

***Eoatlanta ravni* nov. sp. (Mollusca: Gastropoda, ?Hipponicidae) from the Danian (early Paleocene) of Faxe, Denmark**

Kai Ingemann Schnetler

Fuglebakken 14, Stevnstrup, DK-8870 Langå, Denmark; e-mail: i.schnetler@mail.dk

Received 15 March 2013, revised version accepted 14 April 2013

In the very rich mollusc fauna of the middle Danian deposits at Faxe, Denmark, a characteristic gastropod, previously referred to the French Eocene (Lutetian) species *Eoatlanta spiruloides* (Lamarck, 1804) is common. The genus *Eoatlanta* used to be assigned to the family Atlantidae Rang, 1829 in the superfamily Pterotracheoidea Rafinesque, 1814. Lozouet (2012) removed the genus *Eoatlanta* from the Atlantidae and included it in the Vanikoroidea Gray, 1840, family Hipponicidae Troschel, 1861. A renewed study of Faxe material resulted in the recognition of a new species *Eoatlanta ravni*, in several respects differing from *Eoatlanta spiruloides*.

KEY WORDS: Mollusca, Gastropoda, Vanikoroidea, Hipponicidae, Danian, Faxe, Denmark, new species

Introduction

The Danian deposits of Faxe (Denmark) contain a very rich mollusc fauna (Ravn (1902a, b; 1933); Nielsen, 1919; Schilder, 1928; Rosenkrantz, 1960; Schnetler *et al.*, 2001; Schnetler & Petit, 2006; Schnetler & Lozouet, 2012). A common species, previously referred to the Lutetian species *Eoatlanta spiruloides* (Lamarck, 1804) from the Paris Basin, is herein described as the new species *Eoatlanta ravni*.

Geological setting, stratigraphy and palaeoecology

Reference is made to Lauridsen *et al.* (2012) and Schnetler *in* Schnetler & Lozouet (2012). The Faxe Formation was established by Lauridsen *et al.* (2012). The material studied herein was collected in the Faxe quarry from an unconsolidated corallian limestone, described and established as the Baunekule Facies of the Faxe Formation by Lauridsen *et al.* (2012). Previously this facies was informally called 'nose-limestone'. The morphology of originally aragonitic mollusc shells has been preserved in this facies, due to early recrystallisation of aragonite into calcite (Ravn, 1933; Bernecker & Weidlich, 1990; Schnetler & Lozouet, 2012). Mollusc material was collected in the early 20th century by J.P.J. Ravn, K.B. Nielsen and A. Rosenkrantz and later by S.B. Andersen and S.L. Jakobsen in 1972, A. Rasmussen in 1994 and M.S. Nielsen, in 1994.

The species *Eoatlanta spiruloides* (Lamarck, 1804)

The small gastropod, until now identified as *Eoatlanta spiruloides*, is not of rare occurrence in the Faxe deposits. It has generally been considered as a heteropod, belonging to the family Atlantidae Rang, 1829. Both Ravn (1933, p. 70) and Rosenkrantz (1960, p. 196) assigned the species to the pelagic Heteropoda, nowadays indicated as clade Littorinimorpha, superfamily Pterotracheoidea. Wenz (1940, p. 1014) stated that the last whorl in Atlantidae species is carinated. However, in his short description of the genus *Eoatlanta* Cossmann (1889) stated that no carina was present in the type species *E. spiruloides* of this monotypic genus. The present author and A.W. Janssen (2011, pers. comm.) discussed the Danian species from Faxe, Denmark, previously referred to *Eoatlanta spiruloides*, and its taxonomic position. We both had the opinion that the Faxe species was not conspecific with *Eoatlanta spiruloides* and A.W. Janssen (November 2011, pers. comm.) stated that the Faxe species was certainly not a 'heteropod'. Subsequently, Lozouet (2012, p. 14) stated that the assignment of *Eoatlanta spiruloides* to the Atlantidae was improbable because of the general outline and thick-walled shell, the lack of ornament and the paucispiral protoconch with spiral threads and that an assignment to the Capulidae Fleming, 1822 or Hipponicidae Troschel, 1861 was more appropriate. However, *Eoatlanta canaliculata* Lozouet, 2012, established in the same paper, has a smooth protoconch. No spiral threads could be observed on the protoconch of the Faxe species, possibly because the state of preservation

of the gastropods from the ‘nose-limestone’ excludes preservation of a microornament. Majewski *et al.* (2012) illustrated the small hyperstrophic heterobranched gastropod *Retrotortina* Chaster, 1896., which they assigned to the family Omalogyridae G.O. Sars, 1878. Representatives of this family of minute planispiral gastropods, however, have never a widened aperture with an externally reinforced margin. Both *Eoatlanta spiruloides* and *Eoatlanta ravni* nov. sp. have a planispiral dextral shell and *Eoatlanta ravni* nov. sp. furthermore has a widened aperture with an externally reinforced margin. I assign *Eoatlanta* to the Hipponicidae with some hesitation because the regularly coiled shell of *Eoatlanta* is atypical for this family.

Abbreviations

ARF	A. Rasmussen collection, Faxe, Denmark.
GF	Geomuseum Faxe, Faxe, Denmark
GM	Acronym for registered material in the Geological Museum, Copenhagen, Denmark.
ISL	K.I. Schnetler collection, Langå, Denmark.
MGUH	Geological Museum type collection, Copenhagen, Denmark.
MNHN	Muséum National d’Histoire Naturelle, Paris, France.
MNO	M.S. Nielsen collection, Odense, Denmark.
RGM	Naturalis Biodiversity Center (Palaeontology Department), Leiden, The Netherlands (formerly Rijksmuseum van Geologie en Mineralogie).
Rkz	Specimen in the Rosenkrantz files of drawings, housed in the Geological Museum, Copenhagen.
SMF	Forschungsinstitut Senckenberg, Frankfurt am Main, Germany.

Systematic palaeontology

Phylum Mollusca Linnaeus, 1758
Class Gastropoda Cuvier, 1797
Clade Caenogastropoda Cox, 1960
Superfamily Vanikoroidea Gray, 1840 ?
Family Hipponicidae Troschel, 1861 ?
Genus *Eoatlanta* Cossmann, 1889

Type species — ‘*Cyclostoma spiruloïdes*, Lamk’, by monotypy, Cossmann (1889, p. 298, pl. 10, figs 63, 64). Eocene, France.

Eoatlanta ravni nov. sp.

Plate 1, figs 1-8

- 1933 *Eoatlanta spiruloides* (Lamk.) – Ravn, p. 70, pl. 7, figs 10a-c, 11 (*non* Lamarck).
1960 *Eoatlanta spiruloides* (Lamk.) – Rosenkrantz, p. 196 (*non* Lamarck)

Type locality — Faxe quarry, Sjælland, Denmark.

Type stratum — Faxe Formation, Baunekule Facies, middle Danian, Palaeocene.

Etymology – Named in honour of J.P.J. Ravn, who monographed the molluscan fauna of the Faxe ‘nose-limestone’ and first gave a description of this species.

Holotype — Pl. 1, fig. 1a-c, MGUH 30376 (leg. S.B. Andersen 1972).

Illustrated paratypes – Pl. 1, fig. 2a-c, MGUH 30377 (leg. S.B. Andersen 1972). Pl. 1, fig. 3a-c, MGUH 30378 (leg. S.B. Andersen 1972). Pl. 1, fig. 4a-c, RGM 794 231 (leg. S.B. Andersen 1972). Pl. 1, fig. 5a-c, RGM 794 232 (leg. S.B. Andersen 1972). Pl. 1, fig. 6a-c, MGUH 30379 (= Rkz 108). Pl. 1, fig. 7a-b, MGUH 30380 (= Rkz 158A). Pl. 1, fig. 8a-b, MGUH 30781 (= Rkz 158B).

Additional paratypes — GM (Ravn 1933), 137 specimens; SMF, 2 specimens (SMF 341504); MNHN, 2 specimens; ARF, 191 specimens; ISL, 155 specimens; MNO, 109 specimens. GF 10035-33, 33 specimens; GF 10035-34, 5 specimens.

Diagnosis — An *Eoatlanta* with the last whorl disconnecting and gradually increasing in diameter towards the aperture, which has a distinct, trumpet-like collar. The paucispiral protoconch is apparently smooth. Only the terminal half whorl, or slightly more, is disjunct.

Measurements — The holotype has a diameter of 2.5 mm, height of the last whorl 0.7 mm, height of the aperture 0.9 mm.

Description — The shell is small and dextral, planispiral or in a few cases with a slightly elevated spire consisting of about three smooth whorls, which are regularly increasing in diameter. In cross section the whorls are circular or slightly ovate. The nucleus is relatively large and has no microornament preserved. The first two teleoconch whorls form a closed spiral, while the terminal half whorl, or slightly more, is disjunct. The aperture is circular or slightly ovate (in a few cases truly ovate), widened and with an externally reinforced margin giving it a trumpet-like shape. In lateral view the aperture is almost orthocline.

Discussion — The new species differs from *Eoatlanta spiruloides* especially by its aperture with distinct trumpet-like collar. Furthermore, the disjunct part of the body whorl is considerably shorter. Judging from Cossmann (1889, pl. 10, fig. 63), as well as from Lozouet (2012, pl. 4, figs 1a-b, 3a-b), at least 1½ whorls of *Eoatlanta spiruloides* are disjunct. The protoconch of *Eoatlanta spiruloides* has 7-8 fine spiral threads, according to Lozouet (2012, p. 59). A similar ornament could not be observed on the Faxe specimens.

Eoatlanta canaliculata Lozouet, 2012 (p. 60, pl. 4, figs 2a-b, 4a-b) has only 1¼ whorls, a smooth protoconch of different shape and the entire teleoconch is disjunct. Both *Eoatlanta spiruloides* and *E. canaliculata* are species from the French Eocene, viz. Lutetian and Priabonian,

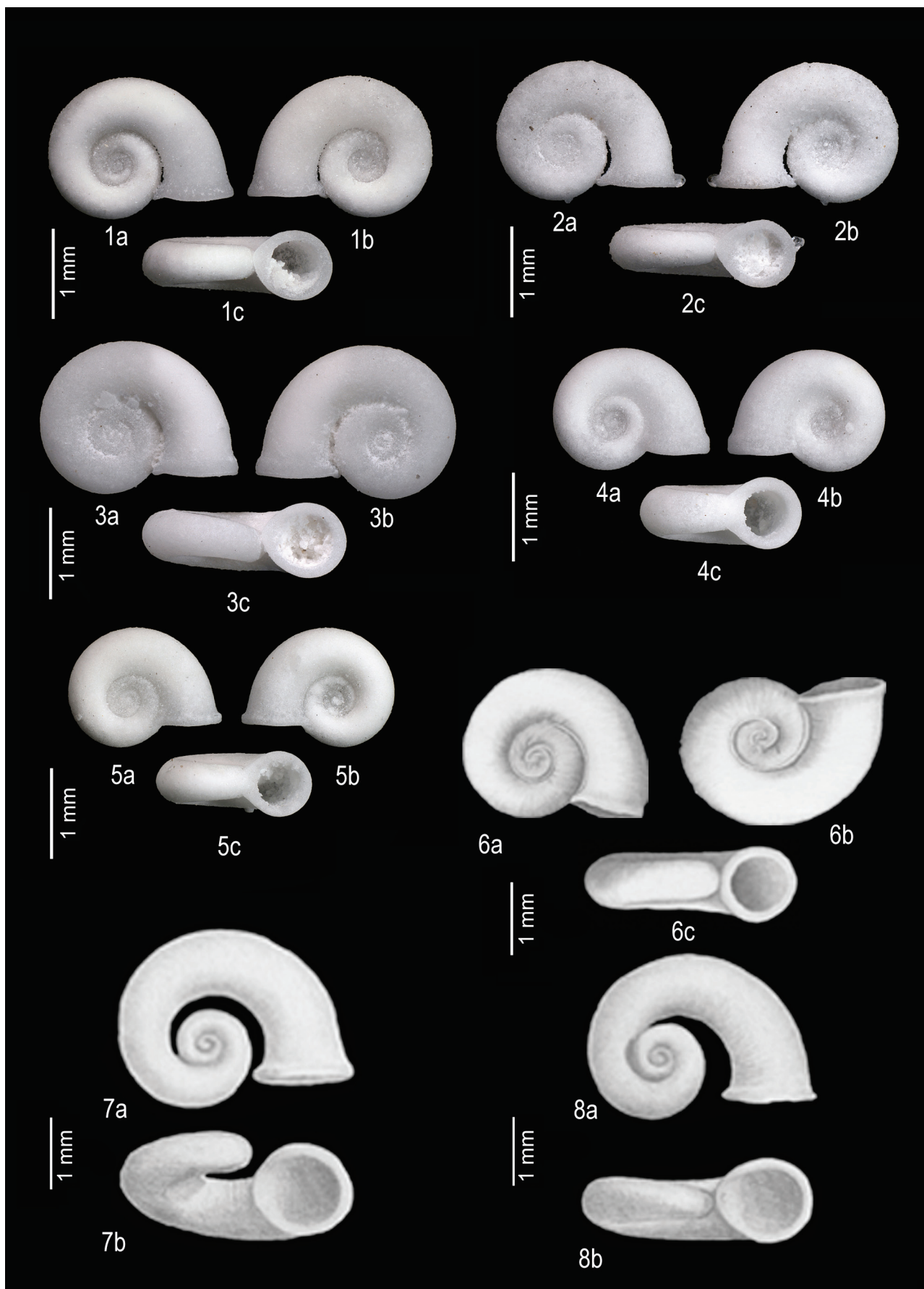


Plate 1.

Plate 1. 1-8. *Eoatlanta ravni* nov. sp.;

- 1a-c **Holotype**, MGUH 30376 (leg. S.B. Andersen), height 0.76 mm;
2a-c **paratype**, MGUH30377, height 0.81 mm;
3a-c **paratype**, MGUH 30378, height 0.92 mm;
4a-c **paratype**, RGM 794 231, height 0.89 mm;
5a-c **paratype**, RGM 794 232, height 0.73 mm (all leg. S.B. Andersen);
6a-c **paratype**, MGUH 30379 (Rkz 108), height 0.9 mm;
7a-b **paratype**, MGUH30380 (Rkz 158A), height 0.8 mm;
8a-b **paratype**, MGUH 30381 (Rkz 158B), height 0.8 mm.

Figs 1-5 are photographed by Ronald Pouwer, Naturalis Biodiversity Center (Leiden, The Netherlands). Figs 6-8 are reproduced from drawings in the Rosenkrantz files, the Geological Museum of Copenhagen.

respectively, and thus considerably younger than the Faxe species. I consider that the Faxe species is not conspecific with either of these species.

Remarks — Ravn (1933, p. 71) noted that the Faxe specimens demonstrated some variability. They were planispiral or almost planispiral, the whorls were circular or slightly ovate in cross section and the aperture was slightly ovate or circular, in rare cases truly ovate. The disjunct part of the body whorl, however, is the terminal half or slightly more and almost all specimens have the widened aperture with an externally reinforced margin. The descriptions and illustrations in literature of the specimens of *Eoatlanta spiruloides* from France show some variation. According to Deshayes (1824, p. 78, pl. 7, figs 15, 16) only the body whorl is disjunct, according to Cossmann (1895, p. 134, pl. 6, figs 6, 7) the other whorls are also disjunct. A widened aperture with an externally reinforced margin was not known on the French species. Ravn assigned the Danish material, not without some hesitation, to *Eoatlanta spiruloides*. Rosenkrantz, however, questioned the assignment to *Eoatlanta spiruloides* in the Rosenkrantz files of drawings (about these files, see Schnetler & Petit, 2006). On one of the pages he compared the Faxe species with *Eoatlanta spiruloides* and found differences, which led him to suggest the name *Eoatlanta ravni* for the Faxe species under the drawings. However, he neither published the species nor the files with drawings and written remarks. Some of the drawings have since been published by Schnetler *et al.* (2001) and Schnetler & Petit (2006). Seven of his drawings are copied herein (Pl. 1, figs 6a-c, 7a-b, 8a-b) and Rosenkrantz's informal name *ravni* is adopted.

Acknowledgements

I am very indebted to Sten Lennart Jakobsen (Geological Museum, University of Copenhagen) for help with locating the material and the Rosenkrantz files of drawings in the museum and giving access to the Faxe collection. Alice Rasmussen† (Faxe, Denmark), Søren Bo Andersen (Aarhus, Denmark) and Mogens Stentoft Nielsen (Odense, Denmark) kindly made their Faxe collections available for study. I am grateful to Ronald Pouwer, Naturalis Biodiversity Center (Leiden, The Netherlands) for the excellent photographic work. I am grateful to Steven Tracey (ICZN

Secretariat, London, UK) and Andrzej Kaim (Instytut Paleobiologii PAN, Warsaw, Poland) for fruitful suggestions and to the editor of this periodical for many improvements of the manuscript.

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