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THE MOLLUSC FAUNA OF THE STEMERDINK BED (MIOCENE, REINBEKIAN) FROM OUTCROPS IN THE SLINGE BROOK AT WINTERSWIJK-BRINKHEURNE (THE NETHERLANDS, PROVINCE OF GELDERLAND)

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The mollusc fauna from two outcrops of the Stemerdink Bed at Winterswijk-Brinkheurne was investigated and a critical list of mollusc species is given. The history of the so-called "Stemerdinkbrug" locality is recorded. In the systematical part descriptions are given of the following species: *Pododesmus (Monia) anitae* sp. nov., *Skenea schuermanni* sp. nov., *Rissoella (Jeffreysina) hesselinki* sp. nov., *Hinia (Hinia) cimbrica voorthuyseni* subsp. nov., *Babylonella stemerdinki* sp. nov. and *Daphnella defectiva* sp. nov.

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Contents:

"Een verzamelaar heeft dus z'n slag geslagen." "Zo is het! Een verzamelaar heeft z'n slag geslagen."

„Jansen & Janssen" in: Hergé, 1946. De avonturen van Kuifje. Het gebroken oor. Tournai/Dronten (Casterman).

SAMENVATTING

Al bijna anderhalve eeuw is de miocene ontsluiting Stemerdinkbrug in Winterswijk-Brinkheurne bekend bij beroeps- en amateurgeologen. Gedurende vele jaren was deze vindplaats één van de excursiedoelen tijdens zomerkampen van de Nederlandse Jeugdbond voor Natuurstudie. Na het afbreken van de oude brug en de bouw van een nieuwe, ongeveer 200 m stroomopwaarts, waarbij de oevers en de bodem werden bedekt met betonplaten, is het gerucht ontstaan dat de ontsluiting Stemerdinkbrug niet meer toegankelijk was. Dit heeft er mede toe geleid, dat de vindplaats bij Dingden (D.B.R.) weer in de belangstelling kwam te staan.

Van het uit twee dichtbijeengelegen vindplaatsen (Stemerdinkbrug en Nieuw-Wassink) verzamelde materiaal is nauwelijks iets gepubliceerd. Bloklander (1954) gaf een soortenlijst van materiaal afkomstig van Stemerdinkbrug in de collectie Drenth. Deze lijst, die hier geheel kon worden gereviseerd, vormde samen met nieuw verzameld materiaal de aanleiding voor dit artikel.

Op beide vindplaatsen is hetzelfde stratigrafische niveau ontsloten: Afzetting van Aalten, Laag van Stemerdink (Mioceen, Reinbekien). Biostratigrafisch wordt dit niveau aangeduid als Limopsis aurita Acme Zone. Het sediment is een donkerbruine, glimmerhoudende, iets zandige klei. Deze klei kan met veel moeite in het veld worden gewassen, maar uit de diverse collecties blijkt duidelijk, dat dit na droging beter thuis kan worden gedaan: de monsterkwaliteit is dan veel beter, waarbij kleine en dunschalige soorten niet worden weggespoeld of vermalen.

Vooral in de oudere collecties werden veelal soorten aangetroffen, die niet afkomstig kunnen zijn uit de op het etiket vermelde vindplaats Stemerdink. Verontreiniging met mollusken uit afzettingen van Hemmoor ouderdom (vermoedelijk wel uit de Peelboringen) en uit de oligocene Afzetting van Brinkheurne (vrijwel zeker afkomstig uit groeve De Vlijt te Winterswijk) werd hierbij herkend.

De fauna van Stemerdinkbrug en Nieuw-Wassink samen omvat 202 soorten mollusken, waarvan er hier enkele nieuw worden beschreven: *Pododesmus (Monia) anitae* sp. nov., *Skenea schuermanni* sp. nov., *Rissoella (Jeffreysina) hesselinki* sp. nov., *Hinia (Hinia) cimbrica voorthuyseni* subsp. nov., *Babylonella stemerdinki* sp. nov. en *Daphnella defectiva* sp. nov. Tevens zijn nog opmerkingen toegevoegd over de systematiek van enkele andere soorten. Karakteristieke soorten voor de Laag van Stemerdink werden afgebeeld. Vergelijking van de fauna's van de twee onderzochte ontsluitingen leidt niet tot het aantonen van significante verschillen.

INTRODUCTION

Miocene deposits in the Winterswijk-Eibergen area have been known for a long time (Becks, 1843; Römer, 1853, 1854; Staring, 1860, etc.). Shell-bearing sediments are locally present in this region below a thin cover of Quaternary sands or boulder-clay. Sometimes these deposits are

visible in natural outcrops in the banks or bottoms of small streams. Miocene clays were used at quite a large scale by tile and brick factories; nowadays only Oligocene sediments are still exploited (brickworks "De Vlijt").

Though the deposits are well-known, hardly anything has been done on the research of the mollusc fauna. Von Koenen (1872, 1882), in his important papers on the German Miocene faunas, studied a restricted number of gastropods from several sites near Eibergen, which material was sent to him by the Dutch Professors Schlegel and Selenka, of Leiden University. This material is kept now in the collections of the Rijksmuseum van Geologie en Mineralogie (RGM), at Leiden.

"Stemerdink" is a farm, some km SE of Winterswijk village, situated in the hamlet Brinkheurne. Close to this farm Miocene clays are cropping out in bottom and banks of the small river Slinge. At this place, usually indicated as "Stemerdinkbrug" (Stemerdink-bridge) amateur paleontologists have frequently collected fossil material (ten Dam, 1934). The only publication on this Stemerdink fauna is a paper by Bloklander (1954), who gave a list of mollusc species, based on material collected by Drenth (see below). This list contains several names of species that are very unlikely to occur in the Stemerdink fauna, which was one of the reasons for us to make an inventory of this fauna, based on existing collections and recently collected material. We exclusively studied material from the outcrops. Faunas collected from the many borings in the same area were left out of consideration.

HISTORY OF THE STEMERDINK LOCALITY

In 1934 Ab ten Dam described in Amoeba, the periodical of the Nederlandse Jeugdbond voor Natuurstudie (Dutch Youth Association for the Study of Nature), how during field-trips of this society near Stemerdink Miocene shells were collected from clays exposed in the banks of the Slinge brook. By washing the clay in a vegetable-tin with holes made in the bottom finally some fragments of shells were obtained. Occasionaly, says ten Dam, a somewhat larger piece was found in which the excursion-leader was interested! Also he described how the owner of the Stemerdink farm lastly forbad further digging in the banks of the stream, which lead ten Dam to look for other excursion possibilities near Winterswijk. He rediscovered the outcrop Königsmühle at Dingden (FRG), which at that time had fallen into oblivion, though it had been the subject of several papers on the mollusc fauna in the 19th century (Beyrich, 1853-1857; von Koenen, 1872, 1882; Lehmann, 1885, 1892, 1893). Lately the fauna from Dingden was studied by Anderson (1964) and Janssen (1967, 1969).

Although ten Dam explicitly stated that the farmer of Stemerdink prohibited digging in the brook the real facts seem to be different. During the years of which ten Dam is telling the recently deceased Hendrik Hesselink was farmer at the Stemerdink estate. Being confronted with ten Dam's story he produced, after long thinking, a quite different version. Hesselink remembered that in the years far before WW II and also after it, he discovered from time to time people pottering around in the brook and doing "mysterious" things there. Prompted by curiosity Hendrik Hesselink tried to approach those visitors to see with his own eyes what was so interesting in the brook that it constantly attracted people. But, he said, always when I reached the stream they had quickly disappeared in the forest. Thus it took him a considerable time to find out what was going on. Apparently the collectors working in the brook felt themselves trespassers (which, in fact, they were!), afraid for a scolding by the owner. But Hendrik Hesselink stated explicitly that he never had forbidden anyone to do collecting in the Slinge brook. (This story is based on a personal communication of Mr M. van den Bosch, RGM, and adopted from a Dutch text in Janssen, in press).

Material collected in the way described by ten Dam is present in a number of private collections and also in the RGM. It is usually indicated as "Stemerdink" or "Stemerdinkbrug", after a wooden bridge that was present close to the exposure. From several personal communications, however, it is certain that the older collections also contain material from a second exposure, some 400 m downstream the bridge (Anonymous, 1960), here indicated as Nieuw-Wassink (see below). The mollusc faunas of these two exposures are highly similar.

About 25 years ago there were rumours among Dutch amateur shell-collectors (e.g. Anonymous, 1960 and Schuyf, 1961) that the famous Stemerdinkbrug locality had disappeared. This stimulated collecting at the Dingden locality to a high degree.

After all it is amusing to reconstruct how these rumours originated. In reality not the exposure had disappeared, but the bridge! At a certain time the old Stemerdink bridge was demolished and the road went out of use. A modern bridge was built a few hundred meters upstream. At this place also a small weir was constructed, requiring protection of banks and bottom by means of concrete plates. Collectors, looking for the Stemerdink bridge were very disappointed to find the section covered with concrete and the conclusion was obvious: the exposure was no longer accessible. But the exposure was still there and even today it is possible at the place of the old bridge to collect Miocene shells (van den Bosch, 1970, p. 21).

As the Slinge brook, together with the adjacent forests and landed estates, is a beautiful and vulnerable scenery it is highly unbecoming to execute any large-scale excavation that might influence the course of the brook or undermine the banks. Properly done small-scale collecting remains possible and will be granted by the present owner of the Stemerdink farm on application.

GEOGRAPHICAL AND STRATIGRAPHICAL POSITION

The mollusc material studied in the present paper originates from two day-light exposures, indicated respectively as Stemerdinkbrug and Nieuw-Wassink. Both are situated in banks and bottom of the Slinge brook, within the hamlet of Brinkheurne, in the municipality of Winterswijk. Coordinates (map-sheet 41E of the topographical map 1:25.000) are:

Stemerdinkbrug	X = 248.930	Y = 441.650
Nieuw-Wassink	X = 248.640	Y = 441.770

The distance between the two outcrops (measured along the brook) is some 400 m. In between a slightly older Miocene sediment is exposed, still belonging to the Stemerdink Bed, but more sandy, in which hardly any fossils are present (as a result of decalcification?). The geographical situation of the outcrops is given in text-fig. 1.

Both exposures belong to the same stratigraphical unit: Aalten Member, Stemerdink Bed. In fact, the Stemerdinkbrug exposure is a reference section of the Stemerdink Bed, situated at a distance of less than a hundred meters from the boring in which the actual stratotype was selected (van den Bosch, Cadée & Janssen, 1975, p. 23, fig. 4). The stratigraphical framework of these deposits is extensively described in this latter paper (pp. 19-32, especially also fig. 9, here reproduced in text-fig. 2). According to the general lithostratigraphical subdivision valid all over the Netherlands the deposits belong to the Breda Formation (N.A.M. & R.G.D., 1980).

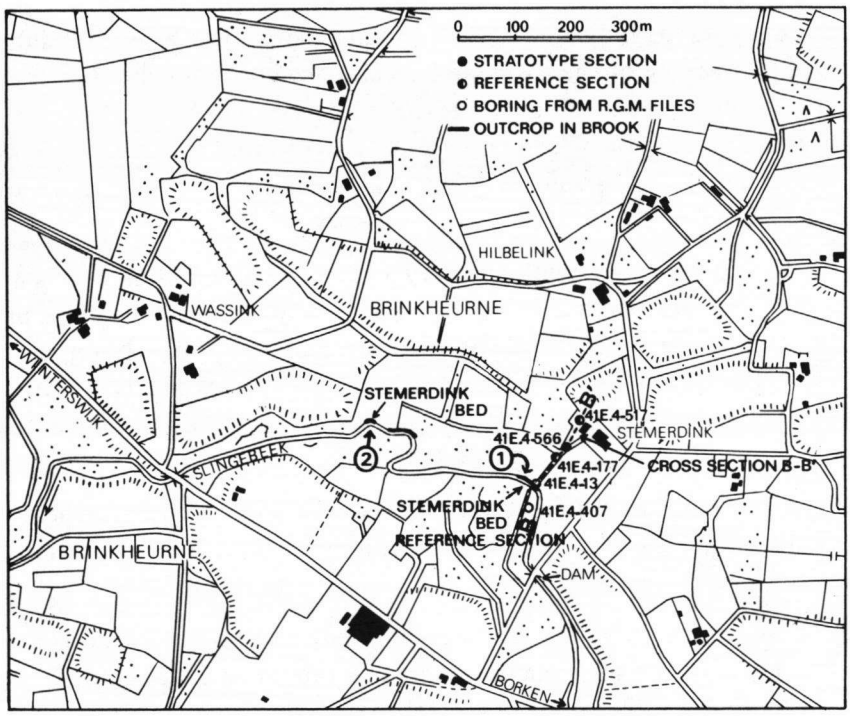


Fig. 1. Situation of localities.
1 = Stemerdinkbrug.
2 = Nieuw-Wassink.
The section B-B' is represented in text-fig. 2.

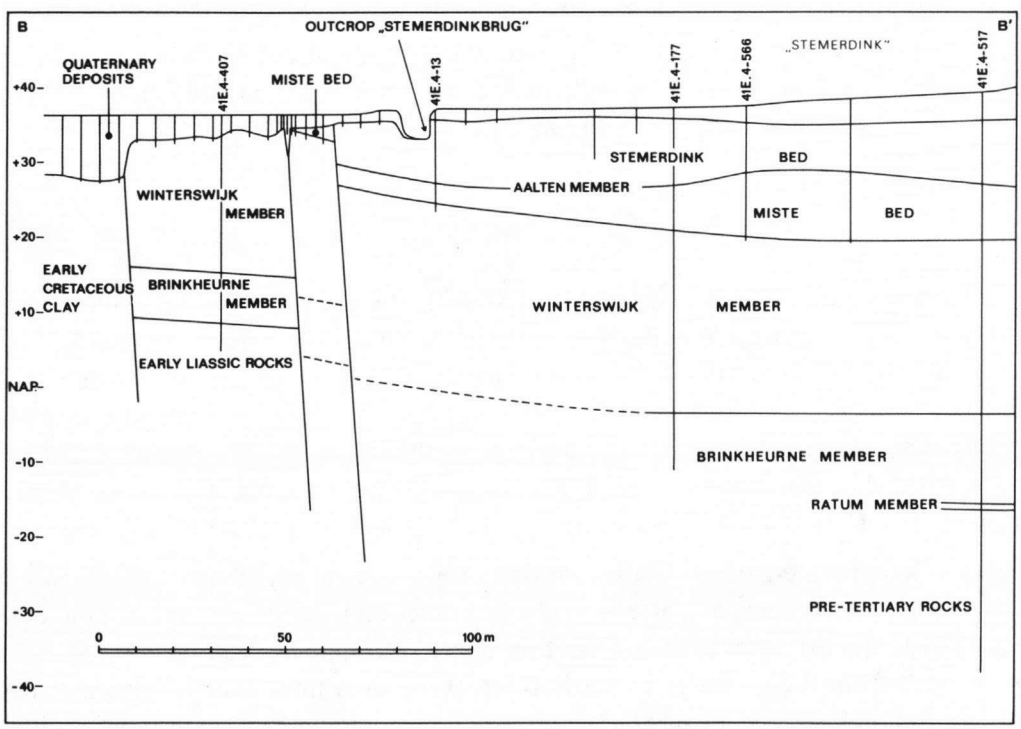


Fig. 2. Geological cross-section of the Stemerdink Bed stratotype.
Locality map see text-fig. 1 (B-B').

The age of the sediments, as indicated by the mollusc fauna, is Miocene (Reinbekian). Decisive in this respect is e.g. the presence of the gastropod species *Scalaspira festiva*. The fauna convincingly belongs to the Limopsis aurita Acme Zone, as described by van den Bosch, Cadée & Janssen (1975, p. 91). It can be correlated with the well-known mica clays visible at the Königsmühle exposure at Dingden (FRG). The same fauna is known from a large number of borings in the Winterswijk-Eibergen area.

At Stemerdinkbrug and Nieuw-Wassink the very top of the Stemerdink Bed is absent as a result of subsequent erosion. The Miocene sediments are covered by a thin sandy deposit of Quaternary age. The uppermost shell-bearing part of the Stemerdink Bed was formerly exposed in the clay-pit of the F.O.W. Brickworks at Eibergen-Zwilbroek. Here the fauna is highly impoverished, but one species not found at Stemerdink, *Neopycnodonte navicularis* (Brocchi, 1814), is rather common.

Very recently the correlation of the Limopsis aurita Acme Zone with (parts of) the Twistringen Member, as suggested by van den Bosch, Cadée & Janssen (1975, p. 93), appeared to be highly improbable. This is indicated by the vertical distribution of *Streptochetus* species (Cadée & Janssen, 1983).

The depositional environment of the Stemerdink Bed may be described as an euhaline, open marine, relatively deep part of the shelf sea. Compared to the fauna of the underlying Miste Bed the fauna of the Stemerdink Bed is rather poor in species.

The sediment in both exposures consists of rather heavy, slightly sandy, blackish-brown mica clay, that can hardly or not be washed in the field. Desintegration of dried sediment in warm water is easy however, but necessitates transportation of samples to the laboratory. Upwards in the section the sand content of the sediment decreases and fossils become scarcer. Molluscs and other fossils are not regularly distributed in the clay, but occur concentrated in thin layers and pockets.

Further and more detailed information on the Stemerdink Miocene may be found in several papers on the subject, of which we especially mention van den Bosch (1970); de Vogel (1970, 1971); van den Bosch, Cadée & Janssen (1975) and van den Bosch (1981).

MATERIAL

From both localities Stemerdink and Nieuw-Wassink the first author recently collected sediment samples of about 300 kg each. This material was dried and carefully washed on a sieve with a 0.4 mm mesh. The dried residue comprised 3.5 kg of shell material, in which also pyrite was present, together with non-molluscs (echinoderms, decapods, anthozoans, skeleton parts of bony fishes and, in the finer fractions, foraminifers and ostracods). The number of otoliths was especially striking: some 20 to 25.000 specimens were sorted out, for the greater part belonging to the deepwater genus *Diaphus* (lantern-fishes). The mollusc fauna in these samples comprises almost 200 species.

The two samples provided us with a sound basis for a critical revision of the already existing collections. It was soon established that especially the older collections (as for example the Drenth collection) contain frequently species that do not originate from one of the two exposures described here, as was obvious from their kind or state of preservation, or from sediment remains. Species not known from the Reinbekian, e.g. *Lembulus emarginatus* (Lamarck, 1819) mentioned in Bloklander (1954), could easily be rejected, especially also because the state of preservation was quite different from shells collected at Stemerdink or Nieuw-Wassink. Several other species, some of them also

known to occur in deposits of Reinbekian age elsewhere in the North Sea Basin, could be recognized as erroneously labeled "Stemerdink". In many cases we were almost certain to identify the state of preservation of the Hemmoorian shell material from e.g. the Beringen well in the Peel area. A large quantity of such material was distributed among shell collectors by the Rijks Geologische Dienst, some 25 years ago.

More easy to detect were molluscs of Rupelian age that were present in one or two collections and indicated with "Stemerdink". Such specimens usually will have been collected at the clay-pit "De Vlijt", also at Winterswijk.

A further source of contamination is formed by remnants of a large quantity of Miocene sand, excavated some years ago from temporary exposures at Winterswijk-Miste and containing a rich mollusc fauna of Hemmoorian age. This sand was transported to the Slinge brook near Stemerdinkbrug to be washed. It is obvious that fossil material from this sediment may easily contaminate samples taken from the Stemerdinkbrug mica clay!

Material indicated with "Stemerdink" of species that we do not know personally from one of the two outcrops was only accepted if its state of preservation or the kind of sediment in, or sticking on the surface of, the fossils agrees with our personal observations at Stemerdink or Nieuw-Wassink.

It cannot be excluded, however, that part of the rejected fossils, yet originate from the indicated locality, but in that case they must have been collected from (very) deep exposures or from one of the many borings.

In the way described above we succeeded in composing a critical list of mollusc species, valid for the two exposures (table 2).

The older collections usually lack the smaller species. Probably the sediment was washed in the field on coarse sieves, or (as the wet sticky clay washes beastly) the samples were treated too roughly, causing the disappearance of small and fragile specimens. From the number of specimens of larger species, however, we have been able to estimate by extrapolation the total quantity of sediment from which the material seen by us was roughly collected. This must have been somewhere near 2.500 kg! Characteristic for former collecting methods is the fact that hardly any species was present in these collections that was not encountered in the newly collected samples.

We studied material from the following collections (S = Stemerdinkbrug, W = Nieuw-Wassink):

- Rijksmuseum van Geologie en Mineralogie, Leiden (RGM-S and RGM-W)

Material collected by C. Beets, M. van den Bosch, J.H. Drenth, P.L.F. de Groot, H. van Haren, B. Hubert, A.W. Janssen, G. Kortenbout van der Sluijs, H. Krul, H.K. Loose, H. Odé and J.H. Stock. Material from Nieuw-Wassink was collected by Janssen and Kortenbout van der Sluijs. All other collections presumably originate from Stemerdinkbrug.

The Drenth collection originally was presented (Bloklander, 1954) to the "Comité ter bestudering van de Nederlandse mariene Fauna" (Committee for the Study of the Dutch Marine Fauna), for short called the "Filiaal-collection". This large collection was incorporated in the collections of the Rijksmuseum van Natuurlijke Historie at Leiden, but the Miocene material was transferred to the RGM several years ago. Apparently this collection was enlarged after Bloklander made his list, as the number of specimens is often higher than given by Bloklander, and other collector names are mentioned on the labels as well (H. van Haren, B. Hubert, H. Odé and J.H. Stock). In most cases

however the samples cited by Bloklander could be recognized. A careful check-up of this collection is represented in Table 1.

- Rijks Geologische Dienst, Haarlem (RGD-S and RGD-W)

In the collections of the Macro-paleontology department material labeled "Stemerdinkbrug" is present. Part of this belongs to the "old collection" (before 1940), in which specimens occur that were certainly not collected from one of the two outcrops, viz.

Nuculana (s.lat.) *deshayesiana* (Nyst, 1835)
Pelecyora (Cordiopsis) polytropa nysti (d'Orbigny, 1852)
Dentalium (Antalis) aff. *dumasi* (Cossmann & Peyrot, 1916)
Tiburnus margaritula tournoueri (von Koenen, 1882)
Acirsa (Hemiacirsa) aff. *duvergieri* (De Boury in Cossmann, 1912)
Polinices miocolligens (Sacco, 1891)
Murex (Tubicauda) spinicosta Bronn, 1831

Material collected in later years by A. Pannekoek and G. Spaink appeared to be uncontaminated. Spaink also collected at Nieuw-Wassink.

- Collections of the following non-professional paleontologists:

S. van Berkum, Oegstgeest	(SBO)
M.C. Cadée, Leiden	(MCL)
V.W.M. van Hinsbergh, Leiden	(VHL)
A.C. Janse, Brielle	(AJB)
A. Stiva, Amsterdam	(ASA)
L.M.B. Vaessen, Utrecht	(LVU)
E.F. de Vogel, Leiden	(EVL)

LIST OF MOLLUSC SPECIES

In Table 2 all mollusc species occurring at the two exposures are listed. Taxonomy is based on Janssen (in press). The frequency of the species is indicated by means of a scale from 1 to 8, with the following meaning (2 valves of a bivalve are 1 specimen):

1 specimen (or less)	1
2-3 specimens	2
4-10 specimens	3
11-40 specimens	4
41-125 specimens	5
126-350 specimens	6
351-1.000 specimens	7
more than 1.000 specimens	8

In several cases (e.g. Dentaliidae) the number of specimens had to be estimated, because of the usually fragmentary state of the material.

Table 2 summarizes the total number of specimens present in all studied collections together. For less-frequent species the collection in which material is kept is given in the right-hand column, in which occasionally also reference is made to the systematical chapter.

Table 1. Revision of Bloklander's (1954) list of species in the Drenth collection of molluscs from Stemerdinkbrug (revised identification between square brackets)

1. from Stemerdinkbrug

2. certainly not from Stemerdinkbrug

	1	2
Calliostoma laureatum (Mayer)		
[*Calliostoma (Ampullotrochus)* sp.]	x	-
Turritella subangulata (Brocchi)		
[*Turritella (Archimediella) subangulata* (Brocchi, 1814)]	x	-
Solarium simplex Bronn		
[*Architectonica (Pseudotorinia) obtusa* (Bronn, 1831) s.lat.]	x	-
Bittium spina (Partsch)		
[*Bittium (Bittium) spina* (Hoernes, 1855)]	x	-
Cerithiella genei (Bellardi & Michelotti)		
[*Cerithiella (Cerithiella) genei* (Bellardi & Michelotti,1840)]	x	-
Opalia straeleni Glibert		
[*Turriscala* (s.lat.) *straeleni straeleni* (Glibert, 1952)]	x	-
Cirsotrema crassicostata (Deshayes)		
[*Cirsotrema (Cirsotrema) crassicostatum* (Deshayes, 1839)]	x	-
Epitonium frondiculum (S. Wood)		
[*Epitonium (Spiniscala) frondiculum* (Wood, 1848)]	x	-
Eulima taurinensis Sacco		
[*Eulima (Eulima) glabra* (Da Costa, 1778)]	x	-
Niso terebellum (Chemnitz) forma *acarinatoconica* Sacco		
[*Niso (Niso) terebellum acarinatoconica* Sacco, 1892]	x	x
Odostomia conoidea (Brocchi)		
[*Odostomia (Megastomia) ? conoidea* (Brocchi, 1814)]	x	-
[*Odostomia (Odostomia)* sp.]	x	-
Eulimella acicula (Philippi)		
[*Eulimella (Eulimella) acicula* (Philippi, 1836)]	x	-
[*Syrnola (Syrnola) hoernesi* (Von Koenen, 1882)]	x	-
[*Syrnola (Syrnola) lutaria* (A.W. Janssen, 1972)]	x	-
Turbonilla elegantissima (Montagu) forma *gastaldi* Semper		
[*Turbonilla (Pyrgolampros) undulata* (Von Koenen, 1882)]	x	-
[*Turbonilla (Pyrgolampros)* cf *pseudoterebralis* (Sacco, 1892)]	x	-
Calyptraea chinensis (Linné)		
[*Calyptraea (Calyptraea) chinensis* (Linné, 1758)]	x	-
Xenophora deshayesi (Michelotti)		
[*Xenophora ? deshayesi* (Michelotti, 1847)]	x	-
Aporrhais alata (Eichwald)		
[*Aporrhais (Aporrhais) alata* (Von Eichwald, 1830)]	x	-
Natica varians Dujardin forma *protracta* (Eichwald)		
[*Euspira helicina protracta* (Von Eichwald, 1830)]	x	-
[*Euspira staringi* (A.W. Janssen, 1969)]	x	-
Natica olla (de Serres)		
[*Naticarius koeneni* (Sacco, 1891)]	-	x

Table 1 (continued)	1	2
Natica beyrichi Von Koenen		
[Naticidae sp. div. juv.]	-	x
Phalium miolaevigatum (Sacco)		
[*Semicassis (Semicassis) miolaevigata* (Sacco, 1890)]	?	?
Phalium bicoronatum (Beyrich)		
[*Semicassis (Echinophoria) bicoronata bicoronata* (Beyrich, 1854)]	x	-
Pirula condita Brongniart		
[*Ficus (Ficus) conditus* (Brongniart, 1823)]	x	-
Typhis fistulosus (Brocchi)		
[*Lyrotyphis (Eotyphis) sejunctus* (Semper, 1861) s.lat.]	x	-
Typhis horridus (Brocchi)		
[*Typhis (Typhis) pungens* (Solander in Brander, 1766)]	x	-
Pyrene nassoides (Brocchi)		
[*Mitrella (Macrurella) nassoides* (Grateloup, 1827)]	x	-
Pyrene corrugata (Bellardi)		
[*Anachis (Costoanachis) hosiusi* (Von Koenen, 1872)]	x	-
Pyrene terebralis (Grateloup)		
[*Anachis (Costoanachis) terebralis* (Grateloup, 1834)]	-	x
Phos decussatus Von Koenen		
[*Phos (Phos) decussatus* (Von Koenen, 1872)]	-	x
Nassarius boccholtensis (Beyrich)		
[*Hinia (Hinia) bocholtensis* (Beyrich, 1854)]	x	-
[*Hinia (Hinia) turbinella* (Brocchi, 1814)]	x	-
Nassarius holsaticus (Beyrich)		
[*Hinia (Hinia) holsatica* (Beyrich, 1854)]	-	x
[*Hinia (Tritonella) tenuistriata* (Beyrich, 1854)]	-	x
Nassarius cf *serraticosta* (Bronn)		
[*Hinia (Hinia) cavata* (Bellardi, 1882)]	-	x
Nassarius tenuistriatus (Beyrich)		
[*Hinia (Tritonella) tenuistriata* (Beyrich, 1854)]	x	-
Aquilofusus beyrichi (Nyst)		
[*Fusiturris aquensis* (Grateloup, 1832)]	-	x
Aquilofusus festivus (Beyrich)		
[*Scalaspira festiva* (Beyrich, 1856)]	x	-
Exilia contigua (Beyrich)		
[*? Exilifusus attenuatus* (Philippi, 1846)]	x	-
Streptochetus sexcostatus (Beyrich)		
[*Streptochetus (Streptodyction) sexcostatus* (Beyrich, 1856)]	x	-
Scaphella bolli (Koch)		
[*Scaphella (Scaphella) bolli* (Koch, 1862)]	x	-
Cancellaria varicosa (Brocchi) forma *paucicostata* Peyrot		
[*Sveltia varicosa paucicostata* (Peyrot, 1928)]	-	x
Admete fusiformis (Cantraine)		
[*Babylonella fusiformis* (Cantraine, 1835)]	x	-
Clavatula boreointerrupta Kautsky		
[*Clavatula (Clavatula) boreointerrupta* Kautsky, 1925]	-	x
Turricula regularis steinvorthi (Semper)		
[*Orthosurcula steinvorthi* (Von Koenen, 1872)]	x	-
[*? Unedogemmula boreoturricula* (Kautsky, 1925)]	x	-

Table 1 (continued)	1	2
Surculites girundicus (Peyrot) var. *leognanensis* (Peyrot)		
[*Acamptogenotia escheri* (Mayer, 1861)]	-	x
Clavus selenkae (Von Koenen)		
[*Splendrillia selenkae* (Von Koenen, 1872)]	x	-
Clavus obeliscus (Desmoulins)		
[*Crassispira* (s.lat.) *borealis* (Kautsky, 1925)]	x	-
Ancistrosyrinx corneti (Von Koenen)		
[*Clinura circumfossa* (Von Koenen, 1872)]	x	-
Turris duchastellii (Nyst)		
[*Fusiturris duchasteli flexiplicata* (Kautsky, 1925)]	x	-
Turris inermis (Partsch)		
[*Elaeocyma diensti* (Kautsky, 1925)]	-	x
Turris spiralis (De Serres)		
[*Gemmula (Gemmula) zimmermanni* (Philippi, 1847)]	x	-
Turris coronata (von Münster)		
[*? = Gemmula (G.) zimmermanni* (Philippi, 1847)]	x	-
Genota ramosa (De Basterot)		
[*Genota ramosa* (De Basterot, 1825)]	-	x
Genota mioturbida (Kautsky)		
[*Bathytoma (Bathytoma) cataphracta jugleri* (Philippi, 1847)]	x	-
Asthenotoma pannus (De Basterot)		
[*Asthenotoma* (s.lat.) *festiva* (Hoernes, 1854)]	-	x
Asthenotoma sp.		
[*Asthenotoma pannoides* (Von Koenen, 1872)]	x	-
Scobinella labellum (Bonelli)		
[*Aphanitoma fransi* A.W. Janssen, 1972]	x	-
[*Mitroborsonia debilis* (Beyrich, 1856)]	x	-
Borsonia uniplicata (Nyst)		
[*Borsonia uniplicata* (Von Koenen, 1872)]	x	-
Mangelia hispidula (Jan) var. *laevigatior* Kautsky		
[*Sorgenfreispira tenella* (Mayer, 1858)]	x	-
Conus dujardini Deshayes		
[*Conus (Conolithus) antediluvianus* Bruguière, 1792 s.lat.]	x	-
Terebra hoernesi Beyrich		
[*Strioterebrum (Strioterebrum) hoernesi* (Beyrich, 1854)]	x	-
Terebra sp.		
[Material absent]		
Actaeon semistriatus (Férussac)		
[*Actaeon (Actaeon) semistriatus* (Férussac, 1822)]	-	x
Ringicula buccinea (Brocchi)		
[*Ringicula (Ringiculina) buccinea* (Brocchi, 1814)]	x	-
Retusa elongata (Eichwald)		
[*Retusa (Cylichnina) elongata* (Von Eichwald, 1830)]	x	-
Volvula acuminata (Bruguière)		
[*Volvulella acuminata* (Bruguière, 1792)]	x	-
Cylichna cylindracea (Pennant)		
[*Cylichna (Cylichna) pseudoconvoluta* (d'Orbigny, 1852)]	x	-
Sabatia utricula (Brocchi)		
[*Roxania (Roxania) utriculus* (Brocchi, 1814)]	x	-

Table 1 (continued)	1	2
Dentalium mutabile Döderlein		
[*Dentalium (Dentalium) dollfusi* Von Koenen, 1882]	x	-
[*Dentalium (Dentalium)* sp.]	x	-
Dentalium vitreum Schröter		
[*Laevidentalium* sp.]	x	-
[*Ditrupa* sp. (Annelida)]	x	-
Nucula laevigata J. Sowerby		
[*Leionucula haesendoncki hanseata* (Kautsky, 1925)]	-	x
Nucula haesendoncki Nyst & Westendorp		
[*Leionucula haesendoncki hanseata* (Kautsky, 1925)]	x	-
Leda westendorpi (Nyst)		
[*Nuculana (Saccella) westendorpi* (Nyst, 1839)]	x	-
Leda emarginata (Lamarck)		
[*Lembulus emarginatus* (Lamarck, 1819)]	-	x
Leda pygmaea (Von Münster)		
[*Portlandia (Yoldiella) pygmaea* (Von Münster, 1837)]	x	-
Yoldia glaberrima (Von Münster)		
[*Yoldia (Yoldia) glaberrima* (Von Münster, 1837)]	x	-
Arca diluvii Lamarck		
[*Scapharca (Scapharca) diluvii* (Lamarck, 1805)]	x	-
Limopsis aurita (Brocchi)		
[*Limopsis (Limopsis) aurita* (Brocchi, 1814)]	x	-
Limopsis anomala (Eichwald)		
[*Limopsis (Pectunculina) anomala* auct. non Von Eichwald, 1830]	x	-
Pinna pectinata L.		
[*Atrina pectinata* (Linné, 1767)]	x	-
Chlamys angelonii (Meneghini)		
[Material absent]		
Chlamys lilli (Pusch)		
[*Pseudamussium lilli* (Pusch, 1837)]	x	-
Amusium woodi (Nyst)		
[*Korobkovia woodi* (Nyst, 1861)]	x	-
Astarte gracilis Von Münster		
[*Astarte (Astarte) gracilis convexior* Anderson, 1959]	x	-
Astarte radiata (Nyst & Westendorp)		
[*Astarte (Astarte) radiata* Nyst & Westendorp, 1839]	x	-
Astarte teschi Heering		
[*Astarte* (s.lat.) *teschi* Heering, 1950]	-	x
Astarte triangularis (Montagu)		
[*Goodallia (Goodallia) angulata* (Lehmann, 1885)]	x	-
Cardita chamaeformis (Leathes M.S., J. Sowerby)		
[*Cyclocardia (Cyclocardia)* sp.]	x	-
Isocardia lunulata Nyst		
[*Glossus (Glossus) lunulatus* (Nyst, 1835)]	x	-
Laevicardium subturgidum (d'Orbigny)		
[Material absent]		
Cardium papillosum (Poli)		
[*Parvicardium straeleni* (Glibert, 1945)]	x	-

Table 1 (continued)	1	2
Pitaria rudis (Poli)		
[*Pitar (Pitar) rudis* (Poli, 1795)]	-	x
Venus multilamella (Lamarck)		
[*Venus (Ventricoloidea) multilamella* (Lamarck, 1818)]	x	-
Gouldia minima (Montagu)		
[*Gouldia (Gouldia) minima* (Montagu, 1803)]	-	x
Angulus posterus (Beyrich)		
[*Macoma (Psammacoma) elliptica* (Brocchi, 1814)]	x	-
Abra alba (W. Wood)		
[*Abra* (s.lat.) *lehmanni* Anderson, 1964]	x	-
Cultellus pellucidus (Pennant)		
[*Ensis hausmanni* (Goldfuss, 1841)]	-	x
Hiatella arctica (Linné)		
[*Hiatella (Hiatella) arctica arctica* (Linné, 1758)]	x	-
Corbula gibba (Olivi)		
[*Corbula (Varicorbula) gibba gibba* (Olivi, 1792)]	x	-
Cuspidaria cuspidata (Olivi)		
[*Cuspidaria* sp. 2]	x	-
Calopodium albidum Röding		
[*Pandora (Pandora) copiosa* Sorgenfrei, 1958]	x	-

Most species are also known from the famous Winterswijk-Miste locality, which fauna will be extensively described and illustrated in Janssen (in press). For such species the reader is referred to that paper, most probably appearing next winter. Several species from the present fauna not occurring at Miste are represented here (by drawings or photographs), to enable recognition. Reference to these illustrations is also included in the right-hand column of Table 2. Unfortunately the species *Eudolium dingdense* is present as fragments only, but it was illustrated very well by Anderson (1964).

The list of species nor the frequencies show significant differences for the two localities Stemerdinkbrug and Nieuw-Wassink. The lower number of specimens for the latter locality can be explained by the usually smaller collections and the somewhat less favourable state of preservation. Especially the smaller gastropods from Nieuw-Wassink have suffered from pyrite desintegration.

There is only one locality of similar age from which the mollusc fauna is reasonably known. This is the so-called "Glimmerton" (= mica clay) of the Königsmühle exposure at Dingden (FRG). Anderson (1964) gave a list of species, that could be completed with material present in the RGM-collections. This Dingden-fauna still contains a number of species also known from the underlying Spisula sp. Acme Zone, that are not known from Stemerdinkbrug or Nieuw-Wassink. This, and e.g. the common occurrence of the bivalve species *Portlandia curvirostris* at both Winterswijk localities, whereas this species is extremely rare at Dingden, leads to the conclusion that the fauna in the Dingden mica clay is slightly older than those of the two Dutch localities.

Table 2. Mollusc species from the Stemerdinkbrug and Nieuw-Wassink outcrops at Winterswijk-Brinkheurne (Aalten Member, Stemerdink Bed, Limopsis aurita Acme Zone.

1. present at Stemerdinkbrug
2. present at Nieuw-Wassink
3. frequency code for the two outcrops together (see text)

In the right-hand column collections are indicated in which material of less frequent species is kept. Furthermore the reader is referred to the systematical part or to illustrations in this paper whenever relevant.

	1	2	3	notes
Leionucula haesendoncki hanseata (Kautsky, 1925)	x	x	4	
Nucula (Lamellinucula) aff. *jeffreysi* Bellardi, 1875	-	x	2	AJB
Nucula (Nucula) aff. *nucleus* (Linné, 1758)	x	-	3	
Nuculana (Saccella) westendorpi (Nyst, 1839)	x	x	6	
Portlandia (Yoldiella) curvirostris (Lehmann, 1885)	x	x	5	pl. 1
Portlandia (Yoldiella) pygmaea (von Münster, 1837)	x	x	6	syst. part
Yoldia (Yoldia) glaberrima (von Münster, 1837)	x	x	6	
Acar nodulosa (Müller, 1776)	x	-	1	AJB fragm.
Bathyarca pectunculoides (Scacchi, 1834)	x	x	4	
Scapharca (Scapharca) diluvii (Lamarck, 1805)	x	-	4	EVL RGD RGM
Limopsis (Limopsis) aurita (Brocchi, 1814)	x	x	8	
Limopsis (Pectunculina) anomala auct. non von Eichwald, 1830	x	x	7	
Limopsis (Pectunculina) lamellata Lehmann, 1885	x	x	6	
Arcoperna sericea (Bronn, 1831)	x	x	3	fragm.
Musculus (Musculus) sorgenfreii Anderson, 1967	x	x	3	
Modiolula phaseolina (Philippi, 1846)	x	x	2	MCL RGM
Atrina pectinata (Linné, 1767)	x	x	3	fragm.
Aequipecten angelonii (De Stefani & Pantanelli, 1880)	x	-	2	
Korobkovia woodi (Nyst, 1861)	x	x	4	
Pseudamussium lilli (Pusch, 1837)	x	x	4	
Pododesmus (Monia) anitae sp. nov.	x	-	3	syst. part
Limea (Limea) strigilata (Brocchi, 1814)	x	-	1	AJB
Limaria (Limatulella) loscombi (Sowerby, 1823)	x	-	2	AJB
Cavilucina (Gonimyrtea) droueti droueti (Nyst, 1861)	x	-	3	ASA EVL RGD
Lucinoma borealis (Linné, 1767)	x	-	3	AJB ASA RGD
Axinulus germanicus A.W. Janssen, 1972	x	x	4	AJB RGM
Thyasira (? Thyasira) sp.	x	-	1	AJB
Erycina (s.lat) *subquadrangularis* (Cerulli-Irelli, 1908)	x	x	4	
Lepton (? Lepton) transversarium Cossmann, 1896	x	-	2	AJB EVL
Mysella (Mysella) bidentata (Montagu, 1803)	x	x	3	AJB ASA
Spaniorinus cimbricus (Kautsky, 1925)	x	-	1	LVU
Anisodonta duvergieri Cossmann & Peyrot, 1909	x	x	4	
Cyclocardia (Cyclocardia) sp.	x	x	7	pl.1
Erycinella chavani (Glibert, 1945)	x	-	1	AJB

Table 2 (continued)	1	2	3	notes
Astarte (Astarte) goldfussi Hinsch, 1952	x	x	3	
Astarte (Astarte) gracilis convexior Anderson, 1959	x	x	8	
Astarte (Astarte) radiata Nyst & Westendorp, 1839	x	x	4	
Goodallia (Goodallia) angulata (Lehmann, 1885)	x	x	5	
Parvicardium straeleni (Glibert, 1945)	x	x	7	
Laevicardium (Habecardium) dingdense (Lehmann, 1885)	x	x	3	
Laevicardium (Habecardium) subturgidum subturgidum (d'Orbigny, 1852)	x	x	4	
Spisula (Spisula) aff. *subtruncata* (Da Costa, 1778)	x	x	3	
Angulus (Moerella) aff. *donacillus* (Wood, 1857)	x	-	2	AJB EVL
Macoma (Psammacoma) elliptica (Brocchi, 1814)	x	x	4	
Abra (s.lat.) *lehmanni* Anderson, 1964	x	x	6	
Azorinus (Azorinus) chamasolen miocaenicus (Cossmann & Peyrot, 1909)	x	-	1	EVL
Spaniodontella nitida (Reuss, 1867)	x	x	5	
Glossus (Glossus) lunulatus (Nyst, 1835)	x	x	5	
Venus (Ventricoloidea) multilamella (Lamarck, 1818)	x	x	5	
Gouldia (Gouldia) minima (Montagu, 1803)	x	-	1	RGD
Sphenia pusilla (Sorgenfrei, 1958)	x	-	1	AJB
Corbula (Varicorbula) gibba gibba (Olivi, 1792)	x	x	7	
Hiatella (Hiatella) arctica arctica (Linné, 1758)	x	x	3	
Panopea (Panopea) meynardi Deshayes, 1828	x	x	3	
Teredinidae gen. et sp. indet.	x	x	2	AJB RGM
Pholadomya (Pholadomya) cf *alpina* Matheron, 1843	x	-	1	EVL fragm.
Pandora (Pandora) copiosa Sorgenfrei, 1958	x	x	2	AJB RGM
Lyonsia (Lyonsia) aff. *norvegica* (Gmelin, 1791)	x	-	1	AJB fragm.
Cochlodesma (Bontaea) praetenue (Pulteney, 1799)	x	x	3	AJB fragm.
Thracia (Thracia) inflata Sowerby, 1845	x	x	3	fragm.
Cardiomya (Cardiomya) costellata (Deshayes, 1832)	x	x	2	AJB RGM
Cuspidaria (Cuspidaria) sp. 1	x	x	3	
Cuspidaria (Cuspidaria) sp. 2	x	x	2	
Cuspidaria (Cuspidaria) sp. 3	x	-	1	RGM
Dentalium (Dentalium) dollfusi von Koenen, 1882	x	x	7	Pl. 1
Dentalium (Dentalium) sp.	x	x	7	
Laevidentalium sp.	x	x	5	
Gadila benoisti houthalenensis (Goddeeris, 1977)	x	-	3	EVL MCL
Cocculina (Cocculina) miocaenica Boettger, 1901	x	-	2	EVL RGD
Calliostoma (Ampullotrochus) ? laureatum (Mayer, 1874)	x	x	3	
Colloniinae sp.	x	-	2	AJB
Daronia (? Cyclostremella) punctata A.W. Janssen, 1967	x	x	3	AJB RGM
Skenea minuta A.W. Janssen, 1967	x	-	3	AJB RGD RGM
Skenea schuermanni sp. nov.	x	x	3	syst. part
Circulus hennei Glibert, 1952	x	-	3	
Circulus praecedens (von Koenen, 1882)	x	x	4	
Circulus subcirculus (Cossmann & Peyrot, 1916)	-	x	1	AJB
Alvania (Alvinia) antwerpiensis Glibert, 1952	x	-	2	AJB RGM
Alvania (Alvinia) partschi (Hoernes, 1856)	x	-	1	AJB fragm.
Hyala laevigata (von Koenen, 1882)	x	x	4	
Putilla (Ovirissoa) gottscheana (von Koenen, 1882)	x	-	2	AJB RGM

Table 2 (continued)	1	2	3	notes
Rissoella (Jeffreysina) hesselinki sp. nov.	x	-	2	syst. part
Architectonica (Pseudotorinia) obtusa (Bronn, 1831) s.lat.	x	-	2	EVL RGM
Mathilda (Fimbriatella) clathratula (Bosquet, 1869)	x	-	1	syst. part
Turritella (Archimediella) subangulata (Brocchi, 1814)	x	x	6	
Bittium (Bittium) spina (Hoernes, 1855)	x	-	5	
Bittium (Bittium) tenuispina Sorgenfrei, 1958	x	-	1	AJB
Cerithiella genei (Bellardi & Michelotti, 1840)	x	x	3	pl. 3
Cerithiopsis andersoni A.W. Janssen, 1967	x	x	2	AJB, pl.
Cerithiopsis vandermarki A.W. Janssen, 1967	x	-	2	AJB LVU pl. 3
Norephora (Norephora) fritschi (von Koenen, 1882)	x	x	4	
Acirsa (Hemiacirsa) sp.	x	-	1	AJB
Amaea (Scalina) subreticulata (d'Orbigny, 1852)	x	-	2	EVL RGD
Cirsotrema (Cirsotrema) crassicostatum (Deshayes, 1839)	x	-	1	RGM
Cirsotrema (Discoscala) ertborni (von Koenen, 1882)	x	x	3	syst. part
Epitonium (Cinctoscala) linoe (Anderson, 1964)	x	-	1	AJB
Epitonium (Spiniscala) frondiculum (Wood, 1848)	x	x	3	AJB RGM
Turriscala (s.lat.) *straeleni straeleni* (Glibert,1952)	x	x	4	pl. 3
Cima neglecta (A.W. Janssen, 1969)	x	x	5	
Balcis (Balcis) alba (Da Costa, 1778)	x	x	4	
Eulima (Eulima) bilineata Alder, 1848	x	x	3	AJB
Eulima (Eulima) glabra (Da Costa, 1778)	x	-	2	RGM
Eulima (Eulima) aff. *glabra* (Da Costa, 1778)	x	x	3	AJB
Niso (Niso) terebellum acarinatoconica Sacco, 1892	x	-	1	ASA
Aporrhais (Aporrhais) alata (von Eichwald, 1830)	x	x	6	
Calyptraea (Calyptraea) chinensis (Linné, 1758)	x	x	5	
Xenophora deshayesi (Michelotti, 1847)	x	x	5	
Erato (Erato) germanica germanica Schilder, 1929	x	-	1	RGM
Trivia (Trivia) westfalica Schilder, 1929	x	-	3	
Euspira helicina protracta (von Eichwald, 1830)	x	x	5	
Euspira nysti (d'Orbigny, 1852)	x	-	1	EVL
Euspira staringi (A.W. Janssen, 1969)	x	x	5	
Euspira edithae A.W. Janssen, 1972	x	-	2	AJB ASA
Natica neglecta (Mayer, 1858)	x	-	1	ASA
Tectonatica miopusilla (Kautsky, 1925)	x	-	1	AJB
Semicassis (Echinophoria) bicoronata bicoronata (Beyrich, 1854)	x	x	4	
Semicassis (Semicassis) miolaevigata (Sacco, 1890)	x	-	2	EVL RGM
Eudolium dingdense Anderson, 1964	x	x	4	
Charonia (Sassia) tarbelliana (Grateloup, 1840)	x	-	2	AJB RGM
Ficus (Ficus) conditus (Brongniart, 1823)	x	x	4	
Murex (Haustellum) inornatus inornatus Beyrich, 1854	x	-	3	
Pterynotus (Alipurpura) parvifolius (Kautsky, 1925)	x	x	2	AJB EVL
Lyrotyphis (Eotyphis) sejunctus (Semper, 1861) s.lat.	x	x	6	
Typhis (Typhis) pungens (Solander in Brander, 1766)	x	x	4	
Anachis (Costoanachis) hosiusi (von Koenen, 1872)	x	-	3	
Anachis (Costoanachis) terebralis (Grateloup, 1834)	x	x	2	AJB MCL
Mitrella (Macrurella) nassoides (Grateloup, 1827)	x	-	3	
Phos (Phos) decussatus (von Koenen, 1872)	x	-	2	ASA RGD

Table 2 (continued)	1	2	3	notes
Scalaspira (Scalaspira) festiva (Beyrich, 1856)	x	x	5	pl.3
Hinia (Hinia) bocholtensis (Beyrich, 1854)	x	x	4	
Hinia (Hinia) cimbrica voorthuyseni subsp. nov.	x	x	5	syst. part
Hinia (Hinia) turbinella (Brocchi, 1814)	x	x	7	
Hinia (Tritonella) tenuistriata (Beyrich, 1854)	x	x	4	
? Exilifusus attenuatus (Philippi, 1846)	x	x	5	
Streptochetus (Streptodictyon) sexcostatus (Beyrich, 1856)	x	x	6	
Scaphella (Scaphella) bolli (Koch, 1862)	x	x	4	
Babylonella fusiformis (Cantraine, 1835)	x	x	6	
Babylonella stemerdinki sp. nov.	x	-	3	syst. part
Cancellaria (Merica) contorta gelriana A.W. Janssen, 1972	x	x	2	AJB EVL RGD
Sveltia varicosa paucicostata (Peyrot, 1928)	x	-	3	RGD RGM
Trigonostoma (Trigonostoma) sp. indet.	x	-	1	RGD
Vexillum (Uromitra) aciculum (Nyst, 1861)	x	-	3	pl. 3
Acamptogenotia escheri (Mayer, 1861)	x	-	3	
Orthosurcula steinvorthi (von Koenen, 1872)	x	-	3	
Fusiturris duchasteli flexiplicata (Kautsky, 1925)	x	x	6	
Gemmula (Gemmula) zimmermanni (Philippi, 1847)	x	x	7	
? Unedogemmula boreoturricula (Kautsky, 1925)	x	x	5	
? Unedogemmula hanseata (Kautsky, 1925)	x	x	2	
? Unedogemmula stoffelsi (Nyst, 1845)	x	x	3	
Clavatula (Clavatula) sp.	x	-	2	syst. part
Aphanitoma fransi A.W. Janssen, 1972	x	-	2	RGM pl. 3
Bathytoma (Bathytoma) cataphracta jugleri (Philippi, 1847)	x	x	6	
Borsonia uniplicata von Koenen, 1872	x	x	5	pl. 3
Mitroborsonia debilis (Beyrich, 1856)	x	-	3	pl. 3
Asthenotoma obtusangula (Brocchi, 1814)	x	-	3	
Asthenotoma pannoides (von Koenen, 1872)	x	x	5	
Asthenotoma pannus (Basterot in Bellardi, 1847)	x	x	3	
Boreodrillia hosiusi (von Koenen, 1872)	x	x	5	
Crassispira (s.lat.) *borealis* (Kautsky, 1925)	x	x	6	
? Haedropleura maitreja (von Koenen, 1872	x	x	5	
Microdrillia serratula (Bellardi, 1878)	x	x	4	pl. 3
Splendrillia selenkae (von Koenen, 1872)	x	x	5	
Mangelia (s.lat.) aff. *miorugulosa* Kautsky, 1925	x	-	2	AJB EVL
Mangelia (s.lat.) aff. *miostriolata* (Nordsieck, 1972)	x	-	1	RGM
Pleurotomoides simplex (Sorgenfrei, 1958)	x	-	3	
Sorgenfreispira sorgenfreii (Nordsieck, 1972)	x	x	3	
Sorgenfreispira tenella (Mayer, 1858)	x	x	4	
Daphnella defectiva sp. nov.	x	-	2	syst. part
Favriella sinuosula (Sorgenfrei, 1958)	x	x	4	
Magnella andersoni Dittmer, 1960	x	x	4	pl. 3
Metuonella grippi (Kautsky, 1925)	x	x	2	AJB EVL
Philbertia praehispida (Boettger, 1906)	x	-	1	RGD
Philbertia sp. 3	x	-	2	
Teretia anceps (von Eichwald, 1830)	x	x	4	
Clinura circumfossa (von Koenen, 1872)	x	-	3	

Table 2 (continued)	1	2	3	notes
Conus (Conolithus) antediluvianus Bruguière, 1792 s.lat.	x	x	5	
Strioterebrum (Strioterebrum) hoernesi (Beyrich, 1854)	x	x	5	syst. part
Chrysallida (Parthenina) toftlundensis Sorgenfrei, 1958)	x	x	5	
Chrysallida (Pyrgulina) pygmaea (Grateloup, 1838)	x	x	3	
Eulimella (Eulimella) acicula (Philippi, 1836)	x	x	5	
Eulimella (Eulimella) sp.	x	-	3	AJB RGM
Odostomia (Brachystomia) sp.	x	x	5	
Odostomia (Megastomia) ? conoidea (Brocchi, 1814)	x	x	4	
Odostomia (Odostomia) sp.	x	x	3	
Syrnola (Syrnola) hoernesi (von Koenen, 1882)	x	x	3	
Syrnola (Syrnola) lutaria (A.W. Janssen, 1972)	x	x	4	
Syrnola (Syrnola) neumayri (von Koenen, 1882)	x	-	2	AJB RGM
Turbonilla (Pyrgolampros) cf *pseudoterebralis* (Sacco, 1892)	x	x	5	
Turbonilla (Pyrgolampros) undulata (von Koenen, 1882)	x	x	6	
Turbonilla (Turbonilla) koeneniana Sacco, 1892	x	x	6	
Actaeon (Actaeon) laevigatus (Grateloup, 1827) s.lat.	x	-	1	AJB
Crenilabium terebelloides (Philippi, 1843)	x	-	1	AJB
Ringicula (Ringiculina) buccinea (Brocchi, 1814)	x	x	7	
Cylichna (Cylichna) pseudoconvolata (d'Orbigny, 1852)	x	x	3	
Roxania (Roxania) utriculus (Brocchi, 1814)	x	x	5	
Scaphander (Scaphander) grateloupi (Michelotti, 1847)	x	-	1	AJB fragm.
Retusa (Cylichnina) elongata (von Eichwald, 1830)	x	x	4	
Volvulella (Volvulella) acuminata (Bruguière, 1792)	x	-	3	
Limacina miorostralis (Kautsky, 1925)	x	-	3	
Limacina valvatina (Reuss, 1867)	x	x	5	
Gastropoda indet.	-	x	2	syst. part

SYSTEMATICAL PART

Portlandia (Yoldiella) pygmaea (von Münster, 1837)
Pl. 1, figs 4-6.

Remarks - In between the numerous specimens of typical *Portlandia pygmaea* a considerable number of shells was found differing by their relatively high shell-form. Such specimens usually also have the line connecting the extreme anterior and posterior ends above the middle of the shell, resulting in a very convex ventral margin. Well-developed specimens of this form, for which we introduce here the name *alta* nov. f., seem to be specifically different from typical *pygmaea* at first view. Scatter-diagrams of the ratios, however, distinctly indicate that all intermediate forms are present.

Rasmussen (1968, p. 17, pl. 1, figs 2 and 4) (material from Gram also in the RGM collection) described identical specimens from the Danish Gram Clay. In this material f. *alta* also occurs together with specimens of typical *pygmaea*.

Material - Holotype (pl. 1, figs 6a-b) from Stemerdinkbrug (coll. RGM 226.182); many paratypes from the type-locality and from Nieuw-Wassink.

Pododesmus (Monia) anitae sp. nov.
Pl. 2, figs 1-8.

Locus typicus - Dingden (FRG), outcrop in Königsbach near Königsmühle, 4-6 m below surface (fide Janssen, 1967, p. 117, figs 1 and 2).

Stratum typicum - Miocene, Reinbekian, Bislicher Schichten, Spisula sp. Acme Zone.

Derivatio nominis - Named after Mrs Anita Mol-Janse, daughter of the first author, who many times was a pleasant companion during field trips.

1964 *Anomia (Anomia) ephippium* Linné 1758 - Anderson, p. 145, pl. 2, fig. 28 (pars, non Linné).

Description - Shell moderately large, irregularly rounded. Right (lower) valve considerably smaller than the left (upper) valve, with a large foramen just below the umbonal region. Left valve unequally flat, slightly convex or, rarely, strongly convex.

The right valve is very fragile and only preserved in two specimens. In a complete specimen from Antwerp (pl. 2, figs 8a-b) it cannot be removed from the opposite valve. The foramen is reniform and occupies more than one third of the umbonal-ventral diameter. The surface of this valve shows some faint growth lines. Another, defective, right valve, also from Antwerp (pl. 2, figs 4a-b) has a thickened part on the inner side of the dorsal margin, apparently shaped to fit the ligament-pit of the opposite valve. From this thickening a narrow and well-defined ridge runs along the posterior side of the foramen, reaching just beyond its lower edge. In ventral direction this ridge gradually decreases in strength.

The left valve is usually almost flat or slightly convex. It is rather solid, its form changes from circular to oblongly expanded, so it may be higher than wide or vice versa. The umbo lies at a short distance from the dorsal margin. The outer surface is furnished with irregular growth lines. In many shells an irregular pattern of fine radiating lines is present, usually more distinct towards the margins. These lines, if present, are more or less scaly and densely distributed. In many specimens this sculpture starts at some distance from the umbo or even close to the margins. Some shells show xenomorphic structures (pl. 2, figs 3a-b).

The inner side of the left valve has an obvious, usually brown-coloured byssal scar, situated above the horizontal midline of the shell. A considerably smaller adductor scar is present at the lower left side of the byssal scar and practically always connected with it. Only very rarely there is a narrow space between these scars. The pallial line lies at about half the distance between the scar-combination and the margins. It is only visible in a few specimens, mainly those collected from clayey sediments. Inside and outside the pallial line the shell is slightly glossy (in well-preserved specimens), except for a narrow zone all along the margins, which is dull.

The ligament-pit of the left valve is transversely elongated, rather deeply incised, in the middle usually partly divided by a small protuberance. In very convex specimens the two branches of the ligament-pit together form a triangle, the anterior part of which is slightly longer than the posterior one.

Material - Holotype (pl. 2, figs 1a-b) (coll. RGM 226.225, leg. A.W. Janssen); paratypes from the type-locality: 11 more or less defective left valves (coll. RGM 226.224, leg. A.W. Janssen);

1 specimen (Natuurhistorisch Museum, Rotterdam, coll. NMR 3830, leg. A.W. Janssen) this specimen is represented in Anderson, 1964, pl. 2, fig. 28). Further paratypes: 2 defective left valves from Winterswijk-Brinkheurne, outcrop Stemerdinkbrug (loc. 1 of text-fig. 1) (coll. AJB); from the same locality fragments of 2 left valves (coll. RGM 226.226, leg. A.W. Janssen) and 1 fragment of a left valve (coll. MCL); 1 complete specimen and 15 left valves from Antwerp (Belgium), construction-pit Ploegstraat (Miocene, Anversian, Antwerp Sands) (coll. RGM 226.220-2, leg. D. van der Mark); 3 left valves from the same locality (coll. RGM 226.223, leg. R.E. Hamstra); 1 complete specimen right valve damaged, pl. 2, figs 4a-b, 5a-b, coll. RGM 226.212) and 17 left valves (coll. RGM 226.213-5) from Berchem-Borgerhout (Belgium), temporary exposures during construction of E 3 Kleine Ring motorway (Miocene, Anversian, Antwerp Sands) (all leg. D. van der Mark); 2 defective left valves from the same locality (coll. RGM 226.216, leg. R.E. Hamstra); 8 left valves from the same locality (coll. RGM 226.217, leg. F.J. Janssen); 2 valves from the same locality (coll. RGM 226.218, leg. M. van den Bosch); 5 valves from the same locality (coll. RGM 226.219, leg. A.W. Janssen).

Remarks – The specimens from Dingden and Winterswijk are usually less convex than those from the Antwerp Sands and they always have a reduced ornamentation on the outside of the left valve. Frequently ornamentation is completely absent. In the holotype it is only present at the anterior dorsal margin. These differences apparently are due to environmental factors. The Antwerp material originates from considerably shallower water. There is however no doubt that all shells belong to the same species.

PLATE 1

Figs 1-3. *Portlandia (Yoldiella) curvirostris* (Lehmann, 1885); x 10.
Winterswijk-Brinkheurne, Stemerdinkbrug.
Coll. RGM 226.177-9 (leg. A.C. Janse).

Fig. 4. *Portlandia (Yoldiella) pygmaea* (von Münster, 1837); x 10.
Winterswijk-Brinkheurne, Stemerdinkbrug.
Coll. RGM 226.180 (leg. A.C. Janse).

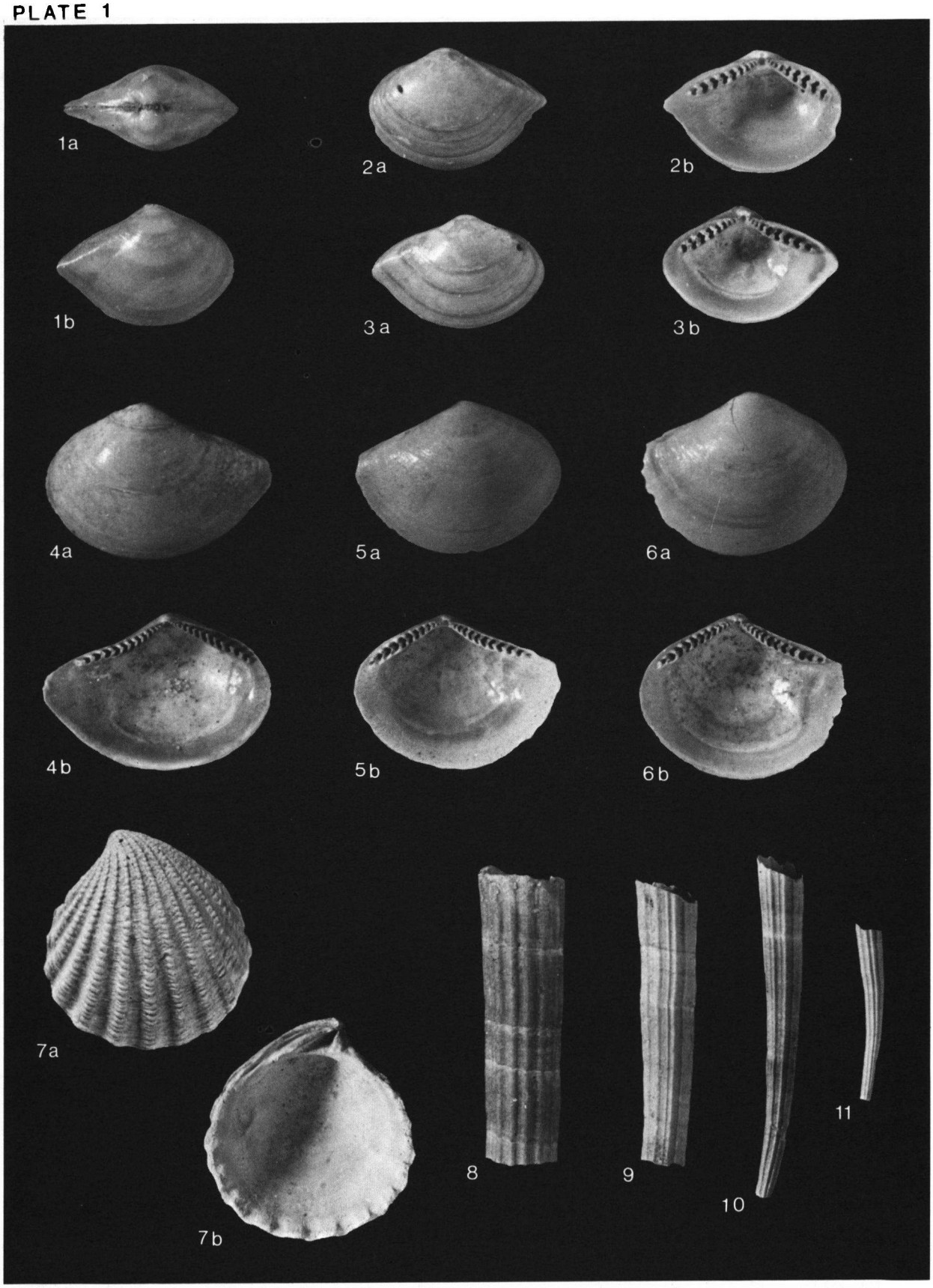
Fig. 5. *Portlandia (Yoldiella) pygmaea* (von Münster, 1837); x 10.
Intermediate specimen between the typical form and f. *alta* f. nov.
Winterswijk-Brinkheurne, Stemerdinkbrug.
Coll. RGM 226.181 (leg. A.C. Janse).

Fig. 6. *Portlandia (Yoldiella) pygmaea* (von Münster, 1837) f. *alta* f. nov.; x 10.
WinterswijkBrinkheurne, Stemerdinkbrug.
Holotype; coll. RGM 226.182 (leg. A.C. Janse).

Fig. 7. *Cyclocardia (Cyclocardia)* sp.: x 5.
Winterswijk-Brinkheurne, Stemerdinkbrug.
Coll. RGM 226.183 (leg. A.C. Janse).

Figs 8-11. *Dentalium (Dentalium) dollfusi* von Koenen, 1882; x 3.
Winterswijk-Brinkheurne, Stemerdinkbrug.
Coll. RGM 226.184-7 (leg. A.C. Janse).

PLATE 1



At most localities where *P. anitae* is present the species *Pododesmus (Heteranomia) squamula* (Linné) is also found. It can always be distinguished by its size (much smaller than *P. anitae*) and by the fact that the inner shell surface is unicoloured with practically invisible scars and pallial line. The sculptured specimens of *squamula* (= f. *aculeata* Müller) have scaly radiating lines. These radial sculpture elements are always widely spaced and relatively much coarser than in *anitae*. Anderson (1964) united unsculptured *squamula* with what he named *A. ephippium*, so with *anitae*. This error is still made by several authors (see e.g. Glibert, 1945, who by the way corrected his mistake in his 1958 list; Anderson, 1959; R. Janssen, 1979), though the differences between *squamula* and *ephippium* are unmistakable.

P. anitae differs from the Late Oligocene *P. philippii* (Speyer, 1864) by the much finer or completely absent surface sculpture. *P. patelliformis* (Linné, 1767), from Pliocene deposits and living in the Recent european fauna, differs by the fact that the adductor scar is not connected with the byssal scar. This latter scar is irregularly striated in *P. patelliformis*. Also this species reaches larger dimensions and its sculpture is coarse and widely spaced. The Recent *P. squama* (Gmelin, 1791) seems to be more closely related to *P. anitae*. Its adductor scar is relatively larger. The pallial line is hardly visible and it lacks a differently coloured inner shell margin.

Whether or not *P. philippii, P. anitae* and *P. squama* form together an evolutionary lineage is difficult to decide. In a sample from the Edegem Sands (Antwerp, coll. RGM 116.498) a defective anomiid is present, strongly resembling smooth *anitae*, together with several strongly sculptured specimens that very much look like *P. philippii*. This latter species, however, has never been mentioned from Miocene deposits, and therefore we doubt the identification, especially so because the scars on the inner shell surface are invisible. Considering the confusions existing in this group any further conclusion seems premature.

Skenea schuermanni sp. nov.
Text-figs 3a-d.

Locus typicus - Winterswijk-Brinkheurne, outcrop in bank of Slinge brook near Nieuw-Wassink (loc. 2 in text-fig. 1).

Stratum typicum - Miocene, Reinbekian, Aalten Member, Stemerdink Bed, Limopsis aurita Acme Zone.

Derivatio nominis - This species is named after Mr. W. Schürmann, amateur paleontologist at Düsseldorf (FRG), who collected the first specimen of this species at Twistringen.

PLATE 2.

Figs 1-8. *Pododesmus (Monia) anitae* sp. nov.

1. Holotype, Dingden-Königsmühle (F.R.G.); Miocene, Reinbekian, Bislicher Schichten; coll. RGM 226.225 (leg. A.W. Janssen, 1971); x 2.
2. Paratype; Winterswijk-Brinkheurne, Stemerdinkbrug; coll. A.C. Janse; x 2.

3-6. Paratypes; Berchem-Borgerhout (Belgium), temporary exposures E 3 Kleine Ring motorway; Miocene, Anversian, Antwerp Sands; coll. RGM 226.213 (fig. 3), RGM 226.212 (figs 4 and 5, right and left valve of one individuum); RGM 226.214 (fig. 6) (all leg. D. van der Mark); x 1½.

7-8. Paratypes; Antwerp (Belgium), construction-pit Ploegstraat; Miocene, Anversian, Antwerp Sands; coll. RGM 226.220-1 (leg. D. van der Mark); x 1½.

PLATE 2

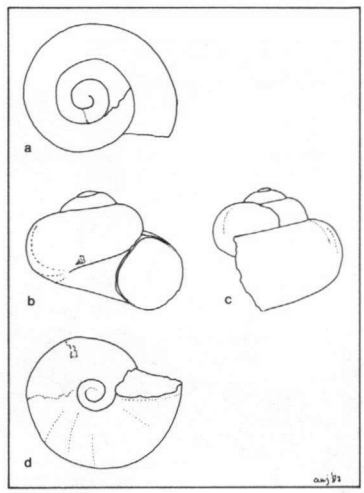


Fig. 3. *Skenea schuermanni* sp. nov., x 25.
Winterswijk-Brinkheurne, Nieuw-Wassink.
Holotype, coll. RGM 226.196 (leg. A.C. Janse).

1972 *Skenea* sp. - A.W. Janssen, p. 24, text-figs 11a-d.
in press *Skenea schuermanni* Janse & Janssen, 1983 - Janssen, pl. 6, figs 5a-c.

Description - Shell very small, depressed conical, dextral, somewhat wider than high. The protoconch consists of a relatively large nucleus and 3/4 whorl, all entirely smooth. The boundary with the teleoconch is rather obvious and very slightly flexuous. There are almost two post-embryonic whorls; they are regularly convex, separated by deep sutures and placed below the periphery of the preceding whorl. The apical angle is about 110°. The base of the shell has a wide umbilicus, showing the basal part of the foregoing whorl. The apertura is almost circular, slightly more than half as high as the entire shell, tending to disconnect from the preceding whorl. The shell surface has some inconspicuous, slightly prosocline growth lines and lacks any further ornamentation.

Material - Holotype (text-figs 3a-d) (coll. RGM 226.196, leg. A.C. Janse); 3 paratypes from the type-locality (coll. AJB); 1 paratype from Winterswijk-Brinkheurne, outcrop Stemerdinkbrug (loc. 1 in text-fig. 1) (coll. AJB); 1 paratype from Twistringen (FRG), clay-pit O. Sunder (fide A.W. Janssen, 1972, p. 24, text-figs 11a-c, coll. RGM 116.727, leg. W. Schürmann); 1 paratype from Winterswijk-Miste (fide Janssen, in press, pl. 6, figs. 5a-c) (coll. RGM 225.453, leg. A.W. Janssen).

Remarks - The first specimen of this tiny new species was found at Twistringen in 1972. A second specimen was collected from the Hemmoorian of Winterswijk-Miste. Now five further shells are available from the localities studied in the present paper and it seems justified to introduce a new taxon. *Skenea* species without any surface ornamentation are known from the Oligocene ("*Cyclostrema*" *planulatum* von Koenen, fide Janssen, 1963, pl. 1, figs 2a-b) and from the Recent european fauna: *S. nitens* (Philippi) and *S. peterseni* (Friele). The Oligocene species is much more depressed (about two times as wide as high). Both Recent species have a very narrow umbilicus and a different shape.

Rissoella (Jeffreysina) hesselinki sp. nov.
Text-figs 4a-d, 5a-c.

Locus typicus - Winterswijk-Brinkheurne, outcrop Stemerdinkbrug (loc. 1 in text-fig. 1).

Stratum typicum - Miocene, Reinbekian, Aalten Member, Stemerdink Bed, Limopsis aurita Acme Zone.

Derivatio nominis - It is a pleasure to name this new species after Mr. J. Hesselink, proprietor of the Stemerdink farm, for his generous hospitality and standing permission to work on his estate.

Description - Shell minute, turreted-globular, dextral, about as high as wide or very slightly higher. The protoconch's nucleus is small, the embryonic shell consists of about 1/4 whorl, separated from the younger parts of the shell by an obvious prosocline growth line. The teleoconch has two tumid whorls, meeting at deep sutures, situated slightly below the periphery of the preceding whorl. The apical angle is about 90°. The base of the body whorl is regularly convex. In its centre a small but deep umbilicus is present, occupying about 1/12 of the basal shell diameter. The apertura is circular or slightly D-shaped, as high as wide or slightly higher. The apertural margin is damaged in both available specimens, but appears to be unthickened.

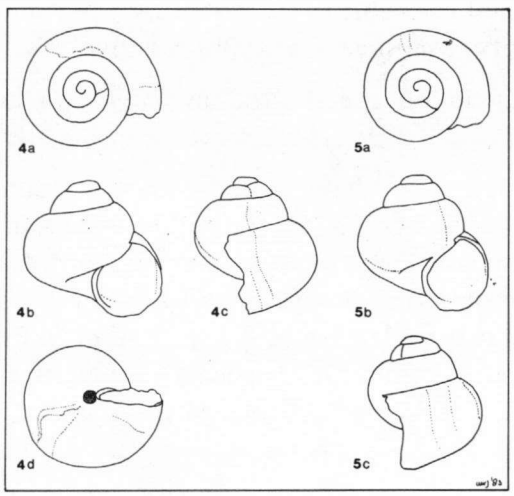


Fig. 4-5. *Rissoella (Jeffreysina) hesselinki* sp. nov., x 25.
Winterswijk-Brinkheurne, Stemerdinkbrug.
4a-d. Paratype, coll. A.C. Janse.
5a-c. Holotype, coll. RGM 226.195 (leg. A.C. Janse).

The shell is devoid of any surface ornamentation, but for some very faint and slightly flexuous prosocline growth lines.

Material - Holotype (text-figs 5a-c) (coll. RGM 226.195, leg. A.C. Janse); 1 paratype from the type-locality (coll. AJB).

Remarks - The shell shows such distinct affinities with the Recent west-european species *R. globularis* (Jeffreys, 1882) that we don't doubt the genus designation, even though no other fossil representatives of this group have been described as far as we know.

R. hesselinki differs from the Recent species by its more turreted, less globular shape (compare Fretter & Graham, 1978, p. 220, figs 184A-B), resulting in a proportionally smaller body whorl. *R. globularis* is considerably larger (height up to 2 mm).

At first glance *R. hesselinki* shows some resemblance with an equal-sized accompanying species, *Skenea schuermanni*, described above. That species, however, is more depressed and it has a wide umbilicus. Furthermore its nucleus has about twice the size of that in *R. hesselinki*.

Up to now this new species is only known from its type locality in two specimens, which certainly is due to its very reduced dimensions.

Mathilda (Fimbriatella) clathratula (Bosquet, 1869)

Remarks - The *Mathilda (Fimbriatella)* species known from the Antwerp Sands (Glibert, 1952, p. 28, pl. 2, fig. 13) and several Dutch Hemmoorian localities (Peel area, Winterswijk-Miste) used to be indicated with the name *filogranata* Sacco, 1895. Mr G. Spaink (RGD) drew our attention to a much earlier description of this species by Bosquet (1869, p. 262, figs 1 and 2), who introduced the name *clathratula* for specimens from Rekken and De Giffel (now Eibergen) in the Dutch province of Gelderland and also from Deurne near Antwerp. Apparently Bosquet's publication was overlooked by all later workers; we have not been able to trace even a single reference! This is the more curious as the paper appeared in one of the most venerable Dutch periodicals.

Judging from Sacco's description and illustration *filogranata* has to be considered a junior synonym of *clathratula*.

The only available specimen from Winterswijk-Brinkheurne (outcrop Stemerdinkbrug) differs from typical *clathratula* by the posession on the earlier whorls of two equally strong primary spirals. The abapical one of these is much weaker, frequently even absent on the initial whorls, in typical *clathratula*. In this respect the Stemerdinkbrug specimen is identical with a shell from Dingden, described and illustrated by Janssen (1967, p. 134, pl. 9, fig. 1) as *M.(F.)* aff. *filogranata*. This latter specimen was collected from the Dingdener Glimmerton, a deposit comparable to the Stemerdink Bed. It is kept in the Natuurhistorisch Museum at Rotterdam (coll. NMR 6081, leg. A.W. Janssen).

As these two aberrant specimens are the only ones known from the Limopsis aurita Acme Zone it might very well be that this form has to be separated as a subspecies. We decided to postpone a decision in this matter until more material will be available. Most probably the form with two strong spirals is a younger representative of the same lineage. A specimen from the Beringen well (Peel area, The Netherlands), depth 119-124 m, seems to be intermediate between the two extremes.

The Stemerdinkbrug specimen is kept in coll. RGD (leg. G. Spaink).

Cirsotrema (Discoscala) ertborni (von Koenen, 1882)
Pl. 3, figs 4-5.

1882 *Scalaria Ertborni* v. Koenen, von Koenen, p. 296, pl. 7, figs 1a-c.

Remarks - *C. ertborni* was based by its author on a single fragmentary shell from Dingden. We never saw any material of this species from the type-locality, in spite of the fact that large collections are available (RGM, Natuurhistorisch Museum Rotterdam, and a lot of private collections as well). In fact *ertborni* was considered to be a synonym of *C. scaberrimum* (Michelotti, 1847), a species occurring at Dingden (Janssen, 1967, p. 143, pl. 14, fig. 3), but not mentioned from that locality by von Koenen (1882) or Anderson (1964).

This latter author (pp. 216) regarded *ertborni* as a junior synonym of *Epitonium weyersi* (Nyst, 1871), a species with only superficial resemblance to *ertborni*. This is the more curious as Anderson stated that he saw the actual type-specimen in the von Koenen collection at Göttingen.

Specimens of typical *C. ertborni* now appear to occur both at Stemerdinkbrug and Nieuw-Wassink and we are quite relieved that the problem about the *ertborni* identity is solved now. The species differs from *C. scaberrimum* by its more slender shell, the presence of a small umbilicus, the less obvious spiral sculpture and especially by the widely spaced collabral sculpture. *E. weyersi* is smaller, lacks spiral sculpture and a basal disc, has no umbilicus and more closely set radial ribs, carrying obvious spines.

C. ertborni seems to be a species restricted to the upper Stemerdink Bed. At Dingden it may therefore be expected in the uppermost mica clay only.

Hinia (Hinia) cimbrica voorthuyseni subsp. nov.
Pl. 3, figs 7a-b, 8a-c.

Locus typicus - Twistringen (FRG), clay-pit O. Sunder, basal part of the exposed section (below 16.90 m in the description of Cadée & Janssen, 1968).

Stratum typicum - Miocene, Reinbekian, Twistringen Schichten.

Derivatio nominis - Named after Dr J.H. van Voorthuysen, retired paleontologist of the Rijks Geologische Dienst, who apparently was the first author illustrating this form.

?1925 *Nassa (Hima) cimbrica* Ravn - Kautsky, p. 107 (non Ravn?).
1944 *Nassa (Hima) cymbrica* Ravn. - van Voorthuysen, p. 92, pl. 10, figs 16-17 (non Ravn).
1964 *Hinia (Hinia) cimbrica* (Ravn 1907) - Anderson, p. 256, pl. 25, fig. 193 (non Ravn).
1968 *Hinia cimbrica* (Ravn 1907) - Rasmussen, p. 142, pl. 12, figs 3-4 (non Ravn).
1978 *Hinia (Tritonella) cimbrica andersoni* (Nordsieck 1972) - Mostafawi, p. 47, pl. 4, fig. 2 (non Nordsieck).

non: 1972 *Profundinassa cimbrica andersoni* n.ssp., Nordsieck, p. 78, pl. 19, fig. 108 (= *Hinia turbinella*).

Description - See descriptions by van Voorthuysen, Anderson, Rasmussen and Mostafawi, all mentioned above.

Material - Holotype (pl. 3, figs 7a-b) (coll. RGM 226.201, leg. A.W. Janssen). Paratypes: several hundreds of specimens from the type locality (coll. RGM 226.202, leg. A.W. Janssen). From Dingden (FRG), outcrop near Königsmühle (Miocene, Reinbekian, Bislicher Schichten) 7 paratypes (coll. RGM 226.209, leg. A.W. Janssen); from the same locality (Dingdener Schichten) 1 paratype (coll. RGM 226.210, leg. M. van den Bosch) and 2 paratypes (coll. RGM 127.155, leg. M. Freudenthal). From Winterswijk-Brinkheurne, outcrop Stemerdinkbrug (loc. 1 in text-fig. 1) 27 paratypes (coll. AJB), 2 paratypes (coll. RGD, leg. G. Spaink), 2 paratypes (coll. VHL), 2 paratypes (coll. RGM 226.191-2, leg. A.W. Janssen), 1 paratype (coll. EVL), 2 paratypes (coll. LVU), 11 paratypes (coll. ASA) and 1 paratype (coll. RGM 87.368, leg. H. Krul). From Winterswijk-Brinkheurne, outcrop Nieuw-Wassink (loc. 2 in text-fig. 1) 1 paratype (coll. RGM 226.211, leg. A.W. Janssen), 1 paratype (coll. AJB) and 1 paratype (coll. VHL).

Remarks - Nordsieck (1972) represented a shell from the Hemmoorian of Winterswijk-Miste, identified by him with a form described by Anderson from several Reinbekian localities. Nordsieck mentioned six specimens from Miste. From this and from his (not very succesful) drawing it has to be concluded that Nordsieck's material is not conspecific with that of Anderson. The second author of the

PLATE 3.

Fig. 1. *Cerithiopsis andersoni* A.W. Janssen, 1967; x 10.
Coll. A.C. Janse.

Fig. 2. *Cerithiella genei* (Bellardi & Michelotti, 1840); x 4.
Coll. RGM 226.203 (leg. M. van den Bosch).

Fig. 3. *Turriscala* (s. lat.) *straeleni straeleni* (Glibert, 1952); x 8.
Coll. A.C. Janse.

Fig. 4. *Cirsotrema (Discoscala) ertborni* (von Koenen, 1882); x 4.
Coll. RGM 226.188 (leg. A.C. Janse).

Fig. 5. *Cirsotrema (Discoscala) ertborni* (von Koenen, 1882); x 4.
Coll. RGM 226.189 (leg. V.W.M. van Hinsbergh).

Fig. 6. *Vexillum (Uromitra) aciculum* (Nyst, 1861); x 3.
Coll. RGM 226.204 (leg. M. van den Bosch).

Fig. 7. *Hinia (Hinia) cimbrica voorthuyseni* subsp. nov.; x 10.
Holotype; coll. RGM 226.201 (leg. A.W. Janssen, 1977).

Fig. 8. *Hinia (Hinia) cimbrica voorthuyseni* subsp. nov.; x 8.
Paratype; coll. RGM 226.191 (leg. A.W. Janssen).

Fig. 9. *Babylonella stemerdinki* sp. nov.; x 10.
Holotype; coll. RGM 226.197 (leg. A.C. Janse).

Fig. 10. *Scalaspira (Scalaspira) festiva* (Beyrich, 1856); x 4.
Coll. RGM 226.190 (leg. J.H. Drenth).

Fig. 11. *Daphnella defectiva* sp. nov.; x 10.
Holotype; coll. RGM 226.205 (leg. E.F. de Vogel).

Fig. 12. *Daphnella defectiva* sp. nov.; x 10.
Paratype; coll. RGM 226.207 (leg. A.W. Janssen, 1971).

Fig. 13. *Magnella andersoni* Dittmer, 1960; x 10.
Coll. RGM 226.194 (leg. A.W. Janssen).

Fig. 14. *Aphanitoma fransi* A.W. Janssen, 1972; x 2½.
Coll. RGM 226.200 (leg. J.H. Drenth).

Figs. 15-16. *Mitroborsonia debilis* (Beyrich, 1856); x 4.
Coll. A.C. Janse.

Fig. 17. *Borsonia uniplicata* von Koenen, 1872; x 4.
Coll. RGM 226.193 (leg. V.W.M. van Hinsbergh).

Fig. 18. *Microdrillia serratula* (Bellardi, 1878); x 5.
Coll. A. Stiva.

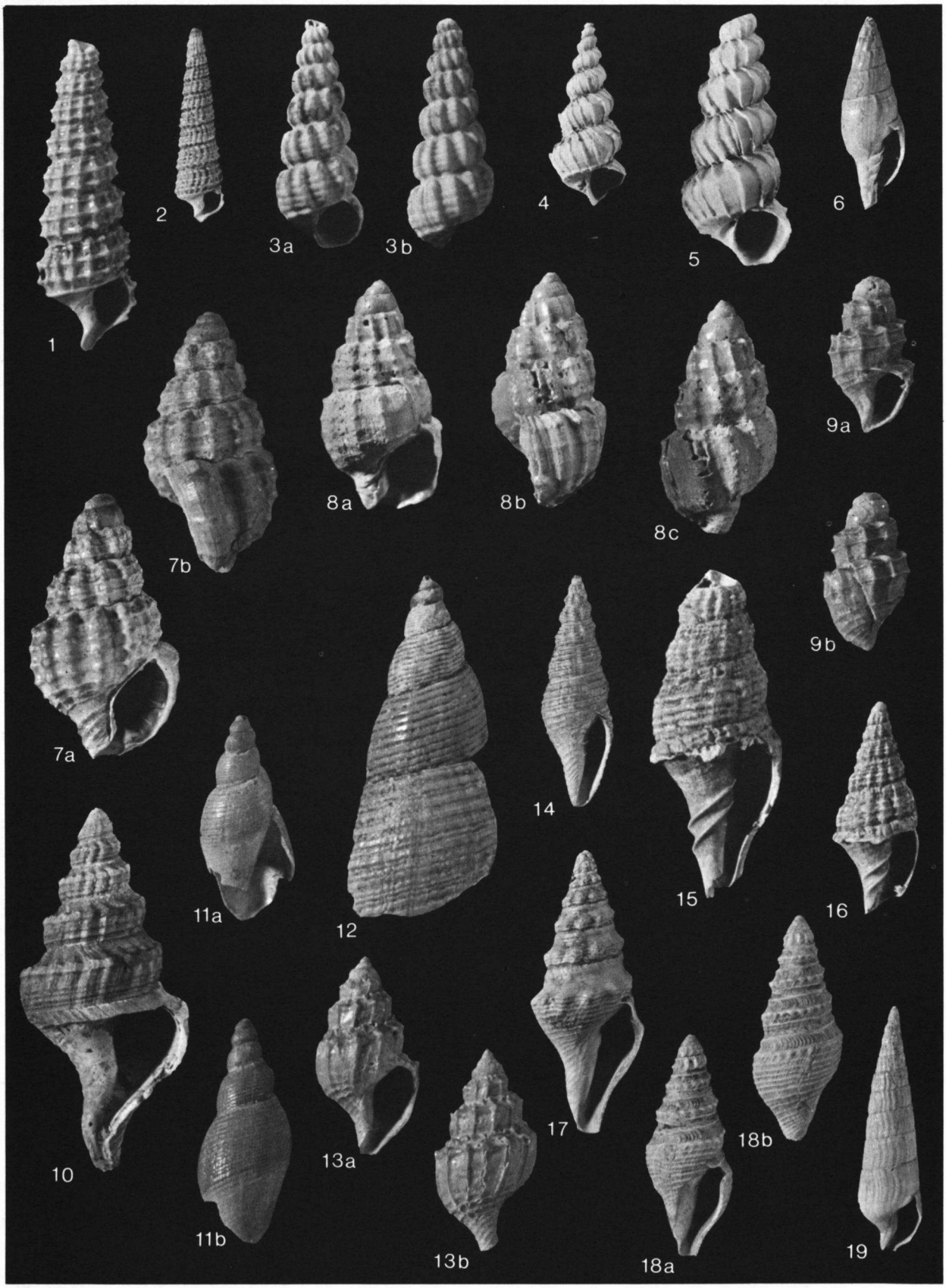
Fig. 19. *Strioterebrum (Strioterebrum) hoernesi* (Beyrich, 1854); x 2½.
Coll. E.F. de Vogel.

Localities:

Fig. 5: Winterswijk-Brinkheurne, Nieuw-Wassink; Miocene, Reinbekian, Aalten Member, Stemerdink Bed.
Fig. 7: Twistringen (F.R.G.), claypit O. Sunder, below 16.90 m; Miocene, Reinbekian, Twistringer Schichten.
Fig. 12: Dingden-Königsmühle (F.R.G.); Miocene, Reinbekian, Bislicher Schichten.

All other figs.: Winterswijk-Brinkheurne, Stemerdinkbrug; Miocene, Reinbekian, Aalten Member, Stemerdink Bed.

PLATE 3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present paper has been studying an exceptionally large collection from Winterswijk-Miste, containing many thousands of *Hinia* shells, among which not a single "*cimbrica*" was present. Nordsieck's drawing agrees, on the other hand, with a form that was identified as *Hinia turbinella* (Brocchi, 1814); so *Profundinassa cimbrica andersoni* has to be considered a junior synonym of *H. turbinella*.

Mostafawi accepted Nordsieck's name for the entire Reinbekian population, but apparently did not realize that the type material of *andersoni* is of Hemmoorian age!

The shells described by Kautsky (but not illustrated) are probably also from the Hemmoor Stufe and therefore we include this material with doubt in our list of synonyms, though Kautsky mentioned the presence of three spirals on each whorl. We think it necessary, however, to see Kautsky's specimens ourselves to be sure of their identification.

Anderson (1964, p. 95) regarded *H. cimbrica*, when occurring in large numbers, to be a fair indication for Hemmoorian faunas. He included in his *cimbrica* both *H. cimbrica cimbrica* (Ravn) and *H. cimbrica voorthuyseni*. The nominal subspecies is restricted to the Hemmoorian apparently, but *voorthuysèni* may already be present during Hemmoorian times (? Kautsky, van Voorthuysen) and reach its maximal development during the Reinbekian. This subspecies is extremely common, for instance, at its type locality.

Babylonella stemerdinki sp. nov.
Text-figs 6a-b; pl. 3, figs 9a-b.

Locus typicus - Winterswijk-Brinkheurne, outcrop Stemerdinkbrug (loc. 1 in text-fig. 1).

Stratum typicum - Miocene, Reinbekian, Aalten Member, Stemerdink Bed, Limopsis aurita Acme Zone.

Derivatio nominis - This species is named after the Stemerdink farm.

Description - Shell small, fusiform, about twice as high as wide. Protoconch naticoid, consisting of 2¼ rather convex whorls and a small nucleus. The embryonic whorls are more or less worn in all specimens, but at least in the holotype it can be seen that the last protoconch whorl has a sculpture of three narrow, evenly distributed spiral lines and very weak, strongly flexuous radial riblets that are widely spread. The transition to the post-larval shell seems to be rather gradual: over a distance of about 1/4 whorl the radial sculpture becomes stronger and less flexuous.

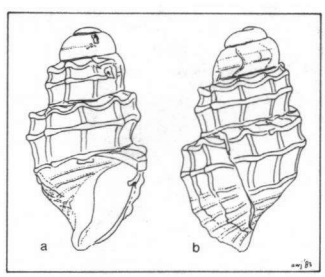

Fig. 6. *Babylonella stemerdinki* sp. nov., x 12½.
Winterswijk-Brinkheurne, Stemerdinkbrug.
Holotype, coll. RGM 226.197 (leg. A.C. Janse).

There are two teleoconch whorls. Their upper third part is almost horizontal, the lower part is slightly convex to almost cylindrical. The body whorl occupies two thirds of the entire shell height.

The base is constricted and only very slightly convex. There is no umbilicus. The aperture is suboval to triangular. The columella is sigmoid without even a trace of columellar folds. The siphonal canal is short and hardly or not incised.

Teleoconch sculpture consists of about 9-10 rather strong and narrow collabral ribs per whorl. These are intersected by three narrow, but well-defined spiral lines. The upper one lies on the shoulder formed at the transition of the almost horizontal shell-part to the vertical part. The lower one is situated against the abapical suture. In between, but slightly more towards the shoulder, lies the third spiral. Radial and spiral elements form together a coarse reticulation of the teleoconch surface; at the points of intersection distinct knobs are present, especially on the upper spiral, giving the shoulder a crown-like appearance (top view!). The basal part of the body whorl has some 5 or 6 weaker spirals. The radial sculpture weakens rather suddenly below the suture.

Material - Holotype (text-figs 6a-b; pl. 3, figs 9a-b) (coll. RGM 226.197, leg. A.C. Janse); 2 paratypes from the type-locality (coll. AJB); 1 paratype dto (coll. RGM 226.198, leg. M. van den Bosch), 2 paratypes dto (coll. RGM 226.199, leg. A.W. Janssen).

Remarks - This species was isolated from samples of *Babylonella fusiformis*. They attracked attention by their slender shell-form and the coarse sculpture. As *B. fusiformis* is a very variable species we for some time considered the aberrant specimens to be extremes of that species. But the quite different ornamentation of the protoconch made us change our mind. In *fusiformis* the larval shell has a very peculiar and dense sculpture, consisting of numerous fine and strongly flexuous radial lines cut by a large number of still finer lines perpendicular to the radial lines and consequently diverging backwards (Janssen, 1983, text-fig. 3). In *B. stemerdinki* there are only very few radial lines, cut by three spirals.

B. stemerdinki seems to be closely related to the Late Miocene (Tortonian) to Pliocene austrian and italian species *B. nassiformis* (Seguenza, 1880). This species, of which *B. stemerdinki* might be no more than a subspecies, differs by the presence of 4 to 5 spirals on the visible part of each teleoconch whorl (Pavia, 1975; Davoli, 1982).

Large samples of *B. fusiformis* from Dingden (FRG) (Spisula sp. Acme Zone) do not contain *B. stemerdinki*, which species is also absent from the Dingdener mica clay (Limopsis aurita Acme Zone).

Clavatula (Clavatula) sp.
Text-fig. 9.

Remarks - Two juvenile and incomplete specimens of a *Clavatula* species were found at Stemerdinkbrug (coll. AJB and coll. RGD). They are to immature for a sound identification. The most complete specimen is illustrated here. It has a paucispiral protoconch of 1¼ whorl only. The boundary with the teleoconch is sharp. About 2¼ whorls are present of the post-embryonic shell, one whorl at least is broken of. The upper 2/5 part of the whorls is concave, the lower part is slightly convex. Radial sculpture consists of some ten ill-defined ribs, only visible on the convex part of the whorls. Along the adapical suture lies a rather strong spiral rib, whereas two further spirals are present on the lower part of the whorls. Below the sutural spiral the shell has an excavated zone. The two lower spirals lie close together, separated by a shallow, inconspicuous groove. On the points of intersection of the radial ribs and both abapical spirals solid knobs are present. The growth lines are hardly visible. A rather deep sinus is present; its deepest point lies at the excavated zone.

This species is the only *Clavatula* species with a lecitotrophic larval shell known to us from the North Sea Basin. It is related to *C. turonensis* Peyrot, 1938, a species from the Helvetian of the Touraine Basin (France). In this latter species, however, the radial ribs are more numerous and a spiral line is present in the excavated zone below the sutural spiral (Glibert, 1954, p. 18, pl. 3, fig. 9a).

Since *Clavatula* species usually are recognized for a great deal by means of their adult sculpture and the shape of the full-grown aperture and siphonal canal a further identification is impossible now.

Daphnella defectiva sp. nov.
Text-figs 7-8; pl. 3, figs 11a-b, 12.

Locus typicus - Winterswijk-Brinkheurne, outcrop Stemerdinkbrug (loc. 1 of text-fig. 1).

Stratum typicum - Miocene, Reinbekian, Aalten Member, Stemerdink Bed, Limopsis aurita Acme Zone.

Derivatio nominis - *Defectivus* (L.) = incomplete; named after the bad condition of the type material.

Description - Only four damaged specimens are available of this unknown form. We have hesitated to introduce it as a new species; its characteristics are unmistakable, however, and the shell is so rare and fragile that it seems useless to wait for better preserved material.

The shell is slender fusiform, in complete state over three times as high as wide, dextral, thin-walled. The protoconch is only undamaged in one shell. It has three rather convex whorls, the nucleus is very small. The first protoconch whorl has some faint spiral striae, the remaining part has a fine diagonally cancellate ornamentation. The boundary with the teleoconch is sharp, strongly flexuous.

In the largest specimen remains of four teleoconch whorls are present. These whorls are relatively high, slightly and regularly convex. Each whorl is attached below the periphery of the preceding one. The basal part of the shell is missing in all specimens, as is the apertura.

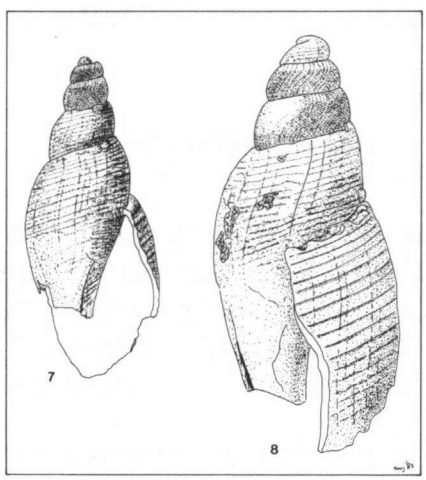

Fig. 7-8. *Daphnella defectiva* sp. nov.
Winterswijk-Brinkheurne, Stemerdinkbrug.
7. Holotype, x 12½; coll. RGM 226.205 (leg. E.F. de Vogel).
8. Paratype, x 25; coll. RGM 226.206 (leg. V.W.M. van Hinsbergh).

The sculpture starts at the first post-embryonic whorl with 13-14 very flat, tape-like spiral lines, separated by very narrow interspaces that look like superficially incised lines. At the base, below the suture line, this sculpture rather quickly weakens and it disappears completely downwards. An irregularly distributed secondary spiral sculpture develops on the youngest available whorls. Radial sculpture is absent. The growth lines are inconspicuous, very slightly prosocline and only to a very low degree flexuous, forming a very shallow and widely open sinus below the suture.

Material - Holotype (pl. 3, figs 11a-b; text-fig. 7) (coll. RGM 226.205, leg. E.F. de Vogel); 1 paratype from the type locality (text-fig. 8) (coll. RGM 226.206, leg. V.W.M. van Hinsbergh); 1 paratype from the type locality (coll. AJB); 1 paratype from Dingden (FRG), outcrop in Königsbach near Königsmühle, 4-6 m below surface (see Janssen, 1967, pl. 117, figs 1 and 2) (Miocene, Reinbekian, Bislicher Schichten, Spisula sp. Acme Zone (coll. RGM 226.207, leg. A.W. Janssen).

Remarks - As far as we know nothing similar to the present species has ever been described from the North Sea Basin. The shape of the shell and its spiral sculpture remind of a species, found in only one specimen at Winterswijk-Miste, described sub nomen ? *Daphnella* sp. by Janssen (in press, pl. 73, figs 8a-b). This latter species is more elongate and it has much stronger flexuous growth lines.

Also outside the North Sea Basin we never came across a species resembling the present *D. defectiva*.

As to the form of the shell, the characteristics of the protoconch and the ornamentation of the teleoconch this new species seems to be a typical representative of the genus *Daphnella*. The sinus in the growth lines, however, is usually more accentuated in *Daphnella* (see Powell, 1966, p. 123). The shape of the sinus resembles that in species of *Andonia* and *Favriella*.

Strioterebrum (Strioterebrum) hoernesi (Beyrich, 1854)
Text-fig. 10; pl. 3, fig. 19.

Remarks - Janssen (in press, pl. 13, fig. 9 and pl. 77, figs. 7-8) described and illustrated a *Strioterebrum* form from Winterswijk-Miste (Hemmoorian) sub nomen *S.* cf. *hoernesi*, differing from the material described here by a smaller apical angle and by the relative height of the whorls.

Doubt on the identity of the Miste specimens with *S. hoernesi* was expressed already, but now we are convinced of the fact that the Stemerdink form represents the real *hoernesi*. So, the Miste material certainly is not this species. It is difficult however, to decide whether it should be considered a separate species or an extreme variety of *S. basteroti* (Nyst, 1845). We are not able now to solve this question satisfactorily.

Gastropoda indet.
Text-figs 11a-b.

Remarks - From the Nieuw-Wassink material two small gastropods are available (a third specimen was "killed in action", unfortunately !) that we have not been able to identify. Their height is about 0.8 mm, but they immediately attract attention by the fact that the second half of the bodywhorl is disconnected from the preceding one. The shell surface is smooth, growth lines are hardly visible.

At first glance these specimens look like embryonic shells of an *Epitonium* species, in which the first part of the teleoconch may have a similar appearance as the last part of the bodywhorl in the

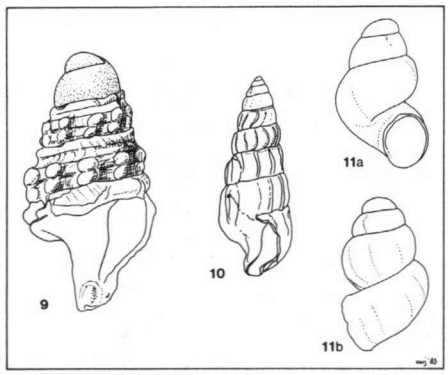

Fig. 9. *Clavatula (Clavatula)* sp., x 12½.
Winterswijk-Brinkheurne, Stemerdinkbrug.
Coll. Rijks Geologische Dienst (leg. G. Spaink).

Fig. 10. *Strioterebrum (Strioterebrum) hoernesi* (Beyrich, 1854), x 6.
Winterswijk-Brinkheurne, Stemerdinkbrug.
Coll. E.F. de Vogel.

Fig. 11. Gastropoda indet., x 25.
Winterswijk-Brinkheurne, Nieuw-Wassink.
Coll. RGM 226.208 (leg. A.C. Janse).

present shells. But in *Epitonium* the boundary between protoconch and teleoconch always is very obvious.

Pending further specimens of this unknown form we renounce the introduction of a new taxonomic unit for the time being.

One shell (text-fig. 11a-b) is kept in coll. RGM (nr. 226.208, leg. A.C. Janse) and the other in coll. AJB.

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