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Notes on the systematics, morphology and biostratigraphy of fossil holoplanktonic Mollusca, 12¹. On the identity of *Hyalea perovalis* Von Koenen, 1882 (Mollusca, Gastropoda, Euthecosomata) from the Early Miocene of the North Sea Basin

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New specimens of the extremely rare cavolinid pteropod '*Hyalea perovalis*' Von Koenen, 1882, are recorded and illustrated from a boulder of Holsteiner Gestein (Early Miocene) collected at Nehnten, Schleswig-Holstein (Germany). *Hyalea perovalis* is here considered to be a junior synonym of *Diacrolinia aquensis* (Grateloup, 1827), which is known from the Early Burdigalian of the Aquitaine Basin, France. The occurrence of this species in the 'Holsteiner Gestein' substantiates previous correlations of the Late Vierlandian of the regional North Sea Basin stages with the Early Burdigalian of the international chronostratigraphic scheme.

Key words: Gastropoda, Euthecosomata, Cavoliniidae, *Diacrolinia*, Miocene, Burdigalian, North Sea Basin, Aquitaine Basin, lectotype designation.

INTRODUCTION

In northern Germany sedimentation of marine Miocene starts with the Lower Mica Clay (of Early Vierlandian age in the local chronostratigraphy). This clay hardly yields any fossils, apart from microfossils such as Foraminifera. On top of this clay the sediment suddenly changes to fine sand, which in the eastern part of the basin contains a molluscan fauna in which the most important pteropod species is *Vaginella depressa* Daudin, 1800. They generated at the storm-wave-base in an open sea and are overlain by deltaic deposits called 'Untere Braunkohlensande'.

The age of this 'Lower Mica Finesand' is indicated as Late Vierlandian. These sands undoubtedly are the source level of the so-called 'Holsteiner Gestein' erratics, found reworked in fluvio-glacial deposits. The boulders usually are small-sized pieces of reddish sideritic sandstone of local origin, frequently replete with a diverse array of commonly well-preserved benthic molluscs, as well as various holoplanktonic species.

The boundary between mica clay and fine sands, however, is diachronous, which means that more to the West it becomes younger and ultimately is of Hemmoorian age.

¹ For No. 11 in this series see Basteria 65: 147-149, 2001

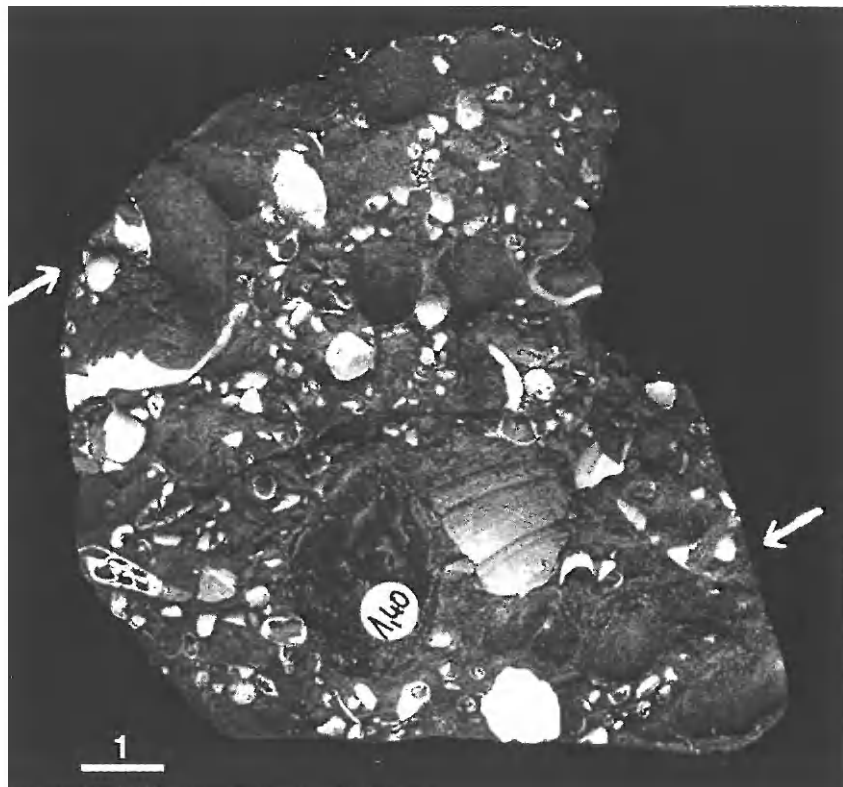


Fig. 1. Slab of Holsteiner Gestein from Nehmten (Germany, Schleswig-Holstein), showing benthic molluscan remains and two specimens of the pteropod '*Hyalea perovalis* Von Koenen, 1882' (arrows). The left hand specimen is illustrated in fig. 3, the right hand one in fig. 4. Scale bar 1 cm.

Borehole samples and erratics (so-called 'Vaginellen-Kalksandstein') from this level contain many specimens of the pteropod *Vaginella austriaca* Kittl, 1886.

The assemblage of the Holsteiner Gestein, which contains benthic molluscs such as *Leionucula laevigata* (Sowerby, 1818), *Toldia glaberrima* (Münster, 1835), *Toldiella pygmaea* (Münster, 1835), *Spisula* sp., *Haustator goettentrupensis* (Cossmann, 1899), *Euspira helicina* (Brocchi, 1814), *Sassia enodis* (Beyrich, 1856), *Nassarius schlotheimi* (Beyrich, 1854), *Mitrella attenuata* (Beyrich, 1854) and *Fusiturris duchastelii* (Nyst, 1845), as well as the pteropod *Vaginella depressa* Daudin, 1800, is unequivocally dated as Early Miocene, or 'Late Vierlandian' in the local chronostratigraphic scheme.

In his well-known paper on North German Miocene molluscan faunas A. von Koenen (1882) included descriptions of several pteropod species from reworked boulders of 'Holsteiner Gestein'. One of the pteropod taxa introduced as a new species was named *Hyalea perovalis* by Von Koenen (1882), and is usually indicated by subsequent authors as *Cavolinia perovalis*. Von Koenen had three specimens available, all from Stolpe (Germany, Schleswig-Holstein), one of which was illustrated (Von Koenen, 1882: 354, pl. 7 fig. 15a-

c) by means of a small drawing. This has remained an enigmatic species ever since, as the type material is missing. The first author, at various occasions, has attempted to trace Von Koenen's specimens in public collections at Hamburg, Berlin and Göttingen, but without any success. They must be considered lost. The species is extremely rare. As far as we know, not a single specimen has been collected ever since the original description, despite detailed inspection of numerous slabs of Holsteiner Gestein from various localities in Schleswig-Holstein.

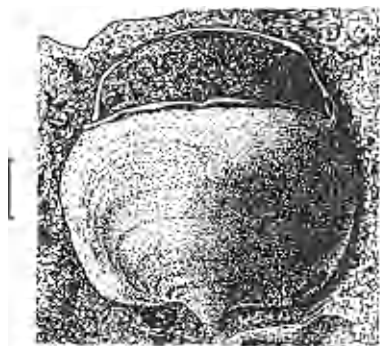


Fig. 2. Von Koenen's (1882) illustration of *Hyalea perovalis*, from Stolpe (Miocene, Vierlandian, Holsteiner Gestein), herein designated lectotype.

NEW MATERIAL.

In April 2002 the second author visited the so-called 'Eiszeitmuseum' at Stolpe and had a look at the fossil samples on sale there. To his great surprise there was a small piece of Holsteiner Gestein from a locality named Nehmten, just 12 km SE of Stolpe, that, although not very attractive at first sight, proved to contain two specimens of Von Koenen's *Hyalea perovalis*! Of course he immediately purchased the specimen (price was € 1.40) and subsequently sent it to the first author. Apart from benthic molluscan remains, the slab contains numerous specimens of the pteropod *Vaginella depressa*, as well as a single shell of *Limacina microstralis* (Kautsky, 1925). Fig. 1 is an overall view of the boulder.

The left hand specimen (arrows) in fig. 1, which was preserved in dorsal aspect, was isolated from the slab, with some fragments of the ventral side left sticking to the matrix, but these could be glued back again. A small portion of the lower ventral side appeared to be missing (fig. 3a-c). The second specimen was carefully freed from the adhering sediment, to reveal the ventral side in its entirety, and left in place (fig. 4).

Both specimens unfortunately lack their protoconch, but the central radial riblet present at the base of the dorsal shell part, as well as the dorsally curved lateral slits, clearly indicate that they belong in the recently introduced genus *Diacrolinia* (compare Janssen, 1995: 110). On the basis of these new specimens it is obvious that Von Koenen's illustration (here reproduced as fig. 2) represents the species very well.

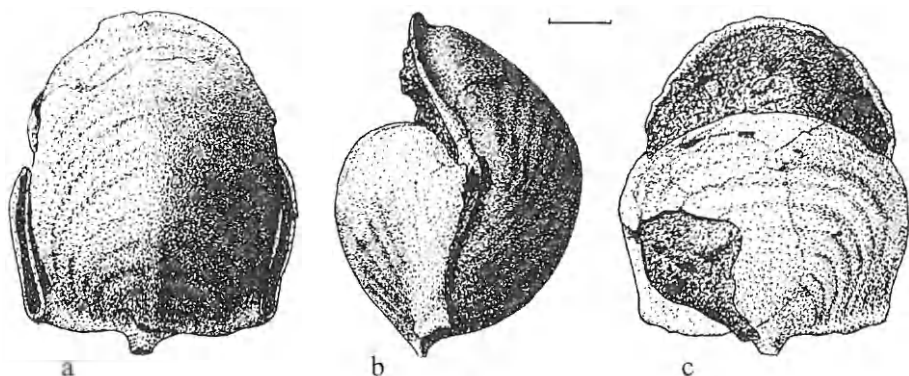


Fig. 3. *Diacrolinia aquensis* (Grateloup, 1827). First of two specimens from a boulder of Holsteiner Gestein, originating from Nehnten (Germany, Schleswig-Holstein). Purchased from the Eiszeitmuseum, Stolpe (Germany); don. Karl Gürs (RGM 458.705). a, dorsal; b, left lateral; c, ventral view. Scale bar 1 mm.

RELATED SPECIES FROM THE MIOCENE OF AQUITAINE (FRANCE)

With regard to the correct name of this interesting fossil there are some taxonomical problems of related species to be considered. Prior to Von Koenen's description in 1882 two closely related species, *Diacrolinia orbigny* (Rang, 1827) (described as *Hyalea Orbigny* by Rang [1827: 383], emended by d'Orbigny [1836: 99, footnote 2]) and *D. aquensis* (Grateloup, 1827) (described as *Hyalaea Aquensis* by Grateloup [1827: 4]) were described from the Aquitaine Basin. Both species are extremely rare, because of their fragility, and at the time were known from very few specimens only. A paper on the Oligocene and Miocene holoplanktonic molluscs of the Aquitaine Basin is in preparation (Janssen, in prep.). In anticipation of the detailed discussion therein, a few notes will suffice here.

Most early authors considered *Diacrolinia orbigny* and *D. aquensis* synonyms. It was Peyrot (1932: 20) who expressed doubts about the conspecificity, although he only had material of *D. aquensis* before him, relying on the original publications otherwise.

A study of additional material of both species clearly shows that Peyrot was right. Indeed, the differences are quite substantial: in *Diacrolinia orbigny* the dorsal shell part has, next to the central radial rib, two weaker such ribs on each side. In *D. aquensis* only the much weaker radial riblet is present in the basal part of the dorsal side. Another important characteristic is found in the dorsal apertural margin, which in *D. orbigny* is reinforced by a completely closed tubular backfolding of the margin, very similar to those found in species of *Diacria*, whereas in *Diacrolinia aquensis* the dorsal edge is reinforced by a simple fold, parallel to the margin.

So far, *Diacrolinia orbigny* is known exclusively from the Moulin de Cabanes outcrop at St. Paul-les-Dax, which, although not mentioned by name (just 'St. Paul-de-Dax' was given) presumably is also its type locality. *D. aquensis* was described from another outcrop (Mandillot), also in St. Paul-les-Dax, but has now also been collected from a few localities situated more northerly in the Aquitaine Basin (Saucats: Moulin de l'Eglise, Peloua, Giraudeau, Coquillère, Pont Porquey; Léognan: Moulin Daney) (part of these localities

after Peyrot, 1932). Dr Bruno Cahuzac (Talence, France) kindly inform us that the Cabanes locality is slightly older than Mandillot, both being of Early Burdigalian age, as indicated by the *Miogypsina*-assemblages (Cahuzac, 1984).

Van der Spoel (1967: 85) erroneously applied the epithet *orbigny* (ms Rang) (Souleyet, 1852) to a form of the Recent *Diacria quadridentata* (Blainville, 1821). Later on (1973: 21) he corrected his interpretation of the epithet *orbigny*, stating that he had misinterpreted Souleyet (1852). In this paper he provided an illustration of the holotype of *Cavolinia orbigny*, at that time housed in the Muséum national d'Histoire naturelle (Paris, France). This clearly shows the presence of radial ornament on the dorsal shell part, as well as the thickened dorsal apertural margin. Unfortunately, however, the holotype seems to have disappeared from the Paris collections since. The same, by the way, holds true for *D. aquensis*, the type of which used to be housed in the collections of the Faculté des Sciences, Bordeaux (France).



Fig. 4. *Diacrolinia aquensis* (Grateloup, 1827). Second of two specimens in a boulder of Holsteiner Gestein, originating from Nehnten (Germany, Schleswig-Holstein). Purchased from the Eiszeitmuseum, Stolpe (Germany); don. Karl Gürs (Colln Landesamt für Natur und Umwelt Schleswig-Holstein, Flintbek, Germany). Ventral view. Scale bar 1 mm.

CONCLUSIONS

In conclusion we identify the two specimens of *Hyalea perovalis* Von Koenen, 1882, as *Diacrolinia aquensis* (Grateloup, 1827), considering *H. perovalis* a junior synonym.

Van der Spoel (1973: 23) synonymised *H. perovalis* with '*Cavolinia*' *orbigny* (Rang, 1827), which is wrong.

In the absence of all syntypes, and because of the confusion with *Diacrolinia orbigny*, we think a lectotype is necessary here. As Von Koenen's illustration was found to represent the species correctly we herewith, in accordance with art. 74.4 ICZN, designate the specimen illustrated by Von Koenen (1882: pl. 7 fig. 15) lectotype of *Hyalea perovalis*.

The occurrence of *Diacrolinia aquensis* in the North Sea Basin "Holsteiner Gestein" corroborates previous correlation of the Late Vierlandian (regional North Sea Basin stages) with the Early Burdigalian as stated by Janssen (2001: 49, fig. 1).

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