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SHORT NOTE - NOTA BREVE

A NEW *DAONELLA* FROM THE LADINIAN PLATFORM OF THE ESINO LIMESTONE (SOUTHERN ALPS, ITALY)

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Abstract. The bivalve *Daonella* Mojsisovics, 1874 is very common in the Middle Triassic pelagic facies, whereas the record of this genus from shallow water limestones is rare. In the present paper a new species of *Daonella*, named *D. pseudograbensis*, is described from the Esino Limestone, a Ladinian (Middle Triassic) carbonate platform in the central Southern Alps. The species is described from Brembana Valley, where the Esino Limestone is rather rich in bioclastic lenses yielding faunas with bivalves, cephalopods, gastropods, brachiopods, corals and calcareous algae.

Daonella pseudograbensis n. sp. is based on very well preserved specimens, which are often articulated and closed, all coming from the same locality. The new species shows a narrow range of intraspecific and ontogenetic morphologic variations. It is easy distinguishable from the other species of the genus for the outline and ornamentation; it therefore differs from *D. grabensis* Kittl, 1912, the most similar species, for the longer anterior dorsal margin.

Riassunto. Il bivalve *Daonella* Mojsisovics, 1874 è molto comune nelle facies pelagiche medio triassiche, mentre le segnalazioni di questo genere in facies calcaree di acque basse risultano rare. In questa nota viene descritta una nuova specie di *Daonella*, denominata *D. pseudograbensis*, proveniente dalla piattaforma ladinica del Calcare di Esino (settore centrale delle Alpi meridionali). La specie è riconosciuta solo in Val Brembana, dove il Calcare di Esino è ricco in lenti bioclastiche molto fossilifere con bivalvi, cefalopodi, gasteropodi, brachiopodi, coralli ed alghe calcaree.

Daonella pseudograbensis n. sp. è descritta su esemplari molto ben conservati, che sono spesso articolati e con valve chiuse, provenienti tutti dalla stessa località. La nuova specie mostra una variabilità intraspecifica ed ontogenetica molto stretta, ed è facilmente distinguibile dalle altre specie del genere per il contorno e l'ornamentazione; la specie più simile è *D. grabensis* Kittl, 1912, da cui si distingue per il margine dorsale anteriore più lungo.

Introduction

The Esino Limestone is a Ladinian carbonate platform in Lombardy locally extremely rich in megafossils. The classic area of Grigne (East of Lake Como) is known since the Stoppani's monograph (1858-1860) for the faunas rich in bivalves, gastropods, cephalopods, brachiopods, but in the recent years several extremely rich localities in the Brembana Valley area, and in particular the Parina Valley, were discovered due to the enthusiastic work of G. Gervasutti, an amateur paleontologist who donated a huge collection of more than 20,000 specimens from this area to the Museo Civico di Scienze Naturali "Enrico Caffi" in Bergamo (Paganoni 1985). The specimens were very carefully collected, therefore the Gervasutti collection provided the basis for scientific contributions on ammonoids (Fantini Sestini 1994, 1996) and brachiopods (Torti & Angiolini 1997). This short note deals with the bivalves, which are one of the most common groups recorded in the Esino Limestone of Brembana Valley area.

The Esino Limestone in central Brembana Valley

The central Brembana Valley is an interesting area for the study of the Esino Limestone (Fig. 1), not only

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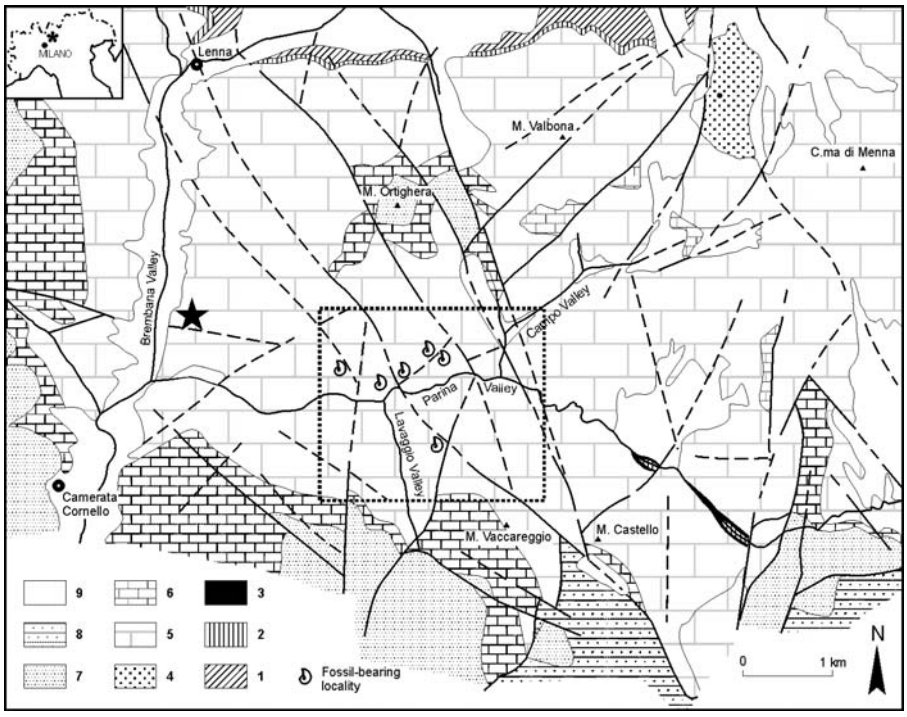

Fig. 1 - Geological sketch map of the Parina Valley area (redrawn from Jadoul et al. 1992, fig. 1). The star shows the position of site S1188. 1) Angolo Limestone; 2) Prezzo Limestone; 3) Buchenstein Formation; 4) Perledo-Varenna Limestone; 5) Esino Limestone; 6) Breno Formation; 7) Val Sabbia Sandstone and Gorno Formation; 8) S. Giovanni Bianco Formation; 9). Quaternary deposits. Dotted frame emphasizes the most fossiliferous part of the Esino Limestone in Parina Valley (see Fantini Sestini 1994, 1996; Torti & Angiolini 1997).

because the unit is well exposed, but especially because it is relatively well accessible. The deeply incised Parina Valley provides a natural cross section East-West oriented which cuts the platform of the Esino Limestone from the top (Breno Formation at Monte Ortighera), to the base (Buchenstein Formation on the valley floor). Moreover the Parina Valley cross section is located in a very complex setting of the carbonate platform, very close to a basin that was developed immediately South to the southern slope of the Parina Valley (Jadoul et al. 1992).

The Gervasutti collection was collected from various sites located along the Parina Valley, from 2 km west of Oltre il Colle to the valley mouth. The most rich and diversified fossil-bearing localities are actually concentrated in the middle part of the Parina Valley (dotted frame in Fig. 1).

The occurrence of Daonellids

Daonellids are not the most common bivalves within the Esino Limestone of central Brembana Valley, but they can be found within the collections from the sites S747, S944E-F, S1011E-F-P, S1046, S1062, S1170, S1171, S1188, S1191, S1490, S1491 and S1603A (Torti 1999). In particular, the thanatocoenosis from site S1188, is of great interest because of the extraordinary preservation of the daonellids: the specimens in fact are not flattened, and often the valves are articulated and closed. The biometric analysis on the fauna shows a monotypic population of medium to large sized specimens (Fig. 2). Moreover the systematic analysis demonstrates that this population cannot be included in any of the species of *Daonella*, then we separate it as the new species *Daonella pseudograbensis*.

Stratigraphic position and age of *Daonella pseudograbensis* n. sp.

The site S1188 consists of slope debris, and is located on the left hand side of the Brembana Valley, 1 km North of the junction of the Parina River with the Brembo River (Fig. 1). The debris is from outcrops located a little higher, i.e., probably between 650 and 850 a.s.l.

The uncertain position of *Daonella pseudograbensis* n. sp. within the Esino Limestone, is only in part due to the collection ex situ, but mostly relies on the lack of bio-chronostratigraphic data for the Esino Limestone at the mouth of the Parina Valley. Ammonoid calibration of the Esino Limestone is available only for the most fossiliferous part of the unit in the mid Parina Valley (see dotted frame in Fig. 1; Fantini Sestini 1994, 1996). There, the fossiliferous succession covers the interval from the Curionii to the Archelaus Zones (Lower Ladinian to lower Upper Ladinian: Fantini Sestini 1996). Then the age of *Daonella pseudograbensis* n. sp. could be comprised within this interval. A more accurate dating is not possible at the present, because the position of the ammonoid zones within the Esino Limestone shows significant lateral changes (Fantini Sestini 1996, tab. 2). The boundaries of the ammonoid

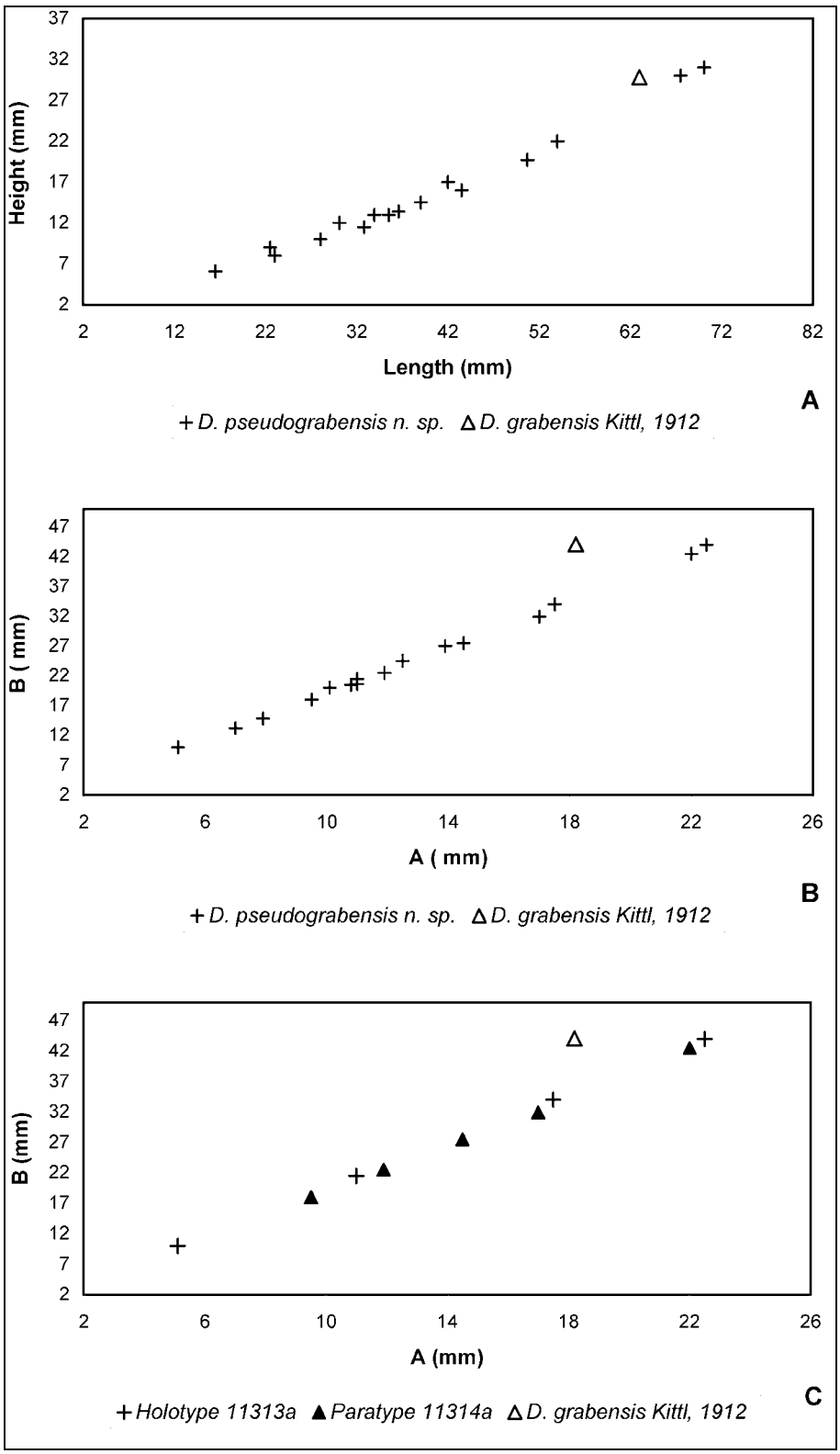

Fig. 2 - Comparison between type specimens of *Daonella pseudograbensis* n. sp. and the holotype of *D. grabensis* Kittl, 1912. A) Height *vs* Lenght. B) B *vs* A; C) Ontogeny of specimens MSNBG 11314a (S1188/1) and MSNBG 11313a (S1188/2). Measurements are listed in the Appendix.

zones cannot therefore be laterally traced from the mid Parina Valley to the Brembana Valley.

Systematic Palaeontology

Suprageneric taxonomy, shell morphology and dimensional terminology is taken from McRoberts (2000) and/or from Schatz (2004), with the exception of the term plica which is here used for the elements of radial sculpture.

All figured and described specimens are housed at the Museo Civico di Scienze Naturali, Piazza Cittadella 10, 24100 Bergamo, Italy. Numbering of specimens: specimens are identified by inventory number (acronym MSNBG) and sample number in brackets. The latter reports the locality of collection and the number of

the specimen. The holotype of *Daonella grabensis* Kittl, 1912 is housed at Naturhistorisches Museum Wien (NHMW), Austria.

Acronyms. A: length of the anterior hinge line; B: length of the posterior hinge line; α: angular value between the posterior hinge line and the line connecting the beak with the posterior-most shell point (for details about these parameters: Schatz 2001a).

Class **Bivalvia** Linnaeus, 1758

Subclass **Pteriomorphia** Beurlen, 1944, emend. Waller, 1978

Order **Pterioida** Newell, 1965, emend. Waller, 1978

Superfamily Halobioidea Campbell, 1994

Family Halobidae Kittl, 1912

Genus *Daonella* Mojsisovics, 1874

Type species: *Halobia lommeli* Wissman, 1841

Daonella pseudograbensis n. sp.

Pl. 1, figs 1-23; Fig. 3.1-4.

?2005 *Daonella* sp. - Schatz, p. 191, fig. 1E.

Etymology. The name points out the morphological similarities with *D. grabensis* Kittl, 1912.

Type series. Holotype: MSNBG 11313a (S1188/2) (Pl. 1, Fig. 11; Fig. 3.1-4). 22 paratypes (PL. 1, Fig. 1-10, 12-23): MSNBG 11314a (S1188/1), 11313b (S1188/3), 11313f (S1188/7), 11315a (S1188/9), 11315b (S1188/10), 11316a (S1188/12), 11316b (S1188/13), 11317 (S1188/15), 11318a (S1188/17), 11318b (S1188/18), 11319 (S1188/20), 11320 (S1188/22), 11321 (S1188/24), 11322a (S1188/25), 11323a (S1188/29), 11323b (S1188/31), 11323c (S1188/32), 11323d (S1188/33), 11323e (S1188/34), 11323f (S1188/35), 11324 (S1188/36), 11314b (S1188/37).

Other specimens not included in the type series. 23 specimens: MSNBG 11313c-e (3 specimens), 11313g (1 specimen), 11323g (1 specimen), 11325 (2 specimens), 11326 (1 specimen), 11327 (3 specimens), 11328 (1 specimen), 11329 (1 specimen), 11330 (1 specimen), 11331 (1 specimen), 11332 (2 specimens), 11333 (6 specimens).

Type locality. Site 1188, Brembana Valley (BG, Lombardy, Northern Italy).

Stratum typicum. Esino Limestone, mid Brembana Valley.

Diagnosis. Medium to large shell, subtriangular in outline, highly inequilateral, slightly prosocline, longer than high. Beak small, orthogyrous, anterior (A/B near 0.52), slightly raised above the straight rectilinear hinge margin. Radial ornamentation mainly given by primary and secondary (bifurcated) plicae, tertiary plicae very rare; plicae very weak on the anterior triangular field. Well evident commarginal rugae.

Description. The shell is elongated, with the maximum length of nearly 7 cm. The valve thickness is thin. The hinge margin is rectilinear and long, the posterior-most shell point is close to the posterior end of the hinge line (α is nearly 10°); the A to B ratio is quite constant during the ontogenesis in the different examined specimens (nearly 0.51-0.53). The only remarkable allometric variation is a little negative growth (valve length to valve height ratio changes from nearly 2.7 at juvenile stage to 2.3 at a more mature stage, e. g. MSNBG 11313a (S1188/2) and MSNBG 11314a (S1188/1)). The beak is small and anterior, slightly raised above the straight hinge margin. The convexity of the shell is somewhat emphasized near the umbonal area.

The radial ornamentation is given by plicae separated by narrow furrows. The plicae are about 100-110 along the ventral margin in mature specimens (e. g. MSNBG 11314A [S1188/1], MSNBG 111313A [S1188/2], MSNBG 11316A [1188/12]; Fig. 3a; Pl.1, figs. 6, 11). The secondary plicae are originated by bifurcation at variable height on flank. The bifurcation

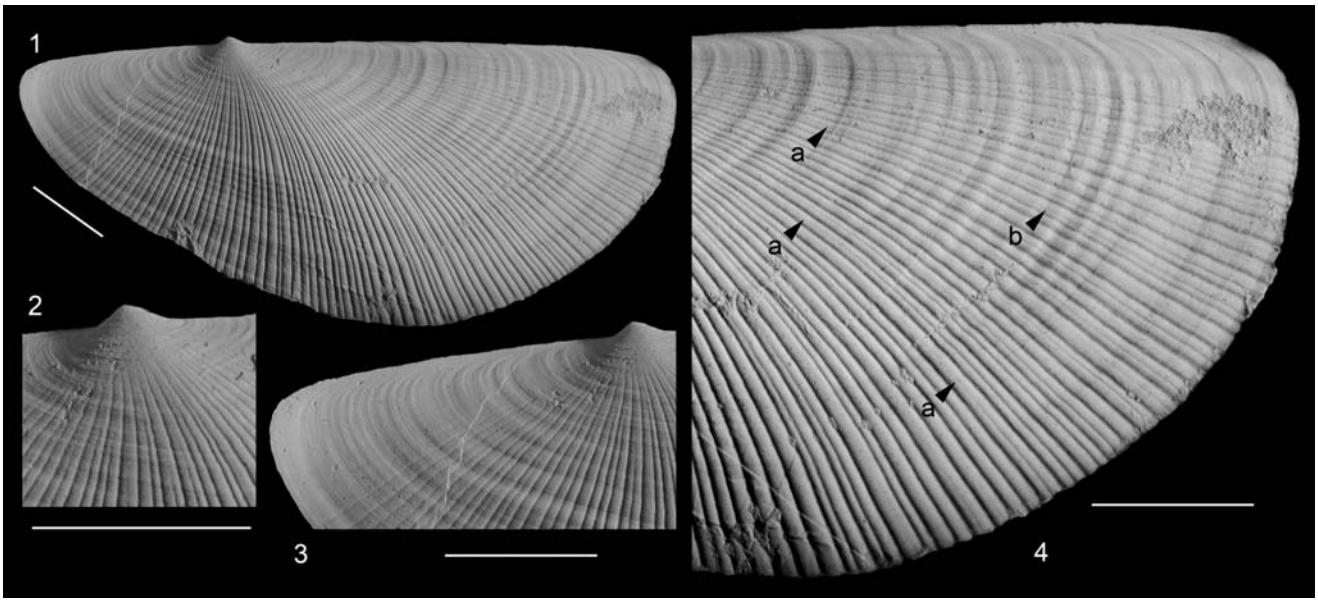

Fig. 3 - 1) Holotype of *D. pseudograbensis* n. sp. MSNBG 11313a(S1188/2). 2) detail of the beak. 3) detail of the anterior triangular field. 4) detail of the posterior sector, a) first bifurcation. b) second bifurcation. Scale bars: 10 mm.

generally is not symmetrical and the larger secondary plica, in a more distal part of the flank can be further divided, thus originating tertiary plicae. This asynchronous trifurcation pattern, when present, is generally limited to the posterior sector of the shell, where the plicae are longer. In section the plicae are weakly rounded, but the wider ones become rather flat. The plicae on the central sector, where the shell is a little inflated, slightly bent with anterior concavity.

The radial ornamentation is weakly defined on the anterior triangular field (angular value of it nearly 20°), this field also includes a narrower completely plicae-free triangular sector (angular value nearly 2°-3°) visible below the hinge margin. A similar narrow plicae-free triangular sector (angular values nearly 3°-4°) is also posteriorly visible.

The pattern of plicae is not perfectly symmetric on the two valves (MSNBG 11319 [S1188/20], MSNBG 11320 [S1188/22]: Pl.1, figs 1a-b, 5a-c).

The commarginal sculpture is made by well evident rugae and growth lines.

The ornamentation on the internal cast is weaker than the ornamentation of outer surface of the shell (specimens MSNBG 11313b [S1188/3] and 11317 [S1188/15]).

Discussion. Only very few species among the very wide varieties of daonellids can be compared with *D. pseudograbensis* n. sp. The most similar one is *Daonella grabensis* Kittl, 1912, that was erected on the basis of a single flattened specimen from the Muschelkalk of Grab, near Grahovo (Bosnia) (Kittl 1912, pl. 2, fig. 17). *D. grabensis* Kittl shows a similar outline and ornamentation, but exhibits a more anterior beak (A/B= 0.41) and a longer posterior dorsal margin which allows an easy separation from *D. pseudograbensis* n. sp. (Fig. 2). The evanescent commarginal ornamentation of *D. grabensis*, with rugae well visible only on umbonal area, might be due to the poor preservation of the only specimen, thus its sculpture is not easily comparable with that of *D. pseudograbensis* n. sp.

Daonella obtusa Rieber, 1968 exhibits a beak anteriorly placed, but it is less elongated (lower value of length/height ratio) and less subtriangular than *D. pseudograbensis* n. sp. *Daonella elongata* Mojsisovics, 1874 and *Daonella caudata* Frauenfelder, 1916 display a subcentral beak on the hinge line. Some similarities can be found also with *Daonella pichleri* Mojsisovics, 1874, recently revised by Schatz (2001b). Neverthless *D. pichleri* is less elongated and not subtriangular. Moreover it exhibits a prosogirous beak and well visible plicae on the anterior margin.

The specimens figured by Schatz (2005, p. 191, fig. 1E) as *Daonella* sp., could be probably included into *D. pseudograbensis* n. sp.

Age. The age of *Daonella pseudograbensis* n. sp. is probably comprised between the Early Ladinian and early Late Ladinian, i.e., between the Curionii and the Archelaus Zone.

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PLATE 1

Figs 1-23 - *Daonella pseudograbensis* n. sp., type series, all the specimens at normal size, except for figs. 9a, -b (MSNBG 11322a (S1188/25)) which are x 1.5.
Figs 1a, -b - Paratype MSNBG 11320 (S1188/22), articulated specimen, a: right valve, b: left valve.
Fig. 2 - Paratype MSNBG 11313b (S1188/3), right valve.
Fig. 3 - Paratype MSNBG 11316b (S1188/13), left valve.
Fig. 4 - Paratype MSNBG 11323a (S1188/29), right valve.
Figs 5a, -b, -c - Paratype MSNBG 11319 (S1188/20), articulated specimen, a: left valve, b: dorsal view, c: right valve.
Fig. 6 - Paratype MSNBG 11314a (S1188/1), left valve.
Fig. 7 - Paratype MSNBG 11314b (S1188/37), right valve.
Fig. 8 - Paratype MSNBG 11324 (S1188/36) right valve.
Figs 9a, -b - Paratype MSNBG 11322a (S1188/25), articulated specimen, a: dorsal view, b: right valve.
Fig. 10 - Paratype MSNBG 11323c (S1188/32), left valve.
Fig. 11 - Holotype MSNBG 11313a (S1188/2), left valve.
Fig. 12 - Paratype MSNBG 11321 (S1188/24), right valve.
Fig. 13 - Paratype MSNBG 11317 (S1188/15), right valve.
Fig. 14 - Paratype MSNBG 11316a (S1188/12), right valve.
Fig. 15 - Paratype MSNBG 11313f (S1188/7), left valve.
Fig. 16 - Paratype MSNBG 11315b (S1188/10), right valve.
Fig. 17 - Paratype MSNBG 11315a (S1188/9), left valve.
Fig. 18 - Paratype MSNBG 11323d (S1188/33), left valve.
Fig. 19 - Paratype MSNBG 11323e (S1188/34), left valve.
Fig. 20 - Paratype MSNBG 11323f (S1188/35), left valve.
Fig. 21 - Paratype MSNBG 11323b (S1188/31), left valve.
Fig. 22 - Paratype MSNBG 11318a (S1188/17), left valve.
Fig. 23 - Paratype MSNBG 11318b (S1188/18), right valve.


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Appendix

Measurements of specimens of *Daonella pseudograbensis* n. sp. and of the holotype of *Daonella grabensis* Kittl, 1912. For the acronyms, see "Systematic Palaeontology".

	Length	Height	A	B	L/H ratio	A/B
D. pseudograbensis n. sp.						
Holotype MSNBG 11313a (S1188/2)	16.5	6.1	5.1	10	2.70	0.51
	35.5	13	11	21.5	2.73	0.51
	54	22	17.5	34	2.45	0.51
	70.1	31	22.5	44	2.26	0.51
Paratype MSNBG 11314a (S1188/1)	28	10	9.5	18	2.80	0.53
	36.6	13.4	11.9	22.5	2.73	0.53
	43.5	16	14.5	27.5	2.72	0.53
	50.7	19.7	17	31.9	2.57	0.53
	67.5	30	22	42.5	2.25	0.52
Paratype MSNBG 11313b (S1188/3)	30.1	12	10.1	20	2.51	0.51
	42	17	13.9	27	2.47	0.51
Paratype MSNBG 11315a (S1188/9)	32.8	11.5	11	20.6	2.85	0.53
Paratype MSNBG 11317 (S1188/15)	39	14.5	12.5	24.5	2.69	0.51
Paratype MSNBG 11319 (S1188/20)	22.5	9	7	13.2	2.50	0.53
Paratype MSNBG 11321 (S1188/24)	23	8	7.9	14.8	2.88	0.53
	33.9	13	10.8	20.5	2.61	0.53
D. grabensis Kittl, 1912						
Holotype, NHMW 1969/968	63	29.8	18.2	44.1	2.11	0.41
Holotype, NHMW 1969/968 (*)	84	39			2.15	

(*) Measurements from Kittl, 1912, p. 75.