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A REMARKABLE MOLLUSCAN FAUNA FROM THE KATTENDIJK FORMATION (LOWER PLIOCENE) AT KALLO (OOST-VLAANDEREN, BELGIUM)

by Dr. R. MARQUET (*)

SUMMARY. - One brachiopod and nine molluscan (3 Amphineura, 5 Bivalvia, 1 Gastropoda) species are recorded for the first time from the Antwerp area (Kattendijk Formation, Lower Pliocene). They were found in a "reef", formed by the gastropod *Petaloconchus intortus* (LAMARCK, 1818) and in a layer, 10 cm above this reef. Remarks are made about the faunal composition and the palaeoecology of both strata.

INTRODUCTION.

During construction works at Kallo, the lower Pliocene Kattendijk Formation was exposed. About 375 cm above the basal gravel of this formation is a 20 cm thick layer, mainly composed of tubes of the gastropod *Petaloconchus intortus* (LAMARCK, 1818). In this layer, 3 species of Amphineura, 44 species of Bivalvia, 20 species of Gastropoda and 4 species of Brachiopoda were collected. New records for the area are the Amphineura, 3 bivalve, 1 gastropod and 1 brachiopod species. In a layer, about 10 cm above the *Petaloconchus* "reef" and characterised by *Similipecten similis* (LASKEY, 1811) three species of brachiopoda, 33 bivalvia and 11 gastropoda were found, two of which are new to the Antwerp region. Most of these are known from the contemporary British Coralline Crag and some of them were collected washed ashore in the Dutch Westerschelde area.

MATERIAL AND METHODS.

About 20 kg of sediment from the *Petaloconchus* "reef" and 10 kg from the *Similipecten* layer were sieved (0.5 mm). The residu was sorted under a binocular microscope. About 4000 mollusca and brachiopoda were collected. They are kept in the collection of the author. Furthermore, the material from this layers in the collections of Mr. T. BACKELJAU (Antwerpen), Mr. W. CALLEBOUT (Aalst), Dr. J. HERMAN (Brussel), Mr. G. VAN DER SCHUEREN (Lede) and Mr. M. VERVOENEN (Aalst) was studied.

DESCRIPTION OF THE SITE AND STRATIGRAPHY.

The samples were taken during the construction of walls around the new dock at Kallo, prov. Oost Vlaanderen, Belgium. This exposure lies about 2 km southwest of the sea-lock and the tunnel, the stratigraphy of which were described by GAEMERS en JANSSEN (1972), HERMAN (1974) and JANSSEN (1974). Only HERMAN (1974) noticed the existence of the *Petaloconchus* "reef" at this locality 27E183, at a depth of -14 m. For a description of the profile, see therefore HERMAN (1974, p. 15-17).

This paper describes the fauna, which was found in the *Petaloconchus* "reef", + 375 cm above the basal gravel of the Kattendijk Formation and + 300 cm below the basal crag of the Sands of Oorderen and in a less compact layer, characterised by the small bivalve *Similipecten similis* (LASKEY, 1811), ± 10 cm above the *Petaloconchus* layer.

DESCRIPTION OF THE FAUNA.

Phylum Mollusca
Classis Amphineura VON IHERING, 1876.
Subclassis Polyplacophora DE BLAINVILLE, 1816.

(*) Leerstoel voor Algemene Dierkunde (Dir. : Prof. Dr. W. N. VERHEYEN), Rijks Universitair Centrum Antwerpen, Groenenborgerlaan 171, B-2020 Antwerpen (België)

Ordo Neoloricata BERGENHAYN, 1955.
Familia Lepidopleuridae PILSBRY, 1892.
Genus *Lepidopleurus* LEACH in RISSO, 1826.

Lepidopleurus asellus (GMELIN, 1791) : pl. 1, fig. 1.

Material : one damaged and one half specimen, *Petaloconchus* layer, Kallo, coll. MARQUET.

Description : The most comple specimen measures 3.5x2 mm. The valve is rather low, but little less than recent specimens. The form is more or less rectangularly pointed. The umbo is not very conspicious. The lateral areas are clearly delimited, but rather low. The triangular apophyses are small and widely spaced. The sculpture consists of numerous longitudinal rows of very small granules. These rows of granules are less clearly delimited on the lateral areas, where they run at an angle of ± 50° with the longitudinal rows on the central part of the shell.

Discussion : *Chiton rissoi* (?) PAYR. of WOOD (1848, p. 186, pl. 20, fig. 11) seems to apply to the same species; indeed, the outline of the valves and their sculpture are nearly identical with our specimens.

Lepidopleurus cancellatus (SOWERBY, 1840) : pl. 1, fig. 2.

Material : one complete and two halve valves, *Petaloconchus* layer, Kallo, coll. MARQUET.

Description : the only complete valve measures 3.6x1.9 mm. The valve is higher than that of the preceding species and slightly more rectangular. The lateral areas are only slightly elevated. The umbo is even less clearly delimited than with *L. asellus*. The apophyses are very small, triangular and widely separated. The ornament consists of narrow longitudinal rows of very small granules, as in the preceding species.

Discussion : this species seems not to be known from the British Pliocene. In the Miocene (Tortonian) of Korytnica (Poland) occurs a rather similar species, *Lepidopleurus sulci* (BAŁUK, 1971, p. 455-456, pl. 2, fig. 1-4).

Familia Hanleyidae BERGENHAYN, 1955
Genus *Hanleya* GRAY, 1857

Hanleya hanleyi (BEAN in THORPE, 1844) : pl. 1 fig. 3

Material : one complete intermediate valve, *Petaloconchus* "reef", Kallo, coll. MARQUET.

Description : The only valve collected measures 3x1.5 mm. It is clearly distinguished by its form and sculpture. The tegmentum contains large, rounded granules, occurring in longitudinal rows in the middle of the valve and converging laterally. On the anterior and lateral parts of the valve, the granules are coarser. The valve has a rounded rectangular form, with a clearly delimited apex and it is only slightly convex. The apophyses are triangular; they are much larger in *H. hanleyi* than in both foregoing species. The areas are not separated.

Discussion : SMITH *in* MOORE (ed.) (1964 p. 154) stated that the genus *Hanleya* was until then only found in Pleistocene deposits. BAŁUK (1971, p. 456-457, pl. 1 fig. 5-7) however considered *Chiton multigranosa* REUSS, 1860 (from the Polish and Bohemian Tortonian, Miocene) as belonging to *Hanleya*. However, this attribution is doubtfull, since *H. ? multigranosa* has insertion plates on the tail valve.

There seems to exist no reasons to separate *Chiton strigillatus* WOOD, 1848 (p. 186, pl. 20 fig. 10) from the British Coralline Crag from *H. hanleyi*. Ornament as well as shell shape can not be distinguished from this species.

"Chiton" sp. : pl. 1 fig. 4

Tho valves were collected, which were too much damaged to identificate.

Classis Bivalvia LINNAEUS, 1758
Subclassis Pteriomorphia BEURLEN, 1944
Ordo Arcoida STOLIZCKA, 1871
Superfamilia Arcacea LAMARCK, 1809
Familia Arcidae LAMARCK, 1809
Genus *Barbatia* GRAY, 1842.

Barbatia barbata (LINNAEUS, 1758) : pl. 1 fig. 5

Material : one complete left valve, *Petaloconchus* "reef", Kallo, coll. MARQUET; three fragments from the same horizon and locality, coll. VERVOENEN; one fragment from the *Similipecten* layer, coll. BACKELJAU; one complete left valve, *Petaloconchus* "reef", Kallo, coll. HERMAN.

Description : the complete specimen figured in 13 mm long, 6 mm high and 25 mm thick. It has 23 taxodont teeth, which become obliterated under the umbo. The area is narrow, with ridges, running between the umbo and the hinge line. The umbo lies anterior to mid-length. The ventral and dorsal margins are perpendicular. The ventral margin is straight. The ornament consists of numerous narrow ribs, which are slightly broader than the intercostal crooves. The ribs are divided into granules by concentric grooves, especially on the anterior side of the shell.

Discussion : the only species, known from the Kattendij Formation, which slightly resembles *Barbatia barbata* is *Striarca (Galactella) lactea* (LINNAEUS, 1758). *S. lactea* differs clearly by the shape of the shell, the larger area, the well developed teeth under the umbo and the smaller, although relatively higher shell (NORDSIECK, 1969 p. 23, pl. 3 fig. 10.60; p. 20, pl. 3 fig. 10.20).

B. barbata is known from the Pontilivien (Miocene) of the Loire bassin (DOLLFUSS et DAUTZENBERG, 1913, pl. 28 fig. 16-28). Shells of this species have also been found in the Netherlands, were they were washed ashore on Walcheren, in the Braakman, at Ritthem, at the Kaloot and in the Westerschelde; their age is uncertain (VAN REGTEREN-ALTENA, BLOKLANDER en POUDEROYEN, 1962, p. 11, pl. 2 fig. 13).

Ordo Mytiloidea DE FERUSSAC, 1822
Superfamilia Mytilacea RAFINESQUE, 1815
Familie Mytilidae RAFINESQUE, 1815
Genus *Crenella* BRONN, 1827

Crenella decussata (MONTAGU, 1808) : pl. 2 fig. 1

Material : one bivalved specimen and 11 valves, *Similipecten* layer, Kallo, coll. MARQUET; three valves, *Petaloconchus* layer, Kallo, coll. CALLEBOUT.

Description : the shells measure about 3.5x3 mm. They are equivalve and almost equilateral; the umbo lies centrally and the outline is circular-oval. The ornament consists of numerous fine radiating ribs, crossed by equally strong concentric growth lines. The margins are crenulate, especially below and behind the umbo, forming there a tooth-like process.

Discussion : young specimens of *Arcoperna sericea* (BRONN, 1831) resemble *Crenella decussata* but their outline is more angular, less equilateral and the concentric growth lines are weaker. *Crenella rhombea* (BERKELEY, 1815) occurs from the Miocene Edegem Sands to the Pliocene Oorderen Sands in the Antwerp region (RINGELE, 1974). *C. rhombea* is inequilateral and rhomboidal in outline; it has furthermore less growth lines and these are raised into ridges in the younger stages (TEBBLE, 1976, p. 48-49, fig. 23).
C. decussata has been found neither in the British, nor in the Dutch Pliocene.

Genus *Musculus* RÖDING, 1798

Musculus (Musculus) discors (LINNAEUS, 1758) : pl. 3 fig. 3

Material : four complete shells and nine valves, *Similipecten* layer, Kallo, coll. MARQUET.

Description : the largest specimen collected measures 9x4.5 mm. The shell is thin, the umbo lies close to the anterior end and the outline is rhomboidal. The ornament consists of an anterior ribbed region with 8 to 11 ribs and a posterior region with 25 to 32 ribs; the part in between is smooth, except for a slight curve at the beginning of the posterior ribbed region and small crenulations where the margin meets the anterior ribs.

Discussion : The specimens collected are all damaged and only the nacreous layer is preserved. There is however no doubt about the determination. GLIBERT (1957, p. 21, pl. 1 fig. 9) mentions the occurrence of a strongly ressembling species, *Musculus (Musculus) marmoratus* (FORBES, 1838) in the Luchtbal Sands of Antwerp. *M. marmoratus* is however much more convex and it has more anterior (15 to 18) as well as posterior (20-35) ribs than *M. discors* (TEBBLE, 1976, p. 46-47, pl. 1 fig. 9j, texfig. 20a). None of the specimens collected at Kallo belongs to the form (or species ?) *M. discors laevigatus* (GRAY, 1824), which is characterised by the absence of the posterior ribs (NORDSIECK, 1969, p. 35-36, pl. 5 fig. 23.02).

M. discors has been found neither in the British Pliocene, nor in the Pliocene of the Netherlands.

Ordo Pteroida NEWELL, 1965
Superfamilia Pteriacea GRAY, 1847
Family Pteriidae GRAY, 1847
Genus *Pteria* SCOPOLI, 1777

Pteria ? phalaenacea (LAMARCK, 1819) : pl. 2 fig. 3

Material : one incomplete right valve, *Petaloconchus* "reef", Kallo, coll. CALLEBOUT.

Description : only one incomplete valve was collected; it is 35 mm long and 27 mm high, but the complete specimen was obviously much larger. The condition of the fragment does not allow a description of the outline of the shell. Only the hinge line is partly intact. It is straight, without teeth; the umbo lies anteriorly and does not protrude above the hinge line.

Discussion : WOOD (1874 p. 109, pl. 8, fig. 12) described the species *Pteria phalenoides* from the Coralline Crag near Orford and Gedgrave; the same specimens had been mentioned as *Avicula tarentina* LAMARCK (= *Pteria hirundo* LINNAEUS, 1758) by WOOD (1861 p. 51). In the description of WOOD (1874) I find however no sufficient reasons to separate the Pliocene specimens from the Miocene species *Pteria phalaenacea*. Indeed, WOOD (1874) considered as most important characteristic of *P. phalenoides* its thickness and size. The Crag *Pteria* are "about intermediate in this respect between the living British and Mediterranean shell *Tarentina* and the giant form from the Bordeaux beds called *Phalaenacea*, Bast." According to WOOD (1874), the shape of the shell and the hinge line are the same. I consider the size alone not as a sufficient reason for separating both as species. The *Pteria* specimens from the Antwerp Miocene are smaller than those from Bordeaux, but they belong to the same species *P. phalaenacea* (GLIBERT, 1945 p. 56, pl. 2 fig. 10). The Pliocene specimen from Kallo is completely similar to damaged specimens from the Antwerp Miocene.

VAN REGTEREN-ALTENA *et al.* (1966 p. 56-57, textfig. 2) mentioned the occurrence of *Pteria phalenoides* in the Vlooswijkpolder near Terneuzen (The Netherlands), at a depth of 18 m-N.A.P.

Subclassis Anomalodesmata DALL, 1889
Ordo Pholadomyoida NEWELL, 1965
Superfamily Poromyacea DALL, 1886
Family Verticordiidae STOLIZCKA, 1871
Genus *Verticordia* SOWERBY, 1844

Verticordia cardiiformis SOWERBY, 1844 : pl. 3 fig. 1

Material : two left and one right valves, Kallo, not collected in situ, coll. MARQUET; one left valve, *Petaloconchus* "reef", Kallo, coll. BACKELJAU; one left valve, *Petaloconchus* "reef", Kallo, coll. VAN DER SCHUEREN; one left and one right valve, *Petaloconchus* "reef", coll. HERMAN.

Description : the largest specimen collected is 7 mm high and 9 mm long. The outline is nearly circular. The umbo is prosogyrate and strongly protruding above the hinge line. The ornament consists of 13 to 15 sharp ribs, radiating from the umbo to the ventral margin. The inside of the valves is nacreous. Only the right valve

has a conical tooth. In the left valve, the lunular ridge is thickened.

Discussion : by the nacreous inside, the ornament and the lacking of teeth in the left valve, *V. cardiiformis* can easily be distinguished from any other species from the Pliocene of Antwerp. According to RINGELE (1974 p. 279), a related species, *Verticordia punctifera* HEERING, 1950, occurs in the Sands of Edegem and Antwerp (Miocene). *V. punctifera* differs from *V. cardiiformis* by the more pronounced umbonal region, the height, which is higher in proportion to the lenght, the higher radial ribs, which are punctated and the denticulated ventral margin (HEERING, 1950, p. 46-47, pl. 4 fig. 94).

V. cardiiformis was first described from the Coralline Crag of Sutton. Fossils were also found washed ashore in the Netherlands (JANSSEN, 1975 p. 133).

NORDSIECK (1969, p. 170, pl. 24 fig. 96.60) used the name *Verticordia verticordia* for this species. This is however a *nomen nudum* and the name *V. cardiiformis* should be used (FISCHER, 1860, p. 296; MOORE (ed.) 1969 p. N855).

Classis Gastropoda CUVIER, 1797
Subclassis Prosobranchia MILNE-EDWARDS, 1848
Ordo Archaegastropoda THIELE, 1925
Superfamilia Pleurotomariacea SWAINSON, 1840
Familia Scissurellidae GRAY, 1847
Genus *Scissurella* d'ORBIGNY, 1824.

Scissurella (Anatoma) crispata FLEMING, 1832 : pl. 3 fig. 2

Material : Five slightly damaged specimens, *Petaloconchus* layer, Kallo, coll. MARQUET.

Description : the largest specimen collected is 1.2 mm high and 1.5 mm broad, with 3 1/2 whorls. The suture is deep. The umbilicus is wide and deep, the aperture is rounded. The ornament consists of numerous sharp, curved cords. The most typical characteristic is the channel at the shoulder, ending in a slit. This channel lies at the periphery of the shell.

Discussion : the slit distinguishes the Scissurellidae clearly from any other European Neogene family. A related species, *Scissurella costata* (d'ORBIGNY, 1823), has been found washed ashore in the Netherlands at Ritthem; the exact age is unknown (VAN REGTEREN-ALTENA *et al.*, 1954, p. 57, pl. 1 fig. 1). Our specimens differ clearly from *S. costata* by the form of the aperture, by the position of the slit, which is further from the suture in *S. crispata* and by the less edged whorls of *S. crispata* (NORDSIECK, 1968, p. 9, pl. 1 fig. 02.10, p. 10 pl. 1 fig. 02.00).

S. crispata is known from the Coralline Crag in Great Britain (WOOD, 1848, p. 163, pl. 15 fig. 13).

Phylum Brachiopoda
Classis Articulata HUXLEY, 1869
Ordo Terebratulida WAAGEN, 1883
Superfamilia Terebratellacea KING, 1850
Familia Megathyrididae DALL, 1870
Genus *Argyrotheca* DALL, 1900

Argyrotheca cistellula (WOOD, 1840) : pl. 2 fig. 2

Material : one adult specimen, *Petaloconchus* layer, Kallo, coll. HERMAN; ten juvenile specimens, *Petaloconchus* layer, Kallo, coll. MARQUET.

Description : the only adult specimen is 3.2 mm high, 3.5 mm wide and 1 mm thick; the juveniles measure only 0.2x0.15x0.15 mm. The outline of the adult specimen is more or less circular and the shell is strongly flattened. The smaller valve has a slight medial fold. The shell is perforated by numerous punctae. The foramen is large and the beak is short and not protruding.

The young specimens are semicircular in outline, but their shape and the elevation of the umbo are variable. The foramen is very large in comparison with the overall size; the fold is not yet distinguishable. Punctae are present. Disconnected valves show a characteristic internal median septum; the hinge teeth are simple.

Discussion : WOOD (1874, p. 170, pl. 11 fig. 6) mentioned the occurrence of this species in the Coralline Crag of Sutton, under the name *Argiope cistellula*. The species is here referred to the genus *Argyrotheca* instead of to *Megathyris* (syn. *Argiope*) because of the absence of plicae (MOORE (ed.), 1965 p. H831).

This species can easily be distinguished from the other Pliocene Brachiopoda from the Antwerp region by the presence of the internal septum. In the Miocene Sands of Edegem, a *Megathyris* sp. was found, which differs from *A. cistellula* by the presence of plicae (CADEE, 1969, p. 63, fig. 1).

REMARKS ON THE OTHER SPECIES.

The abundance of *Similipecten similis* (LASKEY, 1811) in the top of both layers is very unusual in the Antwerp area. We only found this species in this layer and rarely in the *Petaloconchus* "reef", not in the other parts of the Kattendijk Formation or in subsequent formations.

Gregariella barbatella (ANDERSON, 1967) (pl. 3, fig. 4) was recorded in the Antwerp area from the Miocene Sands of Antwerp by GLIBERT (1858) and RINGELE (1974). HERMAN (1974) noted the presence of this species in the *Petaloconchus* "reef". Both valves are frequently found together in *Petaloconchus* tubes, where also *Hiatella arctica* (LINNAEUS, 1758) can be found. The Pliocene specimens differ from Miocene by their smaller size.

Neopycnodonte cochlear (POLI, 1795) is fairly common in the *Petaloconchus* layer. The occurrence of this species in the Pliocene of Antwerp was not yet published. The subspecies *P. cochlear navicularis* (BROCCHI, 1814) occurs in the

Antwerp region in the Miocene sands of Antwerp and Deurne (GLIBERT, 1958; RINGELE, 1974). *Ostrea edulis* LINNAEUS, 1758, which is common in the higher parts of the Kattendijk Formation and in the younger Pliocene strata of Antwerp, is missing in the *Petaloconchus* "reef" and in the *Similipecten* layer.

PALAEOECOLOGICAL CONCLUSIONS.

The position of the *Petaloconchus* tubes and the occurrence of many bivalved shells indicate that this "reef" is undisturbed, as HERMAN (1974) also concluded. Probable because of this, such fragile specimens as chiton valves and *Scissurella* could be preserved.

The frequent occurrence of *Thyasira flexuosa* (MONTAGU, 1803) in both layers should indicate an oligotrophic, oxygen-poor and sulphuric environment (KAUFFMAN, 1967; KAUFFMAN in MOORE (ed.), 1969; OCKELMANN, 1958). However, the numerous other species and specimens indicate this is incorrect. Because *T. flexuosa* is a deep burrower, the specimens could be fossilised, after burrowing, in an older layer.

It must be stressed that the fauna of both layers differs strongly from the main body of the Kattendijk Sands. Otherwise common species such as *Pseudamussium gerardi* (NYST, 1835), *Glycymeris glycymeris kattendijkensis* RINGELE, 1974, *Astarte omalii omalii* JONKAIRE, 1823 and arcticids are scarce or absent.

Also remarkable is the minute size of most species present in the *Petaloconchus* "reef". They usually remain smaller than 0.5 cm and from species, which generally become larger, only dwarf specimens were recorded. *Heteranomia squamula* (LINNAEUS, 1758) reaches at most 10 mm (mean 8 mm), *Neopycnodonte cochlear* (POLI, 1795) becomes maximally 25 mm (mean 22 mm), *Pliothyrina sowerbyana* (NYST, 1843) reaches 26 mm (mean 19 mm). Larger fragments of the last species do occur but they are clearly derived. The lack of larger specimens could tentatively be explained by local circumstances of relief and nature of the sediment.

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REFERENCES.

BALUK, W. (1971) - Lower Tortonian chitons from the Korytnica clays, southern slopes of the Holy Cross Mts. *Acta Geol. Polonica 21(3) : 449-472, 5 pl.*

CADEE, M. C. (1969) - *Megathyris*, een brachiopode uit de Zanden van Edegem (Mioceen, Anversien). *Meded. Werkgr. Tert. Kwart. Geol. 6(3) : 63, 1 fig.*

DOLLFUSS, G.F. et P.H. DAUTZENBERG (1913) - Conchyliologie du Miocène moyen du Bassin de la Loire. *Mém. Soc. Geol. France 27 : 297-378, pl. 22-33.*

FISCHER, P. (1860) - Note sur les genres *Hippagus* et *Verticordia*. *Journ. Conchyl. 8 : 295-300.*

GAEMERS, P.A.M. en A.W. JANSSEN, (1972) - Geologische beschrijving van het proefiel van de bouwpunt voor de nieuwe zeesluis te Kalloo (België, Prov. Oost-Vlaanderen), en een palaeo-ecologische interpretatie van de verschillende afzettingen. *Meded. Werkgr. Tert. Kwart. Geol. 9(1) : 23-33, 2 fig.*

GLIBERT, M. (1945) - Faune malacologique du Miocène de la Belgique. I. Pélécypodes. *Mém. Mus. r. Hist. Nat. Belg. 103 : 1-263, 12 pl., 23 fig.*

GLIBERT, M. (1958) - Tableau stratigraphique des mollusques du Néogène de la Belgique. *Meded. K.B.I.N. 34(32) : 1-20.*

HEERING, J. (1950) Miocene Pelecypods of the Netherlands (Peelregion). *Meded. Geol. St. C 4(1)10 : 1-51, 8 pl.*

HERMAN, J. (1974) - Quelques restes de Sélaciens récoltés dans les sables du Kattendijk à Kallo. I. Selachii-Euselachii. *Bull. Soc. Belg. Geol. 83(1) : 15-26, 2 pl.*

JANSSEN, A. W. (1974) - Het profiel van de bouwput onder het eerste kanaaldok nabij Kallo, provincie Oost-Vlaanderen, België. *Meded. Werkgr. Tert. Kwart. Geol. 11(4) : 173-185, 3 fig.*

JANSSEN, A. W. (1975) - Systematische lijst van de Nederlandse recente en fossiele mollusken. *Meded. Werkgr. Tert. Kwart. Geol. 12(4) : 115-170.*

KAUFFMAN, E. G. (1967) - Cretaceous *Thyasira* from the Western Interior of North America. *Smithsonian Misc. Coll. 152(1) : 1-159, 18 fig., 5 pl.*

KAUFFMAN, E. G. *in* MOORE, R. C. (ed.) (1969) - Form, Function and Evolution, *in* : Treatise on Invertebrate Palaeontology, Part N vol 1. Mollusca 6 : Bivalvia. *Geol. Soc. America, Univ. of Kansas : 129-205, fig. 87-99.*

MOORE, R. C. (ed.) (1965) - Treatise on Invertebrate Palaeontology, Part U. Brachiopoda. *Geol. Soc. America, Univ. of Kansas : XXXII+927 pp., 5198 fig.*

MOORE, R. C. (ed.) (1969) - Treatise on Invertebrate Palaeontology, Part N. Mollusca 6 : Bivalvia. *Geol. Soc. America, Univ. of Kansas : XXXVIII+952 pp., 6198 fig.*

NORDSIECK, F. (1968) - Die europäischen Meeres-Gehäuseschnecken (Prosobranchia). Von Eismeer bis Kapverden und Mittelmeer. *G. Fischer Verlag, Stuttgart : 273 pp., 31 pl.*

Species	*Petal.*	*Simil.*	Species	*Petal.*	*Simil.*
Lingula dumortieri NYST, 1844	+	+	*Angulus donaciformis* (LINNAEUS, 1758)	–	+
Pliothyrina sowerbyana (NYST, 1843)	a	c	*Arcopagia balaustina* (LINNAEUS, 1758)	+	+
Tegulorhynchia nysti DAVIDSON, 1874)	a	+	*Abra prismatica* (MONTAGU, 1808)	–	c
Argyrotheca cistellula (WOOD, 1840)	+	–	*Coralliophaga lithophagella* (LAMARCK, 1819)	+	–
			Venus multilamella pseudoturgida (d'ORBIGNY, 1852)	+	–
"Chiton" sp.	+	–	*Gouldia minima* (MONTAGU, 1803)	c	+
Lepidopleurus cancellatus (SOWERBY, 1840)	+	–	*Pitar rudis rudis* (POLI, 1795)	+	+
Lepidopleurus asellus (GWELIN, 1791)	+	–	*Timoclea ovata* (PENNANT, 1777)	–	+
Hanleya hanleyi (BEAN *in* THORPE, 1844)	+	–	*Dosinia lupines* (LINNAEUS, 1758)	–	c
			Gastrochoena dubia (PENNANT, 1777)	+	–
Nuculoma laevigata (SOWERBY, 1818)	–	+	*Hiatella arctica* (LINNAEUS, 1767)	a	–
Nucula nucleus nucleus (LINNAEUS, 1758)	c	+	*Saxicavella jeffreysi* (WINCKWORTH, 1930)	+	+
Nucinella ovalis WOOD, 1840)	+	–	*Pandora pinna* (MONTAGU, 1803)	–	+
Portlandia pygmaea pygmaea (MÜNSTER, 1873)	+	+	*Thracia* sp.	–	+
Bathyarca pectunculoides (SCACCHI, 1834)	+	+	*Cuspidaria rostrata* (SPENGLER, 1793)	+	+
Barbatia barbata (LINNAEUS, 1758)	+	+	*Verticordia cardiiformis* (SOWERBY, 1844)	+	–
Limopsis anomale coxi GLIBERT & VAN DE POEL, 1965	+	c			
Modiolula phaseolina (PHILIPPI, 1844)	c	a	*Scissurella crispata* FLEMING, 1832	+	–
Arcoperna sericea (BRONN, 1831)	+	c	*Emarginula punctura* (WOOD, 1848)	c	–
Crenella decussara (MONTAGU, 1808)	+	c	*Emarginula crassa* SOWERBY, 1813	+	–
Gregariella barbatella (ANDERSON, 1967)	a	–	*Diodora apertura* (MONTAGU, 1803)	–	+
Musculus discors (LINNAEUS, 1758)	–	c	*Margarites trochiformis* (WOOD, 1842)	–	+
Pteria phalaenacea (LAMARCK, 1819)	+	–	*Calliostoma zizyphinum zizyphinum* (LINNAEUS, 1758)	–	+
Lyropecten radians (NYST, 1839)	a	c	*Calliostoma occidentale* (MIGHELS, 1842)	+	c
Mimachlamys pusio harmeri (VAN REGTEREN-ALTENA, 1937)	a	+	*Solariella maculata* (WOOD, 1842)	–	a
Pseudamussium tigerinum (MUELLER, 1776)	a	a	*Pomatias harmeri* KENNARD, 1909	c	–
Similipecten similis (LASKEY, 1811)	+	a	*Haustator incrassata* (SOWERBY, 1814)	c	–
Heteranomia squamula (LINNAEUS, 1758)	a	–	*Petaloconchus intortus* (LAMARCK, 1818)	a	–
Limatula subauriculata (MONTAGU, 1803)	+	a	*Cerithiopsis tubercularis* (MONTAGU, 1803)	c	–
Neopycnodonte cochlear (POLI, 1795)	a	–	*Laiocochlis woodi* VAN REGTEREN-ALTENA, 1954	+	–
Lucinoma borealis borealis (LINAEUS, 1766)	c	+	*Triphora perversa* (LINNAEUS, 1758)	c	–
Parvilucina scaldensis (GLIBERT & VAN DE POEL, 1967)	+	–	*Circostrema funiculus* (WOOD, 1848)	+	+
Thyasira flexuosa (MONTAGU, 1803)	c	a	*Epitonium subulata* (SOWERBY, 1823)	–	+
Diplodonta brocchii (DESHAYES, 1850)	+	+	*Trivia coccinelloides parvula* SCHILDER, 1933	–	+
Diplodonta rotundata (MONTAGU, 1803)	+	–	*Polinices* cf. *hemiclausa* (SOWERBY, 1824)	+	–
Montacuta ferruginosa (MONTAGU, 1803)	+	–	Turridae indet.	+	–
Kellia suborbicularis (MONTAGU, 1803)	c	–	*Turbonilla kendalli* BELL in HARMER, 1920	+	+
Kellia deltoideum (WOOD, 1851)	+	–	*Pyramidella laeviuscula* WOOD, 1842	+	–
Cyclocardia orbicularis orbicularis (SOWERBY, 1835)	+	c	Actaeonidae indet.	+	–
Venericardia ampla CHAVEN & COATMAN, 1943	+	+	*Ringicula buccinea* (BROCCHI, 1814)	+	+
Astarte omalii omalii JONKAIRE, 1823	+	–	*Cylichna cylindracrea* (PENNANT, 1777)	+	+
Astarte trigonata NYST, 1881	+	+	*Scaphander lignarius* (LINNAEUS, 1758)	+	–
Astarte pseudopygmaea GLIBERT, 1945	+	–	*Retusa conuloides conuloides* (WOOD, 1851)	+	–
Astarte excurrens WOOD, 1853	+	–	Spiratellidae indet.	+	–
Astarte obliqua burtinea (JONKAIRE, 1823)	–	+			
Digitaria digitaria (LINNAEUS, 1758)	+	+			
Parvicardium nodosum nodosum (MONTAGU, 1803)	+	–			

Table 1 - Species present in both layers; *Petal.* = *Petaloconchus* "reef", *Simil.* = *Similipecten* layer; – = absent, + = present (less than 10 specimens), c = common (10 to 50 specimens), a = very abundant (more than 50 specimens).

NORDSIECK, F. (1969) - Die europäischen Meeresmuscheln (Bivalvia). Von Eismeer bis Kapverden, Mittelmeer und Schwarzes Meer. *G. Fischer Verlag, Stuttgart : 256 pp., 25 pl.*

OCKELMANN, W. K. (1958) - The Zoology of East Greenland. Marine Lamellibranchiata. *Meddel. Grønland, 122(4) : 1-256, 3 pl.*

RINGELE, A. (1974) - Bijdrage tot de systematiek, de evolutie en de paleoecologie van bivalvia uit Neogene afzettingen van Noord België. 1. Systematiek. *Proefschrift K. U. L. : 280 pp.*

SMITH, A. G. *in* MOORE, R. C. (ed.) - Amphineura, *in* : Treatise on Invertebrate Paleontology, Part I. Mollusca 1. *Geol. Soc. America, Univ. of Kansas : 41-81, fig. 31-50.*

TEBBLE, N. (1976) - British bivalve seashells. A handbook for identification (2e ed.). *British Museum (Natural History) : 212 pp., 12 pl., 110 fig.*

VAN REGTEREN-ALTENA, C. O., A. BLOKLANDER en L. P. POUDEROYEN (1954) - De fossiele schelpen van de Nederlandse stranden en zeegaten 1. *Basteria 18(4) : 54-64, 4 pl.*

VAN REGTEREN-ALTENA, C. O., A. BLOKLANDER en L. P. POUDEROYEN (1962) - De fossiele schelpen van de Nederlandse stranden en zeegaten, tweede serie *1. Basteria 26(1-2) : 5-16, 5 pl.*

VAN REGTEREN-ALTENA, C. O., A. BLOKLANDER en L. P. POUDEROYEN (1966) - De fossiele schelpen van de Nederlandse stranden en zeegaten, tweede serie 2. *Basteria 30(4) : 54-59, pl. 6-9, 2 fig.*

WOOD, S. V. (1848-1882) - A monograph of the Crag Mollusca, or description of shells from the Middle and Upper Tertiairies of the East of England. Part 1. Univalves (1848), Part 2. Bivalves (1851-1861), Part 3. Univalves and bivalves, first supplement (1872-1874), Part 4. Univalves and bivalves, second supplement (1879), Part 5. Univalves and bivalves, third supplement. *The Palaeontographical Society, London : pp. 1-208, 21 pl.; pp. 1-341, 31 pl.; pp. 1-231, 12 pl.; pp. 1-58, 6 pl.; pp. 1-24, 1 pl.*

EXPLANATION OF THE PLATES

PLATE 1

Fig. 1 - *Lepidopleurus asellus* (GMELIN, 1791) x20
Petaloconchus "reef", Kallo; coll. MARQUET

Fig. 2 - *Lepidopleurus cancellatus* (SOWERBY, 1840) x15.3
Petaloconchus "reef", Kallo; coll. MARQUET

Fig. 3 - *Hanleya hanleyi* (BEAN in THORPE, 1844) x20
Petaloconchus "reef", Kallo; coll. MARQUET

Fig. 4 - *"Chiton"* sp. x20
Petaloconchus "reef", Kallo; coll. MARQUET

Fig. 5 - *Barbatia barbata* (LINNAEUS, 1758) x7.7
Petaloconchus "reef", Kallo; coll. MARQUET

PLATE 2

Fig. 1 - *Crenella decussata* (MONTAGU, 1808) x20
Similipecten layer, Kallo; coll. MARQUET

2 - *Argyrotheca cistellula* (WOOD, 1840)

2a Young specimen, x240
Petaloconchus "reef", Kallo; coll. MARQUET

2b-c - Adult specimen, x10
Petaloconchus "reef", Kallo; coll. HERMAN

Fig. 3 - *Pteria ? phalaenacea* (LAMARCK, 1819) x2.6
Petaloconchus "reef", Kallo; coll. CALLEBOUT

PLATE 3

Fig. 1 - *Verticordia cardiiformis* SOWERBY, 1844 x6.6
Petaloconchus "reef", Kallo; coll. MARQUET

Fig. 2 - *Scissurella (Anatoma) crispata* FLEMING, 1832 x37
Petaloconchus "reef", Kallo; coll. MARQUET

Fig. 3 - *Musculus (Musculus) discors* (LINNAEUS, 1758) x3
Similipecten layer, Kallo; coll. MARQUET

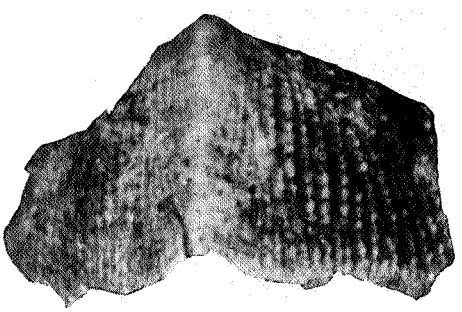
Fig. 4 - *Gregariella barbatella* (ANDERSON, 1967) x11.6
Petaloconchus "reef", Kallo; coll. MARQUET

PLATE 1

1

2

3



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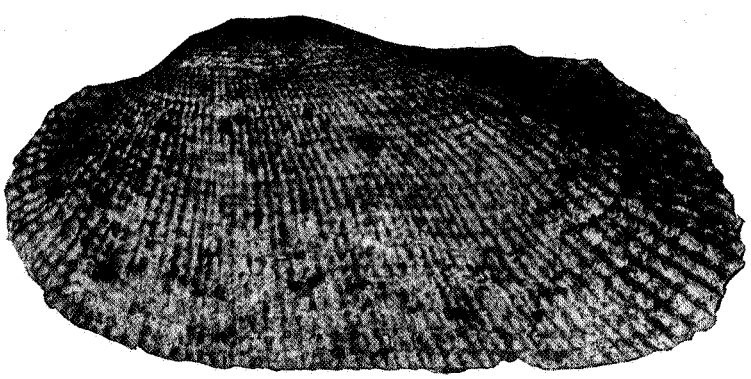

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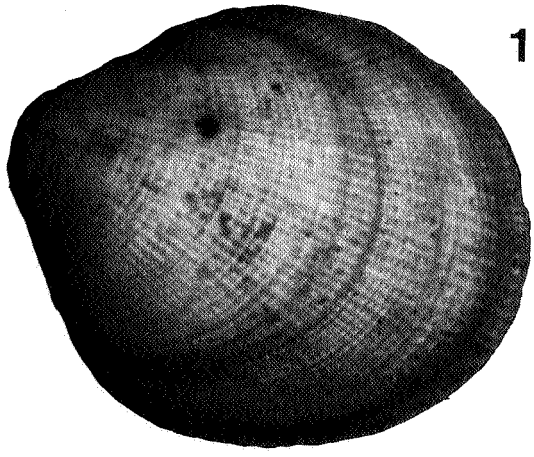

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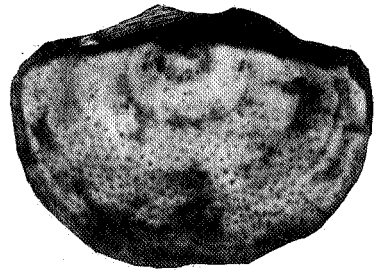

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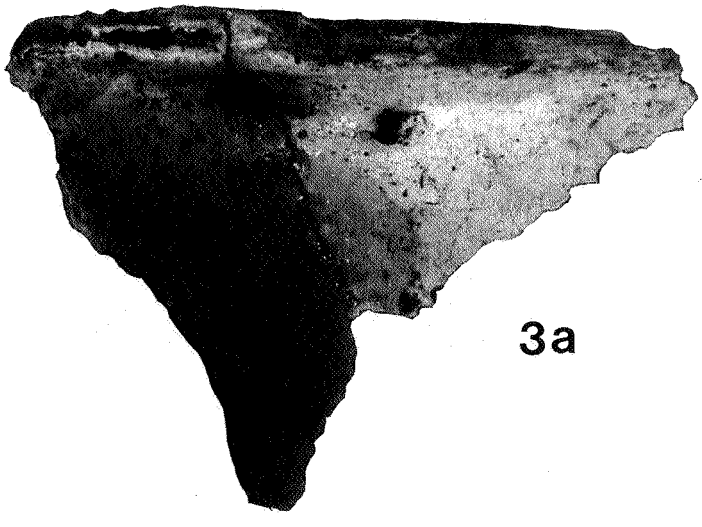

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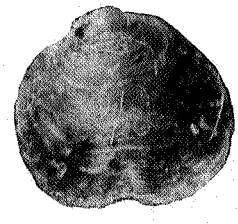

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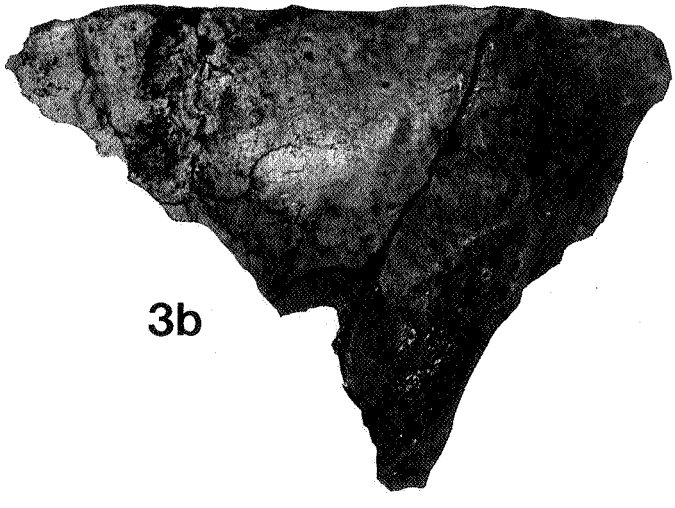

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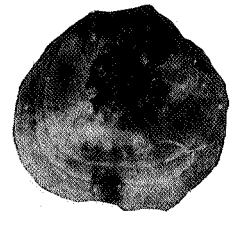

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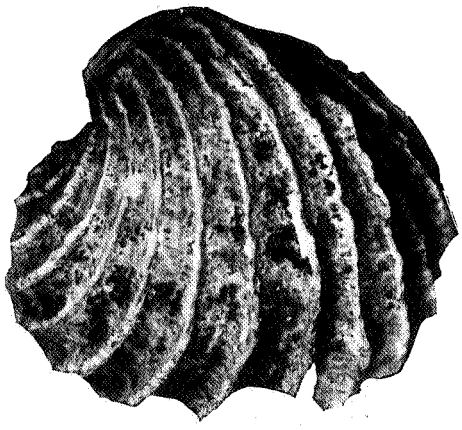
PLATE 3

1a



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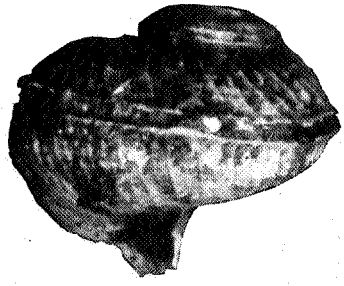

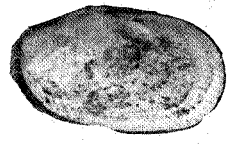

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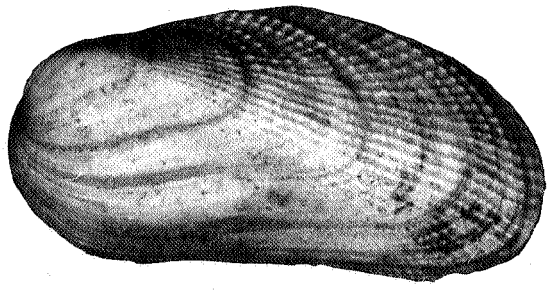

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