

BOSQUET's (1862) inarticulate brachiopods: *Discinisca elslooensis* sp. n. from the Elsloo Conglomerate

by Urszula RADWANSKA & Andrzej RADWANSKI

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Abstract

A revision of the BOSQUET (1862) collection of inarticulate brachiopods, acquired about 140 years ago by the Royal Belgian Institute of Natural Sciences, shows that the whole collection, from the Elsloo Conglomerate, contains taxonomically conspecific material, despite its variable labelling and taxonomic interpretation by previous authors. The morphological features of complete shells, primarily of their ventral valves, clearly indicate that these inarticulate brachiopods can be well accommodated within the genus *Discinisca* DALL, 1871. Since none of the species names, used either by BOSQUET (1862) and in the collection labelling, or by subsequent authors, remains valid according to the ICZN rules, the revised material is herein diagnosed under a new species name, *Discinisca elslooensis* sp. n. Because of its occurrence in a residual-lag deposit, the content of which ranges widely in the stratigraphic column (Lower? Oligocene - Middle Miocene), the lifetime of the new species is probably Middle Miocene; this means the base of the "Bolderian" transgression, during which the Elsloo Conglomerate was formed.

Key-words: Brachiopods, *Discinisca*, new species, Miocene, Europe.

Résumé

La révision des brachiopodes inarticulés de la collection BOSQUET (1862), acquise il y a environ 140 ans par l'Institut royal des Sciences naturelles de Belgique, montre que ceux-ci, récoltés dans le Conglomérat d'Elsloo, appartiennent à la même espèce, malgré des interprétations taxonomiques et des étiquetages différents dus aux auteurs antérieurs. Les caractères morphologiques de coquilles complètes, essentiellement ceux de leurs valves ventrales, montrent clairement que ces brachiopodes inarticulés peuvent être inclus dans le genre *Discinisca* DALL, 1871. Etant donné qu'aucun des noms d'espèces utilisés par BOSQUET dans sa publication (1862) et sur les étiquettes de collection ou par des auteurs qui lui sont postérieurs, n'est valide d'après le CINZ, le matériel révisé est décrit comme espèce nouvelle, *Discinisca elslooensis* n. sp. Du fait de sa présence dans un dépôt de remaniement (conglomérat de base), le matériel révisé a une grande extension stratigraphique (Oligocène inférieur? – Miocène moyen). L'âge de la nouvelle espèce est probablement Miocène moyen, correspondant au début de la transgression "Bolderienne" au cours de laquelle le Conglomérat d'Elsloo s'est déposé.

Mots-clés: Brachiopodes, *Discinisca*, nouvelle espèce, Miocène, Europe.

Introduction

The present authors, during research on fossil representatives of the inarticulate brachiopods of the genus *Discinisca* DALL, 1871, from the Miocene of Poland (RADWANSKA & RADWANSKI, 1984), Oligocene of Austria (RADWANSKA & RADWANSKI, 1989), and topmost Cretaceous of Poland (RADWANSKA & RADWANSKI, 1994), have been informed by Annie V. Dhondt, that well preserved material of these invertebrates from the original collection of BOSQUET (1862) has been acquired by the Royal Belgian Institute of Natural Sciences in 1878. Annie V. Dhondt has kindly invited the present authors to revise this material to estimate its value and significance within the spectrum of recognized Neogene taxa of these inarticulate brachiopods.

The first insight of the present authors has clearly shown that the BOSQUET material differs very much from the illustrations in BOSQUET (1862). Part of the material is labelled as "*Discina Davidsoni* BOSQUET" a name not used by BOSQUET in his publications. According to information supplied by the Belgian Institute of Natural Sciences the date of the labelling (prior to, or subsequent to, the publication by BOSQUET, 1862) remains as yet unknown.

More intriguing is that this material represents a species quite different not only from that presented by BOSQUET (1862), but also from any referable species, either extinct or still living today. Its investigation has resulted in the recognition of its unique character: it commonly has the complete shells (ventral and dorsal valves conjoined), a feature extremely rare in fossil brachiopods.

Historical background

The name-giver of the discussed collection, Joseph Augustin Hubert Bosquet (1814-1880), pharmacist in Maastricht, was an eminent Belgian and Dutch palaeontologist, a well recognized student of fossil invertebrates, and a collaborator of Charles Darwin to whom he was supplying some specimens to the classical monograph of fossil cirripedes (see DARWIN, 1854, a footnote in the *Preface*, p. VII; CROUZEN 1994; cf. also JAGT, 1994).

For the brachiopods, BOSQUET paid special attention to the inarticulates, which were partly described in two papers (BOSQUET 1859, 1862). BOSQUET (1859) comprises a detailed study of the genus *Crania* from the Upper Cretaceous of the Limburg area, and its content has still remained monumental to our times. BOSQUET (1862), being a small contribution, contains a description and illustrations of an inarticulate species, named "*Discina Suessi* nov. spec. 1862", and coming from one locality, Elsloo, situated now in The Netherlands.

The taxon "*Discina suessi*" of BOSQUET (1862), richly illustrated as compared to the others established at that time, attracted the attention of specialists in the 1920's, when the research of ancient *Discina* and related genera progressed, after the recognition of their living relatives by DALL (1920).

To clarify the taxonomy and systematic position of the genera discussed, part of the scheme given by ROWELL (1965) is repeated at the family and lower levels. This despite the later placing of these families in different suborders of the order *Acrotretida* KUHN, 1949 (to avoid further misinterpretation, the formerly used taxonomy compatible with the referenced papers is given, instead of that newly introduced by WILLIAMS *et al.* 2000).

Family Discinidae GRAY, 1840

Subfamily Orbiculoideinae SCHUCHERT, 1929

Genus: *Orbiculoidea* D'ORBIGNY, 1847 (= a part of *Orbicula* CUVIER, 1798, of former authors)

Subfamily Disciniscinae SCHUCHERT, 1929

Genera: *Discinisca* DALL, 1871
Pelagodiscus DALL, 1908

Subfamily Discininae GRAY, 1840

Genus: *Discina* LAMARCK, 1819

Family Craniidae MENKE, 1828

Genus: *Crania* RETZIUS, 1781

Former taxonomic research

The first reviser of BOSQUET's taxon, THOMSON (1927), assigned it, albeit with a question mark, to the present-day genus *Pelagodiscus* DALL, 1908, and referred to it on one page (THOMSON, 1927, p. 131) as: "[?] *Discina suessi* BOSQUET, Lower Miocene, Belgium", and without a question mark, to the genus *Discinisca* DALL, 1871, on the following page (THOMSON, 1927, p. 132) as: "*Discina Nysti* BOSQUET, Oligocene, Limbourg, Holland".

If the first of these designations (THOMSON, 1927, p. 131) is quite curious (see also HERTLEIN & GRANT, 1944, p. 21), the second is realistic as concerns an attribution of the species to the genus *Discinisca*, but it uses the species name *nysti* which was given by BOSQUET (1862, p. 349) to a different brachiopod, an articulate *Terebratulina* from the Oligocene of Belgium.

MUIR-WOOD (1929, p. 466) in her review of fossil species of the genus *Discinisca* DALL, 1871, did not accept the assignment of the species to *Discinisca*, and referred it as "*Discina*" *suessi* BOSQUET, 1862 = *Orbiculoidea nysti* DAVIDSON. She argued that in this species ... "The flat lower valve has a narrow pedicle-groove like that of the genus *Orbiculoidea*, but the internal characters and much thickened shell margin show a greater

resemblance to *Crania* or *Discina*, and the exact relationship of this form is uncertain."

In an earlier paper RADWANSKA & RADWANSKI (1984, p. 260), when reviewing the Tertiary occurrences of the genus *Discinisca* DALL, 1871, commented: "The species "*Discina suessi*" established by BOSQUET (1862)... characterizes by a very solid structure of the valves, especially of the ventral one, their rectangular outline, and internal structure of the cranioid type...."

In a successive paper, reviewing the Oligocene occurrences, RADWANSKA & RADWANSKI (1989, p. 70) stated that the species "*Discina suessi*" of BOSQUET (1862) displays typical cranioid features and thus cannot be included into *Discinisca*. Moreover,.... the specific name *suessi* cannot be used in the genus *Crania* RETZIUS, 1781, since it becomes a younger homonym both to *C. suessi* BOSQUET, 1859 [a species recently placed by LEE & BRUNTON (1986, pp. 144-145) within the genus *Ancistrocrania* DALL, 1877] and to *C. suessi* REEVE, 1862, recently renamed by LEE & BRUNTON (1986, p. 152) as *Neocrania reevei* LEE & BRUNTON, 1986".

To conclude, at the time of the former research (RADWANSKA & RADWANSKI, 1984, 1989), it was obvious that the taxon introduced by BOSQUET (1862) as "*Discina suessi*" cannot be unequivocally attributed to a definite genus, and the validity of its species name cannot be recognized. The latter statement has subsequently been reinforced when it appeared that the species name *suessi* was also used for a Late Triassic species from the Austrian Alps (RADWANSKI & SUMMESBERGER, 2001, p. 117), having been introduced by GÜMBEL (1861, p. 274) for the taxon labelled by SUESS (1854, pl. 4, fig. 24) as "*Discina* sp.", but as "*Discina insignis* SUESS" in the original material (one specimen) deposited at the collection of the Geologische Bundesanstalt in Vienna (GOETEL, 1917, pp. 92-93; SIBLIK, 1988, p. 11; RADWANSKI & SUMMESBERGER, 2001).

From the aforementioned, it is evident that the species name *suessi* is preoccupied by *suessi* of GÜMBEL (1861), to which *suessi* of BOSQUET (1862) becomes a younger homonym. Consequently, neither the genus nor the species name of the taxon established by BOSQUET (1862) remain in accordance with the present-day taxonomic requirements.

The revised material

The material revised comprises 7 samples (Numbered 1 to 7) of the BOSQUET COLLECTION (I.G. 4285) 88/3, the content and labelling of which are presented below. Omitted is the stratigraphic age, noted at the time of labelling as the Middle Oligocene (with, or without, a question mark).

SAMPLE No. 2

Original label: "*Discina Davidsoni* BOSQ. (Junior)" and "J.B.";

Locality: Elsloo, 12 specimens;

Illustrated herein is one specimen (see Pl. 1, Figs 2a-2b).

SAMPLE No. 3

Original label: "*Discina Davidsoni* BOSQ." and "J.B.";

Locality: Elsloo, 3 specimens;

Illustrated herein is one specimen (see Pl. 2, Figs 3a-3c).

SAMPLE No. 4

Original label: "*Discina Suessi* BOSQ." and "J.B.";

Locality: Elsloo, 7 specimens;

Illustrated herein are four specimens (see Pl. 1, Figs 1a-1c and 3-4; Pl. 2, Fig. 2).

SAMPLE No. 5

Original label: "*Discina Suessi* BOSQ.", with the same handwriting as Samples No. 2-4, but without initials J.B.;

Locality: Stein, N. of Elsloo; 1 specimen.

SAMPLE No. 1

Original label: "Discina", with a similar hand-writing as Samples No. 2-5, but without initials J.B.;

Locality: Elsloo, 5 specimens;

Illustrated herein is one specimen (see Pl. 2, Figs 1a-1c).

SAMPLE No. 6

Labelled as "Discina sp." (no original label);

Locality: Elsloo, 13 specimens;

Illustrated herein is one specimen (see Pl. 1, Fig. 5).

SAMPLE No. 7

Residues obtained after treatment of many fragmentary specimens (104 in number) of "Discina" in hydrochloric acid; locality Elsloo. These residues, of no real scientific value, have not been studied.

An analysis of Samples No. 1 - 6 shows that their content does not differ substantially. All samples from Elsloo (No. 1-4, and 6), and Sample No. 5 from Stein, contain specimens of identical morphology. Their state of preservation is variable: either closed shells, usually more or less fragmented (crushed, peeled-off) and/or worn, or isolated valves and their hash contained in the rock pieces. None of the closed shells could be opened, and neither of the isolated valves could be extracted from the hard rock matrix.

A detailed investigation of all specimens from Samples No. 1-6 does not allow to indicate any difference between those labelled as "Discina Davidsoni BOSQ.", or "Discina Suessi BOSQ.", and those named solely "Discina" or "Discina sp.". A distinction, in Sample No. 2, of a separate group "Discina Davidsoni BOSQ. (Junior)" is assumed to refer to the juvenile specimens; nevertheless, all the so-labelled specimens (numbering 12), except one illustrated herein (Pl. 1, Figs 2a-2b) are not smaller than those from other samples.

Consequently, the whole inarticulate-brachiopod material from Elsloo and Stein is recognized to be evidently conspecific, and represented by adult specimens.

BOSQUET'S (1862) figures and labelling names

An examination of the material allows a new insight into the original description and illustrations presented by BOSQUET (1862), as well as into the label inscriptions in the BOSQUET collection (I.G. 4285) of the Royal Belgian Institute of Natural Sciences. Firstly, it is necessary to pay attention to the following three points:

- (1) BOSQUET (1862, p. 347) was aware of similarities between his specimens and those of the genus *Crania*;
- (2) BOSQUET (1862, also p. 347) was in contact with DAVIDSON. He referred to DAVIDSON'S data and especially to species still unpublished;
- (3) BOSQUET (1862, p. 348) clearly stated that his specimens are more or less poorly preserved, and therefore all the figures were drawn on the basis of a very great number of specimens ("un très-grand nombre d'individus").

To comment the above three points, we conclude, that:

Ad (1) and (3) None of the figures in BOSQUET (1862, figs. 1-5) illustrate a real specimen, and all interpretative parts of his figures (not indicated by the engraver) were stimulated by features of the brachiopod genera he was familiar with, that is either *Crania*, or the present-day *Discina* [the genus *Discinisca* not having been established yet!];

Ad (2) The species name *davidsoni* could have appeared in labels written either by BOSQUET himself, or by his collaborators/successors when it was recognized that the name *suessi*

could be confused either with the so-named species of *Crania* by BOSQUET (1859), or with the same name introduced coevally for another species of *Crania* by REEVE (1862), or slightly earlier, by GÜMBEL (1861), for the "Discina" species from the Alps. It does not explain, however, why the name "Discina davidsoni BOSQUET" was used only in a part of BOSQUET'S collection (Samples No. 2 and 3; as a guess, should they be labelled subsequently to those numbered 4 and 5?).

The name "Discina Davidsoni" has been used frequently since MOORE (1867, p. 540 and pl. 16, fig. 29) introduced it to distinguish very tiny, almost microscopic (1.5 mm in diameter) circular shells, centrally apexed, from the Lower Lias of England. The so-established taxon has not been approved by DAVIDSON (1874-1882, p. 84 and suppl. pl. 10, figs 11, 11a), and it has evidently nothing in common with the material studied by BOSQUET.

When the figures presented by BOSQUET (1862, figs 1-5) are concerned, it may easily be demonstrated which features are real and which interpretative.

A radial pattern of very indistinct and discontinuous furrows on the outer side is a peculiar feature of the shell sculpture precisely described by BOSQUET (1862, figs 1a and 3); it is also transmitted as radial shadows ("ghosts") on the inner side of the valves (BOSQUET, 1862, fig. 2). Moreover, correctly recognized is the relatively greater thickness of valves (BOSQUET, 1862, figs 1a and 4).

Two of the features presented in BOSQUET (1862) do not always occur: the round-subtetragonal ("arrondi-sub tétragonal", p. 346, and figs 1a, 2, 3-4, 5a) outline of the valves should rather be regarded as a tendency in some specimens, and not as a constant feature. Interestingly, the sketch-outlines of the fully figured specimens (figs 1b and 5b) are almost circular, to an extent almost identical to most of the studied specimens. The highly elevated profile of the dorsal valve (fig. 1c) has not been found in any of the studied specimens.

The impressions of the mantle canals (*vascula*) exposed at the anterior margin of the adult ventral valve (BOSQUET, 1862, fig. 4) are not discernible in the studied specimens; correctly reported (ibid. fig. 5a) is their lack in a juvenile valve. In the studied specimens, however, they are recognizable in dorsal valves (see below).

A picture of the thick, obtuse limb on the ventral-valve anterior (BOSQUET, 1862, figs 4 and 5a) was supposedly stimulated by that of *Crania*, as may be inferred from BOSQUET'S own statement (ibid. p. 346). Such a limb has not been stated in any of the studied specimens, but its occurrence is known in other *Discinisca* species of Tertiary age (although on their dorsal, not ventral, valves), as shown by RADWANSKA & RADWANSKI (1984, 1989).

Two features were incorrectly drawn: the pedicle arc of the ventral valve (BOSQUET, 1862, fig. 3) and the pattern of the muscle scars (ibid, figs 4 and 5a). The first was probably inspired by the structure of the pedicle arc in the genus *Discina*, and the second one by a muscle-scar pattern of the present-day disciniscan, illustrated e.g. by DAVIDSON (1856, fig. 51 and pl. 5, fig. 20c).

The taxonomy of the BOSQUET material

The data above clearly indicate that the species names *suessi* and *davidsoni* cannot be kept for the revised BOSQUET material, and thus the species taxon from Elsloo and Stein, attributable to the genus *Discinisca* DALL, 1871,

must be re-named. To avoid any further nomenclatorial confusion, the investigated material is diagnosed as a separate species, under a new species name, *Discinisca elslooensis* sp. n., of which the holotype is chosen from Sample No. 4, labelled as "*Discina Suessi* BOSQUET".

Systematic account of the studied material

The systematic position of the new species is given according to the scheme presented by ROWELL (1965), followed by RADWANSKA & RADWANSKI (1989, p. 71) and RADWANSKI & SUMMESBERGER (2001, p. 112).

Phylum Brachiopoda DUMÉRIL, 1806

Class Inarticulata HUXLEY, 1869

Order Acrotretida KUHN, 1949

Suborder Acrotretidina KUHN, 1949

Superfamily Discinacea GRAY, 1840

Family Discinidae GRAY, 1840

Subfamily Disciniscinae SCHUCHERT, 1929

Genus *Discinisca* DALL, 1871

TYPE SPECIES: *Discinisca lamellosa* (BRODERIP, 1834);

O.D. DALL, 1871

[*Orbicula lamellosa* of BRODERIP (1834, p. 142); as corrected by RADWANSKI & SUMMESBERGER (2001, p. 112)]

Discinisca elslooensis sp. n.

Plates 1 - 2

Holotype: The specimen (complete shell) presented in Pl. 1, Figs 1a-1c; deposited in the Royal Belgian Institute of Natural Sciences, Collection BOSQUET, Catalogue Number IRSNB-CI 6002.

Paratypes: The specimens presented in Pl. 1, Figs 2-5 (IRSNB-CI 6003-6006) and Pl. 2, Figs 1-3 (IRSNB-CI 6009-6011); the same Depository and Collection.

Type locality: Elsloo, Zuid-Limburg, The Netherlands.

Type-horizon: A residual lag (The Conglomerate of Elsloo = Elsloolaag) at the base of the "Bolderian" Stage, Middle Miocene (see below).

Derivatio nominis: Neo-Latinized adjective, *elslooensis*, referring to the type locality, Elsloo.

Material: Forty specimens of various kind (complete shells, isolated valves and their hash), either loose or contained in the rock matrix, all but one from the type locality Elsloo; one specimen (in a rock fragment) from Stein. The complete shells usually preserved with their two valves conjoined in life position, but in some specimens the valves are slightly rotated one against the other (Pl. 1, Figs 2a-2b).

Measurements: The holotype (almost circular in outline) is 8.0 mm long antero-posteriorly, and 7.2 mm wide; the paratypes are of a similar size, and of these the largest

(Pl. 2, Figs 3a-3c) is 11.4 mm long, the smallest (Pl. 1, Figs 2a-2b) is 7.0 mm long, but 7.1 mm wide. Not illustrated are fragments of shells estimated as 12.2-12.5 mm long.

Diagnosis: Medium-sized for the genus, distinctly thick-shelled, almost circular, but tending to rectangular (quadrangular) in outline; ventral valve slightly concave to almost flat; dorsal valve low-conical in profile, with apex placed subposteriorly to fully posteriorly; ornament very obsolete or lacking, but growth lines distinct, grouped into tumescent bands; pedicle arc very small with a short pedicle slit, and a very short median septum on the inside.

Description. The organophosphatic shells, almost deep black in colour, are medium-sized but relatively thick-walled as for the genus. The shells, being lamellose in structure, are usually peeled-off along particular lamellae or their parts; the peeling-off is more advanced in ventral valves (Pl. 1, Figs 2b, 4; Pl. 2, Fig. 2). Lamellar structure of the valves is well discernible both on their exteriors where it is manifested by the growth lines (Pl. 1, Figs 1a, 2a-2b, 3-4; Pl. 2, Figs 1a-1b), as well as their interiors (Pl. 1, Fig. 5; Pl. 2, Fig. 2). The growth lines gather into more or less distinct bands, which usually become tumescent at their anterior margin (Pl. 1, Figs 1a-1b, 3-4; Pl. 2, Figs 1a-1b); a lack of distinct bands in some specimens results most likely from wearing (Pl. 2, Figs 3a-3c).

An overall shell outline is more or less circular (Pl. 1, Fig. 3; Pl. 2, Figs 1a-1b, 2), with a tendency of elongation anteriorly, to acquire a rectangular, almost quadrangular shape (Pl. 1, Figs 1a-1b; Pl. 2, Figs 3a-3b), although specimens wider than long are also present (Pl. 1, Figs 2a-2b).

The ventral (pedicle) valve is slightly concave to almost flat, and the dorsal (brachial) low conical in profile, with the apex placed subposteriorly (Pl. 1, Fig. 1c; Pl. 2, Figs 1c, 3c) to fully posteriorly (Pl. 1, Fig. 2a).

On the inside of the dorsal valve impressions of the mantle canals are visible in some specimens (Pl. 2, Fig. 3a) (*vascula*; compare WILLIAMS & ROWELL, 1965, figs 21B and 138/J; RADWANSKA & RADWANSKI, 1989, text-fig. 2 and pl. 1, fig. 1c).

The slightly depressed pedicle arc (*area*, or *disc*, of some authors) is very small, with a short pedicle slit bordered by swollen ridges depressed anteriorly (Pl. 1, Figs 1b, 3); in some specimens the bordering ridges are distinctly elevated (Pl. 1, Fig. 4).

The pedicle-slit part of the pedicle arc in specimens bearing the apex posteriorly is usually abraded (Pl. 1, Fig. 2b; Pl. 2, Fig. 1b). The inner side of the ventral valves displays a well pronounced, but very short median septum (Pl. 2, Fig. 2).

Ornament is very obsolete or completely lacking, as may be ascertained from the studied specimens that all underwent more or less advanced abrasion, regardless their being either complete shells, or isolated valves. Thus, only in some specimens, particularly on their dorsal

valve, an indistinct radial (apically convergent) pattern, composed of shallow, poorly regular, discontinuous furrows (Pl. 1, Fig. 2a) is detectable. This pattern is transmitted to the innersides of some valves, both dorsal and ventral (not visible in the photographs of Plates 1-2, since all specimens were coated with ammonium chloride!).

R e m a r k s. The newly established species, *Discinisca elsloensis* sp. n., does not bear any morphologic resemblance to the Neogene and present-day congeneric species, none of which is so thick-shelled, low-conical to nearly flat, and devoid of distinct ornamentation (review in RADWANSKA & RADWANSKI, 1984, 1989).

Nevertheless, some features of *D. elsloensis* sp. n., should be commented. The outline variability of the shells and their profile, with the apex placed subposteriorly to fully posteriorly, are identical with those displayed by the fossil *Discinisca* species known from a relatively great number of specimens (RADWANSKA & RADWANSKI, 1984, 1989). Such variability of the shell shape is especially well manifested in *D. steingeri* RADWANSKA & RADWANSKI (1989, pls 1-4) from the Oligocene of Austria.

The studied specimens from Elsloo and Stein, although damaged to a considerable extent, are not compressed dorso-ventrally, and their pronounced flatness is of primary origin. In result of this, some of the circular, low-conical specimens, when abraded, are almost flat, or ideally flat, shaped like an ancient Roman coin.

A unique feature of the studied species is the preservation of complete shells, containing the pedicle valve, which feature is extremely rare in the fossil state. The majority of the hitherto known fossil *Discinisca* species are based upon isolated dorsal valves that are usually thicker and more solid than the ventral ones.

To the present authors' knowledge, complete shells of the fossil *Discinisca* species were credibly reported in the four species only: (1) *D. townshendi* (DAVIDSON, 1851), probably identical with *D. babeana* (D'ORBIGNY, 1852), from the Rhaetian of England and France (DAVIDSON, 1851; DESLONGCHAMPS, 1862; MUIR-WOOD, 1929, p. 467); (2) *D. humphresiana* (J. de C. SOWERBY, 1829) from the Kimmeridgian of France (DESLONGCHAMPS, 1862; DAVIDSON, 1874-1882, pp. 81-82; MUIR-WOOD, 1929, p. 467); (3) *D. bosniaca* (KITTL, 1904) from the Triassic of Sarajevo in Bosnia, and (4) *D. sibirica* (MOISSIEIEV, 1947) from the Triassic of Siberia (DAGYS, 1965). A few reports concerned cases of shells adhering to the substrate, and having only the dorsal valve exposed (DAVIDSON, 1851; MUIR-WOOD, 1929, 1939; RADWANSKA & RADWANSKI, 1984, p. 259).

Moreover, isolated ventral valves regarded as conspecific with isolated dorsal ones collected from the same bed(s)/locality were reported in the three cases, as follows: *Discinisca zapfei* RADWANSKI & SUMMESBERGER, 2001, from the Late Triassic of the Austrian Alps, *D. spitsbergensis* BIERNAT, 1995, from the Early Jurassic of Spitsbergen, and *D. perrini* HERTLEIN & GRANT, 1944, from the Miocene of California, U.S.A.

All the above indicated reports document the fully mineralized pedicle arc of the ventral valve, unlike the organic membrane which is typical of the present-day *Discinisca* species of which the ventral valve was illustrated (MUIR-WOOD 1929, fig. 42/1; COOPER, 1973, pl. 1, figs 18-20; and 1977, pl. 2, figs 19-20 and 22). A relevant discussion on the relation between fossil and living *Discinisca* species is beyond the scope of this paper.

Environment and stratigraphical age

The Conglomerate of Elsloo ("Gravier d'Elsloo"), a small lithostratigraphic unit classical for Belgian and Dutch geology, is an irregular, thin layer exposed along the banks of the Maas River, and referred to the base of the "Bolderian Stage" of Middle Miocene age (HALET, 1920; DE HEINZELIN & GLIBERT, 1957, pp. 34-35; TAVERNIER & DE HEINZELIN, 1963; VAN DEN BOSCH *et al.*, 1975). Its type section, known also as the Elsloo Cliff, was first studied by BINKHORST VAN DEN BINKHORST (1859), BOSQUET (1862), and VON KOENEN (1863); subsequently, new exposures appeared along the neighbouring Juliana Canal (VAN DE GEYN 1937, pp. 295-296). The age of the deposit has long been regarded as Oligocene and/or interpreted within a wide range since the Lower(?) Oligocene to the Upper Miocene, or even Pliocene, dependently upon a correlation either with the Belgian, or the German lithostratigraphic schemes (VAN DE GEYN, 1937; VAN DEN BOSCH, 1964 a,b; VAN DEN BOSCH *et al.*, 1975).

The conglomeratic layer, a few to over a dozen centimetres thick, exposed at Elsloo and the neighbouring locality Stein, is composed of subangular pieces or pebbles of fine-grained, slightly glauconitic sandstones, cemented locally by phosphates. Such pieces are sometimes replete with valves of *Discinisca elsloensis* sp. n., and/or valve hash, but also complete shells, that may even form a kind of coquina (lumachelle). The lithology of the *Discinisca*-bearing pieces or pebbles, as seen under the microscope (thin-sections from Sample No. 6), is also typified by the presence of vermicular phosphatic bodies which are comparable to present-day phosphatized faecal pellets of archaeogastropod origin (BANDEL, 1974). The ubiquitous fossils of the discussed layer, containing corals, mollusks (primarily bivalves, some scaphopods), bones of whales (bullae included) and seals, diverse elasmobranch teeth, together with pebbles and wood pieces, have formed a residual lag (the "Elsloolaag" of VAN DEN BOSCH 1964a,b) at the base of the Middle Miocene (Bolderian) transgressive sequence. Some of the Elsloolaag fossils are commonly thought to have been reworked from the older Miocene and/or Oligocene deposits (LERICHE, 1921; VAN DE GEYN, 1937; TAVERNIER & DE HEINZELIN, 1963; VAN DEN BOSCH, 1964a).

Under such circumstances only little can be inferred about the environmental conditions in which *Discinisca elsloensis* sp. n. lived. Probably, these conditions were comparable with those required by the present-day species of the genus: shallow-marine with depths decreasing to zero at extreme tides, situated within the tropical and/or subtropical climatic zone (review and references in RADWANSKA & RADWANSKI, 1984, 1989, 1994). LERICHE (1921, 1926), VAN DE GEYN (1937) and VAN DEN BOSCH (1964b) reached a similar conclusion on the presence of tropical elements in the "Elsloolaag" fauna from an analysis of the fish remains, primarily the sharks and other elasmobranchs.

Regardless the bottom habitat to which the newly established species *Discinisca elsloensis* sp. n. was confined, and which

originally could have been sandy and/or gravelly (RADWANSKA & RADWANSKI, 1989), shell coquinas (RADWANSKA & RADWANSKI, 1984), aquatic plants (RADWANSKA & RADWANSKI 1994) thriving within the photic zone (RADWANSKI & SUMMESBERGER, 2001), all these possible bottom conditions are diagnostic of depths not greater than the wave base. Any stronger, for instance stormy, agitation could easily have involved reworking and redeposition (?tempestite) of the bottom material, and have formed the "Elsloolaag" in which the studied inarticulate brachiopods *D. elsloensis* sp. n. have definitely been entombed.

Consequently, it is inferred that the representatives of the newly established species, *D. elsloensis* sp. n., have supposedly lived just at the time of the Bolderian transgression in the Middle Miocene. Their thick-walled shells survived a temporary stirring-up and abrasion by stormy agitation, and were accumulated in a coquina-like aggregations along the shallow offshores. Less probable is their exhumation from the underlying strata and redeposition during which even their thick, but weakly mineralized, organophosphatic shells had little chance to escape total damage.

Final remarks

A new species of inarticulate brachiopods, *Disciniscia elsloensis* sp. n., in the Bosquet Collection, shows a

unique character concerning the common occurrence of complete shells (ventral and dorsal valves conjoined), and their peculiar morphology (thick-walled, low-conical, almost devoid of ornamentation; pedicle valve with the fully mineralized pedicle arc and a very small pedicle slit), well distinguishing it from any other species of the genus *Disciniscia* DALL, 1871, either extinct or living today.

In spite of its rather poor state of preservation, *Disciniscia elsloensis* sp. n. newly established upon specimens from the Bosquet Collection, considerably enriches our knowledge on the shell structure of ancient representatives of the genus *Disciniscia* DALL, 1871, and their relation to the present-day congeners.

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Urszula RADWANSKA & Andrzej RADWANSKI
Institute of Geology, University of Warsaw,
Al. Żwirki i Wigury 93; PL - 02-089 Warszawa, Poland

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Explanation of Plates

PLATE 1

Discinisca elslooensis sp. n.

- Fig. 1a-1c — Holotype, complete shell: 1a – Dorsal valve, outer view; 1b – Ventral valve, outer view; 1c – Side view of the shell; Sample No. 4 (IRSNB – CI 6002).
- Fig. 2a-2b — Complete shell, with valves slightly rotated: 2a – Dorsal valve, outer view (visible are indistinct radial furrows anteriorly and left-laterally); 2b – Ventral valve partly broken, outer view (arrowed is the apex of the dorsal valve, to focus rotation of the valves); Sample No. 2. This is the smallest of the specimens studied (IRSNB – CI 6003).
- Fig. 3 — Ventral valve, outer view of a complete shell (dorsal valve heavily damaged); Sample No. 4 (IRSNB – CI 6004).
- Fig. 4 — Ventral valve, outer view of a complete shell (dorsal valve heavily damaged); Sample No. 4 (IRSNB – CI 6005).
- Fig. 5 — Valve hash (inner view of dorsal) in a rock matrix: the most common occurrence mode of the studied species in the Elsloolaag; Sample No. 6 (IRSNB – CI 6006).

Specimens coated with ammonium chloride; all photographs taken x 7.5

PLATE 2

Discinisca elslooensis sp. n.

- Fig. 1a-1c — Complete shell: 1a – Dorsal valve, outer view; 1b – Ventral valve, outer view; 1c – Side view of the shell; Sample No. 1 (IRSNB – CI 6009).
- Fig. 2 — Isolated ventral valve, inner view; Sample No. 4 (IRSNB – CI 6010).
- Fig. 3a-3c — Complete shell: 3a – Dorsal valve, outer view; at the anterior margin, where the valve is heavily abraded, visible are impressions of the mantle canals (*vascula*) on the innerside of the valve; 3b – Ventral valve, outer view; 3c – Side view of the shell; Sample No. 3 (IRSNB – CI 6011).

Specimens coated with ammonium chloride; all photographs taken x 7.5.

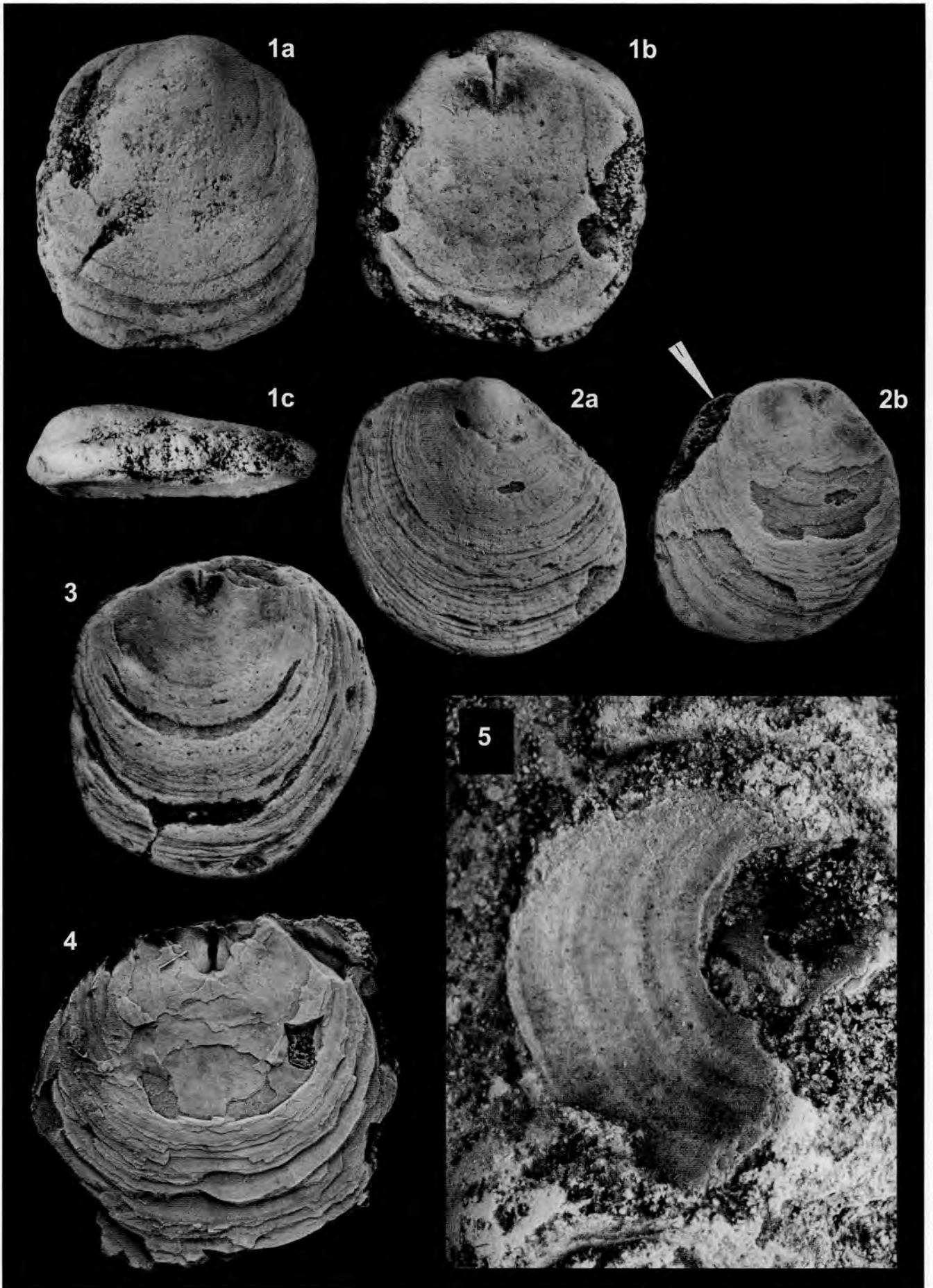


PLATE I

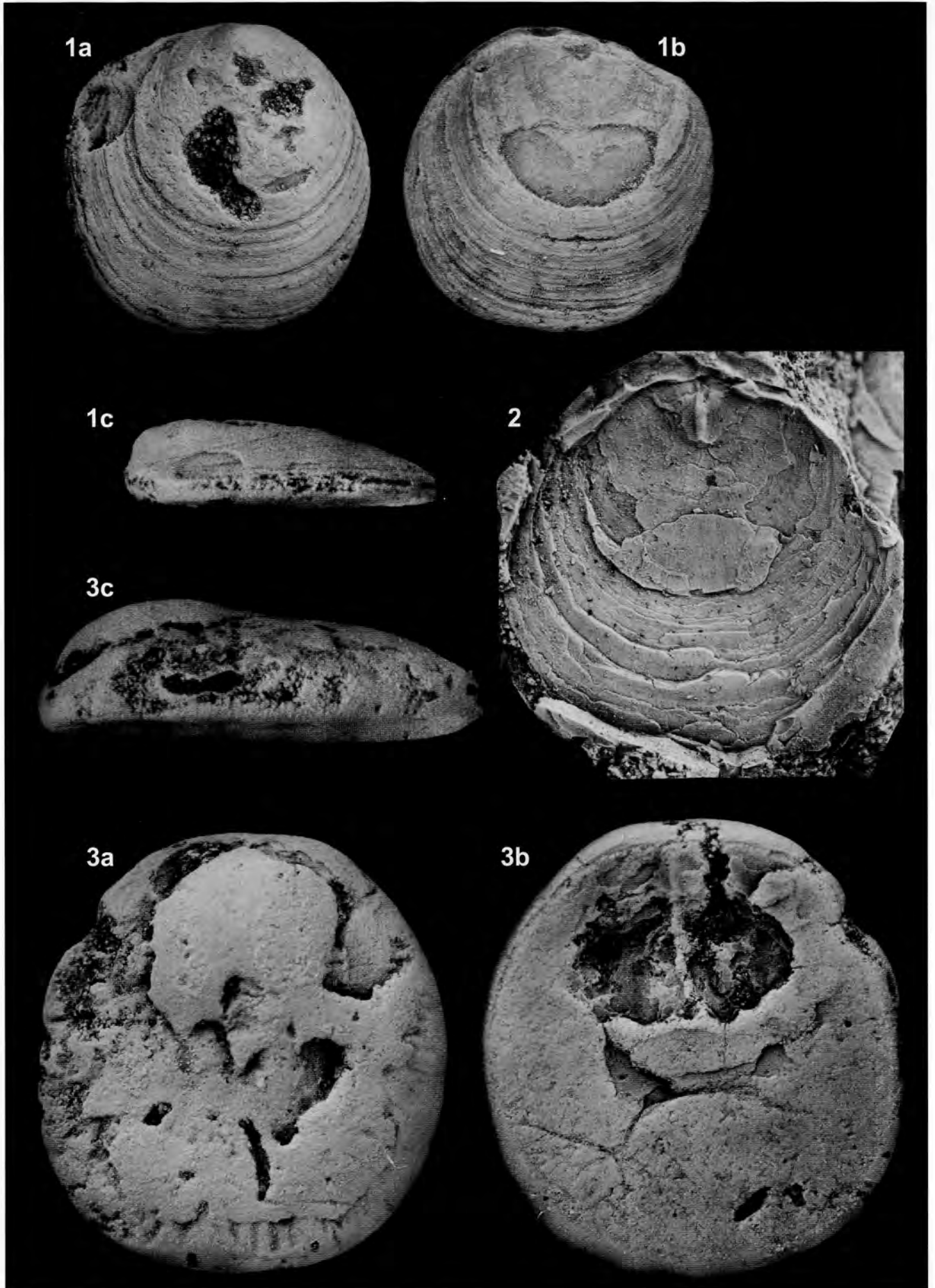


PLATE 2