BASTERIA, 62: 193-196, 1998

Notes on the systematics, morphology and biostratigraphy of fossil holoplanktonic Mollusca, 1. Holoplanktonic molluscs from the Miocene of Wadi Gharandel, Western Sinai (Egypt), revised

Arie W. JANSSEN

National Museum of Natural History, Palaeontology Department,
P.O. Box 9517, 2300 RA Leiden, The Netherlands
and 12, Triq il-Hamrija, Xewkija VCT 110, Gozo, Malta

Two pteropod and one alleged heteropod species preserved in a limestone slab from the Miocene of Wadi Gharandel, western Sinai, Egypt, are revised and shown to represent three pteropod species, viz. *Limacina* sp. [either *L. inflata* (d'Orbigny, 1836) or *L. tertiaria* (Tate, 1887)], *Vaginella austriaca* Kittl, 1886, and *V. lapugyensis* Kittl, 1886. The probable age of the so-called 'Miocene Grits' from which the slab was collected, as based on the pteropods, is Langhian to Early Serravallian (Middle Miocene).

Key words: Gastropoda, Euthecosomata, Pteropoda, *Limacina*, *Vaginella*, Miocene, Egypt, biostratigraphy.

HISTORY

Beets (1953) published a few notes on holoplanktonic molluscs found in a slab of limestone, collected at Wadi Gharandel, a locality situated on the eastern bank (c. 33°00'E 29°20'N) of the Gulf of Suez, Egypt. This limestone slab has recently been traced in the collections of the National Museum of Natural History (formerly the Rijksmuseum van Geologie en Mineralogie), where it bears the registration number RGM 75.102.

Beets studied the fossil contents of this slab and found, apart from numerous planktonic Foraminifera ('Globigerinae'), three species of holoplanktonic molluscs, viz. *Vaginella depressa* Daudin, *Vaginella* cf. *lapugyensis* Kittl, and *Oxygyrus*? spec. indet.

The slab was collected from so-called 'Miocene Grits', overlying 'Miocene Clays', which are the basal deposits of the Miocene in the Gulf of Suez region (see references in Beets, 1953: 56). The 'Miocene Clays', according to Beets, 'have sometimes been referred to the Lower Miocene (Burdigalian)', whereas the overlying 'Miocene Grits' were correlated with the "Vindobonian, or more precisely to the 'Schlier'".

The chronostratigraphical unit 'Vindobonian' is now no longer in use and a stratotype has never been designated for it. According to Marks & Papp (1971: 234) it comprises both the Karpatian and the Badenian, and even portions of the Sarmatian. 'Schlier' has been used for various lithostratigraphically characteristic units of Late Oligocene to Early Miocene age.

Beets remarked that the pteropod species found by him were not indicative in this respect, but that their known ranges did not contradict a Middle Miocene age for the 'Miocene Grits'.

REVISION OF THE HOLOPLANKTONIC MOLLUSCS

Three species of euthecosomatous pteropods were observed in this slab. My results can easily be compared with Beets's conclusions.

Some 25 specimens of a moderately slender *Vaginella* species are available, being those identified *Vaginella depressa* by Beets. In spite of their poor preservation, they can be recognised as belonging to the species *Vaginella austriaca* Kittl, 1886. Especially their slender basal part is indicative in this respect, as details of the apertural characteristics are no longer visible. Until several decades ago all Miocene *Vaginella* specimens in the North Sea Basin used to be identified as *Vaginella depressa*, but that species is now known to be confined to the Vierlandian (= Early Miocene). All later occurrences of Hemmoorian and Reinbekian age belong to *V. austriaca*. This explains why Beets found a good match between his specimens and '*V. depressa*' of the Hemmoorian in the Netherlands. Those, without exception, do indeed belong to *V. austriaca*. Apparently Beets did not compare the specimens with topotypical *V. depressa* from the Aquitaine area.

A second *Vaginella* species was identified by Beets as *Vaginella* cf. *lapugyensis*. Some 15 specimens are visible on the surface of the slab, some of which retain a fairly complete shape. I have no doubts in identifying these specimens as *V. lapugyensis*.

In addition, there are some 13 specimens of a small sinistral shell, apparently representing Beets's *Oxygyrus?* spec. indet. They are poorly preserved, but it may be observed in more than one specimen, that these shells have a flat apical side, with the whorls exposed. This does not agree with the heteropod genus *Oxygyrus*, the juvenile calcareous shells of which have involute whorls. In my opinion they belong to the euthecosomatous genus *Limacina*, and they may either be assigned to *L. inflata* (d'Orbigny, 1836), or to *L. tertiaria* (Tate, 1887). These two species differ mainly in details of apertural structures, which unfortunately are not preserved in the Egyptian specimens.

Apart from these holoplanktonic molluscs the slab contains thousands of globigerinid Foraminifera, a few benthic gastropods (one of which apparently belongs to *Turbonilla*), some poorly preserved bivalves, and echinoderm remains.

The results of this revision may be summarised as follows:

Beets, 1953	this paper
Oxygyrus? spec. indet.	*Limacina inflata* (d'Orbigny, 1836) or *L. tertiaria* (Tate, 1887)
Vaginella depressa	*Vaginella austriaca* Kittl, 1886
Vaginella cf. *lapugyensis*	*Vaginella lapugyensis* Kittl, 1886

AGE OF THE SAMPLE

Following international chronostratigraphic terminology, it is well-established now that *Vaginella austriaca* appears at the Burdigalian/Langhian transition, apparently developing from its precursor species, *V. depressa*, known from the Aquitanian and Burdigalian. Only in Austria there seem to be some discrepancies, as Zorn (1991) mentioned *V. austriaca* from the Eggenburgian and the Karpatian (Feyregger Bach near Pfarrkirchen and Laa an der Thaya, respectively; Early Miocene) and *V. depressa* from one locality (Forchtenau) of Badenian age. Janssen (1995: 145) with some doubt also recorded *V. austriaca* from the Serravallian. This latter occurrence has now been substantiated, as in

the Maltese archipelago *V. austriaca* still occurs in the basal part of the Blue Clay Formation, a deposit that has recently been dated on the basis of calcareous nannoplankton as Serravallian (Kienel et al., 1995: 536). Thus, it may be concluded that *V. austriaca* ranges from the Early Langhian to, at least, Early Serravallian.

Vaginella lapugyensis, first described from the Badenian (= Langhian) in the Paratethys, is known from the Hemmoorian in the North Sea Basin (Janssen, 1984: 384; Janssen & King, 1988: fig. 188), and from the Langhian and Serravallian in the Mediterranean area. The Hemmoorian used to be correlated, at least in part, with the Burdigalian (e.g. Janssen, 1984: 23, tab. 4), but this does not agree with the stratigraphic ranges of *V. depressa* and *V. austriaca*, which indicate that the entire Hemmoorian and Reinbekian succession of the North Sea Basin must be of Langhian age.

The specifically unidentified *Limacina* does not yield much information on the age of the sample. *Limacina inflata* is known to range from the Middle Miocene to the Recent. *L. tertiaria* is known from the Burdigalian and Langhian.

In conclusion, the co-occurrence of *Vaginella austriaca* and *V. lapugyensis* in particular narrows down the probable age interval for the Wadi Gharandel sample to Langhian-Early Serravallian.

ADDITIONAL MATERIAL

In June 1987, Professor K. Bandel (Hamburg) donated some samples collected by himself from a locality at Wadi Gharandel, presumably close to the locality from where Beets took his sample, but these lack stratigraphical data. The material consists of four slabs of coarse-grained calcareous sandstone (RGM 397.077-078), containing abundant angular dark minerals; interspersed are a few fossils in internal mould preservation. Almost 30 specimens of *Vaginella austriaca* could be recognised on these four slabs, as well as a single specimen of *Edithinella varanica* (Checchia-Rispoli, 1921), a species described originally from Langhian deposits in Gargano (Italy), but also present in the Maltese archipelago. It appears logical to assume these samples to have originated from the 'Miocene Grit', also on account of their coarse appearance. Nevertheless they differ strongly in aspect from the slab studied by Beets, which is merely a fine-grained limestone.

A further sample in this material is a small slab of greyish clay (RGM 397.079) in which but a single pteropod could be detected. It could originate from the 'Miocene Clays'; interestingly, the single pteropod present in this sample seems to belong to the species *Vaginella depressa* Daudin, 1800, thus confirming the Early Miocene (presumably Burdigalian) age of the 'Miocene Clays'.

ACKNOWLEDGEMENTS

Mr. John W.M. Jagt (Venlo, The Netherlands) improved the English. Dr. Irene Zorn (Geologische Bundesanstalt, Vienna, Austria) critically read the manuscript and supplied stratigraphical information. Professor Klaus Bandel (Institut für Paläontologie und Geologie, Universität Hamburg, Germany) is thanked for the donation of additional material.

REFERENCES

BEETS, C., 1953. Pteropoda and Heteropoda (?) from Wadi Gharandel, Western Sinai, Egypt. — Basteria 17: 56-59.

JANSSEN, A.W., 1984. Mollusken uit het Mioceen van Winterswijk-Miste. Een inventarisatie met beschrijvingen en afbeeldingen van alle aangetroffen soorten: 1-451. Amsterdam.

——, 1995. Systematic revision of holoplanktonic Mollusca in the collections of the 'Dipartimento di Scienze della Terra' at Torino, Italy. — Monogr. Mus. reg. Sc. nat. 17: 1-233.

——, & C. KING, 1988. Planktonic molluscs (Pteropods). In: R. VINKEN et al., eds., The Northwest European Tertiary Basin. Results of the International Geological Correlation Programme, Project no. 124. — Geol. Jb. (A)100: 356-386.

KIENEL, U., U. REHFELD & S.M. BELLAS, 1995. The Miocene Blue Clay Formation of the Maltese islands: sequence-stratigraphic and palaeoceanographic implications based on calcareous nannofossil stratigraphy. — Berliner geowiss. Abh. (E) 16: 533-557.

MARKS, P., & A. PAPP, 1971. Vindobonian. In: Committee of Mediterranean Neogene Stratigraphy, ed., Stratotypes of Mediterranean Neogene stages. — Giorn. Geol. 37: 233-235.

ZORN, I., 1991. Gastropoda tertiaria, Pteropoda (Thecosomata, Gastropoda). — Catalogus Fossilium Austriae VIc/3c: 1-69.