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Cyrenorita, a new genus for *Erycina neglecta* NYST

(Bivalvia: Corbiculidae).

By

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With 3 text-figures and plates 22-23.

Zusammenfassung Die Gattung *Cyrenorita* n. gen. wird beschrieben. Typus-Art ist *Erycina neglecta* NYST 1836, mit der *Cyrena heterodonta* DESHAYES 1857 synonymisiert wird. Die stratigraphische Verbreitung im Oligozän des Nordseebeckens und des Etampes-Beckens wird angegeben, wie auch die paläoökologische Toleranz. Spezielle Aufmerksamkeit wird der Entwicklung der Schloßzähne gewidmet, illustriert mit einer Reihe SEM-Aufnahmen. Inversion der Schloßzähne wurde beobachtet an etwa 1% der Klappen aus einer belgischen Lokalität. Vierzehnmal handelte es sich dabei um eine Umkehrung der hinteren Seitenzähne, dreimal aber um Inversion der vorderen Seitenzähne. In beiden Fällen ergaben sich die Hauptzähne als normal.

In 1836 NYST (: 2, pl. 1 f. 4) described a small bivalve species from sediments of Oligocene age in the Belgian province of Limburg, which he named *Erycina neglecta*. This species, by no means rare in the well-known euryhaline deposits of the Atuatuca Formation (JANSSEN, HINSBERGH & CADÉE 1976: 95), has offered quite some problems with regard to its generic position. This was mainly caused by the fact that the Belgian material is usually not in a very good state of preservation. The shell-crags from which it is mainly known are washed together by wave or current action, resulting in the fact that the shells of this (and other) species are practically always polished to a high degree.

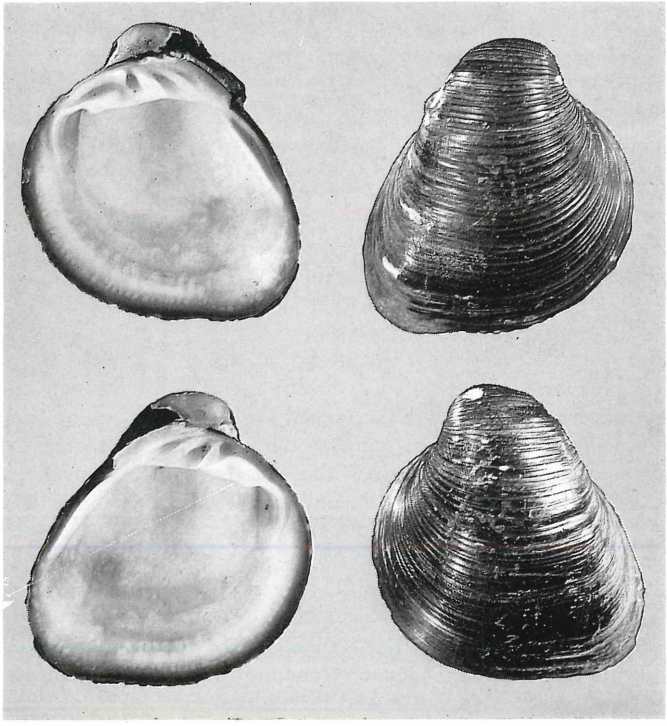
Still, the peculiar construction of the hinge indicated that *neglecta* is a representative of the genus "*Cyrena*", under which denomination it was mentioned for instance by BROECK (in BROECK & RUTOT 1883), who reported it from several localities in Belgium.

DESHAYES (1857: 518, pl. 34 f. 13-15) described the species *Cyrena heterodonta* from Jeures in the Etampes Basin, France. In his description DESHAYES compared his species with the genus "*Velorita*" COSSMANN & LAMBERT (1884: 83) still indicate this form as *Cyrena heterodonta*, reporting it from two further localities in France, viz. Brunehaut and Pierrefitte.

GLIBERT & HEINZELIN (1954: 328, pl. 2 f. 11) incorporated *neglecta* in the genus *Villorita* GRIFFITH & PIDGEON 1834 and regarded *heterodonta* as a junior synonym of *neglecta*. For this latter form they also designated a lectotype from

the NYST collection, of which their photograph represents the hinge area. The state of preservation of the lectotype (very polished) is typical for the level from which it was collected, the so-called "Horizon à *Callista kickxi*", which is the basal part of the Berg Sands in the Tongeren area. This deposit contains at several places, including the type locality of NYST's species (Kleine Spouwen), abundant reworked fossils from the underlying deposits of the Atuatuca Formation (HINSBERGH, JANSSEN & VAESSEN 1973: 15, f. 2).

GLIBERT & VAN DE POEL (1966: 10-11) state, that neither *Villorita imbricata* COSSMANN 1886 (a Paleocene species from the Paris Basin), nor *Erycina neglecta* NYST possess the authentic characters of the genus *Villorita*. They give a detailed description of the hinge of *Villorita*. Concerning *neglecta* they add: "La seconde est d'ailleurs toujours si usée, en Belgique, qu'il est difficile d'en préciser les caractères; elle paraît toutefois peu différente de "*Cyrena heterodonta*" rapportée dubitativement à "*Velorita*" par G. P. DESHAYES (.....), espèce du Rupélien de Jeures que nous ne possédons malheureusement pas." Later (GLIBERT & VAN DE POEL 1971: 6, pl. 8 f. 3a-b) they also published a photograph of the hinge of *Villorita cyprinoides*.



Text-fig. 1. *Villorita cyprinoides* (GRAY). Cochin, Malabar, brackish water, Recent. Coll. E. THURSTON, British Museum (Natural History), reg. no. 1894.5.19.9. Natural size.

I agree with GLIBERT & VAN DE POEL that neither *neglecta,* nor *heterodonta* belong to *Villorita,* as is convincingly demonstrated at first glance by the entirely different development of the hinge elements. In text-fig. 1 a specimen of the type species, *V cyprinoides* (GRAY 1825) is represented.

GLIBERT & VAN DE POEL, however, avoided to give their opinion on the question to what genus both *neglecta* and *heterodonta* should be attributed. This problem, as far as I am aware of, has not yet been solved up to the present.

Two circumstances enable me now to go into the subject again. These are the discovery at Rosmeer, in the Belgian province of Limburg, of a locality where well-preserved specimens of *neglecta* were found, and the fact that I have material of *heterodonta* at my disposal from three localities in the Etampes Basin, France, allowing a direct comparison between the two forms.

The study of the available material convinced me, as was in fact already obvious from the discussion in GLIBERT & VAN DE POEL's paper, that there is no genus in which the forms under consideration fit satisfactorily. Therefore I introduce here

Cyrenorita n. gen.

Type species *Erycina neglecta* NYST 1836.

Derivatio nominis a combination of the generic names *Cyrena* and *Villorita.*

Diagnosis: shell small (length to some 4 mm), usually slightly longer than high. Umbones prosogyrous, lunule and escutcheon wanting. Outer surface with friable concentric lamellae. Hinge corbiculoid. Right valve with well-developed 1 and 3b; 3a minute, fused to the posterior end of A III. A I solid, A III weaker, distinctly separated from the anterior dorsal margin. P I and P III more distant from the umbo than the anterior lateral teeth. The opposite sides of both anterior and posterior laterals are granulated or striated (pl. 1 fig. 7; pl. 2 fig. 12). Left valve with distinct 2a, 2b and 4b. P II and A II well-developed, clearly separated from the dorsal margins and with distinct sockets on their ventral sides for the reception of P I and A I respectively. Both sides of P II and A II are granulated, but this is only visible in very well-preserved specimens. The adductor scars are relatively small and connected by a pallial line without or with only a very slight indication of a pallial sinus.

Remarks.

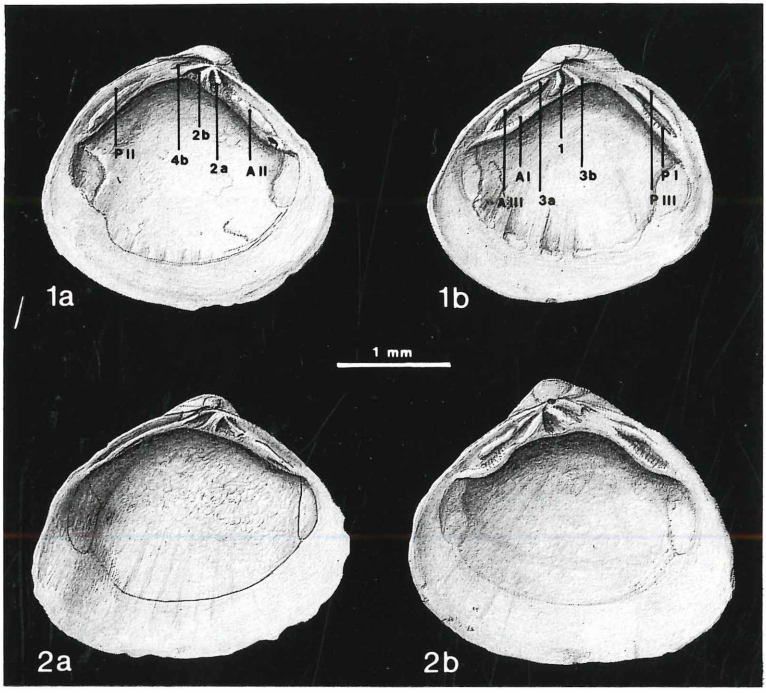
Cyrenorita differs from *Pseudocyrena* BOURGUIGNAT 1854 by its much smaller shell, its general outline and by the presence of concentrical lamellae on the outer surface of the shell. The Cretaceous genus *Filosina* (see MOORE 1969: N 668, f. E 140, 14a-c) has a very similar outline, but is much larger and has considerably reduced lateral teeth.

Equal-sized (so juvenile !) specimens of *Polymesoda (Pseudocyrena) convexa convexa* (BRONGNIART 1822), which species is frequently also present in faunas containing *C. neglecta,* show only minor differences in the construction of the hinge (see text-fig. 2), but differ markedly in their length/height-ratios and in ornamentation of the outer surface. In *P. convexa* a concentric striation is usually present, even in very juvenile shells, but its surface never bears con-

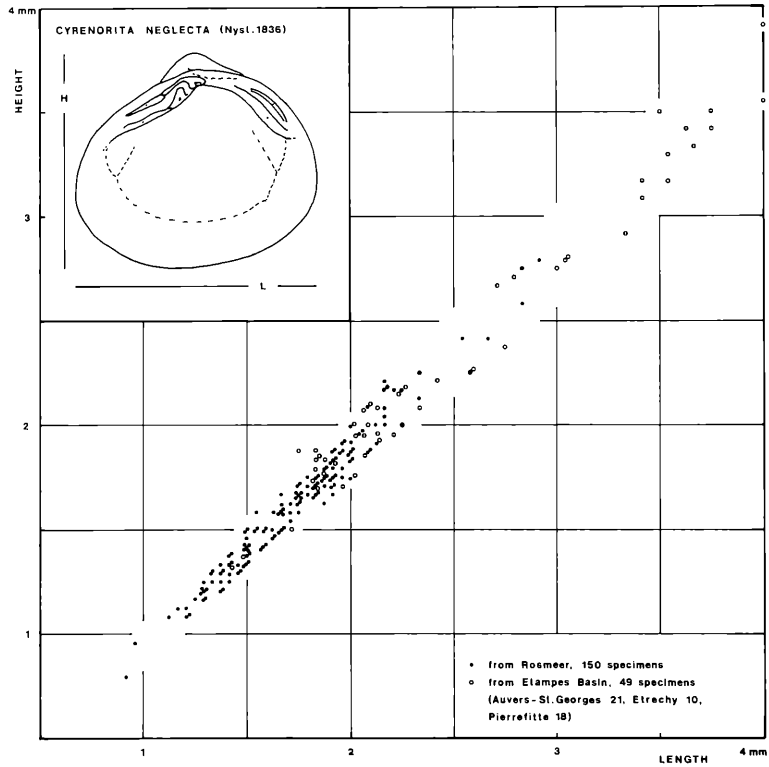
centric lamellae. Still, the high degree of variability of both species and the fact that well-preserved specimens of *C. neglecta* are relatively scarce often necessitate a careful comparison.

Of *heterodonta* I have a restricted material at my disposal, alltogether 52 valves from three localities (Auvers-St.-Georges, Etréchy and Pierrefitte) in the Etampes Basin. Well-preserved specimens from Auvers-St.-Georges and Etréchy have an identical concentric sculpture as the Rosmeer material, but reach considerably larger dimensions. In such larger shells the concentric sculpture is usually more close-set towards the ventral margin. The transition from widely spaced lamellae to close-set lamellae is not gradual, but always takes place immediately after a growth interruption (pl. 1 fig. 2).

The length/height-ratios of the French shells match those of the Rosmeer sample very well (see text-fig. 3). Larger specimens from Belgian localities (e. g. pl. 1 fig. 11, an extreme example!) are very often relatively higher. In general it may be concluded that the French specimens fall within the range of variability of *neglecta*. In my opinion both populations cannot be separated specificly and therefore I regard *heterodonta* as a junior synonym of *neglecta*. Future biometric investigations, however, based on abundant material from the "Stam-



Text-fig. 2. Comparison between equal sized specimens of *Cyrenorita neglecta* (1a-b) and *Polymesoda convexa convexa* (2a-b). — All specimens from the sample Rosmeer 1 (RGM 224876-7 and 224901-2).



Text-fig. 3. *Cyrenorita neglecta* (Nyst). — Length/height-ratio of 150 valves from Belgium (Rosmeer 1) and 49 valves from the Etampes Basin (several localities). Striking is the apparent absence of allometric growth.

pien inférieur" might reveal a difference in the proportions that could be enough reason for regarding *heterodonta* a subspecies of *neglecta*. The material now available does not permit such a conclusion. The material from Pierrefitte, collected from a slightly higher stratigraphic level, seems to agree completely with the Belgian material.

Very small specimens from the Rosmeer sample (though already beyond the larval stage) reveal interesting data concerning the development of the hinge elements. This is illustrated by two series of SEM-pictures (pl. 2 figs. 1-5, 6-10). In the smallest left valves (pl. 2 fig. 1) two lamellae are present, the posterior one of these will develope to P II. In front of the internal ligament lies a second lamella (II). Its posterior half shows a slight curvature in upward direction. In later ontogenetic stages this curvature becomes stronger and stronger, until finally the cardinals 2b and 2a are formed and become separated from the anterior part of the lamella II. This latter part can be distinguished as A II. The cardinal 2b is thickened and sometimes slightly bifid (pl. 2 fig. 5). A lamella

IV cannot be distinguished in the very juvenile shells, but nevertheless a distinct cardinal 4b is present in the later stages. Sometimes this cardinal makes the impression to be connected at its umbonal side with the anterior shell margin, which could lead to the assumption that in the juvenile shells the lamella IV coincides with the shell margin. In other shells, however, 4b seems to develope independantly from the lower margin of the ligament-pit.

In very small right valves there are two posterior lamellae, giving rise to the lateral teeth P I and P III. Anteriorly two lamellae are present, I and III. The posterior half of lamella I gradually thickens and bends upwards during the successive stages. Simultaneously the connection between the two parts diminishes, until finally two distinct teeth are present, A I and 1. This latter cardinal tooth may be slightly bifid (pl. 2 fig. 10). Lamella III developes to the cardinals 3b and 3a and to the lateral tooth A III. Usually the cardinal 3a remains connected with A III, but it is more strongly projecting beyond the plane of commissure (pl. 2 fig. 11, oblique view).

The development of the hinge elements, as observed in the Rosmeer material of *neglecta,* agrees almost completely with the schematical representation of corbiculoid hinge development in MOORE (1969: N 54, f. 48.1a-d).

Several shells of *neglecta* from Rosmeer (17 out of a sample containing 1722 specimens = 1·0%) show a partial reversion of the hinge elements. Reversion of the posterior lateral teeth is present in 14 valves (6 left and 8 right, pl. 1 fig. 8, 10). Three left valves are obvious cases of reversion of the anterior lateral teeth (pl. 1 fig. 3), but curiously enough the cardinals 2b and 2a of these valves are quite normal, connected at their umbonal sides. As these cardinals, as described above, develope from the primitive lamella II it is not clear to me how they originated from the obvious presence of the lamellae I and III in these specimens. An explanation for this discrepancy would only be possible by studying a series of ontogenetical stages, which is of course impossible. It seems inevitable, however, to suppose that in a very early stage only the anterior half of the lamella II was reversed, its posterior half remaining in the left valve and developing to normal 2b and 2a teeth. In this context it is interesting to remember the notes of KUIPER (1943: 38) concerning reversed hinges in species of the freshwater genus *Pisidium*. Out of seven theoretical possibilities of reversion of hinge elements only those three combinations supposing an independant reversal of cardinal and anterior lateral teeth were not found by him in nature. This lead him to the comclusion that if reversion of cardinal and anterior lateral teeth takes place this will only be in combination with each other. This mechanism is explained by the genetical relationship between the cardinals and anterio-laterals. Just as in *neglecta* they develope from one primitive lamella. Still, in very large samples of *Pisidium*-species from Holocene deposits at Kallo (near Antwerp, Belgium) I could ascertain the (admittedly very rare) occurrence of shells with an independant reversion of cardinals and anterio-laterals.

A further interesting feature is the complete reduction of the A III lamella in a right valve of *neglecta* from Rosmeer (RGM 224898). This is not a case of partial reversion, as is distinctly indicated by the position of the only anterior lateral tooth in this valve, which has the exact position of a normal A I and lacks a socket at its ventral side. Such a socket should be there for the reception

of A I if it were a reversed A II lamella. In this specimen the anterior end of 3a ends free in the space between A I and the dorsal margin. The cardinal teeth and the posterior lateral teeth are normal.

Stratigraphical distribution.

In the North Sea Basin *Cyrenorita neglecta* is known from quite a number of localities of the Atuatuca Formation, Sands and Marls of Oude Biesen, gully level (= "Glaises de Henis" pro parte, in the sense of GLIBERT & HEINZELIN 1954) and alternating sands and clays (see JANSSEN et al. 1976, 1978) in Belgium, and from the Tongeren Group, Goudsberg Deposits, in the adjacent part of the Netherlands. Its presence in the Berg Sands (Horizon with *Callista kickxi* and even in the Horizon with *Astarte trigonella*) in Belgium is due to reworking.

In France this species is known from depostis of the "Stampien inférieur", Falun de Jeures (localities Brunehaut, Auvers-St.-Georges, Etréchy and Jeures) and of the "Stampien supérieur", Horizon de Pierrefitte (Pierrefitte).

Paleoecology

Cyrenorita neglecta occurs in faunas of distinct euryhaline character. As stated above it is a common occurrence in the shell-crags of the alternating sands and clays in the Sands and Marls of Oude Biesen. These crags, however, are practically always washed together and supply only little information about the biocoenoses in which the species under concern lived. More information can be obtained from the usually much less fossiliferous clayey deposits that contain often material that has hardly or not been transported. If we do so it will become clear that the ecological tolerance of *neglecta* is rather restricted. It is most common in faunas in which cerithiids are of minor importance and in which only scarcely more marine elements are present. If we consider the variety of faunal assemblages that lived within the lagoon or coastal lake system in which the Atuatuca Formation deposits were formed the highest concentrations of *neglecta* may be expected at those places that lie at some distance from the connections with the open sea, presumably in protected areas with some influx of freshwater from the mainland, but still with a rather high chloride content, certainly not in freshwater biotops.

Two samples from Rosmeer, collected from clays in the gully level of the Sands and Marls of Oude Biesen illustrate these differences very well. The faunal lists of these samples are given in Table 1. Rosmeer 1 is the sample that yielded the abundant material of *neglecta* discussed in this paper, the sample Rosmeer 2 was collected only slightly higher in the section.

Both the samples Rosmeer 1 und 2 yielded a number of bony fish otoliths. Those from Rosmeer 2 were studied by HINSBERGH (1980), those from the other sample were also studied by him, but the results are not yet published.

Both fish faunules belong to the Group 1 fish association, as described by HINSBERGH. This association is typical for the gully level of the Sands and Marls of Oude Biesen. It may be concluded that the fish otoliths supply less detailed information on the ecological circumstances than the molluscs.

Table 1. Comparison between the faunal composition of the samples Rosmeer 1 and 2. Indication of the frequencies is approximate.

Mollusca	1	2
Brachidontes (Brachidontes) sp.	—	
Mytilus (Mytilus) cf. *faujasi* BRONGNIART 1823	—	
Callucina (Callucinopsis) thierensi (HÉBERT 1849)	—	
? Lucinacea sp.		—
Angulus (Peronaea) nysti DESHAYES 1857	—	
Gari (Gobraeus) nitens (DESHAYES 1857)		
Abra (Abra) sp.	—	
Cyrenorita neglecta (NYST 1836)		
Polymesoda (Pseudocyrena) convexa convexa (BRONGNIART 1822)		
Pelecyora (Cordiopsis) polytropa incrassatoides (NYST 1845)		
Sphenia angustata (SOWERBY 1826)		
Sphenia sp.	—	
Corbula (Varicorbula) gibba subpisum (ORBIGNY 1852)	—	
Clithon (Vittoclithon) duchasteli (DESHAYES 1832)	rr	—
Stenothyrella bidens (BOSQUET 1859)	r	
Nystia (Nystia) glibertheinzelini A. W. JANSSEN 1980	cc	—
Turboella (Turboella) turbinata (LAMARCK 1804)	—	
Melanoides fasciata (SOWERBY 1819)		
Pirenella plicata monilifera (DESHAYES 1834)	—	
Potamides (Ptychopotamides) burdigalinus (ORBIGNY 1852)	—	
Potamides (Ptychopotamides) labyrinthus (NYST 1836)		
Sandbergeria cancellata (NYST 1836)	—	
Euspira helicina (BROCCHI 1814) s. lat.	—	
Syrnola (Puposyrnola) laevissima (BOSQUET 1859)	—	
Gyraulus (Gyraulus) sp.		—
Pupillacea sp.		—
Crustacea		
Cirripedia, Balanidae sp.		
Ostracoda		
Vertebrata: Pisces		
Genus Clupeidarum *atuatucae* HINSBERGH 1980 (otoliths)		
Genus aff. Hemiramphidarum sp. (otoliths)		—
Genus Leiognathidarum *nolfi* HINSBERGH 1980 (otoliths)	—	
Genus Sparidarum *whiteheadi* NOLF 1976 (otoliths)		
teeth of bony fishes		—

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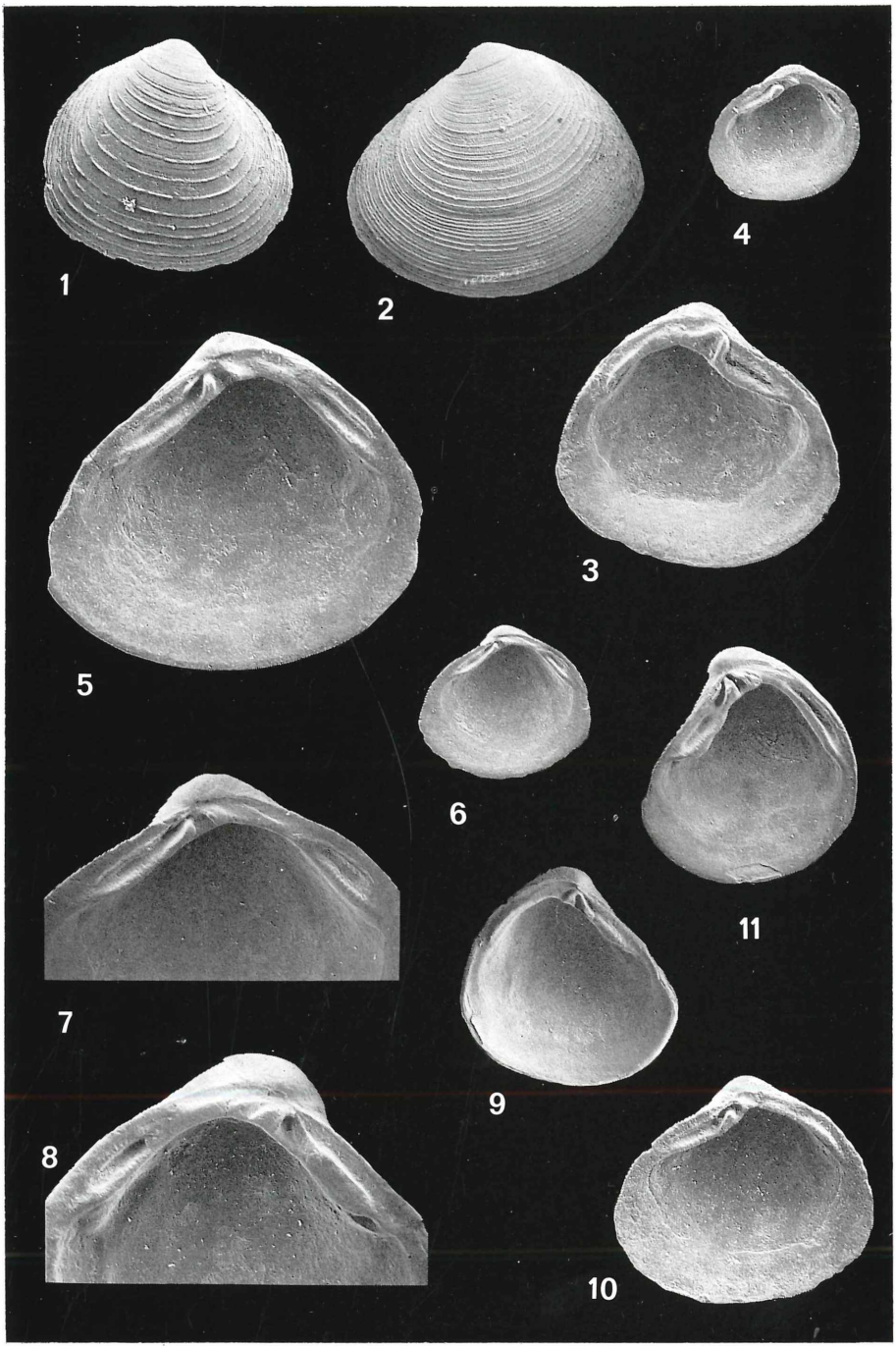
Explanation of plate 22.

Cyrenorita neglecta (NYST).

Fig. 1. Right valve, × 25 [RGM 224878].
Fig. 2. Left valve, × 10 [RGM 224870].
Fig. 3. Left valve, with reversion of anterior lateral teeth, × 27 [RGM 224894].
Fig. 4-7. Right valves.
4) × 27 [RGM 224879]; 5) × 28 [RGM 224880]; 6) × 11 [RGM 224881]; 7) × 28 [RGM 224881].
Fig. 8. Left valve, hinge with reversion of posterior lateral teeth, × 28 [RGM 224896].
Fig. 9. Left valve, × 10 [RGM 224882].
Fig. 10. Right valve, with reversion of posterior lateral teeth, × 27 [RGM 224897].
Fig. 11. Right valve, extremely high form, × 11 [RGM 224872].

Localities: 1, 3-10: Rosmeer; 2: Auvers-St.-Georges; 11: Alde Biesen.



A. W. JANSSEN: *Cyrenorita*, a new genus for *Erycina neglecta* NYST.

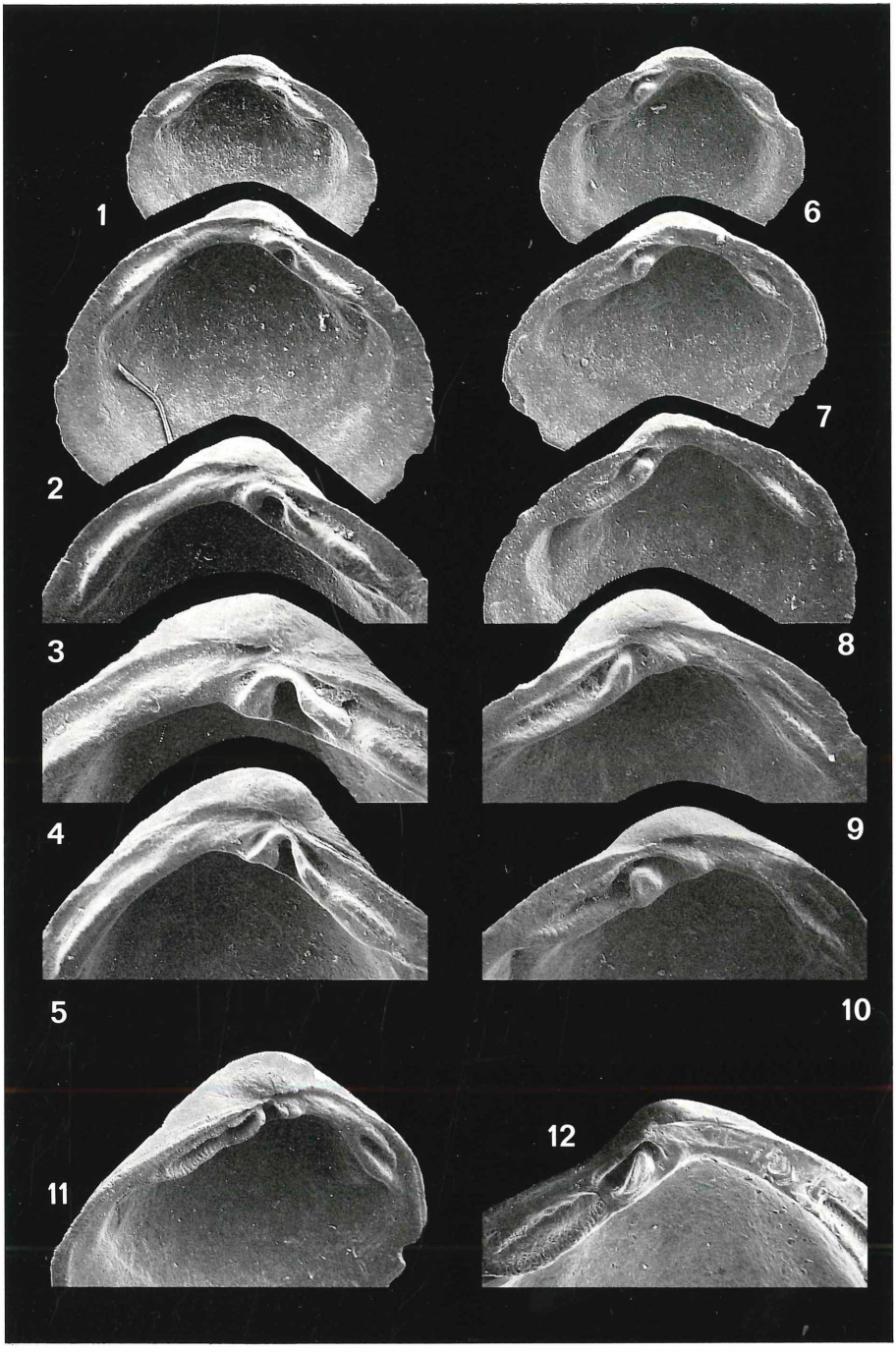
Explanation of plate 23.

Cyrenorita neglecta (NYST).

Fig. 1-5. Left valves.
1-2) × 53 [RGM 224883-884]; 3-4) × 55 [RGM 224885-886]; 5) × 28 [RGM 224882].

Fig. 6-12. Right valves.
6) × 52 [RGM 224887]; 7-8) × 55 [RGM 224888-889]; 9) × 53 [RGM 224890]; 10) × 55 [RGM 224891]; 11) × 29 [RGM 224892]; 12) × 28 [RGM 224871].

Localities: 1-11: Rosmeer; 12: Etréchy.



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