

NOTA BREVE-SHORT NOTE

**TURRIGLOMINA ? ANATOLICA, N. SP. (FORAMINIFERIDA)
FROM THE CRETACEOUS OF NORTH-WESTERN ANATOLIA (TURKEY):
REMARKS ON THE EVOLUTION OF MESOZOIC MEANDROSPIRIDS**

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Key-words. Foraminifers, New Species, Taxonomy, Cretaceous, Turkey.

Riassunto. Nel presente lavoro viene descritta una nuova specie di foraminifero, *Turriplomina? anatolica*, n. sp., del Cretaceo inferiore dell'Anatolia nord-occidentale. La nuova specie è caratterizzata da uno stadio iniziale ad avvolgimento meandrospiroideo seguito da una seconda parte rettilinea ad andamento elicoidale. La morfologia di questo nuovo taxon è simile a quella del genere triassico *Turriplomina* Zaninetti. L'attribuzione generica della nuova specie è comunque dubitativa a causa del fatto che il trend evolutivo di questo gruppo di foraminiferi non è documentato dal Triassico al Cretaceo.

Abstract. A new species of foraminifer, *Turriplomina? anatolica*, n.sp., is erected from the Lower Cretaceous of North-Western Anatolia, Turkey. The species is characterized by a well developed meandrosperid stage followed by a rectilinear, helicoidal stage. The morphology of the new taxon is similar to that of the Triassic genus *Turriplomina* Zaninetti; however, the generic attribution is doubtful as the evolutionary path of meandrosperids is not documented from Triassic to Cretaceous.

Introduction.

In the evolution of Triassic foraminifers, the genus *Turriplomina* Zaninetti in Limongi et al. (1987) (type species: *Turritellella mesotriassica* Koehn-Zaninetti, 1968) is a well-known taxon composed of several species ranging stratigraphically from Anisian to Norian. This genus is considered to be linked in evolution to Triassic representatives of *Meandrosperia* Loeblich & Tappan (Rettori, 1995). Although *Turriplomina* is not reported from the Jurassic, we describe from the Cretaceous of Anatolia a meandrosperid foraminifer, similar to the Triassic genus *Turriplomina*, earlier recorded and figured by Altiner (1991) as *Meandrosperanella* sp. The new form is described as *Turriplomina? anatolica*, n. sp. However

the generic attribution remains doubtful as the evolutionary link between the Triassic and Cretaceous *Meandrosperia-Turriplomina* lineages is not documented.

The new species is recorded from a succession located 25 km North of the Bilecik City (Fig. 1). The Jurassic to Lower Cretaceous sequence in this area is composed of four formations, widely exposed in North-Western Anatolia which is located in the Sakarya Continent, one of the tectonic entities in the Neo-Tethyan evolution of Turkey (Altiner et al., 1991). The Hettangian-Pliensbachian Bayirköy Formation is composed of continental to marine siliciclastics intercalated with fossiliferous Rosso Ammonitico facies (Fig. 2). After a gap in sedimentation, a carbonate regime starts in the succession comprising the nodular limestones of the Callovian-Oxfordian Taşçibayırı Formation in the lowest part. The major unit of the carbonate succession is the Kimmeridgian-Valanginian Günören Limestone, mainly consisting of coral-rich reefal and high-energy limestones. The calcareous and argillaceous pelagic sediments of the latest Valanginian-Aptian Sogukçam Limestone overlies the Günören Limestone with a condensed level rich in crinoids at the bottom. *Turriplomina? anatolica*, n. sp., is recorded from this condensed level. The upper boundary of the Sogukçam Limestone is not exposed in the studied area.

Systematic Palaeontology

Order Foraminiferida Eichwald, 1830

Suborder Miliolina Delage & Hérouard, 1896

Superfamily Cornuspiracea Schultze, 1854

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Family Meandrospiridae Saidova, 1981, emend.

Zaninetti et al., 1987

Subfamily Turriglominae Zaninetti in

Limongi et al., 1987

Genus *Turriglomina* Zaninetti in Limongi et al., 1987

Type species: *Turritellevella mesotriasica* Koehn-Zaninetti, 1968

***Turriglomina* ? *anatolica*, n. sp.**

Pl. 1, figs. 1-16

1991 *Meandrospiranella* sp. Altiner, pl. 13, figs. 6-8.

1991 *Meandrospiranella* n. sp. Altiner et al., p. 32 (not figured).

Origin of the name. The name of the new species is after the region Anatolia, where *Turriglomina* ? *anatolica* n. sp. has been firstly recorded.

Holotype. The holotype (Pl. 1, fig. 1) is a slightly oblique longitudinal section, passing through the proloculus and showing both the helicoidal and meandrospirid parts of the test.

Paratypes. They are figured in Pl. 1, figs. 5, 7, 13, 15, 16.

Type locality. 25 km North of Bilecik, North-Western Anatolia (Turkey) (Fig. 1).

Type level. Condensed level at the bottom of the Sogukçam Limestone, sample G-5, referable to the *Hedbergella sigali/debrionensis* Zone (latest Valanginian to earliest Barremian) of Robaszynski & Caron (1995).

Material and repository. The new species is present in four samples (G-5, G-9, G-10 and GO-14A) from two measured sections (G and GO); the material is deposited in the micropaleontological collection of the Marine Micropaleontology Research Unit, Middle East Technical University, Ankara.

Microfacies and microfaunal association. The microfacies containing *Turriglomina* ? *anatolica* n. sp. are wackestones to packstones rich in crinoids, bryozoa and pelagic elements such as planktonic foraminifers, thin shelled bivalves etc. The microfaunal assemblage contains *Globuligerina hoterivica* (Subbotina), *Hedbergella sigali* (Moullade), *Globochaete alpina* Lombard, *Meandrospira favrei* (Charollais, Brönnimann & Zaninetti), *Vidalina* spp., *Ophthalmidium* sp., *Textularia* sp., *Spirulina* spp., *Patellina turriculata* Dieni & Massari, *Patellina* spp., *Lenticulina* sp., *Gavelinella* sp., *Epistomina* sp., and ataxophragmiid foraminifers.

Description. The test of the new species consists of two parts. The meandrospirid spherical portion is characterized by a globular proloculus, followed by a second undivided tubular chamber, which is rounded in section. The chamber describes, as in the genus *Meandrospira* Loeblich & Tappan, 2 to 2 1/2 (almost 3 in the holotype) planispirally coiled involute whorls, composed of several tight meanders, 5 to 6 in each whorl. The diameter of the tube increases with growth, in order to reach in the second whorl, twice the diameter of the tube in the first whorl; however, the number of the meanders remains constant.

In the second part of the test, the tubular chamber

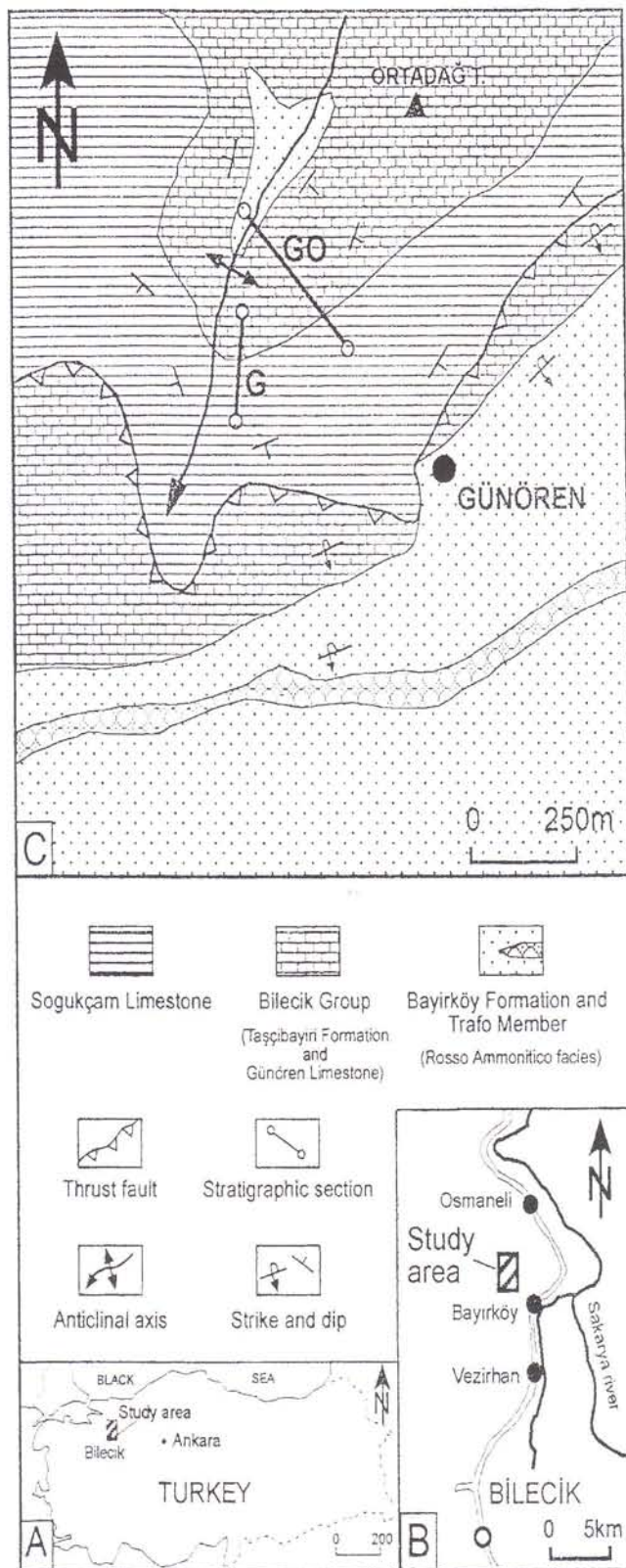


Fig. 1 - Geographic location (A and B) and geological map (C) of the study area (after Altiner et al., 1991, modified).

describes a high spire, helicoidal and close-coiled in order to form a columella; the number of whorls varies from 5 to 7, and the diameter of the tubular chamber remains constant.

The wall is black, compact and porcelaneous,

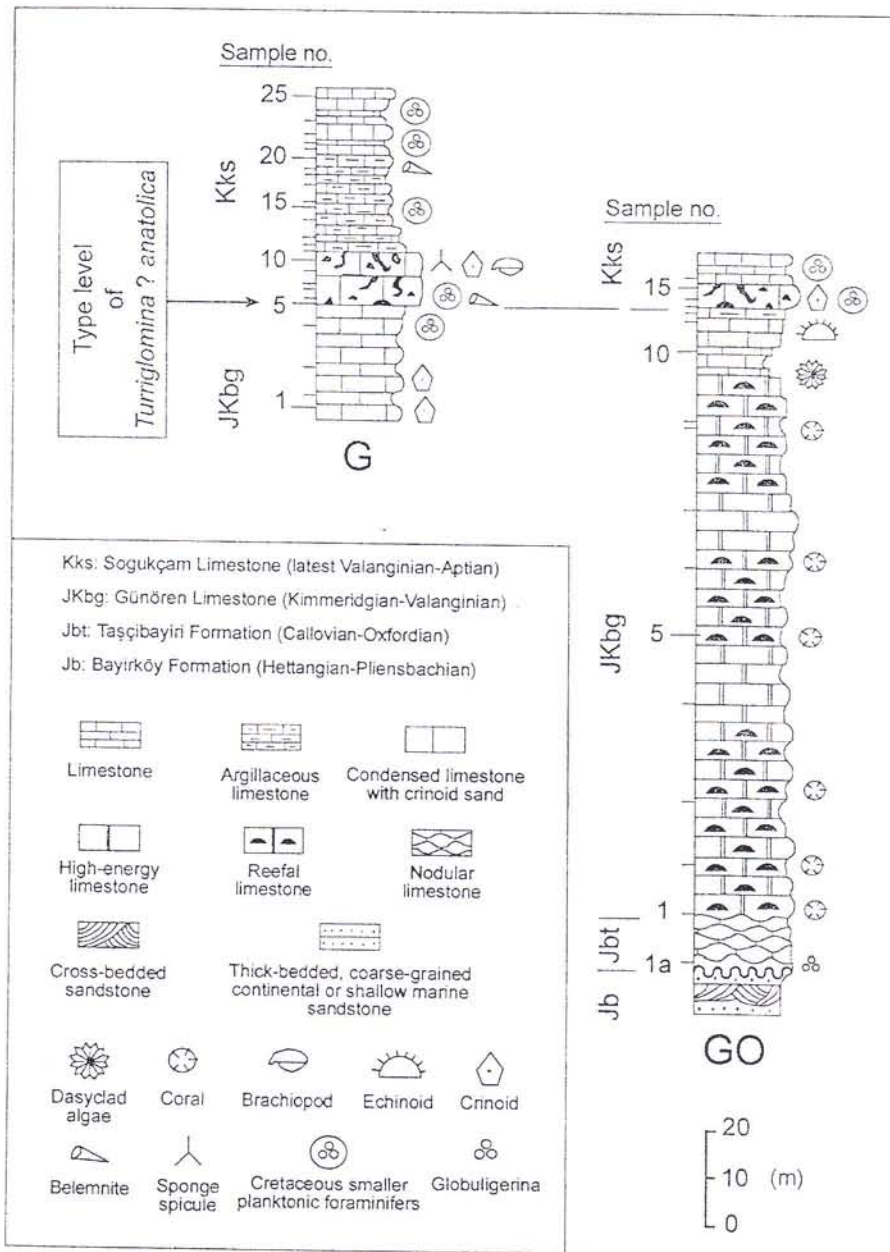


Fig. 2 - Measured stratigraphic sections (G and GO; after Altiner et al., 1991, modified) and type level of *Turriglomina ? anatolica* n. sp.

often recrystallised. The aperture is simple, at the end of tube.

In the studied material, we have recognized two types of specimens characterized by different dimensions of the proloculus, and interpreted as megalospheric (Pl. 1, figs. 1, 6-7, 11, 13) and microspheric generations (Pl. 1, figs. 4, 12, 14). In the megalospheric forms, the dimensions of the proloculus approximately correspond to the diameter of one whorl around the proloculus of the microspheric specimens. For the other parameters of the test, the two different generations do not exhibit a noticeable change in the overall size and general morphology.

Dimensions (in microns). Height of the test: 260-400; width of the rectilinear portion: 70-100; diameter of the meandrospirid portion: 120-150; diameter of the

proloculus: 40-50 (megalospheric), 10 (microspheric); diameter of the tubular chamber in the first whorl: 10; diameter of the tubular chamber in the last planispiral whorl: 20; height of the tubular chamber in the helicoidal portion: 20-30; thickness of the wall: less than 10.

Remarks. Altiner (1991) attributed the specimens figured in pl. 2, 3 and 5 to the Triassic genus *Meandrospiranella* Salaj. However, this attribution can not be correct since the rectilinear portion of *Turriglomina ? anatolica* n. sp. is helicoidal and does not describe a meandrospirid uncoiled stage as in *Meandrospiranella*.

Turriglomina scandonei Zaninetti et al. and *Turriglomina magna* (Urosevic) are the two Triassic species characterized by a well-developed meandrospirid stage (Limongi et al. 1987; Urosevic 1977; Zaninetti et al. 1987; Zaninetti et al. 1990; Bérczi-Makk 1993; Rettori

1995; Martini et al. 1995); *Turriglomina* ? *anatolica* n. sp. differs from *Turriglomina scandonei* in having smaller dimensions, a lower number of meanders in the spherical portion, and a thinner wall. It is distinguished from *Turriglomina magna* by a much regular coiling of the meandrospirid part, and a well developed helicoidal stage.

The other Triassic species of *Turriglomina*, *Turriglomina mesotriassica* (Koehn-Zaninetti), *Turriglomina conica* (He-Yan) and *Turriglomina carnica* (Dager) characterized by their small dimensions and a reduced meandrospirid stage, can be clearly distinguished from all the other representatives of the genus *Turriglomina*, and also from *Turriglomina* ? *anatolica*, n. sp.

Finally, the Ladinian-Carnian *Turriglomina robusta* Bérczi-Makk from Hungary does not exhibit the peculiar features of the genus; for this reason it can not be compared to *Turriglomina* ? *anatolica*, n. sp.

From the Lower Cretaceous of Algeria, Sigal (1952) cited a species called *Meandrospira djaffaensis* characterized by a meandrospirid initial part followed by a rectilinear stage.

However, from the two specimens illustrated and given as drawings by Sigal (1952, pl. 12, two figs.), it is not possible to recognise the type of coiling of the rectilinear portion, which is described by the author as uncoiled (*déroulé*). For this reason, *Meandrospira djaffaensis* can not be compared to *Turriglomina* ? *anatolica*, n. sp.

Phylogenetic considerations.

The stratigraphic range of *Turriglomina*, composed of several species, is Anisian to Norian; the genus is so far completely unknown from the Jurassic platform or basinal facies. In the Triassic, *Turriglomina*, because of its meandrospirid early stage, has been considered to be linked to *Meandrospira* and derived from this genus (Zaninetti et al., 1987; Rettori, 1995). Similarly, the discovery of *Turriglomina*-like forms in the Cretaceous of Anatolia suggests, as in the evolutionary lineage

observed in the Triassic Meandrospiridae, that *Turriglomina* ? *anatolica*, n. sp., could also have been derived from a *Meandrospira* ancestor. This is in concordance with the fact that the genus *Meandrospira* (species *M. favrei*) is also known from the Lower Cretaceous (Valanginian) of several Western Tethyan localities, including the type locality of *T. ? anatolica*, n. sp., in North-Western Anatolia.

In this hypothesis, the *Meandrospira* lineage should be continuous from the Triassic to the Cretaceous, with the evolutionary potential to produce, at any time, specimens with a helicoidal stage. These specimens, resulting from an iterative evolution, are morphologically identical to *Turriglomina* Zaninetti in Limongi et al., and can not be distinguished from this genus. For this reason, *Turriglomina* is here considered as a polyphyletic taxonomic unit, and the genus is used with reservation for the Cretaceous species from Anatolia.

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PLATE 1

All specimens are from the lowermost part of the Sogukçam Limestone, North-Western Anatolia, Turkey.

Figs. 1-14, 15, 16 *Turriglomina* ? *anatolica*, n. sp.

1 - Holotype. Longitudinal section. Sample G5/5.

2, 3 - Longitudinal sections. Sample GO 14 A/1.

4, 8, 14 - 4: Longitudinal section; 8: longitudinal tangential and oblique section; 14: subequatorial section of the meandrospiroid initial part. Sample G10/1.

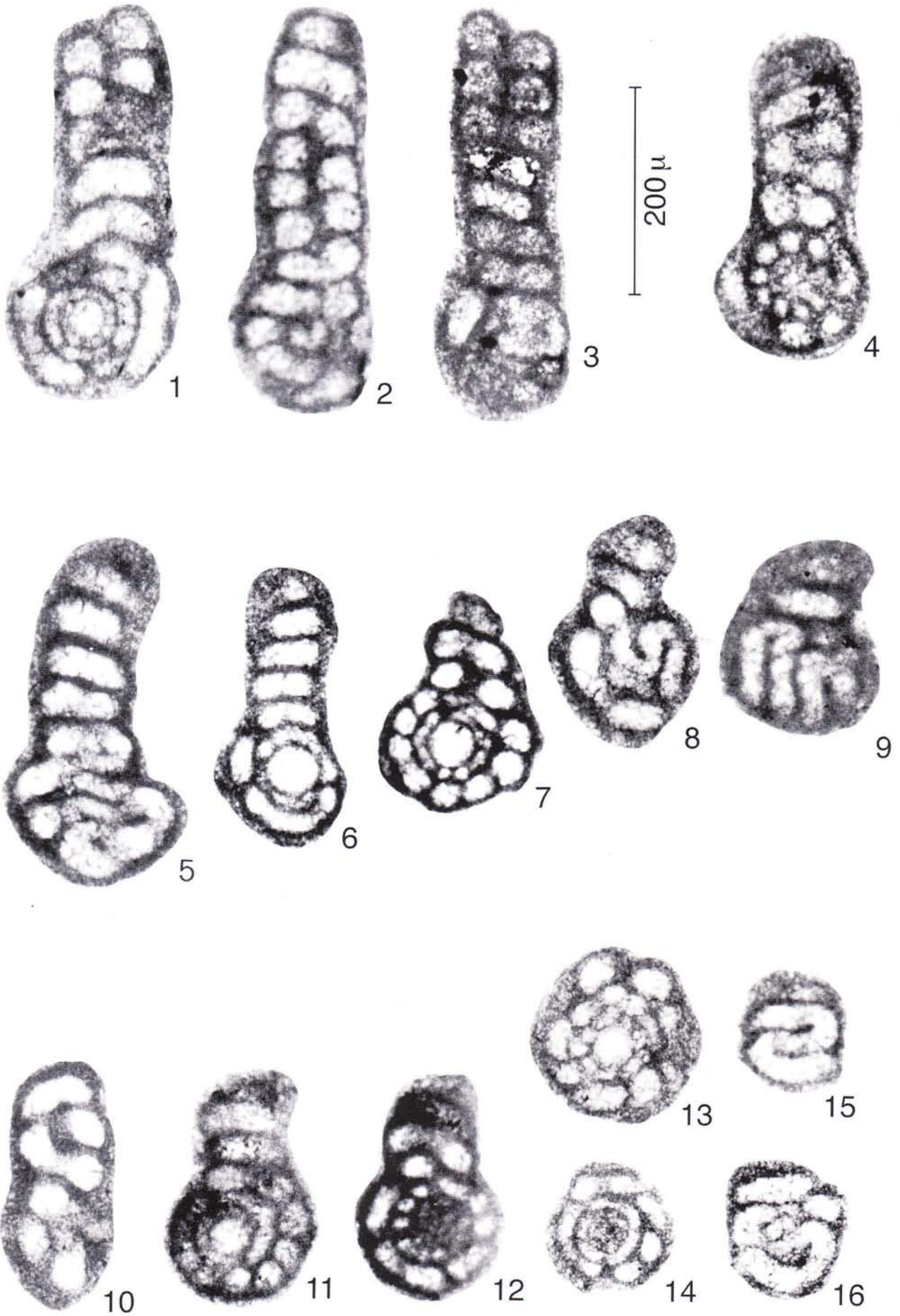
5, 7, 13, 15, 16 - Paratypes. 5: Longitudinal section; 7: Longitudinal oblique section; 13: equatorial section of the meandrospiroid initial part; 15, 16: tangential sections of the meandrospiroid initial part. Samples G5/1, G5/9, G5/5, G5/9, G5/8.

6 - Longitudinal section. Sample G10/2.

9 - Longitudinal tangential and oblique section. Sample G9/1.

10 - Oblique section. Sample G10/3.

11, 12 - Longitudinal oblique sections. Samples G14A/2, GO 14A/12.



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