

## ***Brocchinia gerdae*, a new cancellariid gastropod from the Late Langhian (Miocene) of NW Germany**

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The small cancellariid gastropod, *Brocchinia gerdae* n. sp., is described from the lower Twistingeng Beds (Miocene, 'Reinbekian', Late Langhian), as exposed in three temporary clay pits in NW Germany (Nordlohne, Twistingeng and Woltrup, all in Lower Saxony).

KEY WORDS: Mollusca, Gastropoda, Cancellariidae, Miocene, Twistingeng Beds, Germany, new species.

### **Introduction**

In the 1960s and 1970s, the brick industry in NW Europe was hard hit, and activities at the numerous clay pits were discontinued. Sections exposed there rapidly deteriorated, became overgrown and largely inaccessible to collecting efforts by palaeontologists. Some clay pits were flooded or reshaped into nature reserves, public parks and even rubbish tips. Only exceptionally, e.g. at Gram Teglvaerk (Jylland, Denmark), is it still possible to collect from sections exposed at these clay pits.

By the mid-1980s, environmental problems (e.g. ground water) became more acute and large quantities of clay were needed to seal off rubbish tips from ground water and air. A few clay pits were reopened, e.g. the O. Sunder pit at Twistingeng, the Meistermann pit at Nordlohne and the Wessling pit at Bersenbrück-Woltrup. It is from these exposures that the new cancellariid species described here has been collected.

*Abbreviations* – In the text, the following abbreviations are used:

LANU	Landesamt für Natur und Umwelt Schleswig-Holstein, Flintbek, Germany;
MNHN	Muséum national d'Histoire naturelle, Paris, France;
RGM	Nationaal Natuurhistorisch Museum (Naturalis), Leiden, the Netherlands (formerly Rijksmuseum van Geologie en Mineralogie);
SMF	Senckenberg Museum, Frankfurt am Main, Germany;

H shell height;  
W shell width.

### **Localities and stratigraphy**

Strata exposed at all three clay pits referred to here consist of dark coloured, more or less sandy clays, assigned to the so-called 'Twistingeng Schichten' (Twistingeng Beds), the age of which is 'Reinbekian' in local terminology. This correlates with the Late Langhian of the international chronostratigraphic scheme (Gürs & Janssen, 2002). At two of the localities, the O. Sunder (Twistingeng; see Spiegler, 2002) and Wessling (Woltrup, K. Gürs, pers. comm.) clay pits, samples were taken for analysis of *Bolboforma* assemblages. Both have yielded *B. reticulata* von Daniels & Spiegler, 1974 and thus may be assigned to the *Bolboforma reticulata* Zone of the international *Bolboforma* biozonation (Spiegler, 1999), which also supports a Late Langhian age assignment (Spiegler, 2002).

A direct correlation between the sections is now also possible by means of a nassariid zonation, recently established by Gürs (2002). At all three localities, the '*Nassarius*' *voorthuyseni* and '*N.*' *bocholtensis* zones, with '*N.*' *twistingengensis* (Janssen, 1972) as zonal marker for its lower part, have been documented. The boundary between these two nassariid zones appears to correlate very well with the transition from *Streptodictyon sexcostatus* (Beyrich, 1856) to *S. abruptus* (Beyrich, 1856), as documented by Cadée & Janssen (1983). This transition turns out to be a good biostratigraphic datum for vast areas of the basin as well (K. Gürs, LANU, internal reports).

Finally, dating of the localities studied is also possible

by means of the regional benthic foraminifer (*Uvigerina*) biozonation (von Daniels & Spiegler, 1977). The Twistringeng section comprises the *Uvigerina acuminata*, *U. macrocarinata* and *U. brunnensis* zones.

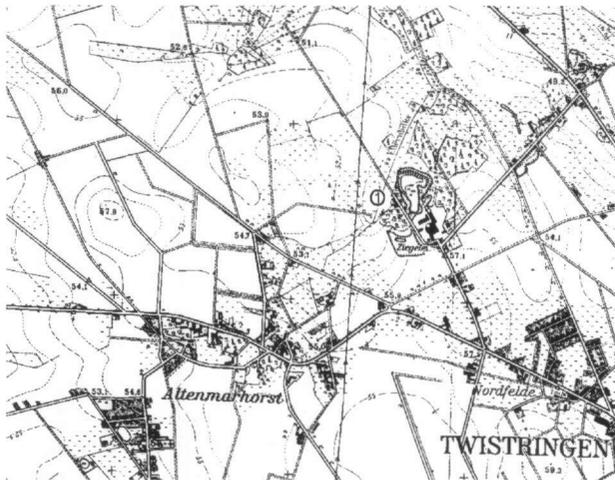


Figure 1. Location of the O. Sunder clay pits (1) at Twistringeng (sheet 3117 Twistringeng, 1:25,000 reduced).



Figure 2. The O. Sunder clay pit at Twistringeng, showing oblique bedding and the black band (photograph: J. van der Voort, 1990).

#### 1 – Twistringeng (Figures 1, 2)

Hinsch (1962), Anderson (1964) and Janssen (1972) all studied the molluscan assemblages from the O. Sunder clay pit at Twistringeng, while Cadée & Janssen (1968, p. 83) provided a detailed lithological description of the section, at a time when the lower 3 metres had already flooded, and a total of 19.70 m of sediments was exposed.

In general, the section could be subdivided into a greyish coloured upper part in which the gastropod *Streptodictyon abruptus* is common, and a dark brown to almost blackish lower part, yielding numerous specimens of

'*Hinia*' *voorthuyseni* Janse & Janssen, 1983. Between 10.40 and 10.65 m below surface, a markedly dark band, closely resembling lignite in texture, occurred in this section. Previous data have all referred to the 'old' clay pit, which was closed down in 1968. After that, excavations continued in a new pit just opposite the old one and described by Menzel *et al.* (1984). In 1990, during the final stages of excavation, the black band was well exposed (J. van der Voort, pers. comm.).

Cadée & Janssen (1983) published a note on species of '*Streptochetus*' (now *Streptodictyon*) from Twistringeng, reconstructing an evolutionary lineage with *S. sexcostatus* below and *S. abruptus* above. At Twistringeng, the former species occurs exclusively in the dark basal portion of the section, where '*H.*' *voorthuyseni* is common. *Streptodictyon abruptus* was found only in the higher, light-coloured portion of the section. Those authors were then unable to indicate the exact point of transition between these fasciolariid taxa, as some intermediate forms (*S. 'quinquecostatus'* Rasmussen, 1968) were found, but only *ex situ*.

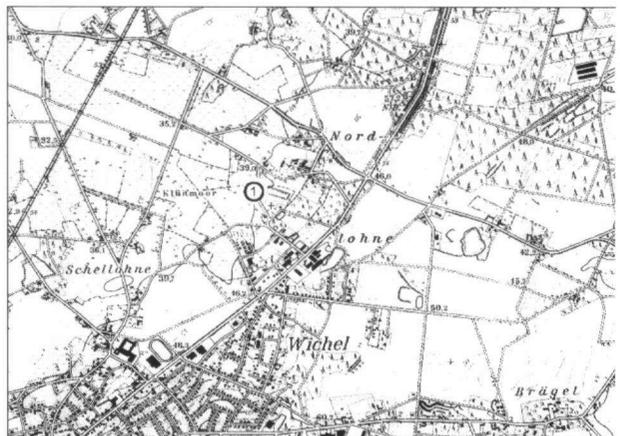


Figure 3. Location of the Meistermann clay pit at Nordlohne, municipality of Lohne (1) (sheet 3315 Lohne, Oldb., 1:25,000 reduced).

#### 2 – Nordlohne (Figure 3)

The section at the Meistermann claypit, situated some 30 km SW of Twistringeng, reopened twice, in 1987 and in 1990. Although not measured in detail, the sequence there demonstrated many similarities to the Twistringeng section. The upper part is light coloured as well and the vertical distribution of species of *Streptodictyon* is identical. An almost black, lignitic band of some 20-25 cm in thickness was visible all over the entire section exposed, c. 13 m below the surface, and closely comparable to the one observed at Twistringeng.

In this section, a level at c. 1.50 m below this black band was found to be palaeontologically highly interesting, as it turned out to represent the transition from *S. sexcostatus* to *S. abruptus*. Intermediate specimens ('*quinquecostatus*' morphology) occurred over an interval of 1 m at

most (Cadée & Janssen, 1994, p. 41). The same level also yielded other interesting molluscan species, amongst which is the new cancellariid described here.

### 3 – Bersenbrück-Woltrup (Figure 4)

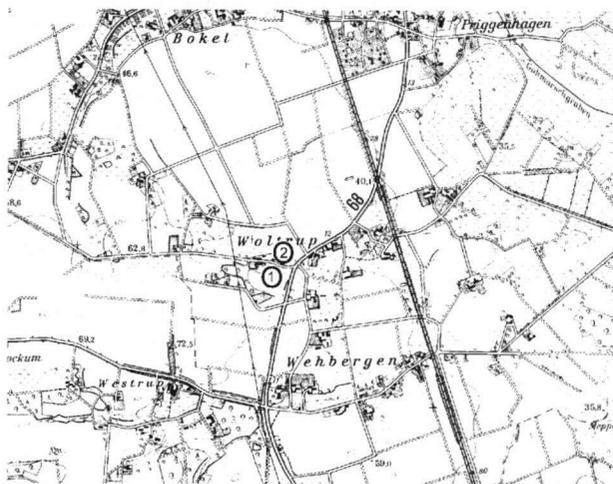


Figure 4. Location of the Giesting (1) and Wessling (2) clay pits at Bersenbrück-Woltrup (sheet 3413 Bersenbrück, 1:25,000 reduced).

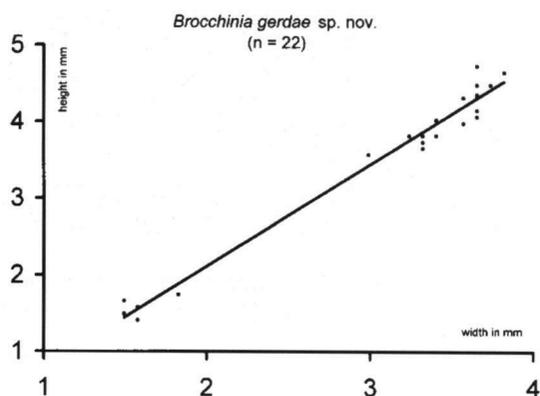


Figure 5. Height and width of twenty-two specimens of *Brocchinia gerdae* n. sp., from the three localities studied.

The former Giesting clay pit ('1' in Figure 4) was described by Anderson (1964, p. 61, fig. 2); here, strongly glaciotectonically disturbed Miocene strata were exposed. Just north of this pit a new one, the Wessling clay pit ('2' in Figure 4), was operated in 1994-1995, and collections were made there by J. van der Voort, which include a few specimens of the new cancellariid. Vast quantities of clay were excavated, which explains why sections changed daily. The occurrence of *S. sexcostatus* and *S. abruptus* in repeating levels confirmed earlier information (Anderson, 1964) that the Woltrup section consists of various sets of

levels containing the different molluscan assemblages of the Twistringen Beds.

### Systematic palaeontology

Order Neogastropoda Wenz, 1938

Superfamily Cancellarioidea Forbes & Hanley, 1851

Family Cancellariidae Forbes & Hanley, 1851

Genus *Brocchinia* Joussemaue, 1887

*Type species* – *Voluta mitraeformis* Brocchi, 1814 (*non Voluta mitraeformis* Lamarck, 1811 = *Brocchinia tauro-parva* Sacco, 1894).

*Brocchinia gerdae* n. sp.

Figures 6-9

*Types* – Holotype is RGM 458 748 (leg./don. J. van der Voort, October 1986) (see Figures 6-8). Paratypes are as follows: Meistermann clay pit, Nordlohne, lower Twistringen Beds, c. 1.50 m below the black band, RGM 458 751 (5 specimens, leg. A.W. Janssen, 1987); RGM 458 749 (1 specimen, see Figure 9, leg. A.W. Janssen, 1987); RGM 458 750 (1 specimen, leg. A.W. Janssen, 1987); J. van der Voort Colln (16 specimens, 1987; 5 specimens, 1990); SMF 323 669 (1 specimen, leg. J. van der Voort, 1990); LANU unregistered (1 specimen, leg. J. van der Voort, 1987); R.E. Petit Colln (1 specimen, leg. J. van der Voort, 1987). From the O. Sunder clay pit (Twistringen, lower Twistringen Beds, below the black band) and from the Wessling clay pit at Bersenbrück-Woltrup (Twistringen Beds) are two and seven paratypes, respectively (J. van der Voort Colln, 1990 and J. van der Voort Colln, 1994-1995, respectively).

*Locus typicus* – Meistermann clay pit, borehole VII at coordinates (sheet 3315), r 3450 050, h 5839 025, sample 14-15 m below surface, Nordlohne (municipality of Lohne, Lower Saxony, Germany).

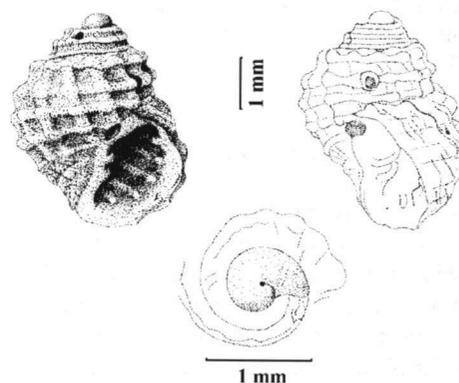


Figure 6. *Brocchinia gerdae* n. sp., RGM 458 748 (holotype); scale bar equals 1 mm.

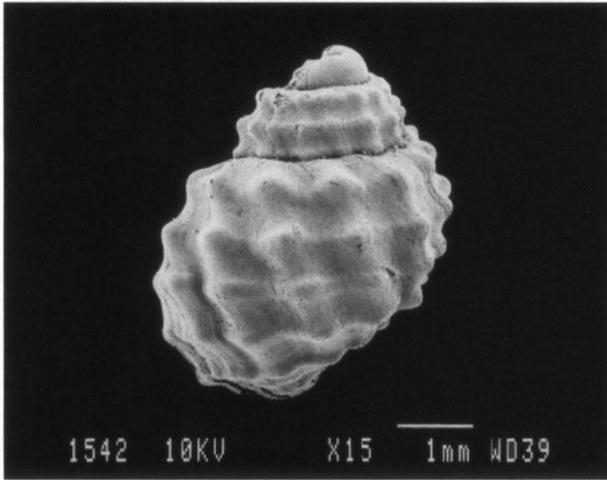


Figure 7. *Brocchinia gerdae* n. sp., RGM 458 748 (holotype).

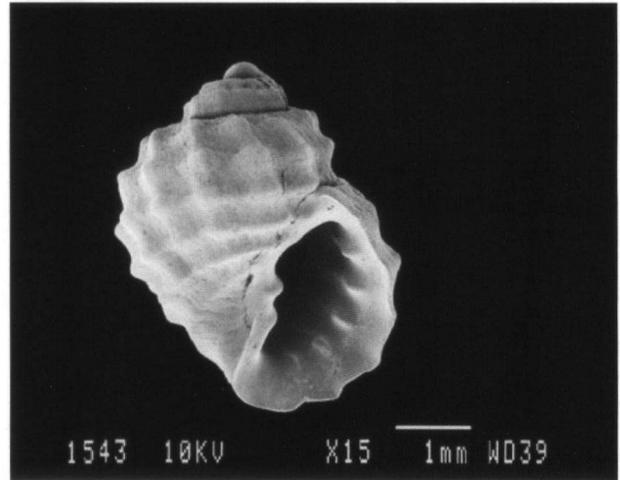


Figure 9. *Brocchinia gerdae* n. sp., RGM 458 749 (paratype).

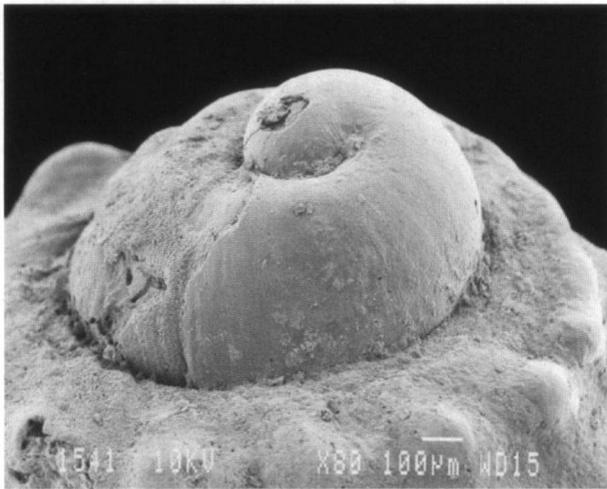


Figure 8. *Brocchinia gerdae* n. sp., RGM 458 748 (holotype).

*Stratum typicum* – Dark grey to blackish clays of the lower Twistinggen Beds (Miocene, ‘Reinbekian’ in local stratigraphic terminology, Late Langhian).

*Derivatio nominis* – Named after Mrs Gerda van der Voort-Schütte (Ostercappeln-Venne), in grateful recognition of numerous delicious meals and hospitality offered to the senior author.

*Description* – Shell small, oviform, higher than wide. Paucispiral protoconch consisting of 1.2 whorls, nucleus spherical in frontal view; transition to teleoconch marked by a distinct line where surface texture changes and three strong spiral cords emerge. Teleoconch of slightly more than two whorls. Following immediately upon the onset of spiral cords are axial ribs, visible as nodes on the first teleoconch whorl but becoming more clearly defined thereafter. Spiral cords, six in number, visible on upper whorls only as rows of strong, rounded nodes but anterior cords are stronger as axial ribs, eleven in number, weaken. On the penultimate whorl, there are three rows of spiral cords; the posterior cord forming the edge of a narrow, sloping sutural ramp that extends back to a deeply impressed suture. Teleoconch thick-walled. Outer lip prosocline, a smooth concave shelf within, behind which five strong lirae descend deeply into the aperture, the posterior one strongest and forming the edge of a widely rounded posterior canal. Columella almost straight with two prominent rounded folds that extend almost to the edge of the thick inductural callus, the posterior fold being the larger. Short, but well-defined, siphonal canal recurved to the left.

*Measurements* – We have measured height and width of twenty-two specimens, five of which are juveniles (Table 1 and Figure 5).

H		W		H/W			n
Min	max	min	max	min	max	mean	
3.57	4.73	2.99	3.82	1.10	1.20	1.17	17 (adult)
1.41	1.74	1.49	1.83	0.89	1.11	0.99	5 (juvenile)

Table 1. Height and width measurements (in mm).

**Discussion** – The new species resembles the Recent *Brocchinia nodosa* (Verrill & Smith in Verrill, 1885 (see Bouchet & Warén, 1985, p. 258, fig. 691; Verhecken, 2002, p. 511, figs 7, 8), but differs in having much larger nodes where the axial ribs and spiral cords intersect. *Brocchinia gerdae* n. sp. also differs in being less attenuate than *B. nodosa* or any other known member of the genus. *Brocchinia nodosa* has a spire angle of approximately 60 degrees, whereas that of *B. gerdae* n. sp. is c. 80 degrees. Other species of *Brocchinia*, both extant and of Cainozoic age, are very high spired and, with few exceptions, have spire angles of less than 40 degrees.

*Brocchinia nodosa*, the species most closely similar to the new fossil taxon in shell morphology, has a multispiral protoconch (Bouchet & Warén, 1985, p. 260), as opposed to the paucispiral one in *B. gerdae* n. sp. Other than overall shape, the most striking features of *B. gerdae* n. sp. are shell thickness and strong internal lirations. No other species of *Brocchinia* known has such a thick-walled shell, and the thickening of the shell inside the outer lip with the onset of strong internal lirations is known in only few species. Two undescribed extant, bathyal taxa off New Caledonia (MNHN collections) and two Indonesian specimens illustrated by Verhecken (1997, figs 14, 15) as *B. fischeri* (A. Adams, 1860) have similar internal lirations but all have slender teleoconchs in comparison to *B. gerdae* n. sp.

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Jaap van der Voort's co-operation, in making available his collections, plus donating specimens and providing outcrop data, is gratefully acknowledged. Mr Jeroen Goud (Nationaal Natuurhistorisch Museum, Leiden) prepared the photomicrographs, Drs Karl Gürs (LANU) and R. Janssen (SMF) critically reviewed an earlier draft, and John W.M. Jagt (Natuurhistorisch Museum Maastricht) edited the final version of the text.

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