Revision of the gastropod family Scissurellidae from the Middle Danian (Paleocene) of Denmark

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The rich molluscan fauna from the Middle Danian (Early Paleocene) of Fakse contains five species of the gastropod family Scissurellidae Gray, 1847. This revision recognizes three new species, viz. *Anatoma rosenkrantzi* sp. nov., *Praescissurella? ravni* sp. nov. and *Scissurella* (s. l.) *aliceae* sp. nov. *Anatoma danica* Bandel, 1998 is considered a junior synonym of *Leptomaria niloticiformis* (von Schlotheim, 1820). The palaeoecoelogy of this scissurellid and pleurotomarid fauna and the associated mollusc fauna is noted.

Key words: Gastropods, Scissurellidae, palaeoecoelogy, Paleocene, Middle Danian, Fakse, Denmark.

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Representatives of the gastropod family Scissurellidae Gray, 1847 are generally rare in fossil molluscan assemblages, without doubt due to the generally small size and fragility of the shells. Thus only relatively few fossil scissurellids have been recorded. From Denmark *Scissurella annulata* Ravn, 1933, *Scissurella hedegaardi* Bandel, 1998 and *Anatoma danica* Bandel, 1998 have been described from the Danian (Early Paleocene) of Fakse, and *Scissurella koeneni* R. Janssen, 1978 was recorded from the Upper Oligocene at Mogenstrup by Schnetler & Beyer, 1990. *Praescissurella corneti* (Rutot, 1915) is known from the Danian of Belgium (Glibert 1973) and from the Danian of Vigny (France).

Ravn (1933) described a high number of new mollusc species from an unconsolidated coral limestone. However, Rosenkrantz had further unstudied material in his collection and in the 1960s he obviously intended a study of this material. He supervised numerous drawings, made by several artists, of molluscs from the Danian of Fakse, the Selandian of Copenhagen and the Paleocene of Nuussuaq, West Greenland (Kollmann & Peel 1983) and these drawings are still housed in the Rosenkrantz files in the Geological Museum of Copenhagen. Among the drawings were representatives of scissurellids, and Rosenkrantz recognized the three new species described in this paper. More material was collected by Søren Bo Andersen and Sten Lennart Jakobsen in 1972, and recently by Mrs. Alice Rasmussen, Fakse. Thus the basis for the present study is considerably greater than the small sample, described by Ravn. The new material also includes specimens of *Scissurella annulata* Ravn, 1933 with aperture characters better preserved than Ravn's material, allowing a better illustration of this species.

Geological setting and stratigraphy

For several hundred years the limestone in the quarry east of the small town of Fakse in Eastern Zealand has been excavated. Fakse is situated in the Danish-Polish Trough, which is bounded to the north by the Fennoscandian Shield and to the south by the Ringkøbing-Fyn High (Fig. 1). In the quarry a section through a bryozoan-coral mound complex is exposed. In the complex a vast number of interbedded microfacies may be recognized, as results of early diagenesis: Bryzoan limestone, chalky limestone and coral limestone (Bernecker & Weidlich 1990; Willumsen 1995). For a review see Surlyk & Håkansson 1999. Desor (1847) introduced the Danian Stage with the type localities of Fakse Quarry and Stevns Klint and considered the stage as the youngest part of the Cre-

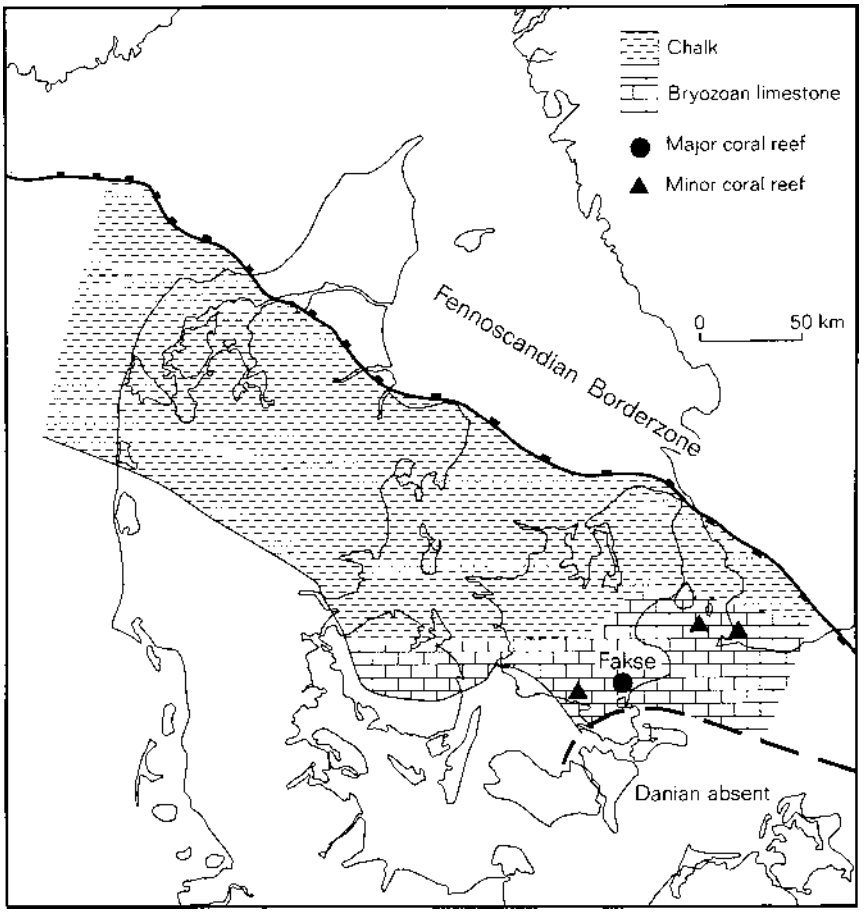


Fig. 1. Main structures of the Danish area in Middle Danian. Compiled by Erik Thomsen, Geologisk Institut, Aarhus University.

taceous System. For many years the stratigraphic position of the Danian has been discussed, e.g. by Nielsen (1919), Ravn (1925) and Rosenkrantz (1938), but is now generally considered as the oldest part of the Paleocene. Various subdivisions of the Danian have been suggested, and the sequence at Fakse has been referred to the local *Tylocidaris bruennichi* echinoid Zone (Ødum 1926, Ravn 1928, Rosenkrantz 1938) of Middle Danian age and to nannoplankton zone NP3 (Perch-Nielsen 1979). Recently Thomsen (1995) has divided the Danish Danian into 9 calcareous nannoplankton zones and according to his subdivision the sequence falls into his calcareous nannoplankton zones 4 and 5 (Middle Danian).

Material

As a result of variation in diagenesis the coral limestone in Fakse Quarry exhibits a wide range of facies types (Surlyk & Håkansson 1999). Scissurellids are found only in an unconsolidated coral limestone in which originally aragonitic mollusc shells are preserved, due to a transformation into calcite (Ravn 1933, Bernecker & Weidlich 1990). This type of limestone is informally named "nose-chalk" after a projecting part in the quarry, called the nose (Ravn, 1933: le "Nez"), which apparently resembled Dr Ravn's nose. This locality was found in about 1915 and was mentioned by Nielsen (1919), but disappeared many years ago, due to excavation. Molluscs were collected by Nielsen and especially by Rosenkrantz. In his monograph of 1933, Ravn had only nine specimens of scissurellids at hand, and these specimens were referred to one species: *Scissurella annulata* Ravn, 1933. In the Rosenkrantz' files of drawings of molluscs from Fakse a further three species are illustrated. Since then the "nose-chalk" has been encountered in other parts of the quarry. In 1972 S. B. Andersen and S. L. Jakobsen found a large mollusc fauna in nose-chalk from a new pit north of the old quarry, including additional material of *Scissurella annulata* and the three undescribed species from the Rosenkrantz' files. Recently Alice Rasmussen (Fakse) has collected additional fossil material, including scissurellids.

Palaeoecological setting

Scissurellids lived both in shallow and deep waters (the genus *Anatoma*) and some genera fed on algae or were detrivorous (Fretter & Graham 1978 and personal observations by one of us (Lozouet) from recently collected material of the MNHN, containing 700 lots from tropical and temperate waters). Others are known from deep-sea hydrothermal vents (McLean 1989). The high diversity of the Scissurellidae in the fauna of Fakse is remarkable, a similar diversity was reported by Lozouet (1997) in the Upper Oligocene of the Aquitaine Basin (Peyrehorade "Peyrère" outcrop). At the generic level (for the Mollusca), the Fakse fauna is close to that of the Peyrère fauna. The Peyrère assemblage (Lozouet 1997) contains many elements from cryptic environments, especially from submarine caves.

The mollusc fauna of the bryozoan and coral limestone at Fakse was discussed by Ravn (1933) and more recently Schnetler (in press) has noted the fauna in comparison with the mollusc fauna of the younger (Selandian) Lellinge Greensand. The very rich fauna of the "nose-chalk" is characterised by e. g. numerous Pleurotomariidae, trochoids, Cerithiopsidae, Triphoridae, Ranellidae, and Cypraeids. Many small species are undescribed. Among the gastropods, supposed sponge eaters were common (Pleurotomariidae, Cerithiopsidae, Triphoridae), while some trochoids were herbiverous and other carnivorous (Fretter & Graham 1978). *Emarginula* was also very common (sponge and detritus eater; Fretter & Graham 1978). The Ranellidae were carnivorous (Riedel 1995). Representatives of the fauna from soft bottom (e.g. Turridae) were very rare. An *Eulima* was rather common; this genus lives parasitic on echinoids (Müller & Strauch 1991). Among the bivalves sessile genera were common (cementing forms like *Pycnodonte* and *Gryphaeostrea* or byssate, like representatives of the Arcidae and Pectinidae (Müller & Strauch 1991)). *Limopsis, Nuculana* and other representatives of the infauna were rare.

Bernecker & Weidlich (1990) divided the coral limestones of the mound complex into five facies and the "nose-chalk" seems to belong to their *Dendrophyllia* subfacies, which has *Dendrophyllia candelabrum* as the dominant coral species together with abundant octocorals and stylasterine hydrozoans. Bernecker & Weidlich concluded that the coral mounds are aphotic and azooxanthellate, and they estimate the palaeodepth to have been more than 100 m, perhaps between 230 and 300 m. However, several plates of a polyplacophora have been found in the "nose-chalk" (S. B. Andersen, pers. com.) and as this mollusc group feeds on algae this may indicate that at least parts of the coral mounds were situated in the photic zone. The numerous herbiverous gastropods also indicate this. For a review of the palaeoecology, see Surlyk & Håkansson (1999).

Müller & Strauch (1991) discussed a Danian coral mound from the mine shaft Sophia Jacoba 8 in Germany (Lower Rhine Area), but this consists of hermatypic corals. They found some similarities between the mollusc faunas from Sophia Jacoba 8 and Fakse, as well as similarities in the faunas of serpulids and brachiopods, but Müller & Strauch interpreted these similarities as the results of the coral substrate, rather than the depth.

Abbreviations

MGUH = Geological Museum of the University of Copenhagen. MNHN = Muséum National d'Histoire Naturelle, Paris. MNHN-LP = Laboratoire de Paléontologie du Muséum National d'Histoire Naturelle, Paris. SMF = Forschungsinstitut Senckenberg, Frankfurt a. M. ISL = Collection of I. Schnetler, Langå, Denmark. ARF = Collection of Alice Rasmussen, Fakse, Denmark. JMP = Collection of Jean-Michel Pacaud, Paris.

Systematic palaeontology

Class Gastropoda Cuvier, 1797
Subclass Orthogastropoda Ponder & Lindberg, 1995
Superorder Vetigastropoda Salvini-Plawen & Haszprunar, 1987
Superfamily Pleurotomariidae Swainson, 1840
Family Scissurellidae Gray, 1847

Genus *Scissurella* d'Orbigny, 1823

Type species. – *Scissurella costata* d'Orbigny, 1824

Remarks. – McLean (1989), Marshall (1993) and Sasaki (1998) divided the family into five subfamilies. Lozouet (1998) questioned this subdivision, at least for the subfamilies Anatominae McLean, 1989 and Scissurellinae Gray, 1847 and found it uncertain that these two subfamilies each were monophyletic groups. Amitrov (1996) and Amitrov & Zhegallo (1998) studied the protoconch microsculpture of scissurellids, a feature which is badly preserved on the material from Fakse. Bandel (1998) introduced several new genera, of which *Maxwellella* Bandel, 1998 partly resembles the genus *Scissurella*, but has a

planispiral shell without spiral ornamentation, and thus the subfamilial assignment for this genus is not certain. Because of these doubts we prefer to omit the subdivision of the family Scissurellidae.

Scissurella (s. l.) *aliceae* sp. nov.
Pl. 1, figs 1 – 3; Pl. 3, figs 1–2

Type locality. – Fakse Quarry.

Type stratum. – Coral Limestone, Middle Danian, Paleocene.

Derivation of name. – This species is named after Mrs Alice Rasmussen, Fakse who very kindly placed her collection of scisurellids from Fakse at our disposal.

Holotype. – Pl. 1, fig. 1, MGUH 25748 (leg. Alice Rasmussen).

Paratypes. – Pl. 1, fig. 2, MGUH 25749, ex ISL Colln; Pl. 1, fig. 3, MGUH 25750, ARF Colln; Pl. 3, figs 1a–b, MGUH 25758, ex Rosenkrantz Colln No. 120; Pl. 3, fig. 2, MGUH 25759, ex Rosenkrantz Colln No. 119; one specimen, MGUH Colln; one specimen, MNHN Colln; one specimen, JMP Colln (MNHN-LP R63044); one specimen, SMF Colln (SMF 321220); seven specimens, ISL Colln; 49 specimens, ARF Colln.

Diagnosis. – A *Scissurella* (s. l.) with about 24 radial minor ribs on the adapical part of the last whorl. Selenizone present on the terminal half to ¾ whorl. Umbilicus wide, but almost invisible in umbilical view because of a lamella, which surrounds the umbilicus. The aperture is wide and almost semicircular, as the columella is almost straight. Adapically the columella and the labrum meet in a very acute angle of prosocline direction.

Measurements. – The holotype has a height of 1.6 mm and a width of 1.9 mm.

Description. – The shell is very small and turbiniform with a flattened apex. The last whorl equals 0.8 of the total shell heigh, the aperture about 0.6 of the total shell height. The protoconch consists of 1½ whorls and has a small nucleus. No microsculpture can be observed on the protoconch. The protoconch and the first half teleoconch whorl are submerged, and the last half of the first teleoconch whorl projects over the last teleoconch whorl, which is rapidly increasing in diameter.

The selenizone is present on the terminal half to ¾ whorl and divides the whorl into an adapical almost flat part and an abapical convex part, going regularly into the slightly convex base. The selenizone is relatively wide and slightly submerged, demarcated by two rather low spiral ribs.

On the adapical part of the whorl there is a spiral ornamentation, consisting of about eight weak minor ribs, which are only visible on the last teleoconch whorl, where they increase in strength. In between these ribs weaker ribs are present. On the base about six spiral ribs are present and in the spaces between these ribs 3–4 much weaker spiral threads are visible.

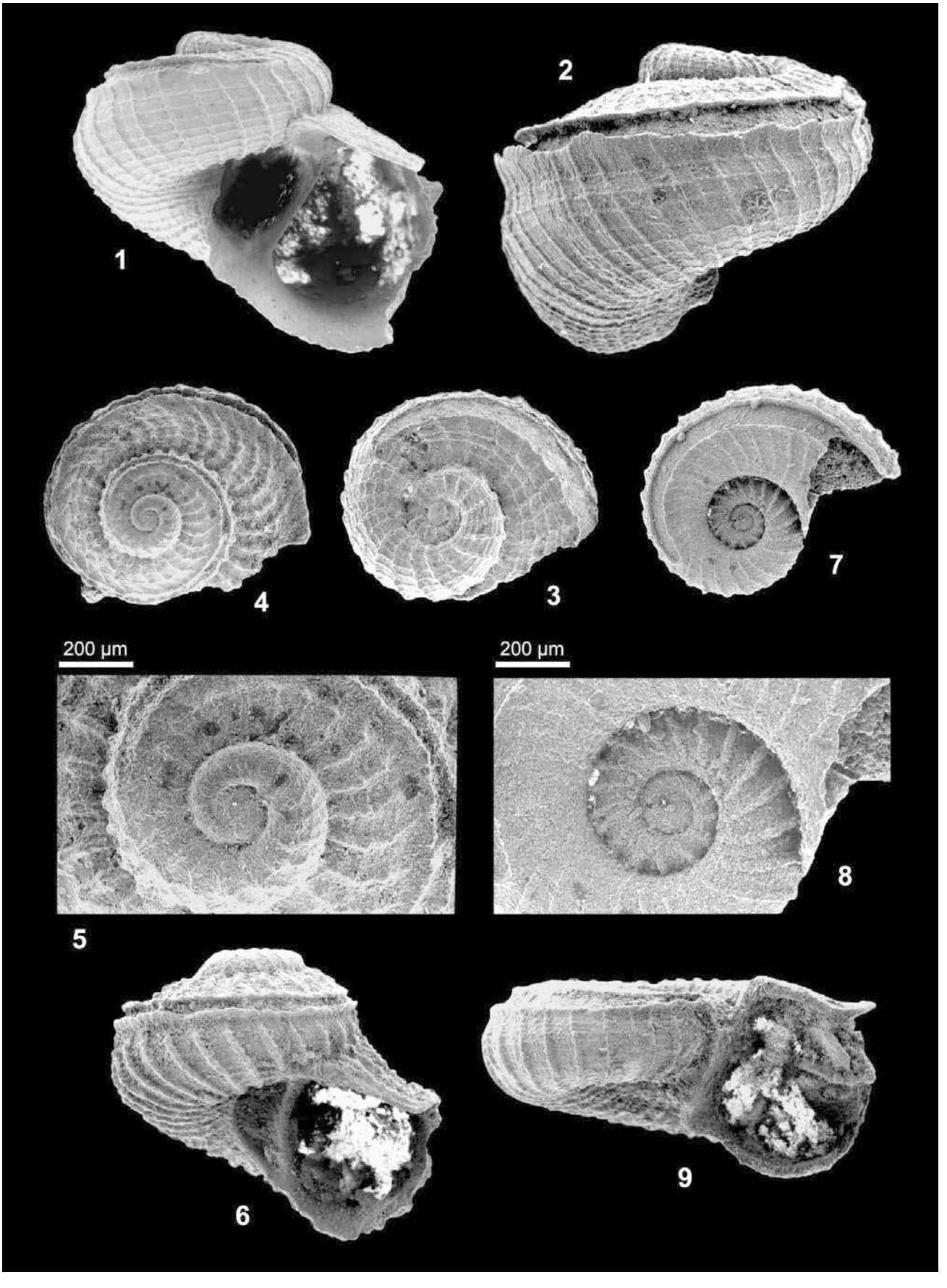
A radial sculpture is visible on the teleoconch whorls. Initially very weak ribs occur with about 15 on the first teleoconch whorl, and these ribs increase in strength and number to about 24 on the last teleoconch whorl. In between these radial ribs 4–5 weaker radial ribs are present, but when the selenizone appears these ribs disappear. The radial ribs are slightly prosocyrt on the adapical part of the whorl and prosocline in lateral view of the abapical part of the whorl. On the base the number of radial ribs is about 35 on the last teleoconch whorl.

In umbilical view the umbilicus is almost invisible, partly covered by a lamella, which surrounds the umbilicus. This lamella runs into the almost straight columella in an acute angle. The columella runs into the convex labrum in a regular curvation. Adapically the columella and the labrum meet in a very acute angle, which has a prosocline direction. The umbilicus is very deep and almost as wide as the aperture, which is almost semicircular, and thus the columella looks like it is dividing an ovate aperture into two almost equal parts. A short anal slit is present.

Plate 1
Figs 1–3. *Scissurella* (s.l.) *aliceae* sp. nov. Fig. 1: Holotype, × 31, MGUH 25748. Fig. 2: Paratype, × 35.6, MGUH 25749. Fig. 3: Paratype, × 32.4, MGUH 25750.

Figs 4–6. *Praescissurella? ravni* sp. nov. Figs 4–5: Paratype, MGUH 25751; Fig. 4: Apical view, × 23; Fig. 5: Apical view, × 67.5. Fig. 6: Holotype, MGUH 25752, apertural view, × 32.8.

Figs 7–9. *Maxwellella annulata* (Ravn, 1933). Figs 7–8: MGUH 25753. Fig. 7: Apical view, × 27. Fig. 8: Umbilical view, × 67.5. Fig. 9: MGUH 25754, apertural view, × 31.5.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Discussion. – In general outline and sculpture the new species is rather similar to other species of *Scissurella*, but it differs considerably in having a wide and deep umbilicus. Such a wide and deep umbilicus is questionable. Marshall (1993) provided some evidence that the female shells of *Larochea* (Scissurellidae, Larocheinae) had a large inner lip septum (brood chamber) that was absent in male shells. Hickmann (1999) also reported important sexual dimorphism in the genus *Sinezona* (Scissurellinae). Also, there is a slight possibility that *S. aliceae* is a shell of a female. This for the moment is a simple working hypothesis because the shell of *S. aliceae* does not fit well with any Scissurellidae from Fakse. If there were some relations between the young shells of *Maxwellella annulata* and *S. aliceae* (see Plate 1, figs 3 and 7), the adult shells of these species differ totally.

Genus *Praescissurella* Lozouet, 1998

Type species. – *Scissurella depontaillieri* Cossmann, 1879

Praescissurella? ravni sp. nov.
Pl. 1, figs 4 – 6; Pl. 3, figs 5a–c

Type locality. – Fakse Quarry.

Type stratum. – Coral Limestone, Middle Danian, Paleocene.

Derivation of name. – This species is named after Dr J. P. J. Ravn, who was the first to monograph the rich mollusc fauna from the Danium of Fakse.

Holotype. – Pl. 1, fig. 6, MGUH 25752 (leg. S. B. Andersen).

Paratypes. – Pl. 1, figs 4–5, MGUH 25751, ex coll. ISL; Pl. 3, figs 5a–c, MGUH 25761, ex Rosenkrantz Colln No. 121; one specimen, MGUH Colln ; one specimen, MNHN Colln; one specimen, JMP Colln (MNHN-LP R63045); one specimen, SMF Colln (SMF 321221); three specimens, ISL Colln; one specimen, ARF Colln.

Diagnosis. – A possible *Praescissurella* with a distinct radial sculpture, consisting of 13–18 sharp and a little crispy ribs. The selenizone appears after one teleoconch whorl and is demarcated by two relatively high and sharp lamellae. The aperture is rather large and the labrum and the columella meet adapically into an almost right angle. The umbilicus is narrow.

Measurements. – The holotype has a height of 1.2 mm and a width of 1.6 mm.

Description. – The shell is very small and turbiniform. The height/width ratio is 0.7 and the last whorl equals about ⅔ of the total shell height. The largest specimen consists of 2¾ whorls. The protoconch has a relatively small nucleus and consists of 1½ whorls. A microsculpture seems to be absent and the transition into the teleoconch is not very distinct. On the first teleoconch the only sculpture is 13 fine radial riblets , which gradually become flexuous and increase in strength. This part of the shell has no selenizone. On the largest specimen the selenizone is present on the last 1 ½ whorls. The selenizone is placed on the middle of the whorls and is somewhat submerged and demarcated by two prominent spiral lamellae. The selenizone divides the whorls into two convex parts. On the adapical part of the last whorl about 18 radial ribs are present and these ribs do neither reach the adapical suture nor the selenizone. On the abapical part 24 ribs are present, running into the umbilicus. The radial ribs increase in strength and are somewhat crispy at the intersections with the spiral ornamentation. The radial ribs are prosocline especially so on the adapical part of the whorl. The spiral ornamentation is weak and only visible because they give the radial ribs a crispy outlook. On the adapical part of the whorl about five spirals are suggested, on the abapical part about eight spirals. In the umbilicus a few further spirals are visible. The aperture is relatively large and subcircular and the labrum and the columella meet adapically in an almost right angle. The columella is almost straight and the labrum is convex. There is a short anal slit.

Discussion. – This species is very close to *Praescissurella? peyreirensis* (Lozouet in Bandel, 1998) from the Upper Oligocene of the Aquitaine Basin. *P. ravni* differs from *P. peyreirensis* by having a little more depressed spire and more numerous costae (24 on the

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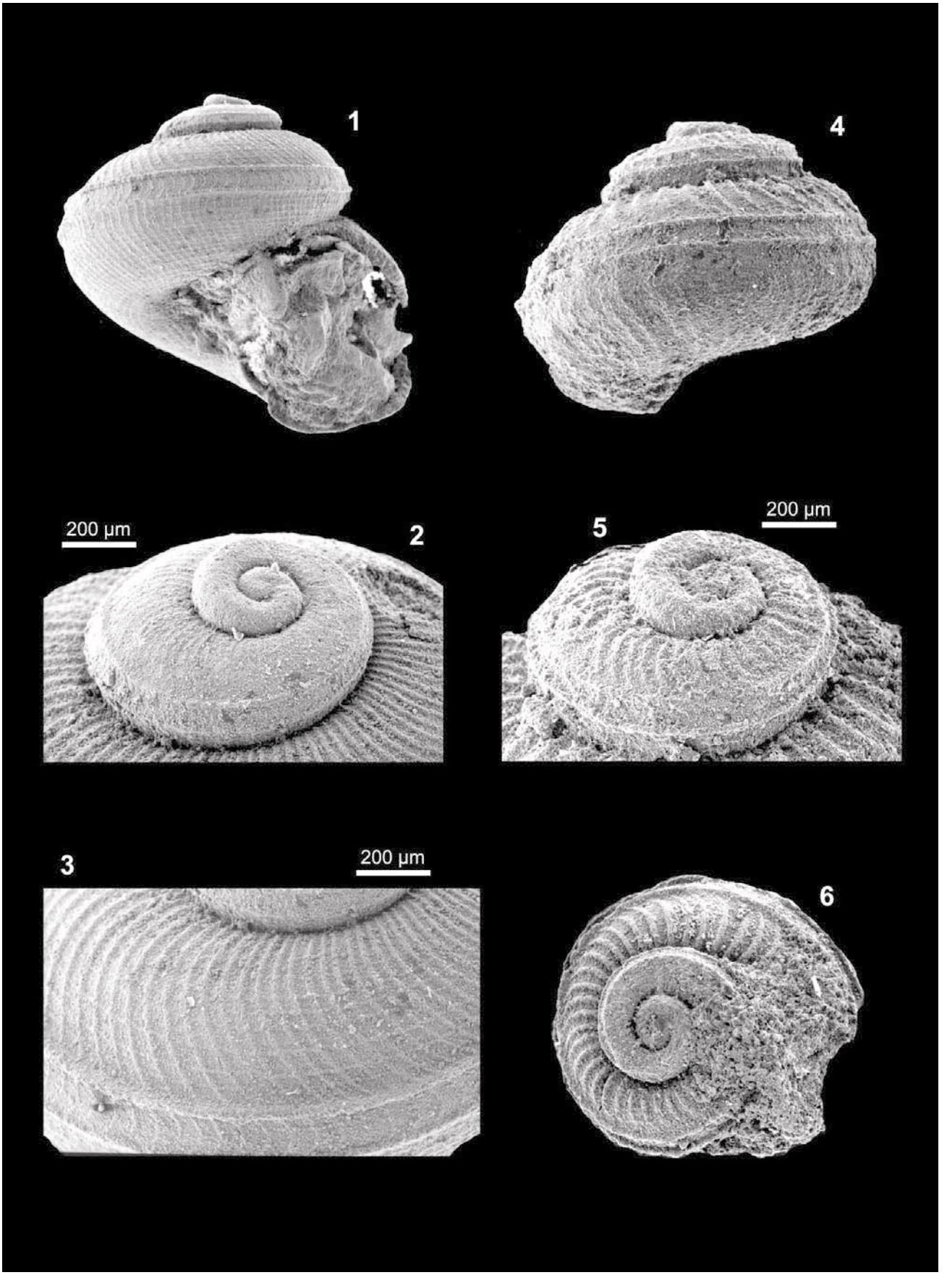
Plate 2
Figs 1–3. *Anatoma hedegaaardi* (Bandel, 1998). MGUH 25755. Fig. 1. Apertural view, × 29. Fig. 2. Apical view, x 67.5. Fig. 3. Details of sculpture, × 67.5.

Figs 4–5. *Anatoma rosenkrantzi* sp. nov. Holotype, MGUH 25756. Fig. 4: Rear view, × 43.3. Fig. 5: Apical view, × 67.5. Fig. 6: Paratype, MGUH 25757. Apical view, × 47.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abapical part of the last whorl, where *P. peyreirensis* has about 14 costae or ribs). The generic assignment is questionable because the new species has a relatively high spire and very high radial ribs, compared to *P. depontaillieri* (the type species of *Praescissurella*).

Genus *Maxwellella* Bandel, 1998

Type species. – *Scissurella annulata* Ravn, 1933

Maxwellella annulata (Ravn, 1933)
Pl. 1, figs 7 – 9; Pl. 3, figs 4a–c, Holotype, MGUH 3123 (= Ravn 1933, pl. 1, figs 14a–c).

Material. – Nine specimens, MGUH Colln; two specimens, MNHN Colln; two specimens, JMP Colln; two specimens, SMF Colln (SMF 321222); 22 specimens, ISL Colln; 54 specimens, ARF Colln.

Description. – The shell is very small and planispiral, almost twice as wide as high. The aperture is higher than the total shell height. The whorls are almost circular in cross section and increase rapidly in diameter.

The protoconch and the first teleoconch whorls are depressed and only the last whorl is higher than the apex, partly covering the penultimate whorl. On the base there is a wide and deep umbilicus, in which all previous whorls are visible. Thus the shell is rather similar in apical and umbilical view, except for the selenizone.

The protoconch consists of about 1¼ whorls and the nucleus is rather small. On no specimen a microsculpture can be observed. On the first teleoconch whorl about 15 rather strong radial ribs are present. On the adapical part of the whorl they are slightly prosocline. Below the selenizone the ribs are rather strong and directed towards the umbilicus. Weak growth lines are visible in between the radial ribs. On the last whorl there are about 24 radial ribs. A little higher than the periphery a rather wide selenizone, ending in a short slit, is present. On the last ¾ whorl the selenizone is demarcated by two rather prominent edges. A spiral ornamentation is totally absent.

The aperture is subcircular to subquadratic. Only two specimens have a rather well preserved aperture, which is widened and almost quadratic in outline. The short slit is situated near the upper abaxial corner and the aperture is placed slightly obliquely to the axis of the shell.

Genus *Anatoma* Woodward, 1859

Type species. – *Anatoma crispata* (Fleming, 1828)

Anatoma hedegaardi (Bandel, 1998)
Pl. 2, figs 1 – 3

1998 *Scissurella hedegaardi* n. sp. – Bandel, p. 16, pl. 4, figs 3–4.

Description. – The shell is very small and turbiniform. The height equals the width on the adult specimen and the last whorl equals 0.9 of the total shell height. The adult specimen consists of 3¾ whorls, which are highly convex and separated by deep sutures.

The protoconch, consisting of about 1¼ whorls, is paucuspiral and depressed. The nucleus is rather small and no microsculpture is preserved. The transition into the teleoconch is not distinct. After ½ teleoconch whorl a spiral rib runs into a selenizone, which divides the whorl into an adapical and an abapical part, which both are convex. The selenizone is situated in the middle of the whorls and the whorls have their largest width, where the abapical spiral rib demarcating the selenizone is situated. The selenizone is relatively wide and has rather prominent chevron-like ribs.

The adapical part of the whorl has eight fine spiral ribs, which are increasing in strength towards the se-

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Plate 3
Scissurellida from the Danian of Fakse. Reproduced after drawings, made 1963 by Mrs Erna Nordmann, in the Rosenkrantz' files in the Geological Museum, the University of Copenhagen. All figures are × 30.

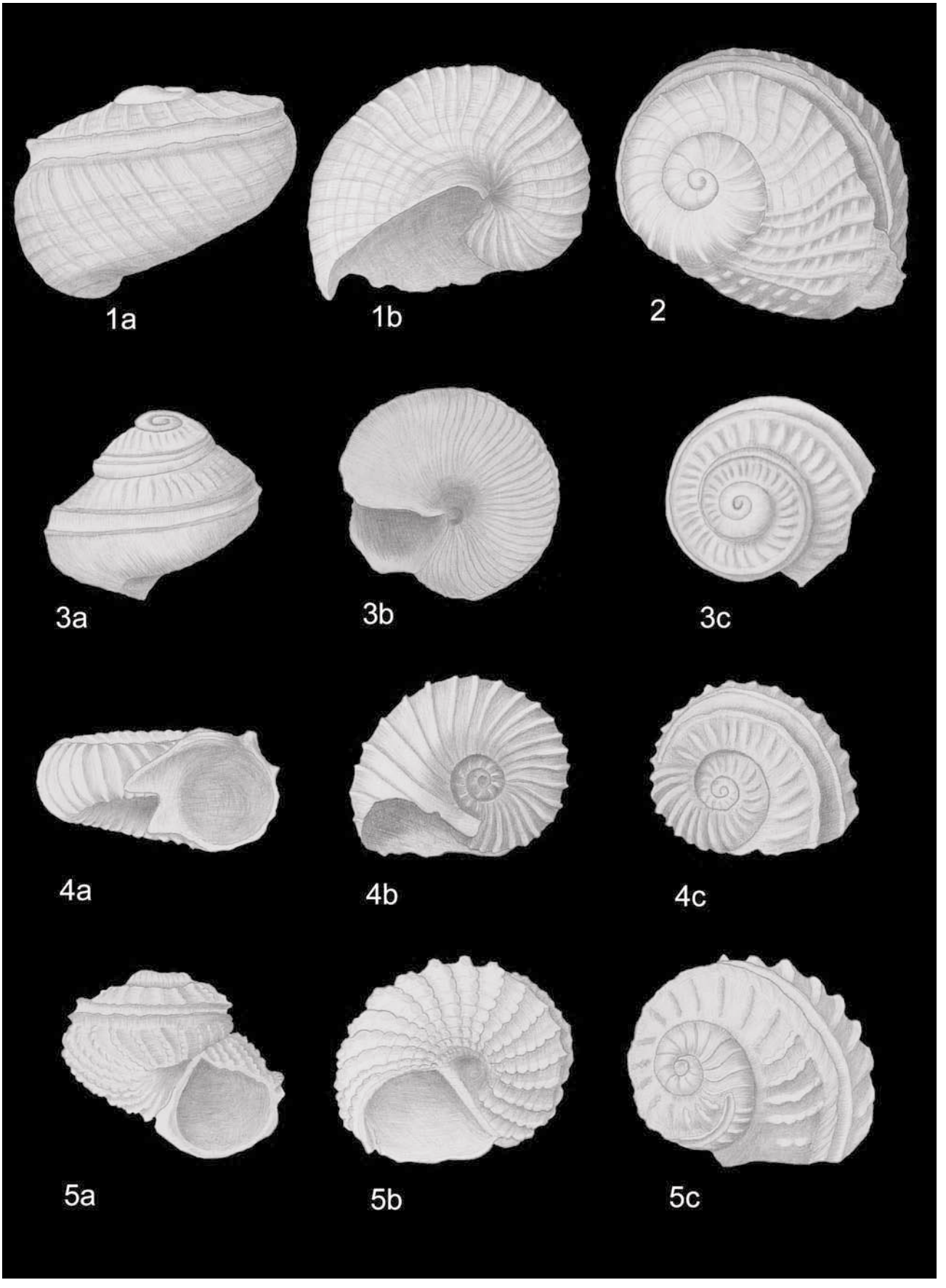
Figs 1a–b. *Scissurella* (s. l.) *aliceae* sp. nov. Paratype, MGUH 25758, ex Rosenkrantz Colln No. 120.

Fig. 2. *Scissurella* (s. l.) *aliceae* sp. nov. Paratype, MGUH 25759, ex Rosenkrantz Colln No. 119.

Figs 3a–c. *Anatoma rosenkrantzi* sp. nov. Paratype, MGUH 25760, ex Rosenkrantz Colln No. 118.

Figs 4a–c. *Maxwellella annulata (Ravn, 1933).* Holotype, MGUH 3123.

Figs 5a–c. *Praescissurella? ravni* sp. nov. Paratype, MGUH 25761, ex Rosenkrantz Colln No. 121.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lenizone. On the abapical part of the whorl four spiral riblets are present. The adapical part of the whorl has about 50 prosocyrt radial ribs, which are stronger than the spiral ribs. On the abapical part of the whorl and on the convex base the radial ribs are more straight and directed towards the umbilicus. The radial and spiral sculptural elements result in a cancellate sculptur on the abapical part of the whorl and on the base.

The aperture is ovate and a rather narrow umbilicus is present. A very short anal slit is situated near the middle of the labrum.

Remarks. – Bandel based this species on a single juvenile specimen, which did not show umbilical characters. In the collection of Mrs Alice Rasmussen three juvenile and one adult specimen were found, thus allowing an emendation of Bandel's description. In the ISL Colln one further juvenile specimen was isolated.

According to Bandel's description and illustrations this species has about 2.5 whorls at a diameter of 0.5 mm. The whorls are flat adapically and convex abapically. The protoconch is small and without any microsculpture preserved. On the first teleoconch whorl a very fine spiral rib passes into the selenizone, which is present on the last teleoconch whorl. On the last teleoconch whorl about 40 fine flexuous radial ribs are present, and they run across the periphery and the convex base. The selenizone is slightly submerged with only slightly projecting margins and is situated on the upper edge of the whorl, which has its greatest diameter below the selenizone. The base is convex and the aperture is rounded and as high as wide. This rather short description, however, shows that the new material can be referred to *Anatoma hedegaardi.*

Bandel (1998) also established *Anatoma danica*, based on one very juvenile specimen, consisting of the protoconch and half of the first teleoconch whorl. His new species was characterised by its unusually large protoconch (diameter 0.5 mm) and a prominent spiral rib on the periphery. Furthermore the selenizone is present after a quarter of the teleoconch whorl. A study of juvenile specimens of *Leptomaria niloticiformis* (von Schlotheim, 1820) in the collections of the senior author and of MNHN demonstrated that *Anatoma danica* Bandel, 1998 could be referred to this species, and *Anatoma danica* Bandel, 1998 thus is a junior synonym of *Leptomaria niloticiformis* (von Schlotheim, 1820).

Anatoma rosenkrantzi sp. nov.
Pl. 2, figs 4 – 6; Pl. 3, figs 3a–c

Type locality. – Fakse quarry.

Type stratum. – Coral Limestone, Middle Danian, Paleocene.

Derivation of name. – This species is named in honour of the late Prof. A. Rosenkrantz.

Holotype. – Pl. 2, figs 4 – 5, MGUH 25756 (leg. S. B. Andersen).

Paratypes. – Pl. 2, fig. 6, MGUH 25757, ex ISL Colln; Pl. 3, figs 3a–c, MGUH 25760, ex Rosenkrantz Colln No. 118.

Diagnosis. – A relatively high-spired *Anatoma* with a weak radial sculpture, especially so on the base. On the adapical part of the last whorl 28–34 radial ribs are present, on the abapical part there are about 60 radial ribs. The spiral ornamentation is almost invisible. The selenizone is present on the last two whorls. The umbilicus is narrow.

Measurements. – The holotype has a height of 1.2 mm and a width of 1.5 mm.

Description. – The shell is very small and turbiniform. The height/width ratio is about 0.8. The largest specimen consists of 3½ whorls which are increasing slowly and regularly in diameter and are separated by distinct sutures. The protoconch seems to be smooth, with a rather small nucleus. The transition into the teleoconch seems to be gradual. The protoconch and the first teleoconch whorl are planispiral.

The selenizone is present after about ¼ teleoconch whorl and situated below the middle of the whorl, but on the last whorl it is situated on the middle of the whorl and gradually increases in width. It is demarcated by two low spirals. The selenizone divides the whorl into an adapical almost flat part and an abapical convex part. On the adapical part there are about 28 very fine radial ribs on the first teleoconch whorl and this number increases to about 34 on the last whorl. The ribs are not visible near the sutures and increase a little in strength on the last whorl. On the adapical part of the whorl about 60 weak, narrowly spaced ribs are present, running into the relatively narrow umbilicus. The aperture is rather small and almost circular.

Discussion. – The species differs from *Anatoma hedegaardi* (Bandel, 1998) in having a lower number of

collabral ribs and furthermore the ribs are more prominent. The spiral ornamentation is almost invisible, while *Anatoma hedegaardi* has a fine, but distinct spiral ornamentation. Finally the selenizone on *A. hedegaardi* is wider and has rather distinct chevron-like lines.

Dansk sammendrag

Sneglefamilien Scissurellidae fra Danmarks Paleocæn er revideret. I Ravns monografi fra 1933 over faunaen kendtes kun arten *Scissurella annulata*, mens Bandel (1998) opstiller arterne *Scissurella hedegaardi* og *Anatoma danica*. Der opstilles tre nye arter fra Danienet ved Fakse: *Scissurella* (s. l.) *aliceae, Praescissurella? ravni* og *Anatoma rosenkrantzi*. Der gives en palæøkologisk tolkning. *Anatoma danica* (Bandel, 1998) anses for et junior synonym for *Leptomaria niloticiformis* (von Schlotheim, 1820). Familien Scissurellidae er således repræsenteret ved fem arter i Danienet fra Fakse.

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