

A new agglutinated foraminiferal species (*Arenoturrspirillina waskowskae* sp. nov.) from the Danian of Contessa, Italy

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Received: 13 October 2022; accepted: 23 November 2022; first published online: 16 December 2022

Abstract: This paper describes a new Paleogene deep-water agglutinated foraminifera from the Contessa Highway Section, Umbria-Marche Basin, Italy. The new species *Arenoturrspirillina waskowskae* is characterised by its predominantly high trochospiral coiling, which distinguishes it from the genus *Glomospira*. The new species is also found in the Polish Carpathians.

Keywords: agglutinated foraminifera, taxonomy, Paleocene, Umbria-Marche Basin, Italy

INTRODUCTION

The Umbria-Marche Basin in the area of Gubbio, Italy contains a thick sequence of Cretaceous to Paleogene deep-water limestone formations. The Gubbio area is an important reference region for the Cretaceous/Paleogene boundary, as the Iridium anomaly was first documented here by Alvarez et al. (1980). The boundary section records important changes in the abundance and composition of assemblages of deep-water agglutinated foraminifera (Kuhnt & Kaminski 1996, Hikmahtiar et al. 2022). In addition, Kaminski et al. (2011) presented the taxonomy, biostratigraphy, and assemblage changes of the Upper Cretaceous deep-water agglutinated foraminifera at Contessa. In a preliminary study of the lowermost Paleocene DWAF of Contessa (Hikmahtiar et al. 2022) a number of species were not formally described, and left in open nomenclature. Refinement of the taxonomy and descriptions of new

Cretaceous-Paleogene species will be the topic of additional studies. Presented here is a newly named and described foraminiferal species that may have scientific value in terms of our paleoecological and paleogeographic understanding of DWAF faunas.

In a recent taxonomic monograph on predominantly agglutinated foraminifera species from the Grzybowski Collection, Waśkowska et al. (2020) figured and described an uncertain species from the Potok oil field, near Krosno, but left the form in open nomenclature. The two illustrated specimens were not assigned to a predefined species. These specimens display features that place it in the genus *Arenoturrspirillina*, but with some differences to previously known species.

Our recent analyses done in high resolution sampling (bed by bed) from the Paleocene in the Contessa Highway outcrop revealed additional specimens of this enigmatic species. Moreover, the specimens extracted by the HCl digestion method

show excellent preservation, which enables us to resolve its morphological features and describe it as a new species.

SAMPLE LOCATION

The Contessa Highway Section (lat. 43°22'47"N; long. 13°33'49"E) is located in the Umbria-Marche Basin of Central Italy (Fig. 1). It is part of a pelagic

limestone sequence extending from the Cenomanian to the upper Eocene, with interbedded marls in the lower Paleocene. The Scaglia Rossa Formation consists of reddish-pinkish pelagic micritic limestones and some cherts (Alvarez & Montanari 1988). The section sampled for this study is the lower part of the Danian (1.0–5.0 m above the K/Pg boundary) of the R3 member of the Scaglia Rossa Formation (Fig. 2).

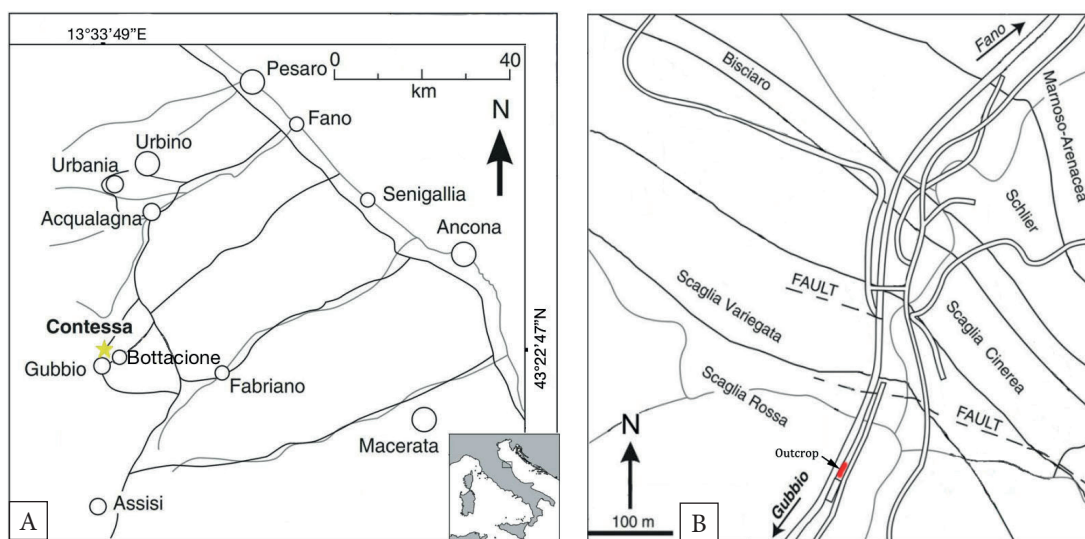


Fig. 1. Location of the Contessa Highway section near Gubbio, Italy. Figure A – modified after Coccioni et al. (2016), Figure B – after Galeotti et al. (2000)



Fig. 2. View of the sampled exposure, showing the position of the K/Pg boundary and the sampled section. Hammer for scale

MATERIAL AND METHODS

Twenty-six samples from the Danian were collected for this study. The sampled interval starts 1 meter above the K/Pg boundary. The samples were collected with a sampling resolution of 10 cm from 1 to 2 m and 20 cm from 2 to 5 m above K/Pg. The samples were dissolved using hydrochloride acid (HCl) and washed over a 63 µm sieve. The specimens were picked from the >125 µm fraction and mounted onto cardboard microslides. The holotype and paratype specimens were separated from the assemblage slides and placed into single-hole slides. The specimens were photographed using a scanning electron microscope (SEM) – Neoscope JCM-7000 in the College of Petroleum and Geosciences, KFUPM. The holotype and paratypes are deposited in the European Micropalaeontological Reference Centre at Micropress Europe in Krakow (in drawer 7/27c), Poland.

RESULTS

Our lowermost samples collected from the Danian in Contessa contained no specimens of *Arenoturrisspirillina waskowskae*; instead, we found various *Glomospira* species, such as *Glomospira gordialis*, *Glomospira charoides*, *Glomospira irregularis*, and *Glomospira serpens*. The *Arenoturrisspirillina waskowskae* assemblages begin at a stratigraphic level 1 m above the K/Pg boundary, and the specimens are numerous and well preserved.

SYSTEMATIC PALAEOLOGY

Suborder AMMODISCINA Mikhalevich, 1980

Superfamily AMMODISCOIDEA Reuss, 1862

Family AMMODISCIDAE Reuss, 1862

Subfamily USBEKISTANIINAE Vialov, 1968

Genus *Arenoturrisspirillina* Tairov, 1956

Arenoturrisspirillina waskowskae sp. nov.

Figures 3.1A–4C, 4.1A–4C

2020 *Arenoturrisspirillina* sp. Waškowska et al., p. 57, pl. 15, figs. a, b.

Etimology: Named in honour of Professor Anna Waškowska (AGH University of Science and Technology) for her dedicated work in updating the atlas of Grzybowski's Carpathian

Foraminifera and her devotion to the study of Carpathian foraminifera.

Type specimen: The holotype is specimen no CON-1.2 (Fig. 3.1A–1C) housed at the European Micropalaeontological Reference Centre at Micropress Europe in Kraków (in drawer 7/27c).

Material: 87 specimens.

Type locality: R3 member of the Scaglia Rossa Formation, Contessa Highway, Gubbio, Italy.

Type level: Danian, lower Paleocene, in the interval 1.2 m above the K/Pg boundary.

Dimensions of specimens: Diameter length horizontal = 200–450 µm, diameter length vertical = 230–650 µm, thickness = 150–250 µm.

Diagnosis: A species of *Arenoturrisspirillina* with a dome-shaped profile, broad tubular chamber coiled in 3–4 whorls with slightly irregular coiling, especially in the last whorl.

Description: The test is finely agglutinated, relatively large; circular to oval in outline, low to medium conical spiral in shape. The test consisting of an elongated proloculus followed by long single undivided tubular chamber coiled in a regular to irregular trochospiral, with the final portion becoming more irregular. Chamber diameter increases gradually and follows the previous pattern, forming three to four whorls. The terminal part of the tubular chamber may cross over the test or cover the umbilicus. The coil suture between whorls is depressed; aperture an opening at the end of the tubular chamber. Wall finely agglutinated, noncalcareous.

Remarks: Specimens belonging to the species were discovered by Grzybowski (1898) in his samples from the Potok oil field. Grzybowski included the specimens in *Ammodiscus irregularis* but did not illustrate them. Two specimens housed under this name were found in Grzybowski's Lviv collection by Waškowska et al. (2020). Grzybowski did not assign a type specimen for *A. irregularis*, but Kaminski & Geroch (1993, pl. 6, fig. 8a, b) documented the lectotype and paralectotype of *A. irregularis* from the Grzybowski Collection deposited at the Jagiellonian University in Krakow. The documentation presents an irregularly coiled form, the same as in the description by Grzybowski. On the other hand, specimens listed under the name *A. irregularis* in the Lviv Collection show a fairly regular trochospiral coiling, and differ from the lectotype.

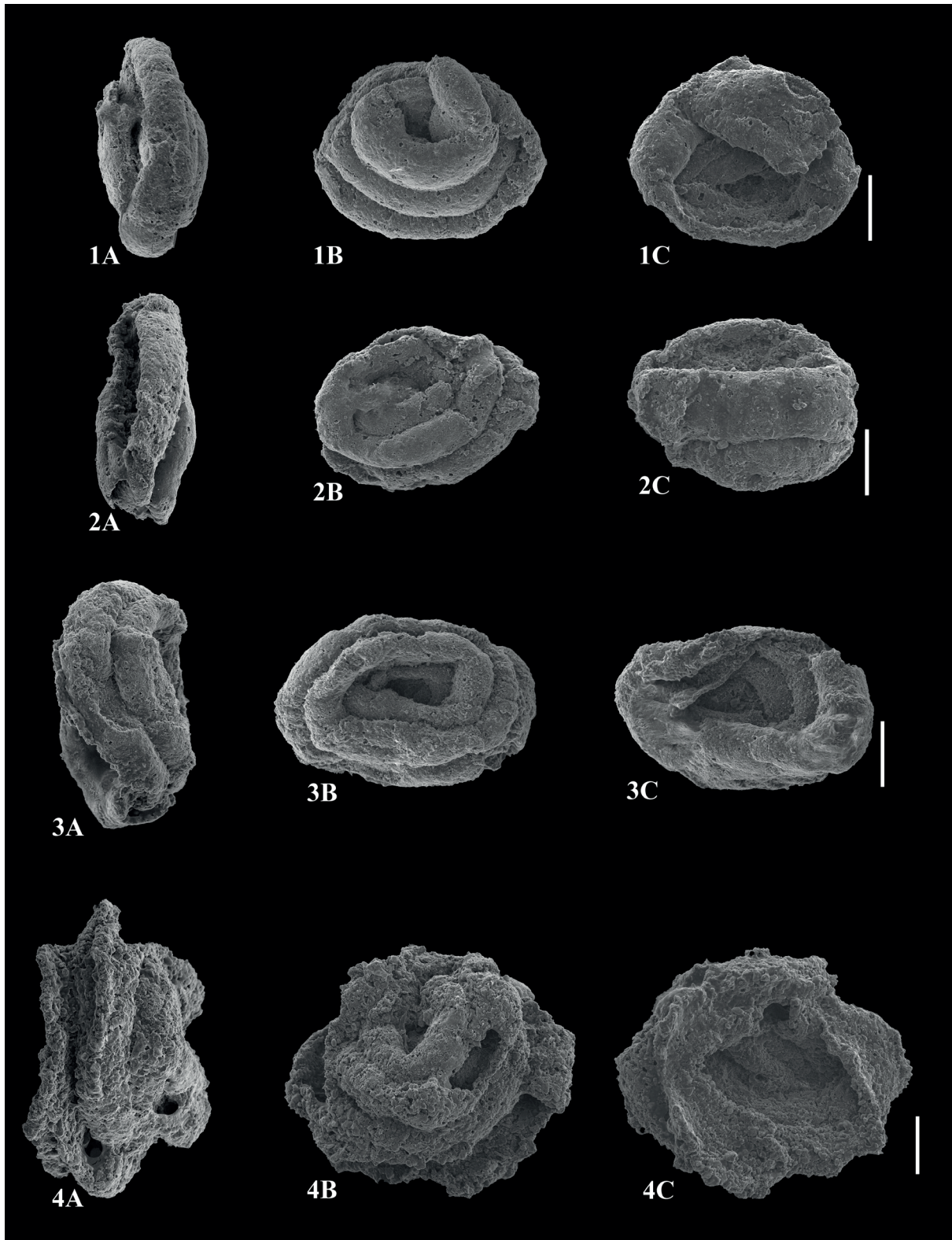


Fig. 3. *Arenoturrispirillina waskowskae* sp. nov. from the Danian of Contessa Highway section, near Gubbio, Italy: 1A–1C – holotype, sample CON-1.2; 2A–2C – paratype, sample CON-1.6; 3A–3C – paratype, sample CON-1.7; 4A–4C – paratype, sample CON-1.7. All scale bars = 100 μ m

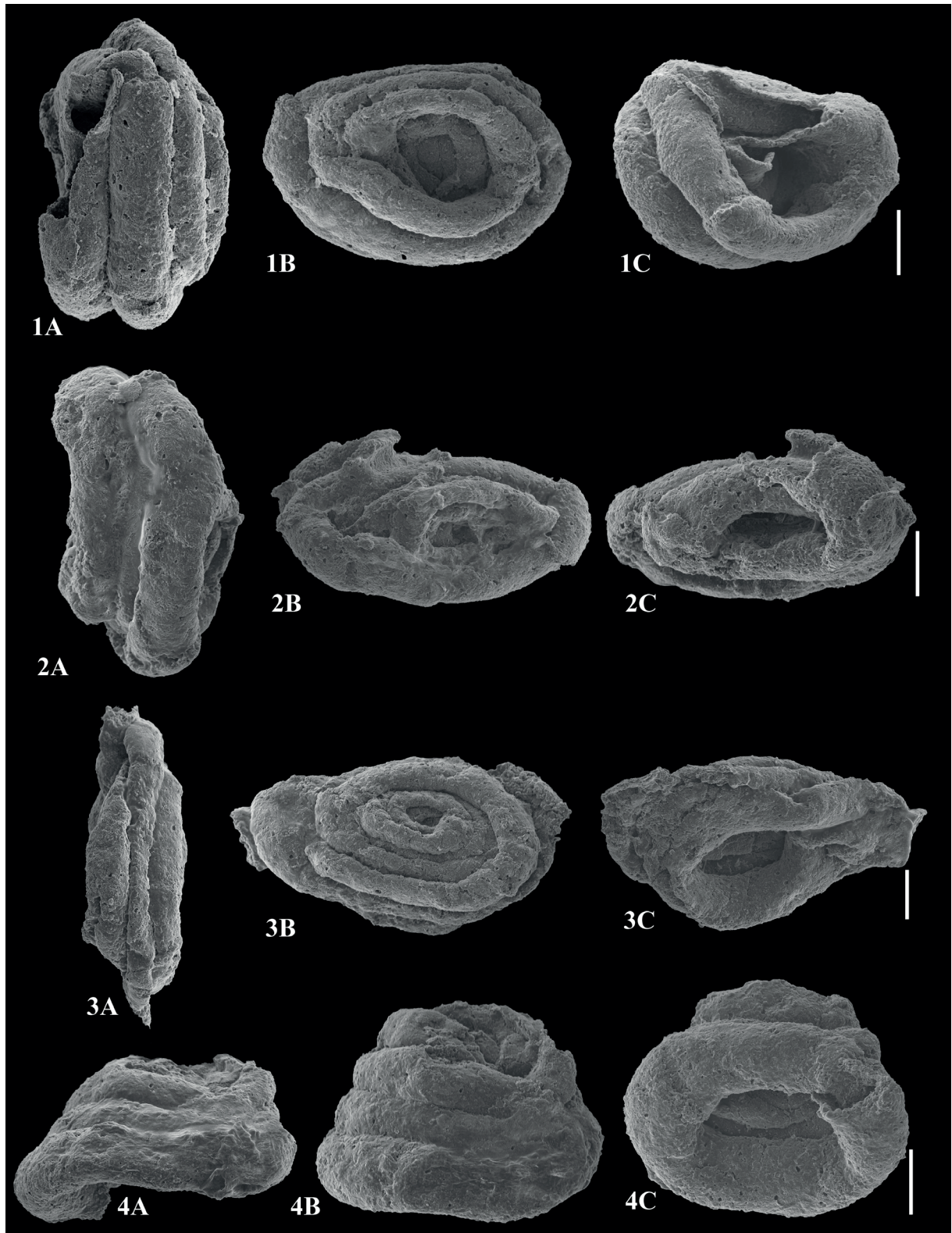


Fig. 4. *Arenoturrspirillina waskowskae* sp. nov. from the Danian of Contessa Highway section, near Gubbio, Italy; paratypes: 1A-1C - sample CON-1.8; 2A-2C - sample CON-2.0; 3A-3C - sample CON-3.8; 4A-4C - sample CON-4.6. All scale bars = 100 µm

Waškowska et al. (2020) stated that these specimens are most similar to known representatives of *Arenoturrspirillina* although there are some features that may be different. Waškowska et al. (2020) identified them as *Arenoturrspirillina* sp. with the following description: the presence of a conical shape, streptospiral coiling, and increasing chamber size. These features allow for including these specimens to the new species proposed in this article.

Kaminski et al. (2021) found the species *Arenoturrspirillina micra* Subbotina, 1958 in the Paleocene at Site 1511 in the Tasman Sea. This species differs in possessing five to six whorls with a very regular, high trochospiral form. The additional whorls create a more precise hat-like conical shape. *Arenoturrspirillina tunisiana* Peryt, Alegret and Molina, 2004 differs in possessing a narrower tubular chamber, 6 to 8 whorls, and a characteristic dome shape. Peryt et al. (2004) reported that *A. tunisiana* bloomed opportunistically in the basal Paleocene at Ain Settara, Tunisia.

Occurrence: In addition to the R3 member of the Scaglia Rossa Formation in Italy, this taxon has thus far been recorded from the Eocene deposits of the Silesian Unit, Polish Carpathians (Waškowska et al. 2020).

DISCUSSION

As early as 1898, Józef Grzybowski pointed out the similarities in coiling modes between the unchambered “ammodiscids” and the chambered “trochamminids” (read *Paratrochamminoides*). Indeed, several species of *Glomospira* have analogous coiling modes among *Paratrochamminoides* species, for example *Glomospira serpens* and *P. gorayskii* form a pair based on their triloculine coiling. Similarly, *G. gordialis* and *P. olszewskii* share the same type of glomospiral coiling. One might pose the question “where is the ammodiscid equivalent of the trochospirally coiled species *Paratrochamminoides acervulatus* or *P. kaminskii*, a species recently described from the Lower Cretaceous of Brazil?” (Anjos-Zerfass et al. 2022). The answer to this question is apparently provided by the new “hat-shaped” ammodiscid *Arenoturrspirillina waskowskae* sp. nov.

We thank the Dean of the Faculty of Petroleum Engineering and Geosciences, KFUPM, for funding micropaleontological research through a start-up fund grant. We thank Anna Waškowska for pointing out the existence of a “hat-shaped” ammodiscid in the Paleogene of the Carpathians, and Justyna Kowal-Kasprzyk for curating the type specimens. We thank anonymous reviewer and the Editors of GGaE for comments on the manuscript.

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