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A MOLLUSC-FAUNA WITH *'PSEUDAMNICOLA' HELICELLA* (BRAUN) FROM THE ATUATUCA FORMATION (OLIGOCENE) AT ST.-TRUIDEN (BELGIUM, PROVINCE OF LIMBURG)

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A small mollusc-fauna is described from a temporary excavation in the middle part of the Atuatuca Formation near the town of St.-Truiden. The following species were encountered: *Hydrobia elongata* (Faujas de St.Fond), *Mercuria helicella* (Braun), *Nystia (Nystia) plicata* (d'Archiac & de Verneuil) sensu Glibert & de Heinzelin, 1954, Hydrobiidae gen. et sp. indet., *Lymnaea longiscata* (Brongniart), *Radix (Radix)* sp. and *Gyraulus (Gyraulus) acuticarinatus vleminckxae* n. subsp. *Nystia (Nystia) glibertheinzelini* n. sp. is introduced from heavy clays in the Atuatuca Formation (localities Grote Spouwen, Outershoven and Rosmeer).

The stratigraphical position and the palaeoecology of the fauna are discussed.

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INTRODUCTION

In the summer of 1979, during geological field work in the region of St-Truiden (province of Limburg, Belgium), members of the Werkgroep voor Tertiaire en Kwartaire Geologie discovered a temporary excavation in clays belonging to the Oligocene Atuatuca Formation. In this excavation, presumably made for some agricultural purpose, some 1.75 m of sediments were visible. An auger boring close to the excavation demonstrated the presence of Atuatuca Formation sediments to 4.10 m below surface (not penetrated). Outcrop and boring were used (together with many other auger borings) for the construction of a section through Oligocene deposits. This section, published by Bor et al. (1980) shows, that it may be presumed that these sediments represent more or less the middle part of the Atuatuca Formation at this place.

A level of 0.20 m thickness visible in the excavation from 1.30 m to 1.50 m below surface contains an interesting mollusc fauna, which will be described in this paper.

DESCRIPTION OF SEDIMENTS

The upper part of the boring section is given here in extenso. For details on the lower part of the deposits the reader is referred to Bor et al. (1980).

Exposure number of Geological Survey of Belgium: 92W 433 (VIIa).
Field number: KZ 14.
Locality: St-Truiden, province of Limburg, Belgium
Coordinates: X = 210.210 Y = 171.220
Map-sheet of topographical map: Alken-Kortessem 33/3-4.
Date: 2 June 1979, continued on 3 July 1979.
Height of surface: 57.17 m + O.P.
Levelling: done by Mr. A. C. Janse, 4 June 1979
Method: edelman auger 7 cm ∅.
Description of sediments: M. C. Cadée.

Description:

0.00 - 0.80 m brownish-grey, very fine-sandy clay with some limonite concretions and small brown spots, more greyish below but still with limonite concretions.

0.80 - 1.25 m greenish-grey, heavy clay, with some small brown spots, downwards a uniform greenish-grey. At 1.10 m changing to bluish-green clay. At 1.15 m a specimen of *Pseudamnicola helicella*. Downwards the clay somewhat more greyish.

1.25 - 1.30 m lead-grey, heavy clay, with black spots.

1.30 - 1.31 m brown, heavy clay, with abundant shell fragments and *Pseudamnicola helicella*.

1.31 - 1.35 m black, heavy clay, with some shell fragments and *Pseudamnicola helicella*.

1.35 - 1.50 m green, heavy clay, with calcareous concretions and shell fragments, among which *Nystia* and *Pseudamnicola helicella*. Downwards less concretions but many shells and some brown spots and streaks.

1.50 - 1.53 m black, heavy clay, with some brown spots.

1.53 - 1.60 m fine, somewhat micaceous, brownish-grey sand, with some dark brown spots. No shell fragments.

1.60 - 2.05 m light greenish-grey, micaceous, somewhat clayey sand, with some brown and black spots. No shell fragments. From 1.90 m less clayey and with brown streaks and spots.

2.05 - 2.10 m very clayey, greenish-grey, fine sand, with many calcareous concretions.

2.10 - 4.10 m sands, clayey sands and clay, with a shell-bearing level from 3.40 to 4.00 m below surface (fauna with *Pirenella, Lentidium* and *Melanoides*).

Interpretation: 0.00 - 0.80 m Quaternary deposits.
0.80 - 4.10 m Oligocene, Rupelian, Atuatuca Formation.

Because the presence of a mollusc fauna with *'Pseudamnicola' helicella* was rather surprising at this locality sediment samples were collected from the exposure from the level 1.30 - 1.50 m. Some 40 kg of sediment were collected, but because of the fact that the fauna is rather monotonous only a part (about 15 kg) of this material was washed and inspected.

The residue contained in the coarser fractions mainly fragments of gastropods (*Lymnaea*) and only a few specimens of *Nystia*. The finer fractions yielded such quantities of especially the gastropod *'Pseudamnicola' helicella*, that they were only partly inspected. The available fractions below 2.5 mm really must contain hundreds of thousands of specimens! They make it quite impossible to inspect larger portions of these fractions, which is a pity because they contain also other interesting fossils (*e.g.* a small fish otolith, and other small species of gastropods).

The same mollusc fauna was also encountered in an other boring used for the composition of the section described by Bor et al. (1980). From boring KZ 7 (see map in Bor et al., fig. 2), also within the municipality of St-Truiden, Mr M. C. Cadée washed some composite samples from the Atuatuca Formation. In the residue he found a mixed mollusc-fauna with many *'Pseudamnicola' helicella* and other species found in the KZ 14 excavation. After reconstruction of the available data it can be estimated that this fauna originates from about 3.50 - 4.30 m below surface of the KZ 7 boring. All specimens belonging to the *'Pseudamnicola' helicella*-fauna could easily be recognized by their state of preservation. All species were also found at the KZ 14 locality.

DESCRIPTION OF THE MOLLUSC FAUNA

The material described here is incorporated in the collections of the Rijksmuseum van Geologie en Mineralogie at Leiden. RGM registration numbers are added to the individual samples.

No extensive morphological descriptions are given of the various species, as most of them are sufficiently known. Literature citations in general refer to systematical papers in which adequate descriptions and/or illustrations are given. Numbers of available specimens are usually estimated, so no statistical value may be set upon these figures. The illustrations were drawn with a *camera lucida* device of a Wild M5 binocular.

I would like to express my gratitude to Mr W. Pouw (RGM), who spent a lot of time picking out the residues and to Mr M. C. Cadée for allowing me to study his material from the KZ 7 boring.

Hydrobia elongata (Faujas de St. Fond, 1806)
Plate 2, figs. 1 - 3

Hydrobia (Tournoueria) elongata Faujas sp. - Dollfus, 1911, p. 258, pl. 6, figs. 1 - 4.
Hydrobia (Tournoueria) elongata (Faujas) - Glibert & de Heinzelin, 1954a, pl. 2, fig. 2.
Hydrobia (Tournoueria) elongata Faujas, sp. 1806 - Glibert & de Heinzelin, 1954b, p. 346, pl. 4, fig. 23.

Material: more than a thousand specimens, RGM 223 312 - 223 315.

Remarks: This species may be easily distinguished from juvenile specimens of *Nystia plicata* (see below) by the fact that the first embryonic whorl in the latter species is markedly more voluminous. The shell of *H. elongata* is somewhat more slender and regularly built, its whorls are evenly convex, instead of slightly angulated, as in *N. plicata* (compare plate 1, figs. 9 - 10 with plate 2, figs. 1 - 3, same magnification).

Mercuria helicella (Braun, 1857)
Plate 2, figs. 7 - 8

Pseudamnicola helicella (Braun) - Glibert & de Heinzelin, 1954a, p. 14, pl. 2, fig. 3.
Pseudamnicola helicella Braun, sp. 1857 - Glibert & de Heinzelin, 1954b, p. 346, pl. 4, fig. 25.

Material: many hundreds of specimens, RGM 223 316 - 223 318, enormous numbers are present in still uninspected sieving residues.

Remarks: Because of the regular conical form of the spira and the morphology of the inner apertural lip this species belongs in the genus *Mercuria* (see Boeters, 1971, p. 177, figs. 9 - 10).

The numerous specimens from St-Truiden are somewhat less slender than shells from the 'Marne à Chara' at Boutersem. Specimens of this species are always somewhat darker in colour (light purplish-brown) than the shells of other species.

Nystia (Nystia) plicata (d'Archiac & de Verneuil, 1845) sensu
Glibert & de Heinzelin, 1954
Plate 1, figs. 1 - 12

Nystia plicata (Arch. et Verneuil) - Glibert & de Heinzelin, 1954a, p. 8, pl. 2, fig. 6.
Nystia plicata d'Archiac et de Verneuil, sp. 1845 - Glibert & de Heinzelin, 1954b, p. 348, pl. 5, fig. 7a-f.

Material: 47 full-grown specimens, 112 fragments of full-grown specimens, many hundreds of juvenile shells, RGM 223 319 - 223 334.

Remarks: *Nystia plicata* s. str. was described from Oligocene deposits of the Mont Pagnotte, Creil, near Senlis, France (d'Archiac & de Verneuil, 1845, p. 336). The first adequate description and illustrations were given by Deshayes (1862, p. 497, pl. 33, figs. 28 - 30), based on material from the type locality. Both the drawings and the description in Deshayes show notable differences with the Belgian material, and therefore I doubt the identity of the French and the Belgian material. A decision should be postponed until there will be a possibility of direct comparison of the Belgian specimens with the shells from the Mont Pagnotte.

Judging from the information given by Deshayes the French specimens are less cylindrical because of the fact that the whorls increase more quickly in diameter. The radial sculpture is much more regular and more pronounced than in any Belgian specimen I saw. Finally the apertural lip is less strongly developed in the French shells. It should be added, however, that I have no idea about the variability of the Mont Pagnotte material as yet.

If we compare the St-Truiden material with that from the 'Horizon à vertébrés de Hoogbutsel' (Glibert & de Heinzelin, 1954b, p. 384, abundant material in RGM collections) it is evident that both populations display an enormous variability in shell-form, size and sculpture. From the St-Truiden population I made a choice of eight specimens (represented on plate 1, figs. 1 - 8) to demonstrate this variability. Slender specimens with a smooth surface may resemble very much *Nystia duchasteli* (Nyst, 1836), but it is not possible to split the material into two distinct species. The most important difference between *N. plicata* and *N. duchasteli* seems to be the form of the outer lip. In *N. duchasteli* the broadened outer lip is more extended beyond the lower left corner of the apertura, at least in completely full-grown specimens. Should both species, however, be found in a mixed population, then it seems doubtful whether they could be separated satisfactorily. But mixed populations do not seem to occur. Presumably *N. plicata* lived in a somewhat less brackish environ-

ment than *N. duchasteli*. Faunas with *N. plicata* never contain cerithiids, which always are an important constituent in faunas containing *N. duchasteli* (*viz.* Sands and Marls of Oude Biesen).

Nystia pseudoplicata Glibert & de Heinzelin (1954a, p. 11, pl. 2, fig. 7a, non 7b) was described from the 'Horizon de Henis' at Grand Spauwen. This indication of the locality was apparently erroneous, as Glibert & de Heinzelin (1954b, p. 348) indicate, that the holotype originates from Heyde, 'Sable à Cyrènes' (= Boutersem Sands). The photograph of the holotype on their pl. 5, fig. 8a is in accordance with this statement. It is a specimen typical for the Boutersem Sands, quite different from the specimens represented in figs. 8b-d, which is the form from the 'Horizon de Henis'. Typical *N. pseudoplicata* differ from *N. plicata* by their strong and regular radial sculpture, weak apertural lip and slightly angular whorls. This *N. pseudoplicata* is common in the Boutersem Sands, occasionally a specimen is found reworked in the 'Marne à Chara'. It is doubtful whether this species is a *Nystia* s. str.!

As stated above the specimens from the 'Horizon de Henis' identified as *N. pseudoplicata* by Glibert & de Heinzelin, and also by Schlickum (1970, p. 293, fig. 6) represent a different taxon, which is typical for heavy clays of the Atuatuca Formation. It is somewhat intermediate between *N. plicata* and *N. duchasteli*, but never found mixed with these species. For this species I introduce the name *Nystia (Nystia) glibertheinzelini* n. sp. Holotype is the specimen nr. 3947 in the collections of the Institut royal des Sciences naturelles de Belgique at Brussels (Glibert & de Heinzelin, 1954b, pl. 5, fig. 8d). Paratypes are the specimens represented by Glibert & de Heinzelin, 1954b, pl. 5, fig. 8b-c (fig. 8c is also a paratype of *N. pseudoplicata*!), Glibert & de Heinzelin, 1954a, pl. 2, fig. 7b (which is in fact the same paratype specimen!) and Schlickum (1970, p. 293, fig. 6). Furthermore a sample from Rosmeer (Belgium, province of Limburg), collected from a bluish-green, heavy clay at the base of the Sands and Marls of Oude Biesen by the author (Janssen, 1977) (coll. RGM). Summarizing *N. glibertheinzelini* is known from heavy clays in the Atuatuca Formation from the localities Grote Spouwen (*locus typicus*), Outershoven and Rosmeer. At the last locality the accompanying fauna consists of e.g. *Polymesoda convexa* (Brongniart), *Potamides (Ptychopotamides) labyrinthus* (Nyst) and *'Villorita' neglecta* (Nyst). This latter species occurs abundantly in this clay and, quite unusual, in excellent preservation.

Hydrobiidae gen. et sp. indet.
Plate 2, figs. 4 - 6

Material: 6 specimens, RGM 223 335 - 223 338.

Remarks: Between the large numbers of *Hydrobia elongata* some specimens attracked attention by their relatively wide shells and quickly increasing diameter of their whorls. It has not yet been possible to identify these specimens. At first glance they show affinities with juvenile shells of *'Bithinella' tenuiplicata* (Glibert & de Heinzelin, 1954a, pl. 2, fig. 4), but a comparison pointed out that in this species the whorls increase much more quickly in size (material from the localities Kumtich, Bunsbeek and Boutersem, all Boutersem Sands, in coll. RGM. The species is as yet not found in the 'Marne à Chara'-material, from which it was described).

The six specimens available (and one further shell from the KZ 7 boring in coll. M. C. Cadée) demonstrate a considerable variability in shape and sculpture. It is, of course, impossible to decide whether this is infraspecific variability or not. Therefore this form is mentioned here, for the time being, in open nomenclature.

Lymnaea longiscata (Brongniart, 1810)
Plate 2, fig. 10

Limnaea longiscata. Brard - Edwards, 1852, p. 85, pl. 13, fig. 3c-d.

Material: 2 defective specimens (strongly deformed, in clay); many fragments among which 48 apical fragments, RGM 223 339 - 223 342.

Remarks: Unfortunately the St-Truiden material is very fragmentary. Apical fragments agree very well with better preserved specimens from the 'Marne à Chara' at Boutersem in coll. RGM, although these too are always somewhat deformed. These latter specimens agree fairly well with the specimens represented by Edwards (figs. 3c-d).

Radix (Radix) sp.
Plate 2, fig. 9

Material: 3 juvenile defective specimens, RGM 223 343 - 223 344.

Remarks: These specimens may at first glance be distinguished from the *Lymnaea longiscata* shells by their very convex apical whorls. They correspond almost completely with the form from the Sands and Marls of Oude Biesen, indicated as *Limnaea acutilabris* by Glibert & de Heinzelin, 1954b, p. 387-389). *L. acutilabris* was introduced by Sandberger (1858, p. 69, pl. 7, figs. 7, 7a). I compared the St-Truiden specimens with material from the 'Cyrenen Mergel' of Weinheim, Mayence Basin and found them to be different.

Gyraulus (Gyraulus) acuticarinatus vleminckxae n. subsp.
Plate 2, figs. 11 - 12

Planorbis acuticarinatus Dunker - Glibert & de Heinzelin, 1954a, p. 10, pl. 2, fig. 9 (non Dunker).

Material: 13 juvenile and defective specimens RGM 223 345 - 223 346.

Remarks: The rather poor material from St-Truiden mentioned above (and one further specimen from the KZ 7 boring, coll. Cadée) agrees completely with abundant material collected from the 'Marne à Chara' at Boutersem (coll. RGM). The carina,which is especially pronounced in larger specimens (up to more than 5 mm in diameter) develops gradually starting from the last part of the first whorl. In almost all specimens this carina is accompanied on both sides by a spiral line. Very rarely this spiral is missing abapically, in which case the shell wall is gradually convex towards the suture. In one specimen from Boutersem two such spirals are present along the carina. This specimen therefore agrees very well with the form described by Speyer (1870, p. 163, pl. 18, fig. 3 - 4) from the type-locality of *G. acuticarinatus* s. str. (Grossalmenrode). The Belgian populations differ in this respect constantly from the Grossalmenrode form (disregarding the single specimen just mentioned, which is a real exception). Therefore I introduce the name *vleminckxae* for this new subspecies. It is named after the daughter of the former proprietor of the Boutersem sandpit (see Glibert & de Heinzelin, 1954b, p. 288, pt. 2 'Maison Vleminckx', and also Janssen et al., 1978, p. 39, fig. 13) at Butsel, Boutersem, Mrs J. Nackaerts-Vleminckx, who has been so cooperative in our frequent visits to the locality, which is in her backyard garden now!

Holotype is the specimen represented here (plate 2, fig. 12) from the 'Marne à Chara'. As paratypes I regard several hundreds of specimens from the type locality (coll. RGM 223 348), the specimen represented in Glibert & de Heinzelin (loc. cit.) from Hoeleden ('Tongrien, Marne claire') and the specimens mentioned above from the St-Truiden KZ14 and KZ 7 localities. Stratum typicum is the 'Marne à Chara', Boutersem Sands.

NON MOLLUSCA

In the sieving residues also some non-mollusca were found. These will not be described here, but merely mentioned. This material, kept in the RGM collections (unless stated otherwise), is available for specialists.

Plantae

The finer sieving fractions yielded quite a lot of oögonia of some characean species: very characteristic sphaeroidal to oblong fossils with a spiral ornamentation. It may be expected that many additional specimens are present in the uninspected residues.

Crustacea

Many ostracods were seen in the finer fractions. These belong obviously to more than one species.

Pisces

Five small bony-fish otoliths were collected (length about 1 mm). Dr V. W. M. van Hinsbergh, who did a provisional study of these specimens, found that they are very familiar to otoliths from Early Miocene deposits in Western Germany ('Obere Rheingraben, Rheinhessen, Untere Maintal'), which were described by Weiler (1963) as Ot. inc. sedis sp. 1 (Weiler, 1963, p. 48-49, figs. 222-224, ? 225- ? 228). The fish-fauna from these deposits ('Hydrobia Schichten', including 'Potamides Horizont', 'Corbicula (Inflata) Schichten', base of 'Cerithien Schichten') consists of species preferring a brackish or freshwater environment. This species has not yet been observed among about 800 fish otoliths collected from many Atuatuca Formation localities in the Tongeren-Borgloon area.

Reptilia

Two fragments of turtle bone, very well known from the 'Horizon à vertébrés' at Hoogbutsel, were found. One of these is kept in Mr W. Groeneveld's collection.

DISCUSSION AND CONCLUSION

Table 1 gives a survey of the known stratigraphical distribution in Belgium of the mollusc species found at the KZ 14 and KZ 7 localities near St-Truiden. Data for the composition of this table were taken from Glibert & de Heinzelin (1954a and b) and from private observations (most of them as yet unpublished).

It should be noted that the indication 'Glaise de Henis' as used by Glibert & de Heinzelin, may at least partially refer to layers of heavy clay in the Sands and Marls of Oude Biesen, as defined by Janssen et al. (1976).

Table 1

Species \ Localities	'Horizon à vertébrés' Hoogbutsel	'Glaise bleu-noire' Hoeleden	'Marne claire' Hoeleden	'Sable à Cyrènes' Boutersem	'Marne à Chara' Boutersem	'Glaise de Henis' various locs.	Sands and Marls of Oude Biesen various locs.
Hydrobia elongata			+		+		
Mercuria helicella	+	+	+	+	+		
Nystia plicata	+	+	+		+		
Hydrobiidae indet.					+		
Lymnaea longiscata	+		+		+		+
Radix (Radix) sp.	?				+	+	+
Gyraulus a. vleminckxae	+	+	+		+		+

From table 1 it is obvious that the St-Truiden fauna displays most affinities with the fauna of the 'Marne à Chara'. Some additional species, not found at St-Truiden, mentioned by Glibert & de Heinzelin: *Polymesoda convexa* (Brongniart), *Lentidium nysti* (Deshayes), *Littorinella* cf *inflata angustior* (Braun), *Bythinella tenuiplicata* (Glibert & de Heinzelin), *Stenothyrella bidens* (Bosquet), *'Planorbis' bosqueti* Glibert & de Heinzelin, and *'Planorbis' schulzianus* Dunker, should be discussed. Both bivalve species will most probably be reworked from the 'Sable à Cyrènes'. These species, and some others, are also present in the RGM collections from the 'Marne à Chara'. *Littorinella* cf *inflata angustior* and *'Planorbis' bosqueti* are very rare species. Only the second one is present in my material from the 'Marne à Chara'. *Bythinella tenuiplicata* originates in my opinion from the 'Sable à Cyrènes', rather than from the 'Marne à Chara' (see above, Hydrobiidae gen. et sp. indet). *Stenothyrella bidens* and *'Planorbis' schulzianus* are absent or very rare in the Boutersem locality of the 'Marne à Chara', but very common at other places.

The three species occurring in the Sands and Marls of Oude Biesen should be regarded most probably as reworked material. So there is hardly any relation between the St-Truiden faunas with those of 'Glaise de Henis' and Sands and Marls of Oude Biesen. The similarity with the fauna from the 'Marne à Chara' on the contrary, is striking, even the more so when considering the differences between the sediments. The 'Marne à Chara' is a rather consolidated marl, almost a limestone, whereas the St-Truiden sediment is a real clay.

In my opinion the 'Sables à Cyrènes' is the most 'marine' fauna (with obvious brackish affinities), as is indicated by the presence of numerous specimens of cerithiids and other species. The absence of hydrobiids in the 'Horizon à vertébrés' and in the 'Glaise bleu-noire' leads to the conclusion that these are the most 'freshwater' faunas. The St-Truiden fauna and that from the 'Marne à Chara' take a position in between brackish and freshwater.

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EXPLICATION OF PLATE 1

Figs. 1 - 12 *Nystia (Nystia) plicata* (d'Archiac & de Verneuil, 1845) sensu Glibert & de Heinzelin, 1954.

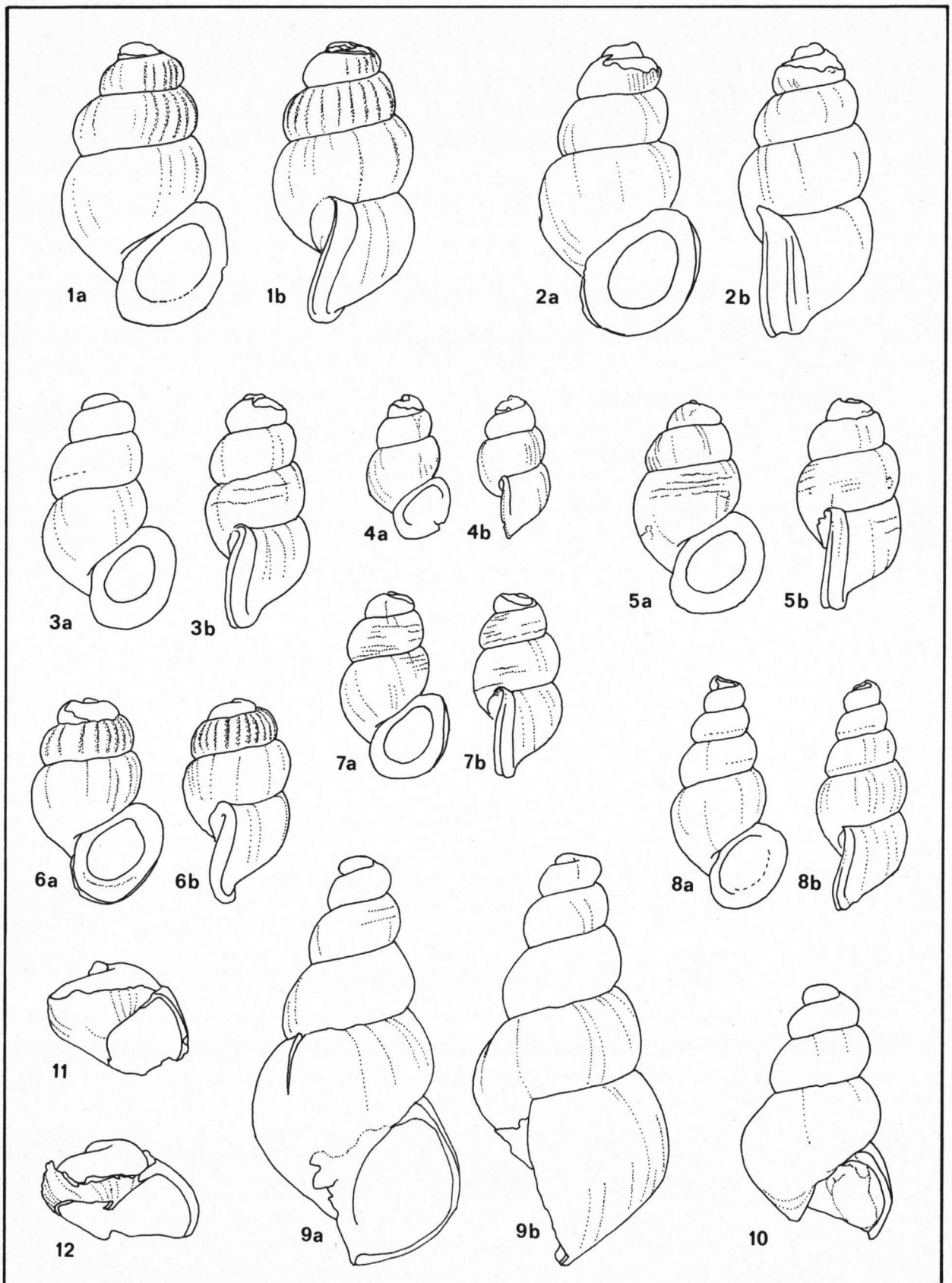
Figs. 1 - 8. Adult specimens selected to show the variability, x 6. All specimens (except fig. 8) have repaired apical parts, indicating a shed-off of earlier whorls.

Figs. 9 - 10. Juvenile specimens possessing the embryonic whorls, the specimen of fig. 10 is obviously shed off by a more full-grown individual, x 25.

Figs. 11 - 12. Juvenile specimens, shed off from adult individuals. Both shells have repaired apical parts, indicating a former shed-off of earlier whorls, x 12.

Resp. RGM 223 320, 223 321, 223 322, 223 327, 223 324, 223 323, 223 325, 223 326, 223 332, 223 333, 223 329 and 223 330.

All specimens from a temporary excavation close to boring KZ 14. Oligocene, Rupelian, Atuatuca Formation, leg. A. W. Janssen, 1979.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EXPLICATION OF PLATE 2

Figs. 1 - 3 *Hydrobia elongata* (Faujas de St.Fond, 1806), x 25.
Resp. RGM 223 313, 223 315 and 223 314.

Figs. 4 - 6 Hydrobiidae gen. et sp. indet., x 25.
Resp. RGM 223 336, 223 337 and 223 338.

Figs. 7 - 8 *Mercuria helicella* (Braun, 1857), x 12.
Resp. RGM 223 317 and 223 318.

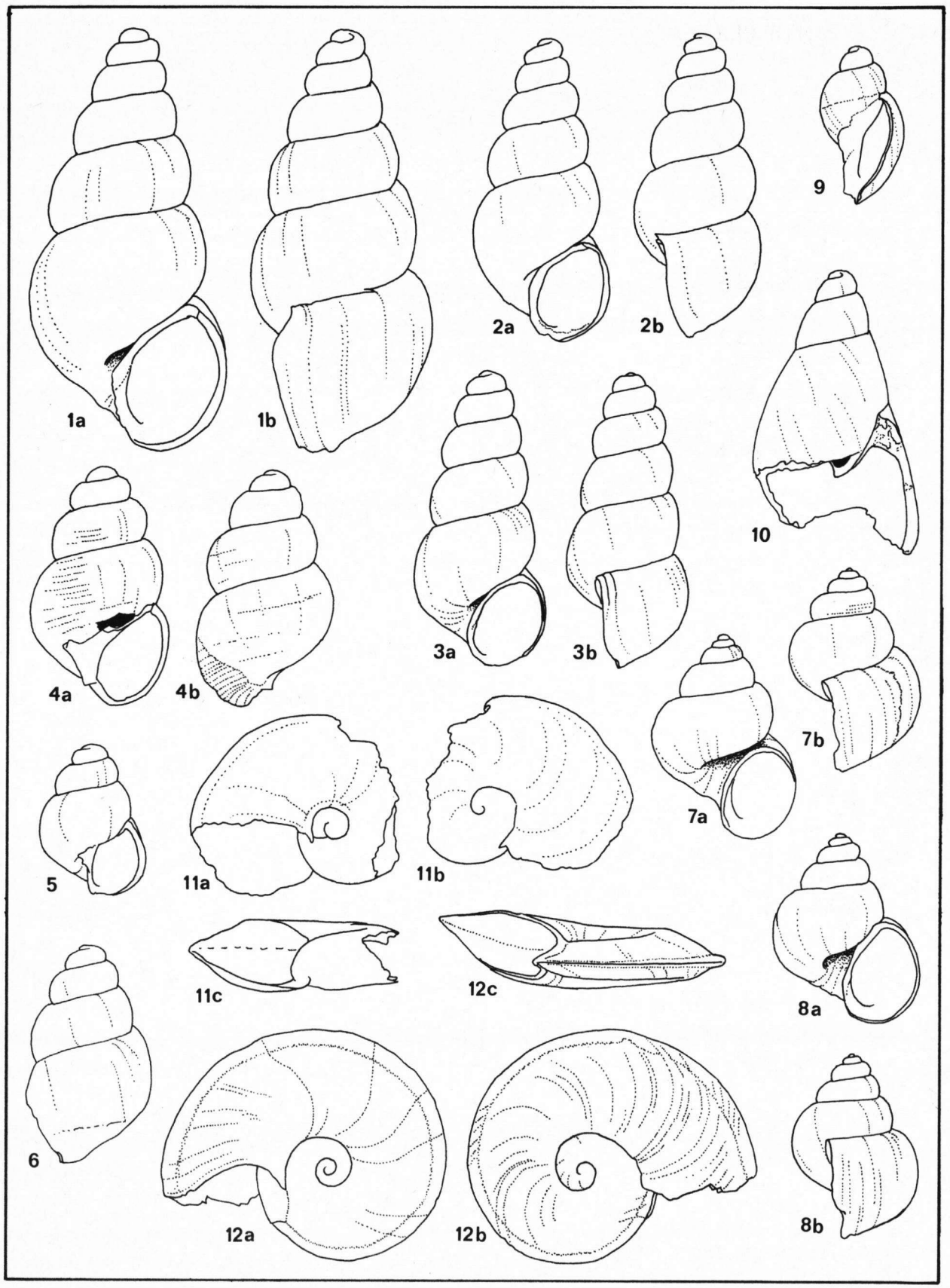
Fig. 9 *Radix (Radix)* sp., x 12.
RGM 223 334.

Fig. 10 *Lymnaea longiscata* (Brongniart, 1810), x 12.
RGM 223 342.

Fig. 11 *Gyraulus (Gyraulus) acuticarinatus vleminckxae* n. subsp., x 25.
Paratype, RGM 223 346.

Fig. 12 *Gyraulus (Gyraulus) acuticarinatus vleminckxae* n. subsp., x 12.
Holotype, RGM 223 347.

Figs. 1 - 11 from a temporary excavation close to boring KZ 14. Oligocene, Rupelian, Atuatuca Formation. Leg. A. W. Janssen, 1979.
Fig. 12 from the 'Maison Vleminckx' locality at Butsel, Boutersem. Oligocene, Rupelian, Boutersem Sands, 'Marne à Chara'. Leg. A. W. Janssen, 1978.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