

Krausella minuta, a nomen nudum in ostracodology, and three new species of *Cardobairdia* Bold, 1960 from the Campanian of Belgium and the Cenomanian of southern England

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ABSTRACT - Van Veen (1936b) found the ostracod species *Krausella minuta* Triebel, in deposits of the uppermost Maastrichtian from the Valley of the Jeker, South Limburg, The Netherlands. Investigation has shown that Triebel never published any data on this species, so the name *Krausella minuta* has to be rejected, being a nomen nudum.

In the boreholes of Kallo (27 E 148) and Knokke (11 E 138), in the northwestern part of Belgium, a related, yet undescribed species occurs, for which the name *Cardobairdia triebeli* sp. nov. is proposed. This taxon was found in deposits of mainly Lower Campanian age. Another new species, *Cardobairdia rectimarginata*, is described from the Campanian in the Knokke Borehole.

The specimens of *Cardobairdia minuta* from the Cenomanian from southern England belong to a new species, defined here as *C. cenomanensis*.

INTRODUCTION

During the last 50 years, many authors have mentioned the presence of the ostracod species *Krausella minuta*, in deposits of Cretaceous as well as of Ordovician age. The first, but incomplete description of this taxon was by Van Veen (1936b), who attributed the species to Triebel: the latter had sent Van Veen some photographs of an ostracod from the Lower Cretaceous of Germany, labelled "(?) *Krausella minuta*". Van Veen (*ibid.*) declares to have found the same taxon in deposits of the uppermost Cretaceous of South Limburg, The Netherlands, namely in the "dritten Bryozoenschicht von Staring im Jekertal" (see fig. 1), which is part of the Nekum Member, Maastricht Formation (see fig. 2). The same author mentions a slight difference with Triebel's material, namely a smaller carapace, but explains this as due to sexual dimorphism. Contrary to Triebel's opinion, Van Veen did not doubt

the attribution of the species *minuta* to the genus *Krausella* Ulrich, 1894. Study of the existing literature on Upper Cretaceous ostracods has not revealed any publication, in which Triebel has described or mentioned *Krausella minuta* as a new species. This was confirmed by Malz (Frankfurt am Main, F.R.G.) in a letter to the present author, in which he states that Triebel never published anything on *Krausella minuta*, therefore this taxon is a nomen nudum. Moreover, the collections of Triebel, stored at the Senckenberg Institute, do not include any individuals of this species.

The Van Veen collection only comprises one slide, number 0.1418, labelled as "*Krausella minuta* Triebel Jekerdal Mc 3° Br. 1. v. St.", and contains one carapace and one right valve. The indications leave no doubt about the stratigraphical origin: the third Bryozoa layer of Staring, within the "Mc"



Fig. 1. Map of mentioned localities.

D. STAGES	H. FORMATIONS			Van Veen, 1934	
UPPER MAASTRICHTIAN	MAASTRICHT FORMATION	Md	GEULHEM MEMBER	First Bryozoa layer Second Bryozoa layer Third Bryozoa layer of Staring Third Bryozoa layer of Ubaghs Coprolite layer	
			Vroenhoven Horizon		
		Mc	MEERSSSEN MEMBER		Caster Horizon NEKUM MEMBER Laumont Horizon
			EMAEL MEMBER		
		Mb	Romantbosch Horizon		SCHIEPERSBERG MEMBER GRONSVELD MEMBER VALKENBURG MEMBER
		Mg	Lichtenberg Horizon		
		Cr4	LANAYE MEMBER		
G.			D.: Danian G.: Gulpen Formation H.: Houthem Formation		

Fig. 2. Stratigraphy of the Maastricht Formation.

of Uhlenbroek (1912). This material differs from *Cardobairdia triebeli* sp. nov. by the greatest width being distinctly behind mid-length, the right valve is higher anteriorly, with a convex ventral margin, while the posterior end is rather blunt. Because of a lack of such specimens - two individuals in the collection Van Veen, and one valve from the borehole at Hoeselt, NE-Belgium - we can not give a fuller detailed description, and so not allowing the erection of a new species.

The Cenomanian deposits of southern England comprise a related *Cardobairdia* species, which was described by Weaver (1982) as *C. minuta*. Because of considerable differences with the Belgian and Dutch specimens, we define here a new species: *C. cenomanensis*.

Harris (1957) described a new species, *Rayella minuta*, from the Simpson Group, Lower Ordovician in Oklahoma (U.S.A.). According to Copeland (1974), who also studied Ostracoda from the Mohawkian of Oklahoma, this taxon would belong to the genus *Krausella*. Copeland (*ibid.*) does not refer to the publication of Van Veen, probably because he was not aware of the synonymy. However, his description and his figures do not match *Kr. minuta sensu* Van Veen. Therefore, and because of the considerable difference in age of the deposits under study, the material of neither Harris, nor Copeland, can belong to Van Veen's species.

SPECIMEN REPOSITORIES

All specimens of *C. rectimarginata* and *C. triebeli* are

deposited in the collections of the "Laboratorium voor Paleontologie" of the State University in Ghent. The material of *C. cenomanensis*, collected by Dr. Weaver (Wormley), is housed in the British Museum (Natural History), Department of Palaeontology, London.

SYSTEMATIC DESCRIPTIONS

Subclass Ostracoda Latreille, 1806
 Order Podocopida G.W. Müller, 1894
 Suborder Metacopa Sylvester-Bradley, 1967
 Superfamily Healdiacea Harlton, 1933
 Family Saipanettidae McKenzie, 1968
 Genus *Cardobairdia* Bold, 1960
Cardobairdia cenomanensis sp. nov.

(Pl. 1, figs. 1-4)

v non 1936b *Krausella minuta* Triebel; Veen: 176-177, pl. 10, figs. 7-15.

? 1966 *Sigillium ? minuta* Van Veen ?; Gründel: 49, pl. 8, figs. 40-41.

v 1982 *Cardobairdia minuta* (van Veen); Weaver: 26-27, pl. 19, figs. 15-19.

Derivation of name. After the age of the deposits in which the species is found: Cenomanian.

Diagnosis. A species belonging to the genus *Cardobairdia* characterised by: the left valves have rounded anterior margins and rather blunted posterior margins; right valves are merely triangular with swollen sides, with a distinct bending point posterodorsally; ventral side convex; greatest height in front of mid-length.

Holotype. A female left valve, BM OS10016.

Paratypes. Two left valves (one male, one female) and two carapaces (both female), BM OS10017 to BM OS10020.

Material. 479 valves and carapaces from southern England (Weaver collection).

Locality and horizon. Bluebell Hill, Chatham, Kent, sample BB12, Grey Chalk, Upper Cenomanian.

Description. The left valves are suboval in lateral view, with a symmetrically rounded anterior extremity. The posterior end is rather blunt, composed of an almost vertical part, forming a clear angle with the ventral side. The dorsal margin is convex, ending at a distinct bending point posteriorly. The ventral side is regular convex. Greatest height is measured somewhat in front of mid-length. The right valves are lower and subtriangular in shape, with swollen sides. The posterior extremity has a low bending point. The longitudinal borders are convex. Greatest height lies in front of the mid-point. Left valve overlaps the right one along the entire margin, except at the posterior, where the right valve extends. Lateral surface is smooth. The greatest width is measured near the middle of the carapaces. Sexual dimorphism is pronounced: males are more elongate and less high than females and the posterior is more drawn-out. Hinge of the right valve consists of a low, elongate, crenulate tooth anteriorly, followed by a smooth median groove and a crenulate posterior tooth, continuing as a ridge around the posterior end of the valve. The marginal zone is rather narrow, without vestibules. Other internal details not seen.

Dimensions (mm)		length	height
Holotype	LV-female BM OS10016	0.43	0.26
Paratype	CA-female BM OS10017	0.39	0.25
Paratype	CA-female BM OS10018	0.46	0.28
Paratype	LV-male BM OS10019	0.47	0.25
Paratype	LV-female BM OS10020	0.42	0.25

Mean and range of dimensions (mm). Not available.

Remarks. See "Remarks" on *Cardobairdia triebeli* sp. nov.

Occurrence. Southern England: Cenomanian (Foraminiferal Zones 8 - 14i).

Stratigraphical and geographical range. ? German Democratic Republic : Middle Albian to Lower Cenomanian.

Cardobairdia rectimarginata sp. nov.
(Plate 1, figs. 5-8)

v non 1936a *Cytheridea* ? *bemelenensis* nov. spec.; Veen: 173, pl. 9, figs. 52-56.

v 1940 *Cytherideis bemelenensis* van Veen; Bonnema: 115-116, pl. 3, figs. 35-38.

1966 *Cardobairdia* sp.; Herrig: 774-775, pl. 15, figs. 5-6, text-figs. 46-47.

Derivation of name. From "rectus" (Latin) = straight, and "marginare" (Latin) = provide with a border or margin. Referring to the straight margins.

Diagnosis. A species belonging to the genus *Cardobairdia*, characterised by : subtrapezoidal valves; longitudinal margins straight and faintly converging behind; anterior end rounded; posterior end rounded, rather narrow and low; lateral surface smooth; greatest height in front of mid-length, near the bending point between dorsal and anterior border.

Holotype. A right valve, number KN-403.80/4/10.

Paratypes. Four left valves, five right valves and one carapace, KN-417.30/1/1, KN-417.30/R/3, KN-403.80/4/12, KN-403.80/R/15.1.1, KN-403.80/R/15.1.2, KN-403.80/R/15.2.1, KN-403.80/R/15.2.3, KN-349.70/3/18, KN-325.70/3/12, KN-325.70/3/13.

Material. 58 adult specimens (19 LV, 38 RV, 1 CA) and 14 juveniles (6 LV and 8 RV) from the Knokke Borehole. One doubtful adult RV from the Hoeselt Borehole.

Locality and horizon. Knokke-Westkapelle, Borehole 11 E 138, depth -403.80 m, Lower Campanian.

Description. The right valves are subtrapezoidal, with a short, rectilinear dorsal margin and a somewhat longer, in the middle straight to slightly concave ventral margin. The greatest height is at one third of the anterior. The anterior extremity has a symmetrical curve ventrally, which dorsally continues into a less strong curve. The low posterior extremity is rounded, rather narrow, with a more or less straight posterodorsal part, forming a bending point with the dorsal margin. In dorsal view, the valves show evenly curved borders, with the greatest width near mid-length. The left valves are somewhat higher than the right valves. The lateral surface is smooth. No sexual dimorphism. Hinge type merodont; the right valves show two elongate teeth, probably with a crenulate apex, and separated by a smooth bar, under

a narrow groove. The marginal zone is rather broadly developed in the anterior part. Other internal details not seen.

Dimensions (mm)		length	height
Holotype	RV KN-403.80/4/10	0.36	0.16
Paratype	LV KN-417.30/1/1	0.38	0.18
Paratype	RV KN-417.30/R/3	0.46	0.20
Paratype	RV KN-403.80/4/12	0.37	0.17
Paratype	LV KN-403.80/R/15.1.1	0.41	0.19
Paratype	RV KN-403.80/R/15.1.2	0.42	0.17
Paratype	RV KN-403.80/R/15.2.1	0.33	0.17
Paratype	LV KN-403.80/R/15.2.3	0.38	0.19
Paratype	CA KN-349.70/3/18	0.39	0.20
Paratype	RV KN-325.70/3/12	0.40	0.18
Paratype	LV KN-325.70/3/13	0.38	0.19

Mean and range of dimensions (mm)

	length	height
14 LV	0.40 (0.38-0.44)	0.20 (0.18-0.22)
33 RV	0.41 (0.33-0.46)	0.18 (0.16-0.20)

Remarks. *Cardobairdia triebeli* sp. nov. and "*Cardobairdia minuta* Triebel" *sensu* Van Veen (1936b) differ by a more plump shape, with clearly arched longitudinal margins and a pointed posterior end in the right valves. Herrig (1966) describes *Cardobairdia* sp. from the Lower Maastrichtian of Rügen, and gives a good illustration of the hinge type. Because Herrig's material seems to be conspecific, we refer to his figure for additional details on the hinge type. The Bonnema collection, stored at the Rijks Geologische Dienst, Haarlem, The Netherlands, comprises several slides containing good specimens of *Cardobairdia rectimarginata* sp. nov. This material originates from boreholes in the province of Drente, in the northeastern part of The Netherlands. Unfortunately the exact stratigraphy of the studied sections is unknown. Bonnema (1940) only indicates the age of his samples by "Mergel" and "Schreibkreide". According to Pokorný (1975), who studied some samples from one of Bonnema's boreholes, the NN-IV de Krim section, the "Mergel" = marls - probably are of Middle Turonian to Lower Santonian age. **Occurrence.** ? Hoeselt : Nekum Member, Maastricht Formation, Upper Maastrichtian. Knokke : Gulpen Formation, Lower Campanian to uppermost Campanian. **Stratigraphical and geographical range.** German Democratic Republic: Rügen, Baltic Sea, Lower Maastrichtian ("Weissen Schreibkreide") (Herrig, 1966); The Netherlands : Drente, Middle Turonian to Lower Santonian ("Mergel" and "Schreibkreide") (Bonnema, 1940).

Cardobairdia triebeli sp. nov.
(Plate 1, figs. 9-12)

v non 1936b *Krausella minuta* Triebel; Veen: 176-177, pl. 10, figs. 7-15.

v 1940 *Krausella minuta* Triebel; Bonnema: 115, pl. 3, figs. 32-34.

non ? 1946 *Krausella minuta* Triebel; Bold: 67, pl. 2, fig. 7.
non 1957 *Rayella minuta* Harris, n.sp.; Harris: 255, pl. 10, figs. 8a-b.

- non 1958 *Krausella minuta* Triebel; Howe & Laurencich: 276.
 non ? 1960 "*Krausella*" *minuta* Triebel; Bold: 155-156, pl. 6, fig. 3, text-fig. 4.
 non ? 1960 "*Krausella*" sp. aff. *Krausella minuta* Triebel; Bold: 156, pl. 6, fig. 2.
 non 1963 *Krausella minuta* Triebel; Morkhoven: text-fig. 131.
 v non 1965 *Krausella minuta* Triebel; Kaye & Barker: 376, pl. 48, figs. 12 & 14.
 1966 *Cardobairdia minuta* (Triebel); Herrig: 772-774, pl. 15, figs. 1-4, text-figs. 46-47, tab. 17.
 non 1966 *Sigillium* ? *minuta* Van Veen ?; Gründel: 49, pl. 8, figs. 40-41.
 non 1974 *Krausella minuta* ? (Harris); Copeland: 28, pl. 3, figs. 5-8.
 1979 *Cardobairdia minuta* (Triebel); Joergensen: tab. 1.
 v non 1982 *Cardobairdia minuta* (van Veen); Weaver: 26-27, pl. 19, figs. 15-19.
 1987 *Cardobairdia minuta*; Hart *et al.*: 145 & 146.

Derivation of name. After the late Prof. Dr. Erich Triebel, in recognition of his contribution to our understanding of Cretaceous Ostracoda.

Diagnosis. A species belonging to the genus *Cardobairdia*, characterised by: the left valves possess symmetrically rounded anterior margins and rather blunted posterior margins; right valves are more triangular with swollen sides, posteriorly forming a distinct angle with the dorsal margin; ventral side almost rectilinear in the median part.

Holotype. A male left valve, KN-424.20/3/49.

Paratypes. Eight right valves (one female, seven males), KN-424.20/1/25, KN-403.80/R/14.1.1, KN-403.80/R/14.1.2, KN-403.80/R/14.1.3, KN-403.80/R/14.2.1, KN-403.80/R/14.2.2, KN-391.70/3/24, KN-311.70/R/4.

Material. 14 adult specimens (3 LV, 10 RV, 1 CA) from the Knokke and Kallo Boreholes.

Locality and horizon. Knokke-Westkapelle, Borehole 11 E 138, depth -424.20 m, Lower Campanian.

Description. The left valves are subovate in lateral view, with a symmetrically rounded anterior. The posterior is quite blunt, with an almost straight and vertical border. The dorsal margin is convex, posteriorly forming a distinct angle with the posterior margin. The ventral margin is regularly convex. Greatest height in front of mid-length. The right valves are subtriangular in shape, with swollen sides. Anterior margin is low and narrower, compared to the left valves. The posterior extremity has a rather low bending point. The ventral border is straight to gently convex, while the dorsal margin is convex. Greatest height in front of the mid-point. Left valve overlapping the right valve around the entire border, except at the posterior end, where the right valve

extends beyond the posterior of the left valve. Lateral surface is smooth. Dorsal view shows greatest width near the middle. Sexual dimorphism pronounced: male right valves are more elongate, with a rectilinear margin. Hinge of the right valves consists of two long, dentate ridges, with 8 to 10 teeth each, separated by a smooth groove. Left valves show opposite structures. The marginal zone is rather narrow, without vestibules. Other internal details not seen.

Dimensions (mm)		length	height
Holotype	LV-male KN-424.20/3/49	0.47	0.26
Paratype	RV-male KN-424.20/1/25	0.38	0.23
Paratype	RV-female KN-403.80/R/14.1.1	0.36	0.21
Paratype	RV-male KN-403.80/R/14.1.2	0.40	0.21
Paratype	RV-male KN-403.80/R/14.1.3	0.39	0.21
Paratype	RV-male KN-403.80/R/14.2.1	0.40	0.21
Paratype	RV-male KN-403.80/R/14.2.2	0.39	0.21
Paratype	RV-male KN-391.70/3/24	0.41	0.22
Paratype	RV-male KN-311.70/R/4	0.39	0.21

Mean and range of dimensions (mm)

	length	height
3 LV-males	0.46 (0.45-0.47)	0.27 (0.26-0.29)
7 RV-males	0.40 (0.38-0.41)	0.21 (0.21-0.23)
3 RV-females	0.37 (0.36-0.38)	0.20 (0.19-0.21)

Remarks. See "Remarks" on *Cardobairdia rectimarginata* sp. nov. The material described by Weaver (1982) as *Cardobairdia minuta* (van Veen, 1936) differs in having left valves with a distinct curve at the dorsal margin, a lower posterior end, while the right female valves are obviously narrower. These specimens are described in this paper as *C. cenomanensis* sp. nov. See also "Introduction".

Occurrence. Kallo: sample KA-560, probably Gulpen Formation, Upper Campanian. Knokke: Gulpen Formation, Lower Campanian to uppermost Campanian.

Stratigraphical and geographical range. Denmark: Maastrichtian (Joergensen, 1979); Federal Republic of Germany: Lägerdorf & Krons Moor, Campanian (*pilula* zone to *langei* zone) (Personal collection); German Democratic Republic: Rügen, Baltic Sea, Lower Maastrichtian ("Weissen Schreibkreide") (Herrig, 1966); Great Britain: Isle of Wight, ? Coniacian to Campanian (Hart *et al.*, 1987); The Netherlands: Drente, Middle Turonian to Lower Santonian ("Mergel" and "Schreibkreide") (Bonnema, 1940).

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Explanation of Plate 1.

Figs. 1-4. *Cardobairdia cenomanensis* sp. nov.:

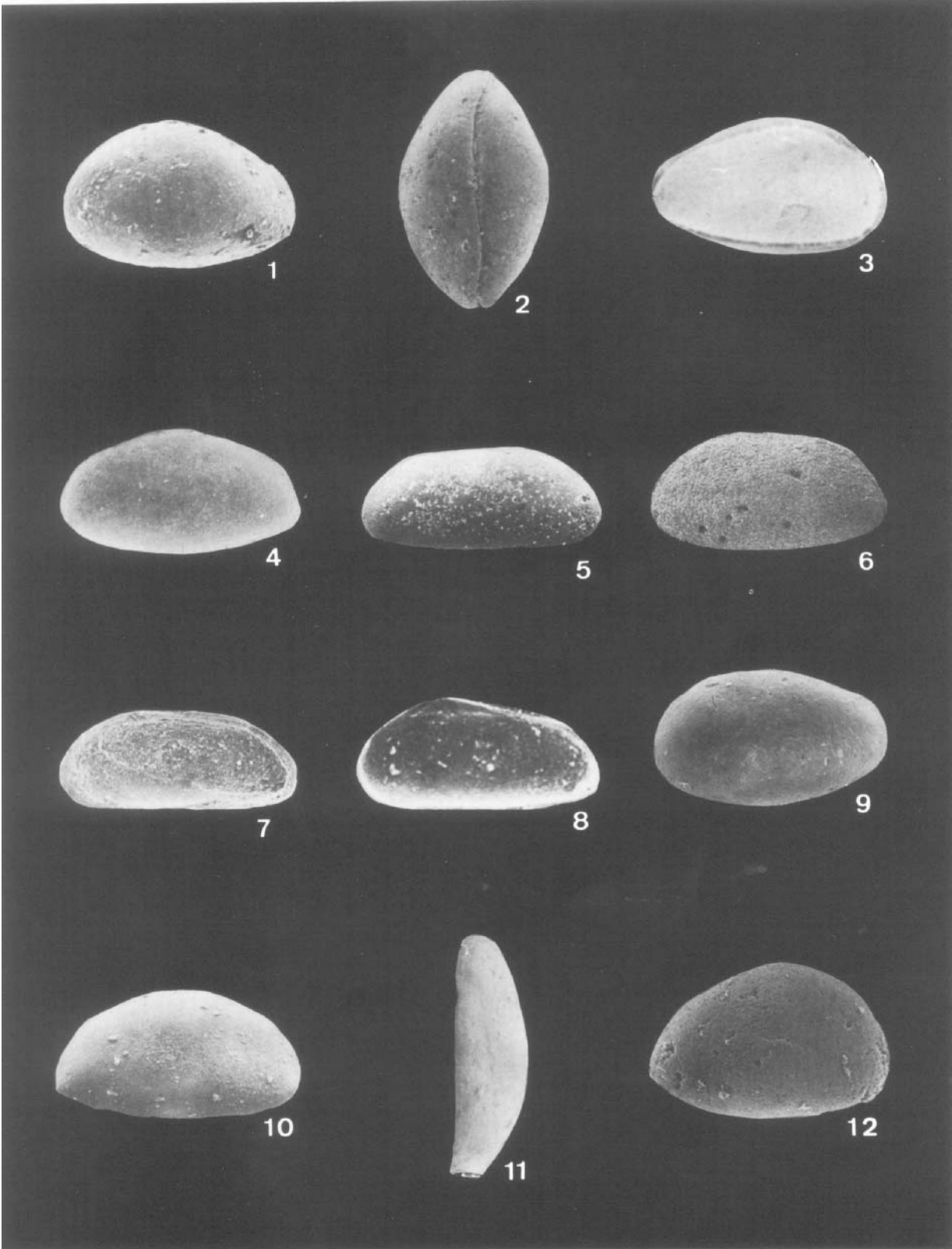
fig. 1, Holotype BM OS10016 female LV, ext. lat. (X 91); fig. 2, Paratype BM OS10017 female CA, ext. dorsal (X 105); fig. 3, Paratype BM OS10018 female CA, ext. lat. (X 88); fig. 4, Paratype BM OS10019 male LV, ext. lat. (X 87).

fig. 5-8. *Cardobairdia rectimarginata* sp. nov.:

fig. 5, Holotype KN-403.80/4/10 RV, ext. lat. (X 113); fig. 6, Paratype KN-417.30/1/1 LV, ext. lat. (X 107); fig. 7, Paratype KN-417.30/R/3 RV, int. lat. (X 87); fig. 8, Paratype KN-325.70/3/12 RV, int. lat. (X 102).

figs. 9-12. *Cardobairdia triebeli* sp. nov.:

fig. 9, Holotype KN-424.20/3/49 male LV, ext. lat. (X 86); fig. 10, Paratype KN-403.80/R/14.1.3 male RV, ext. lat. (X 105); fig. 11, Paratype KN-403.80/R/14.1.3 male RV, ext. dorsal (X 105); fig. 12, Paratype KN-403.80/R/14.1.1 female RV, ext. lat. (X 112).



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