

Psamminopelta gradsteini n.sp., a new species of Paleogene deep-water agglutinated foraminifera from the northern North Atlantic and Polish Outer Carpathians

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ABSTRACT

We describe the new species *Psamminopelta gradsteini* Kaminski and Geroch, n. sp. from green shales of Eocene age from the Labrador Sea, Norwegian Sea, and the Silesian Unit of the Polish Outer Carpathians. The species is characterised by its small, gracile test and numerous evolute whorls. The more or less synchronous appearance of *Psamminopelta gradsteini* n.sp. in middle to late Eocene green shales in three geographically separated areas means that the species is probably cosmopolitan, and is a useful stratigraphical index species in the abyssal area of the Atlantic and Tethys oceans.

INTRODUCTION

The deep water agglutinated foraminifera (DWAF) are widely distributed in oceanic sediments deposited beneath the Carbonate Compensation Depth throughout the world ocean. Although some faunal endemism may admittedly exist in semi-isolated oceanic basins such as the North Sea (e.g. Gradstein & Kaminski, 1989), as a general rule most DWAF species are cosmopolitan in distribution. This particularly applies to the faunas of the abyssal plains.

On various occasions over the years, the authors of this study have carried out direct comparisons of DWAF assemblages from classic localities in the Atlantic and Carpathian regions for the purpose of establishing a standardised taxonomic framework for biostratigraphical studies. Our earlier comparative studies have shown, for example,

that a number of species described from the Paleogene of Trinidad by Cushman and co-workers in the 1930's and 1940's are identical with those first described from the Carpathian flysch by Grzybowski and co-workers at the turn of the 19th/20th centuries (Kaminski *et al.* 1988; Kaminski & Geroch, 1993). In another instance, a species newly found in Trinidad by the first author also turned up in samples from the Polish Carpathians (Kaminski & Geroch, 1987). It would appear that the faunal links between the Atlantic Ocean and the Carpathian flysch basins were indeed strong, at least until the Oligocene when Alpine tectonic movements severed the connections between the two areas.

The purpose of this note is to assign formal taxonomic status to yet another new species of cosmopolitan DWAF that has been found in the Eocene of the northern North Atlantic and Carpathi-

¹ Prof. Stan Geroch visited the GEOMAR bungalow in the spring of 1991 to carry out comparative studies of microfossils with the first author. At this time, the matter of the new *Psamminopelta* was discussed, and Prof. Geroch contributed photographs of specimens of the species from the Carpathian flysch. We again discussed this species in 1992 - 1993 while we were carrying out our revision of the Paleogene species from the Grzybowski Collection (Kaminski & Geroch, 1993). Although the idea carrying out more taxonomic work was discussed and a preliminary description of the species was written at that time, Prof. Geroch's death in 1995 precluded him from taking part in the actual writing of this paper. However, photographs of the Carpathian specimens used in this paper were made by him. Because of his initial contribution to this paper he is included here as the co-author.

an deep sea basins. The species has been reported previously under various names, notably in four (possibly five) different studies of Paleogene DWAF from DSDP and ODP localities in the Labrador Sea and Norwegian Sea. The species may have also been observed by Grzybowski (1901) from the Paleocene of the Magura Unit of the Carpathians, but as specimen is not preserved in the collections we cannot be certain of the synonymy. We therefore propose the new name *Psamminopelta gradsteini* n.sp. and provide a formal description of the species.

SYSTEMATIC TAXONOMY

Family RZEHAKINIDAE Cushman, 1933

Genus *Psamminopelta* Tappan, 1957

Psamminopelta differs from *Rzehakina* in having flat sides and in the absence of any wall thickening over the flat sides of the test. Loeblich & Tappan (1987) reported the stratigraphic distribution of the genus as Cretaceous. Reports of this genus in the Norwegian Sea extend its known stratigraphic range to the Miocene.

Psamminopelta gradsteini Kaminski & Geroch,
n. sp.

Textfigure 1; Plate 1, figs. 1-9.

aff. *Ammodiscus polygyrus* (abnormal).—Grzybowski, 1901, pl. 8, fig. 27.

aff. *Spirolocammina lamposa* (Hussey).—Verdenius & van Hinte, 1983, p. 192, pl. 4, figs. 19, 20.

Spirosigmoilinella compressa Matsunaga.—Miller *et al.*, 1982, p. 20, pl. 2, fig. 5; —Kaminski *et al.*, 1989, pl. 5, fig. 6.

Psamminopelta sp. Kaminski *et al.* 1990, pl. 4, figs. 3,4.

Diagnosis: A gracile species of *Psamminopelta* with a thin wall and a concave initial part.

Type Specimen: Currently housed in the first author's collection at University College London. Holotype and paratypes will be deposited in the micropalaeontology collections of the Natural History Museum, London.

Type Level: Upper Eocene.

Type Locality: ODP Site 647, Southern Labrador Sea. Holotype is from Sample 647A-45R-1, 14-17cm.

Diagnostic Features: Test small, wholly planispiral, flat or weakly biconcave, evolute, with two chambers per whorl. Proloculus is minute. Chambers increase in diameter slowly, and do not overlap preceding whorls. Specimens consist of as many as eight sets of whorls, and have a poorly

developed spiral suture. Periphery is rounded. Aperture is an eccentric slit at the end of a produced neck.

Size: Specimens from ODP Site 647 are up to 0.6 mm in length, 0.28 mm in width.

Derivation of Name: In honour of Dr. Felix M. Gradstein (Saga Petroleum), who was co-author of three of the ODP papers that originally reported this species under various names. Also in recognition of his long-standing work on the systematics and biostratigraphy of DWAF from the northern North Atlantic region.

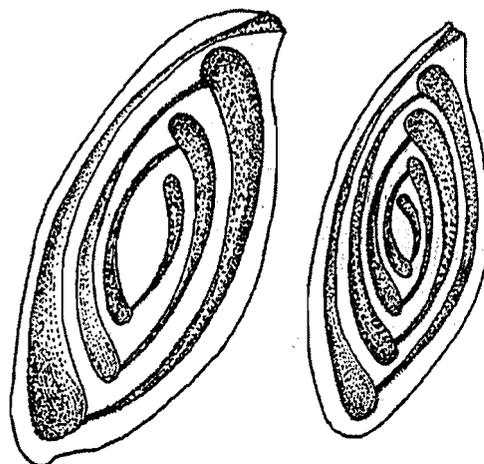


Figure 1. Internal structure of *Psamminopelta gradsteini* n.sp., drawn from transmitted light photographs. Specimens from the upper Eocene of Biecz, Poland, magnification ca. x160.

Observed Occurrences: This species may have been seen by J. Grzybowski in the Paleogene of the Gorlice region of the Carpathians. The specimen illustrated by Grzybowski (1901) as „*Ammodiscus polygyrus* (abnormal)“ in his plate 8, fig. 27 is certainly reminiscent of our species. However, this specimen is not preserved in the collection, and has no formal status. Miller *et al.* (1982) reported this form as *Spirosigmoilinella compressa* from the upper middle Eocene to upper Eocene of DSDP Site 112 in the Labrador Sea. Verdenius & van Hinte (1983) illustrated specimens as *Spirolocammina lamposa* from DSDP Hole 338 which probably fit the description of *Psamminopelta gradsteini* n.sp. Osterman & Spiegler (*in press*) illustrated a specimen as *S. compressa* from the Miocene at Site 909, west of Spitsbergen.

We observed *Psamminopelta gradsteini* n.sp. in

the upper middle Eocene to lower Oligocene at Sites 112 and 647 in the southern Labrador Sea (Kaminski *et al.*, 1989), in the upper Eocene to Oligocene at ODP Site 643 in the Norwegian-Greenland Sea (Kaminski *et al.*, 1990), and in middle to upper Eocene (A. *latus* Zone) green claystones of the Silesian Unit of the Polish Carpathians, in Biecz, Poland.

Known Stratigraphic Range: upper middle Eocene to ?lower Miocene. The first occurrence of this species is a useful biostratigraphic datum in the upper middle Eocene in the deep Labrador Sea and Norwegian Sea.

Bathymetry: lower bathyal to abyssal.

Remarks: One of us (MAK) originally believed this form to represent one of the alternate generations of *S. compressa*, and therefore included it together with the latter species in data from ODP Site 647 (Kaminski *et al.*, 1989). However, after closer examination of material from both the Labrador and Norwegian-Greenland Sea, we have been unable to find any individuals of this species with spirosgmoiline initial coiling. Moreover, at both localities, the first occurrence of this form occurs lower in the stratigraphic section than that of the typical *S. compressa* Matsunaga. There is also a paleobathymetrical separation between *S. compressa* and *P. gradsteini* n.sp. in the North Sea region. *Psamminopelta gradsteini* n.sp. is rare in the North Sea, and is only observed in the deepest parts of the basin and at the abyssal ODP sites, whereas *S. compressa* is widely distributed. *Psamminopelta gradsteini* n.sp. occurs in low numbers in the middle to upper Eocene (Ammodiscus *latus* Zone) of the Silesian basin of the Polish Carpathians, but in this area *S. compressa* has not been observed. Based on the above observations, we now believe it is necessary to separate this species from *S. compressa*.

Although some specimens may be slightly assymetrical, others are almost perfectly symmetrical. The species therefore cannot be placed in the genus *Spirolocammina* Earland, 1934. (*Spirolocammina* is a strongly sigmoidal modern genus described from the Antarctic seas).

Psamminopelta gradsteini n.sp. is most similar in morphology to Paleocene specimens of *Rzehakina minima* from the Central North Sea. The major differences can be found in the nature of the initial portion of the test. *Rzehakina minima* has a larger proloculus than *Psamminopelta gradsteini* n.sp. Topotype specimens of *R. minima* from Lizard Springs are broader and thicker, and have perfectly flat lateral sides, whereas *Psamminopelta gradsteini* n.sp. is biconcave. Many specimens of *Psamminopelta gradsteini* n.sp. have broken centers, indicating that the proloculus and first whorls must have been extremely thin-walled. Schröder-Adams &

McNeil (1994) described the new species *Psamminopelta arca* from the Oligocene Kugmallit sequence in the Beaufort-Mackenzie Basin. This species differs in its thicker test and more rounded outline.

Acknowledgements

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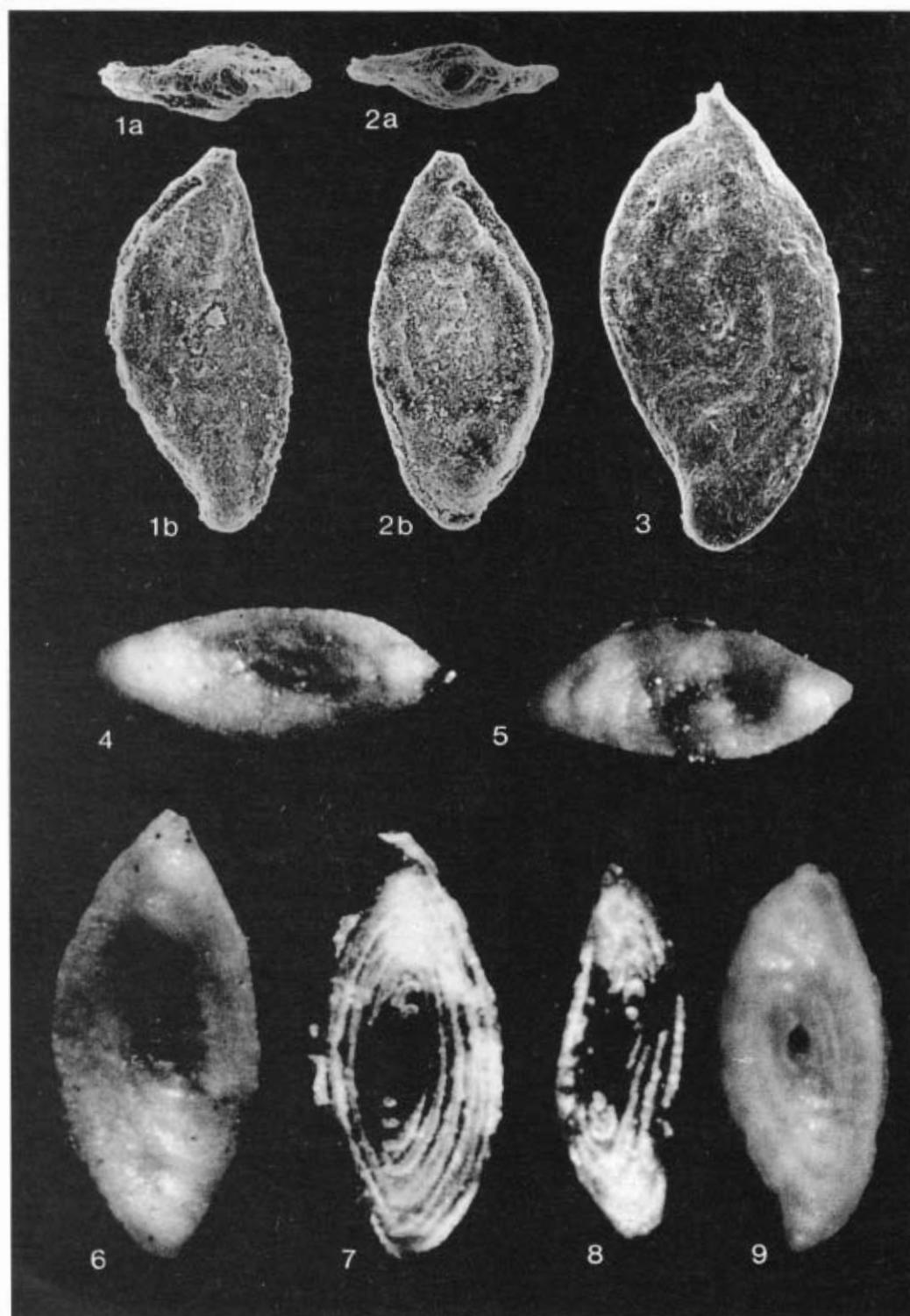


Plate 1. *Psammimopelta gradsteini* n.sp.

Fig. 1a,b. Oligocene, ODP Site 643, Norwegian Sea, Sample 643A-44R-5, 79-84 cm, x145.

Fig. 2a,b. Oligocene, ODP Site 643, Norwegian Sea, Sample 643A-44R-5, 79-84 cm, x145.

Fig. 3. Upper Eocene, ODP Site 647, Labrador Sea, Sample 647A-36R-4, 49-52 cm, x175.

Fig. 4-6. Upper Middle Eocene, ODP Site 647, Labrador Sea, Sample 647A-45R-1, 14-17 cm, 4,5, Paratypes, 6, Holotype, x132.

Fig. 7-8. Upper Middle Eocene, ODP Site 647, Labrador Sea, Sample 647A-45R-2, 20-24 cm, x142.

Fig. 9. Upper Eocene, Silesian Unit of the Polish Carpathians near Biecz Poland, x140