BASTERIA, 62: 35-41, 1998

Three Cerithiopsis species, new for the Miocene of Belgium (Cerithiopsidae, Prosobranchia: Gastropoda)

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Three species of the family Cerithiopsidae new for the Miocene of Belgium are described and figured: *Cerithiopsis (C.) vogeli* A.W. Janssen, 1967, *Cerithiopsis* (s. l.) *serrula* R. Janssen, 1978, and *Cerithiopsis* (s. l.) *dautzenbergi* Glibert, 1949. Their stratigraphic and geographic distributions are discussed. Remarks are made about the genera and subgenera of the family Cerithiopsidae in the Cainozoic of Europe.

Key words: Gastropoda, Prosobranchia, Cerithiopsidae, Miocene, Belgium, Antwerp.

At least nine species of Cerithiopsidae are present in the Early Miocene Berchem Formation in Belgium. In two earlier publications (Marquet, 1997a-b) three species of this family were discussed. Three further species are treated here. Most material for these papers was collected during the construction works of the E3 Kleine Ring Motorway with the E3 Kennedy-tunnel, in the Edegem Sand Member of the Berchem Formation. The stratigraphy observed during these works was described by Janssen & Van der Mark (1968) and by De Meuter, Wouters & Ringelé (1976). Hooyberghs (1996a) discussed the stratigraphy of the Edegem Sand Member type locality. The Antwerpen and Zonderschot Sand Members yield less material of this family; the stratigraphy of the Antwerp Member was described by the same authors for the E3 sections and by Marquet (1991) for the Antwerp Metro works. Hooyberghs (1996b) placed the Zonderschot Member in the Early Miocene Burdigalian on the basis of planktonic Foraminifera.

Abbreviations used. — IRSNB: Collections Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium; RGM: Collections Nationaal Natuurhistorisch Museum, formerly Rijksmuseum van Geologie en Mineralogie, Leiden, The Netherlands; RM: Collection R. Marquet, Antwerp, Belgium; SMF: Senckenberg Museum, Frankfurt am Main, Germany; fr: fragment.

Cerithiopsis (C.) vogeli A. W. Janssen, 1967, fig. 1

1964 *Cerithiopsis vignali* — Anderson: 209 p.p.
1967 *Cerithiopsis (Cerithiopsis) vogeli*, A.W. Janssen: 136, pl. 10 figs. 1-2.

Material. — Coll. RGM: Antwerp, Belgium (Kennedy-tunnel); Edegem Sand Member, Berchem Formation, level 3 to 5 in Janssen & Van der Mark (1968, p. 78) Hemmoorian, Behrendorfian, Early Miocene: 1 fr. RGM 182.583. Same locality and stratum, level 3: 1 fr. RGM 116.581 (figured specimen).

Type locality. — Köningsbach, Dingden, Nordrhein-Westfalen, Germany.

Stratum typicum. — Bislicher Schichten, Reinbekian, Middle Miocene.

Description. — Small, very slender shell, with four and a half protoconch whorls and up to eleven (five in the largest fragment from Belgium) teleoconch whorls. Protoconch smooth. Nucleus relatively large and globular. Other protoconch whorls tumid and regularly widening. End of protoconch sharply marked by three to five sinuous, slightly opisthocline growth lines. Teleoconch sculpture starting with three spiral ribs, crossed by axial sculpture. The adapical spiral lies close to the suture and to the second spiral; it is slightly weaker than both other spirals. The teleoconch whorls are flat-sided, with a deeply incised suture. The last whorl has three spirals and twelve to fifteen axial ribs. Tubercles occur at the intersection of spirals and axials. They are rectangular and slightly wider than high. Tubercles on subsequent whorls are more or less in line. The spirals are slightly stronger than the axial sculpture and narrower than the intercostal areas. The spaces between axial and spiral ribs are square. At the base of the body whorl, a thick spiral without tubercles is present. The aperture is square, the siphonal canal short. The shell base is flat, with a very weak smooth spiral running obliquely on the adapical side of the siphonal canal.

Dimensions of figured specimens. — Fig. 1: height 1.86 mm, diameter 0.66 mm; protoconch height 0.53 mm.

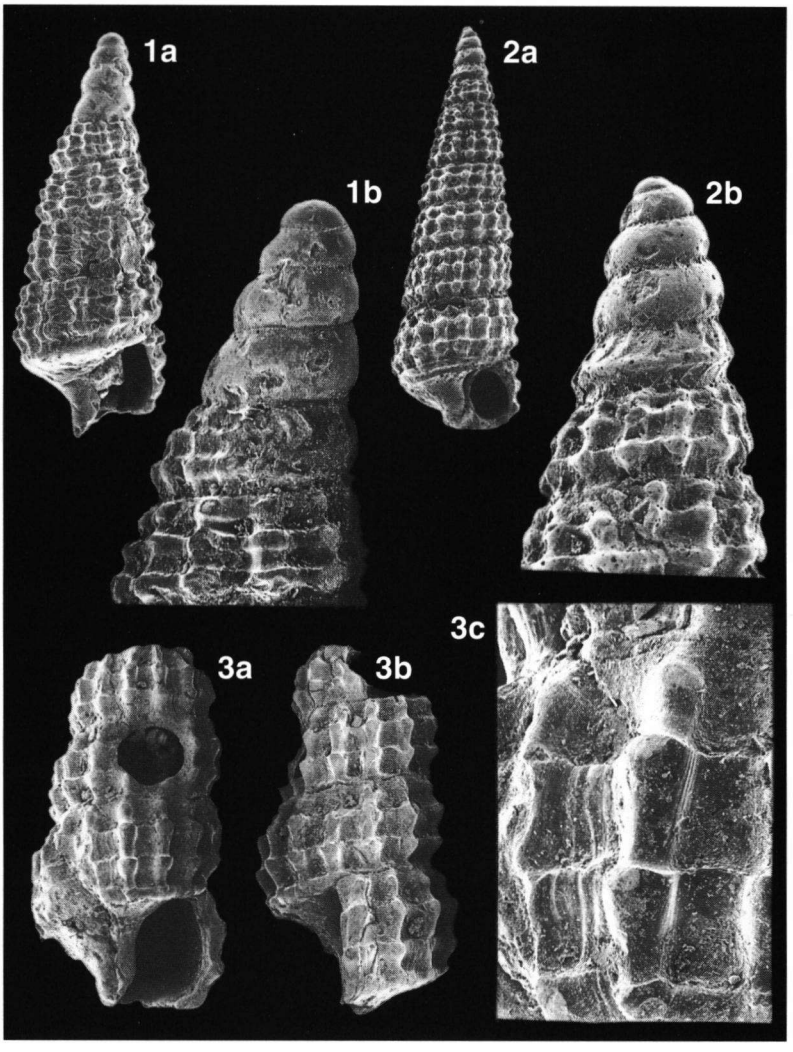
Remarks. — The material from Antwerp nearly completely agrees with the description of A.W. Janssen (1967); the most marked difference is the presence of fewer growth lines at the end of the protoconch. Until now the species was only known from its type locality; it seems to be absent in Winterswijk-Miste (Aalten Formation) and in the Antwerp Sand Members. In Belgium, it is very rare in the Edegem Sand Member, in overlying strata no specimens were found.

Species with three spiral teleoconch ribs and a smooth multispiral protoconch are here considered as belonging to *Cerithiopsis* Forbes & Hanley, 1850, s.s. This follows from fig. 258 in Fretter & Graham (1982) and fig. 130 in Van Aartsen et al. (1984), illustrating the type species of *Cerithiopsis*, *C. tubercularis* (Montagu, 1803). The microsculpture of granules, which is present on the protoconch of *C. tubercularis*, was not observed in the material studied, which, however, is always more or less eroded. According to Gründel (1980) the species of *Cerithiopsis* have axial as well as spiral sculpture on the protoconch. This, however, is not in accordance with the above mentioned figures of the type species. Gründel (1980) placed *C. vogeli* in the New Zealand genus *Clathropsis* Laseron, 1956, which also has a smooth protoconch. *Clathropsis* possibly is a junior synonym of *Cerithiopsis* s. s.

Cerithiopsis (sensu lato) *serrula* R. Janssen, 1978, fig. 3

1978a *Cerithiopsis* (s.l.) *serrula*, R. Janssen: 58, pl. 5 fig. 5.
1978b *Cerithiopsis* (s.l.) *serrula* — R. Janssen: 168.
1980 *Eumetula (E.) serrula* — Gründel: 245, figs. 28-29.

Material. — Coll. RGM: Antwerp, Belgium (Kennedy-tunnel); Edegem Sand Member, Berchem Formation, level 3 of Janssen & Van der Mark (1968, p. 78) Hemmoorian, Behrendorfian, Early Miocene: 1 fr. RGM 117.215 (figured here). Coll. RM: Antwerp, Belgium, Kleine Ring Motorway exit Berchem, Antwerpen Sand Member, Berchem Formation, late Early Miocene: 1 fr.; Zonderschot, Heist-op-den-Berg, prov. Antwerp, BVP pit in Bergebeekstraat, Zonderschot Sand Member, Berchem Formation, late



Figs. 1-3. *Cerithiopsis* shells From the Miocene in Belgium. *C. (C.) vogeli* A.W. Janssen, 1967, RGM 116.581, E3 Kennedy-tunnel, Antwerp, Belgium, Edegem Member, Berchem Formation, Early Miocene; 1a, Apertural view of complete shell x 35; 1b, apical whorls x 85. 2, *Cerithiopsis* (s. l.) *dautzenbergi* Glibert, 1949, RGM 396.397, E3 Kennedy-tunnel, Antwerp, Belgium, Edegem Member, Berchem Formation, Early Miocene; 2a Apertural view of complete shell x 17; 2b, apical whorls x 70. 3, *C.* (s. l.) *serrula* R. Janssen, 1978, RGM 117.215, Kennedytunnel, Antwerp, Belgium, Edegem Member, Berchem Formation, Early Miocene; 3a, complete shell apertural view x 23; 3b, complete shell view 90° to the right of 2a x 23; 3c, detail of teleoconch sculpture x 90. All SEM photographs.

Early Miocene: 1 ? fragment. SMF: Glimmerode, Hessen, Germany, Kasseler Meeressand, Chattian, Late Oligocene: 2 paratypes 250.555.

Type locality. — Former lignite quarry Höllkopf, near Glimmerode, Hessen, Germany.

Stratum typicum. — Kasseler Meeressand, Chattian, Late Oligocene.

Description. — Small, very slender shell with six protoconch and six to seven teleoconch whorls. The Belgian fragments studied have at most only three and a halve teleoconch whorls, while the protoconch is absent in all specimens, but one of the SMF paratypes has a slightly eroded protoconch, consisting of four tumid whorls. The first one to one and a half protoconch whorls are smooth, subsequent ones have axial sculpture. On the last protoconch whorl 25 opisthocline axial ribs and a very weak carina are present. The ribs are about half as wide as the intercostal spaces. Teleoconch sculpture starts with axial ribs, which are much wider than those on the protoconch and less opisthocline. Spiral sculpture starts with tubercles on these axials. The adult sculpture consists in the Belgian material of three spiral ribs and 13 to 16 axial ribs. On the points of intersection very characteristic tubercles are formed: they are adapically sharply delimited, elongated along the shell axis and narrower abapically than adapically. The spirals are weaker than the axial sculpture. The intercostal areas are only slightly wider than the tubercles and elongated along the shell axis. The teleoconch whorls are tumid, with a deep suture. The aperture is rounded. The siphonal canal is rather long but absent in the material studied.

Dimensions of figured specimens. — Fig. 3: height 2.50 mm, diameter 1.40 mm; tubercles: height 0.24 mm, width 0.13 mm.

Remarks. — Until now this species was only known from its type locality. In Antwerp it seems to be a rare relic species from the Late Oligocene. It is easily recognizable by the shape of the tubercles, even when the protoconch is absent. The Zonderschot specimen has similar tubercles, but a smooth area is present above the abapical suture. This, however, could be the result of a growth accident. Gründel (1980) placed *Cerithiopsis serrula* in the genus *Eumetula* Thiele, 1912. However, all species of this genus, figured by Bouchet & Warén (1993, figs. 1325-1343) have a paucispiral protoconch and no, one or two weak teleoconch spirals instead of three, while their youngest whorls strongly broaden. So it seems more appropriate to consider this species as a member of *Cerithiopsis* sensu lato.

Cerithiopsis (sensu lato) *dautzenbergi* Glibert, 1949, fig. 2

1949 *Cerithiopsis (Cerithiopsis) dautzenbergi* Glibert: 150, pl. 10 fig. 2.
1967 *Cerithiopsis* (s.l.) *dautzenbergi* — A.W. Janssen: 137, pl. 11 fig. 2.
1984 *Cerithiopsidella (Vatopsis) dautzenbergi* — A.W. Janssen: 154, pl. 43 fig. 3.

Material. — RGM: Antwerp, Belgium (Kennedy-tunnel); Edegem Sand Member, Berchem Formation, level 3 in see Janssen & Van der Mark (1968, p. 78), Hemmoorian, Behrendorfian, Early Miocene: 3 fr. RGM 116.580. Same locality and stratigraphy: 42 fr. RGM 117.217. Same locality, level 3-5: 3 fr. RGM 182.954. Same locality and stratigraphy: 69 fr. RGM 182.536. Same locality and stratigraphy: 1 fragment RGM 396.397 (figured here). RM: same locality and stratigraphy: 2 fr. IRSNB: holotype IST 2521.

Type locality. — Sainte-Cathérine de Fierbois, dépt. Indre-et-Loire, Touraine, France.

Stratum typicum. — Pontilevian, Middle Miocene.

Description. — Small, very slender shell with four and a halve protoconch and seven

teleoconch whorls. Nucleus and three first whorls rather tumid and smooth. Last one and a half whorls with a strong carina, slightly below the middle of the whorl. Fifteen opisthocline axial ribs are present on these last protoconch whorls. They are weaker abapically from the carina. Teleoconch sculpture starts with three spirals, crossed by axial ribs. The adapical spiral is much weaker than both lower ones; it lies close to the suture and near the second spiral. It remains weaker than both other spirals on all subsequent whorls. The abapical spiral is the continuation of the protoconch carina. Teleoconch with strongly flattened whorls, sutures shallow and not incised. Aperture square, siphonal canal very short. On the last whorl, on average sixteen axial ribs are present; they alternate on subsequent whorls. At the crossing of spiral and axial sculpture, rounded or square tubercles are present. The intercostal areas are narrow, rectangular to square and as wide as the spiral ribs. On the body whorl, two smooth spirals are present; they lie close to each other at the transition between body whorl and shell base.

Dimensions of figured specimen. — Fig. 2: height 3.78 mm, diameter 1.17 mm; protoconch height 0.54 mm, width 0.38 mm.

Remarks. — The complete protoconch of this species is figured here for the first time. A.W. Janssen (1967) figured part of it. His specimen shows more axial ribs on its body whorl than those studied herein. The overall resemblance in teleoconch sculpture between our material and that of Janssen (1967) and Glibert (1949) makes it clear that our specimens indeed belong to *Cerithiopsis dautzenbergi* Glibert, 1949. R. Janssen (1978a-b) described specimens from the German Kasseler Meeressand (Chattian, Late Oligocene) which he doubtfully considered as conspecific with *C. dautzenbergi.* The protoconch of his material is described as "... aus 4 1/2 Umgängen bestehende Embryonalende. Erste Windung glatt, die folgenden mit Spiralkanten und zahlreichen gebogenen Axialfältchen." Gründel (1980, fig. 6) figured a specimen from the same locality; it shows spiral as well as axial sculpture on all protoconch whorls except the nucleus. Three specimens from SMF (no. 250.625) were studied. One of these has an intact protoconch, which is ornamented with a carina, axial ribs above this carina and very fine reticulate sculpture abapically. Consequently, this material does not belong to *C. dautzenbergi.* Gründel (1980) assigned the species to the genus *Cerithiopsidella* Bartsch, 1911, but remarked that this genus has nearly the same characters as *Cerithiopsis* Forbes & Hanley, 1850. The only difference mentioned by Gründel (1980) is that the axial protoconch sculpture of *Cerithiopsis* is straighter, prosocline and limited to the abapical part of the whorls. Gründel (1980), however, did not know the real protoconch of *Cerithiopsis* s. s. (see discussion of *Cerithiopsis vogeli). Cerithiopsidella* is interpreted here as a subgenus of *Cerithiopsis* with reticulate sculpture at least on part of its protoconch. Three European Cainozoic species probably belong to this subgenus: *Cerithiopsis (Cerithiopsidella) daphnelloides* R. Janssen, 1978, *C. (Cerithiopsidella) dautzenbergi* sensu R. Janssen, and a species present in the Pliocene of the North Sea basin, which will be discussed by Marquet (1997c). Gründel (1980) furthermore described a subgenus *Vatopsis* of *Cerithiopsidella* in which he placed the Chattian *C. dautzenbergi* sensu R. Janssen. *Vatopsis* has spiral as well as axial sculpture on nearly all protoconch whorls. The type species of *Vatopsis, V. bimonilifera* (Sandberger, 1858), has only two spirals on the teleoconch. Consequently it does not belong to *Cerithiopsis* but should be considered a separate genus.

In the Miocene *C. dautzenbergi* sensu Glibert, a keel and axial sculpture only occur on the last protoconch whorl. In this character, it comes close to the Oligocene species *Cerithiopsis henckelhiusi* (Nyst, 1835), which according to Gründel (1980) belongs to the subgenus *Zaclys* Finlay, 1927. *C. henckelhiusi* differs from *C. dautzenbergi* in having one

protoconch whorl more, while the carina is weaker. The teleoconchs of both species, however, are nearly identical and it is clear that both are closely related. In the original description of *Zaclys* by Finlay (1927) the protoconch was described as smooth. According to Cotton (1950), however, *Zaclys* species have a reticulate protoconch sculpture, while their nucleus is pointed instead of rounded. Therefore, the attribution of *C. henkelhiusi* and *C. dautzenbergi* to this Australian genus or subgenus is very questionable. It would be better to unite both European species in a new subgenus of a broadly defined genus *Cerithiopsis*. This genus should include all Cerithiopsidae with three teleoconch spiral ribs, crossed by axial sculpture, with tubercles on the points of intersection, and with a smooth, or sculptured multispiral protoconch. Subgenera could be defined using protoconch ornamentation.

I wish to thank Messrs. A. W. Janssen, R. Janssen and A. V. Dhondt for the opportunity to study the RGM, SMF and IRSNB collections, respectively. For the photographs I am much indebted to Messrs. L. Cilis and K. Wouters (IRSNB).

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