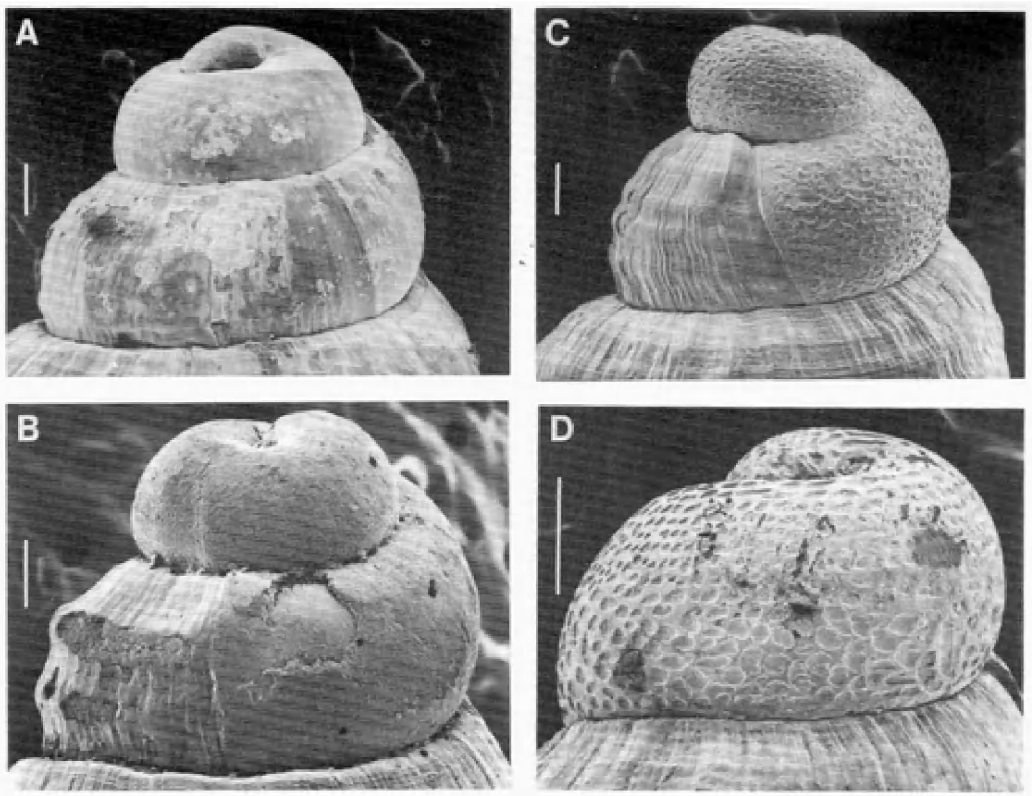

Fig. 25. *Onoba* spp., *Alvania* sp., protoconchs. A. *Alvania* sp., *Ingolf* Expedition station 25. B. *O. aurivilli* (Dall, 1886), holotype, USNM 213680. C. *O. torelli* sp.n., Svalbard, Spitsbergen, Kobbe Bay. D. *O. bakeri* (Bartsch, 1910), holotype, USNM 208435. Scale lines 100 μm.

Onoba torelli sp.n.
(Figs 25C, 26A, 27A-C)

Alvania mighelsi Warén 1974:129 (partim), figs 32-34.

Type locality: Iceland, Berufjord, Djupavagur.

Type material. Holotype and 3 paratypes, SMNH 4762 and 4763.

Material examined: Greenland, Prøven, 1 spm (SMNH). - Jacobshavn, 18-27 m, rocks and algae, 2 spms (SMNH). - Claushavn, 10 fms, algae, 2 spm (SMNH). - Sukkertoppen, 100 fms, shelly bottom, 7 spms (SMNH). - Ritenbenk, 10 fms, algae, 1 spm (SMNH).

Svalbard, Spitsbergen, Kobbe Bay, 3 fms, 1 spm (SMNH). - Freurenburg Bay, 6 fms, clay, 2 spms (SMNH). - Icefjord, Advent Bay, 90 m, 1 spm (SMNH).

Distribution. Only known from the material examined, Greenland, northeastern Iceland and Spitsbergen, depth range poorly known, ca 10-200 m.

Habitat. Not known in detail.

Etymology. Named after Otto Torell (1828-1900), Swedish biologist and geologist, who made several arctic expeditions to document the arctic mollusc fauna for comparison with the Swedish subfossil Glacial fauna and found the type specimens of this species.

Description. Shell (Fig. 27A-C) of average size for the genus, semitransparent in fresh shells, with convex whorls and strong, sharp spiral sculpture. The protoconch (Figs 25C, 26A) consists of slightly more than one whorl sculptured by an irregular network which demarcates irregularly shaped, shallow pits. The teleoconch has up to slightly more than 3, distinctly convex whorls, sculptured by 3-5 major spiral keels and a few less distinct ones on the basal surface. The whole surface is covered by a fine uniform striation, well visible under a stereo microscope. The axial sculpture consists of irregularly spaced incremental lines of variable strength, some of them almost giving an impression axial ribs. The peristome is almost round, the outer lip orthocline and not thickened. There is a distinct umbilical chink. Maximum height 3.4 mm.

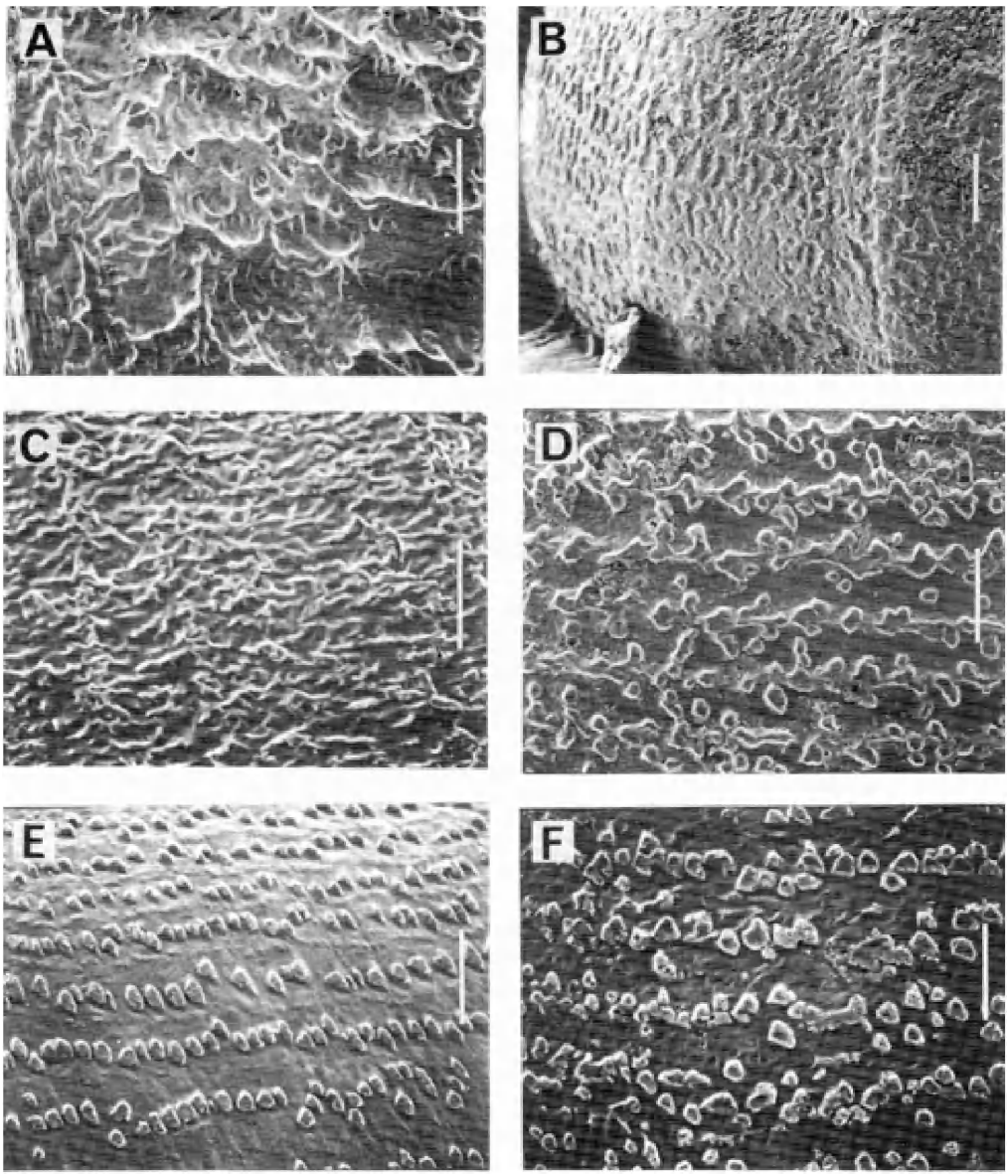

Fig. 26. *Onoba* spp., details of protoconch sculpture, end of last protoconch whorl. A. *O. torelli* sp.n., Svalbard, Spitsbergen, Kobbe Bay. B. *O. aurivilli* (DALL, 1886), holotype, USNM 213680. C. *O. improcera* sp.n., BIOICE 2128. D. *O. dalli* (BARTSCH, 1927), Afognak Island, Alaska (SMNH). E. *O. mighelsi* (STIMPSON, 1851), Greenland, Godthaab. F. *O. mighelsi*, neotype. Scale lines 20 μm.

Remarks. No precise data exist for the type locality but SMNH's material from Berufjord was collected by Torell and his dredgings there were not deeper than 25 m.

Onoba torelli closely resembles *O. mighelsi*, but the latter species has a thickened outer lip and its protoconch has a fine spiral striation consisting of spirally arranged granulae, it has 1/4 whorl more and more evenly rounded. Furthermore, its spiral sculpture looks more like a smooth surface with furrows, while *O. torelli* has spiral ribs.

Onoba improcera also resembles *O. torelli*, but has a finely sculptured protoconch and opisthocline, thickened outer lip.

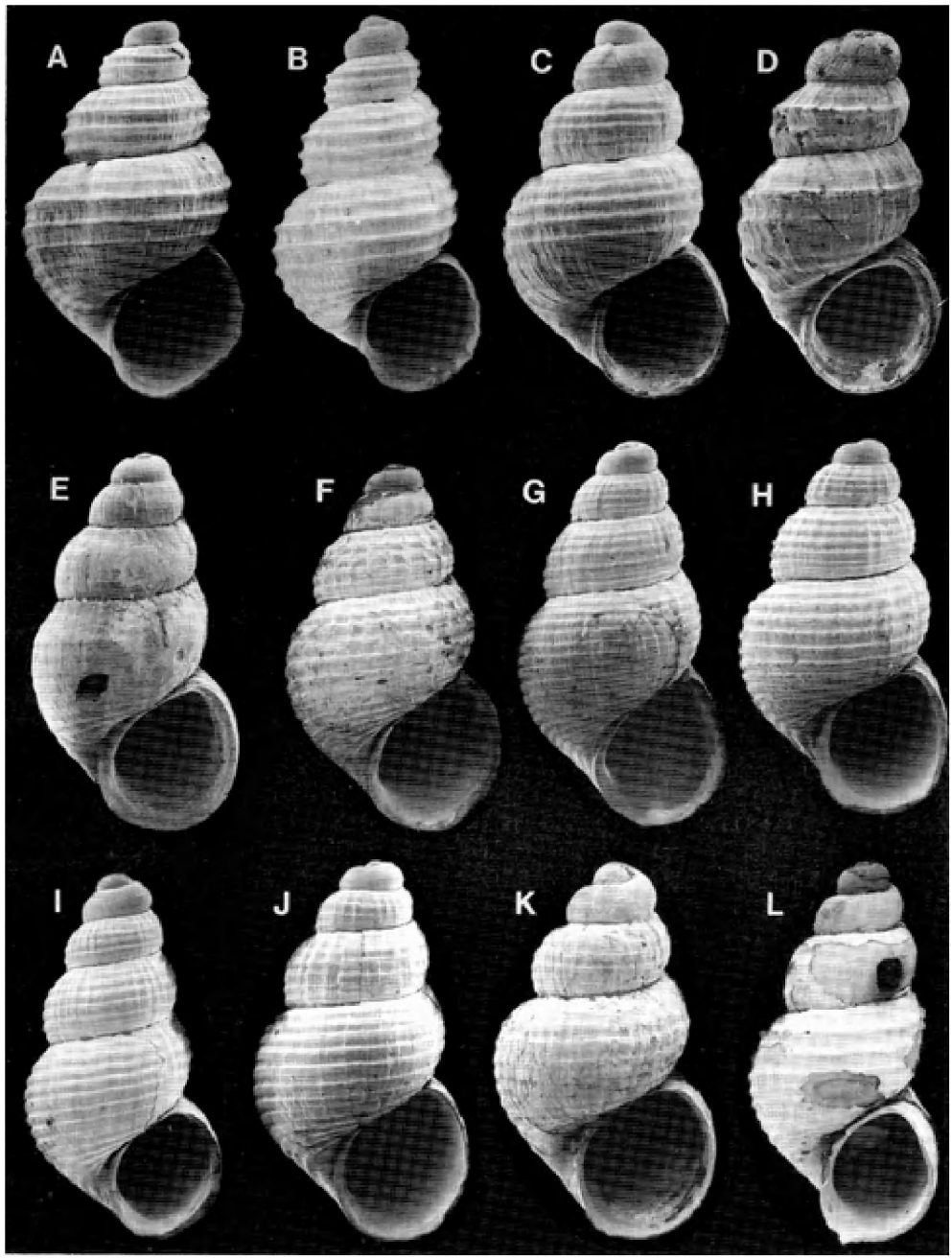

Fig. 27. *Onoba* spp. A. *Onoba torelli* sp.n., Greenland, Prøven, 3.4 mm. B. *O. torelli*, holotype, 3.1 mm. C. *O. torelli*, Svalbard, Spitsbergen, Kobbe Bay, 2.7 mm. D. *O. bakeri* (Bartsch, 1910), holotype USNM 208435, 1.50 mm. E. *O. mighelsi* (Stimpson, 1851), holotype of *O. dinora* (Bartsch, 1917), holotype USNM 268740, 2.1 mm. F. *O. mighelsi*, holotype of *A. alaskana* (Dall, 1886), USNM 213686, 2.91 mm. G. *O. mighelsi*, Alaska, Prince William Sound, Elrington Island (59° N), 3.2 mm, (SMNH). H. *O. mighelsi*, neotype, MCZ 34499, 2.86 mm. I. *O. mighelsi*, Maine, MCZ 149833, 3.4 mm. J. *O. mighelsi*, Greenland, Godthaab, 144 m, 2.9 mm. K. *O. mighelsi*, Svalbard, Spitsbergen, Bell Sound, 2.3 mm. L. *O. castanella* (Dall, 1886), holotype, USNM 213677, 2.5 mm.

Onoba improcera sp.n.
(Figs 16D, 23F-G, J-K; 26C)

Alvania mighelsi: Warén 1974:129 (partim), figs 51-52.

Type locality. Off northern Iceland, 66°59.02' N, 18°49.97' W, 203 m, BIOICE 2128, 15 spms.
Type material. Holotype and 7 paratypes IMNH 1996.04.24.8 and 1996.04.24.9-15, 5 paratypes SMNH 4751.

Material examined. Northern Iceland, 64°04' N, 14°52' W, 13 Jul 1980, 287-265 m, 1 spm (JB). - 67°07.9' N, 22°46.3' W, 265-270 m, 10 Sept. 1983, 1 spm. - BIOICE 2170, 66°18.51'N, 19°12.00' W, 88 m, 1 spm (IMNH). - BIOICE 2096, 67°01.10' N, 17°34.66' W, 300 m, 2 spms (IMNH). - BIOICE 2097, 66°36.92' N, 18°14.42' W, 110 m, 2 spms (IMNH). - BIOICE 2126, 66°59.51' N, 18°49.82'W, 208 m, 6 spms (IMNH). - BIOICE 2154, 66°34.02' N, 20°01.83' W, 143 m, 1 spm (IMNH).

Northern Norway, Varangerfjord, Byluft, 70°04' N, 29°03' E, 25 m, 1 sh (SMNH). - Tromsøsundet, 40-45 m, 4 shs (SMNH). - Western Norway, outer part of Korsfjorden, 1 sh, Glacial fossil (SMNH).

Swedish west coast, Bohuslän, 3 lots, 35 shs, Glacial fossil (SMNH).

Distribution. Only known as Recent from northern Iceland and northernmost Scandinavia, in a depth of 25-300 m. Habitat not known in detail.

Etymology. From *improcerus* (Latin), short or stunted.

Description. Shell (Fig. 23F-G, J-K) of average or slightly below this size for the group, colour less, semitransparent, with a stunted appearance. The protoconch (Fig. 16D) has slightly more than one whorl with a large and blunt initial part. The sculpture consists of very fine, short, irregularly arranged tubercles, together forming spiral zones on the otherwise smooth protoconch (Fig. 26C). The teleconch has up to 3 convex whorls of slowly increasing diameter. The sculpture of the upper whorls consists of 3-6 stronger spiral ribs and numerous much finer striae, forming an irregular cover of the whole surface. The last whorl has 5-7 additional spiral ribs on the basal surface. The axial sculpture consists of numerous, irregularly disposed incremental lines, some of which may be stronger and give an impression of axial ribs. The peristome is almost round, small, and has a distinctly opisthocline, thickened outer lip. The umbilicus forms a narrow crevice. Maximum size ca 2.6 mm.

Remarks. The known specimens from Iceland and northern Norway are very constant in their appearance, and although many species of the family are infamous for their variation, I believe this to be a new species. The restricted distribution in northern Norway and Iceland also gives raise to suspicions that it may be a local form but since I have seen no specimens that may be transitional forms, I want to draw attention to these specimens.

Onoba improcera resembles *Alvania bakeri*, from Alaska, in the shape of the teleconch, but the latter has fewer spiral keels, is smaller and has a very different sculpture of the protoconch, similar to *O. torelli*. *Onoba improcera* may resemble *O. aculeus*, but has a coarser sculpture and more stunted shape.

HETEROBRANCHIA

Superfamily Architectonicoidea

Family Mathildidae

Remarks. The Mathildidae is a poorly known family, previously usually classified in the vicinity of the Turritellidae and Cerithioidea. Work by Haszprunar (1985) has confirmed relations with Architectonicidae, and (Haszprunar 1988 and references therein) given ample support for a position among the 'lower Heterobranchia'.

Virtually nothing is known about the biology of mathildids, but examination of gut contents of *Mathilda* cf *quadricarinata* (Brocchi, 1814) from West Africa, indicated that it feeds on alcyonariae (pers. obs.). This supports relations to the Architectonicidae, many of which are known to feed on Anthozoa (no other diets known in the family).

Genus *Brookesena* Finlay, 1927

Type species *Mathilda neozelanica* Suter, 1908, New Zealand, by original designation.

Remarks. When introduced (Finlay 1927), the generic name *Brookesena* was classified in the Rissoidae (although the type species was correctly described as a mathildid). Later the genus was transferred to the Mathildidae by Wenz (1940), a position maintained by Ponder (1985a: 108) after examination of operculum and radula.

The information about the morphology of the soft parts presented below and by Haszprunar (1988:420) does not contradict this, except the radula which is of a type known from several heterobranch families, but not the Mathildidae.

The generic name has been very little used, but unpublished examination of type collections in many museums has shown that several species described as rissoids, turritellids, aclids, and pyramidellids should be classified in *Brookesena*.

Brookesena turrita sp.n.
Figs 28D-F, 29A-B, 30A)

Type locality. Off northern Iceland, BIOICE 2098, 66°36.82' N, 18°15.51' W, 115 m, 2 spms.

Type material. Holotype and one paratype, IMNH 1996.04.24.16 and 1996.04.24.17; 3 paratypes BIOICE 2100 (data below), SMNH 4706.

Material examined. Off northern Iceland, BIOICE 2100, 68°00.06' N, 19°25.26' W, 1141 m, 3 spms (paratypes, SMNH). - *Dagny* Si 70, sta 5, 67°39' N, 19°04' W, 22 June 1979, 250 m, 1 sh (JB). - Off southwestern Iceland, Reykjanes Ridge, BIOICE 2276, 63°10.98' N, 24°14.04' W, 237 m, 1 sh (IMNH). - Off eastern Iceland, BIOICE 2319, 64°01.00' N, 09°37.00' W, 776 m, 1 spm (used for radula preparation).

Distribution. Only known from the material examined, all around Iceland. Depth range ca 250-1100 m.

Etymology. From *turritus*, Latin, resembling a tower.

Description. Shell (Fig. 28F) small, *Turritella*-like, with few whorls, dominating spiral sculpture, and blunt apex. The protoconch (Fig. 28D-E) is large and bulbous, not distinctly demarcated from the teleoconch, finely striated by sharp, raised lines on a smooth surface. After about 1.0 protoconch whorl, axial ribs and two strong spiral keels appear, which gradually become stronger. The spiral striation of the protoconch still remains, superimposed. Later down the spire additional, much weaker spiral ribs may or may not be intercalated. An adult specimen has a total of about five whorls, three stronger and 0-4 weaker spiral ribs. The peristome is rounded and its edge is not thickened. Dimensions, height of holotype 2.8 mm.

Soft parts. The foot was not examined in detail, since it was strongly contracted. The cephalic tentacles are short, strongly contracted, and lack eyes. The snout is very short and distinctly bilobed. The pallial cavity is deep, reaches about 1.0 whorls back and the right corner of its margin has a slender pallial tentacle. The gill is absent; instead there is a (ciliated?) brownish stripe, extending 0.6 whorls back. The specimen examined was a female with a large pallial oviduct reaching a full whorl backwards, directly preceded by an axially striated or folded organ.

Jaw small, bilobed, with a reticulate pattern.

Operculum (Fig. 30A) very thin, perfectly transparent, multispiral with a slightly expanded growth zone and central nucleus.

Radula (Fig. 29A-B) short and broad with sturdy teeth, 7 in each of the ca 20 transverse rows. The central tooth is low and broad with widely diverging anterolateral supports and a cutting plate with one major central and 2-4 smaller lateral cusps. The first lateral tooth is roughly triangular with a very large inner and a series of 3-5 smaller, more lateral cusps. Its outer margin has a slit, into which the second lateral tooth interlocks. The second lateral tooth is similar to the first but only 2/3 of the size and lacks the lateral slit. The outermost tooth is a small irregular plate.

Remarks. *Brookesena turrita* may perhaps be mistaken for a species of *Alvania*, but the aperture is proportionally smaller than in any rissoid from this area.

Genus *Turritellopsis* G.O. Sars, 1878

Type species. *Turritella acicula* Stimpson, 1851 (= *Turritellopsis stimpsoni* Dall, 1919), northeastern United States, by monotypy.

Remarks. The genus *Turritellopsis* has throughout the literature had a constant placement in the Turritellidae, despite the unusual radular configuration which prompted G.O. Sars to make a new genus for it. Haszprunar (1988:420) presented some preliminary results of an anatomical examination which persuaded him to include *Turritellopsis* (and Turritellopsinae Marwick, 1937) in the Mathildidae.

Details from an examination of some poorly preserved specimens in SMNH are used to complete Haszprunar's description with information on the external morphology of the soft parts (reported below under *T. stimpsoni*). They support Haszprunar's opinion. Especially the shape of the foot, absence of a gill, and presence of a proboscis, are features unknown in the Turritellidae.

This position is, however, contradicted by the protoconch, which in the genus *Mathilda* and close relatives (but not *Brookesena*) is heterostrophic, multispiral, large and bulbous, with its axis tilted 90° to that of the teleoconch. The fact that *T. acicula* is viviparous and has encapsulated development may, however, have suppressed the heterostrophy, as seems to be the case in Rissoellidae, Cimidae, some Pyramidellidae, Omalogyridae and several other low-spired families.

The genus is known from the north Pacific (*T. stimpsoni* and *T. subvenustellus* (Okutani, 1964)) and the Antarctic area (*T. gratissima* Thiele, 1925). *Turritellopsis floridana* Dall, 1927 from deep water off Florida belongs to the Aclididae (unpublished).

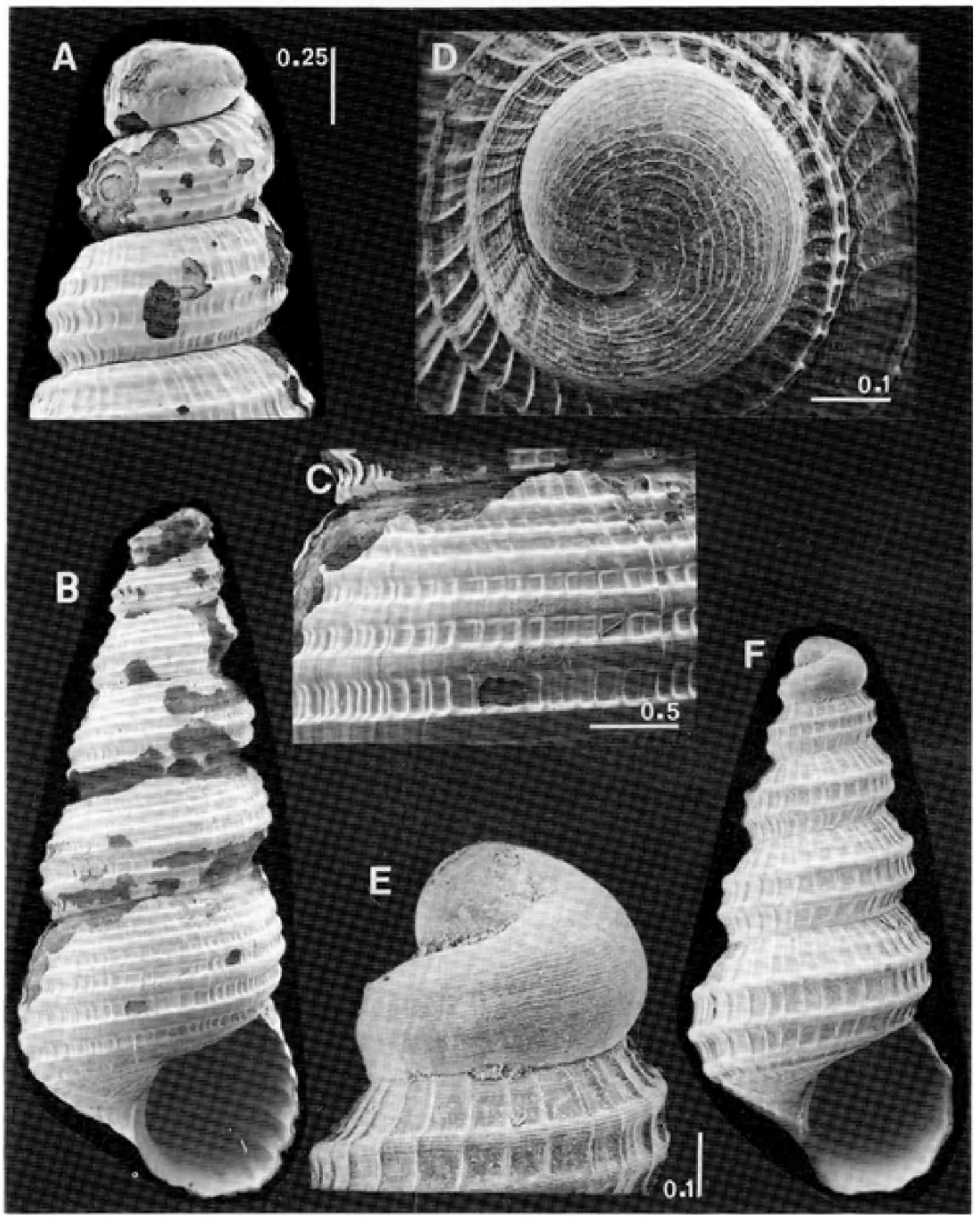

Fig. 28. Mathildidae, shells. A-C. *Turritellopsis stimpsoni* (DALL, 1919), Svalbard, Spitsbergen, Hornsund, 75-100 m. A. Apex, corroded but all whorls present. C. Detail of sculpture. D-F. *Brookesena turrita* sp.n., holotype, BIOICE 2098. D. Apex, apical view. E. Apex, lateral view. F. Holotype, 2.8 mm. Scale lines in mm.

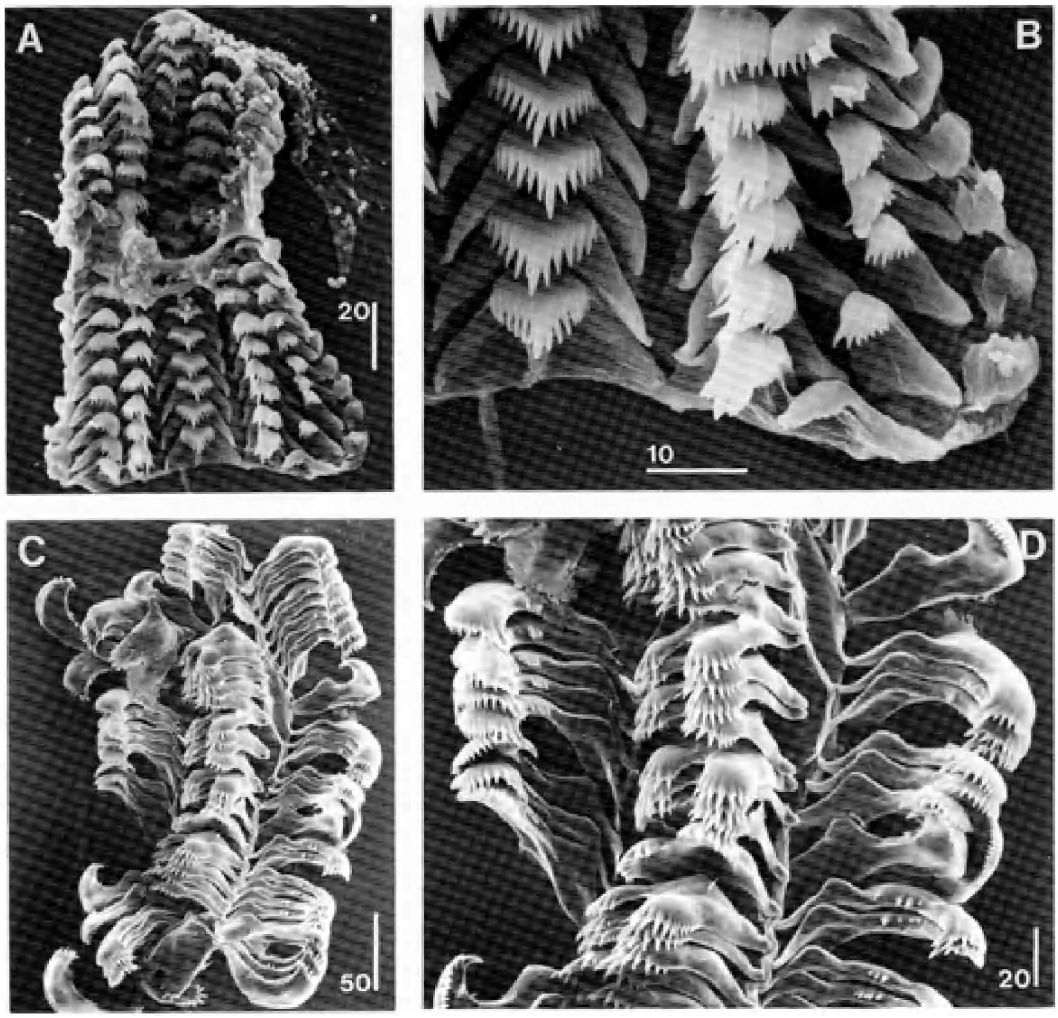

Fig. 29. Mathildidae, radulae. A, B. *Brookesena turrita* sp.n., radula. A. Complete radula. B. Central tooth and lateral field. C, D. *Turritellopsis stimpsoni* (DALL, 1919), radula (see also Fig. 30B). C. Half the length of the radula. D. Full width of radula. Scale lines in µm.

Turritellopsis stimpsoni DALL, 1919
(Figs 28A-C, 29C-D, 30B-E)

Turritella acicula STIMPSON 1851a:15 (not PHILLIPS, 1836).
Turritella acicula: STIMPSON 1851b:35, pl 1, fig. 5.
Turritellopsis acicula: G.O. SARS 1878:186, pl. 10, fig. 14a-b; pl. VII, fig. 2a-e, pl. XVIII, fig. 25.
Turritellopsis (*acicula* variety) *stimpsoni* sp.n. (sic!) DALL 1919:347.

Type locality. *T. acicula*, three localities in Massachusettes; *T. stimpsoni*, northern Norway, Varangerfjord, 10-20 m.

Type material. *T. acicula*, lost; *T. stimpsoni*, not recognised in ZMO.

Material examined. Northeastern United States, several lots (USNM, MCZ).
Western Greenland, 2 lots (SMNH).
Northern Norway, Varangerfjord a few spms (ZMO).
Svalbard, 15 lots, numerous spms (SMNH).

Distribution. Arctic, the White Sea and northern Norway (Varangerfjord), Svalbard, East and West Greenland, northeastern United States (Massachusettes and northwards) and Canada. The North Pacific (details uncertain). Depth range 5-500 m. Not known from Iceland and the Faeroes.

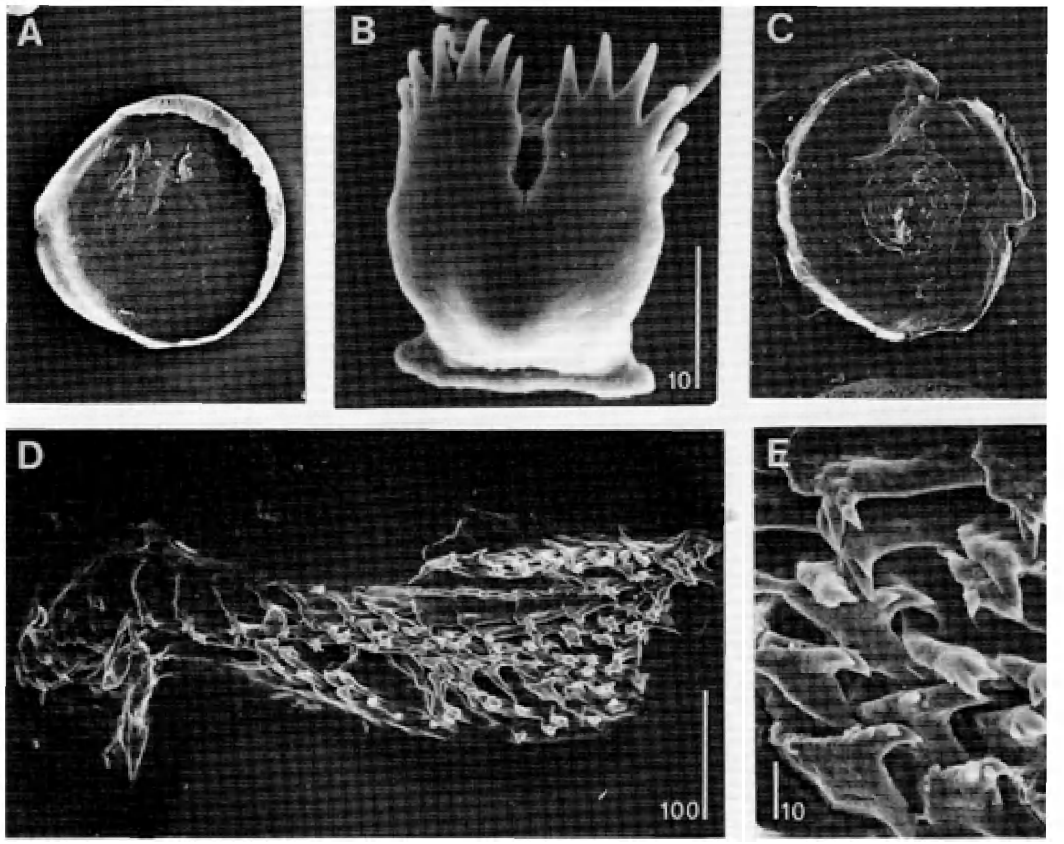

Fig. 30. Mathildidae, radulae, jaws and opercula. A. *Brookesena turrita* sp.n., operculum, diameter 0.55 mm, BIOICE 2319. B-E. *Turritellopsis stimpsoni* (Dall, 1919), Svalbard, Spitsbergen, Hornsund, 75-100 m. B. Central tooth of radula. C. Operculum diameter 2.0 mm. D. Jaw. E. Jaw, detail of denticles. Scale lines in µm.

Description of soft parts. The foot is short and broad, deeply bilobed in front, with a distinct propodium. The cephalic tentacles are short and broad, with laterobasal eyes. Between them is a short, indistinct snout, strongly folded around a large proboscis opening. There is a short, wide proboscis and behind this a pair of salivary glands opening via short ducts to the buccal mass just in front of the radula. No specimen had a penis although one was suspected to be a male, from large quantities of sperm behind the pallial cavity. Two specimens had a voluminous oviduct filled with developing egg capsules, which posteriorly are less and less advanced in their development. The pallial cavity extends about half a whorl backwards. The gill is either very inconspicuous or absent.

Radula (Figs 29C-D, 30B) short, broad, and stiff, with about 25 transverse rows; 3 sturdy, dark brown teeth in each row.

Jaw (Fig. 30D-E) small, elongate, composed of numerous small elements with 1-3 cusps.

Operculum (Fig. 30C). Round, thin, yellowish, multispiral, with central nucleus, and each whorl forming a distinct fringe above the subsequent one.

Remarks. Dall (1919) introduced a new name for the specimen figured by G.O. Sars (1878), stating that species to have 5-7 spiral ribs while the specimen figured by Stimpson (1851b) was said to have only three ribs. Actually Sars' drawing shows four major ribs and one smaller rib close to each suture at the end of the penultimate whorl, as does also Stimpson's drawing. I have examined East and West Atlantic material and can see no reason for distinction, as did Abbott (1974). Nevertheless Dall's name has to be used since Stimpson's name is preoccupied.

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