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CUNEOSPIRELLA SAMNITICA GEN. N., N. SP. (FORAMINIFERIDA) FROM THE SANTONIAN OF THE MATESE MOUNTAINS (MOLISE, CENTRAL ITALY)

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Abstract. A new larger foraminifer, *Cuneospirella samnitica* gen. n., n. sp., from the Santonian of the Matese Mountains (central Italy) is described. This taxon, characterized by an initial planispiral, a rectilinear adult stage and the subdivision of chambers by partitions, could be descended from a morphotype like *Spiroplectammina multicamerata* Said & Kenawy, recorded in the upper Turonian of the Apennines (central Italy).

Riassunto. Viene descritto un nuovo macroforaminifero, *Cuneospirella samnitica* gen. n., n. sp., proveniente dal Santoniano del Matese (Italia centrale). Questo taxon, caratterizzato da uno stadio iniziale planispirale a cui segue uno stadio adulto rettilineo e dalla presenza di camere suddivise da septula, potrebbe discendere da un morfotipo simile a *Spiroplectammina multicamerata* Said & Kenawy, segnalata nel Turoniano superiore degli Appennini centrali.

Introduction

Some years ago, one of us (A. Cherchi) studied the microfossils of a number of samples, which were collected by D. Ruberti during the preparation of her doctoral thesis on the Cretaceous shelf margin sequences of the central-northern Matese Mountains (central Italy) (Cherchi et al. 1993) (Fig. 1). In one of the Upper Cretaceous foraminiferal associations a new larger foraminifer was found, which is described in the following under the name *Cuneospirella samnitica* gen. n., n. sp. The studied material is deposited in the Forschungsinstitut Senckenberg (Cherchi-Schroeder collection), Frankfurt am Main (Germany).

Geological setting

The Matese Mountains in the central-southern Apennines of peninsular Italy are considered deriving from the deformation of a marine domain ("Piattaforma Carbonatica Abruzzese-Campana" in D'Argenio et al. 1973) although recent papers based on seismic and outcrop data suggest that the Mesozoic carbonate successions cropping out in the Matese and Camposauro Groups can be interpreted as an exposed part of the Inner Apulia Platform (Carannante et al. 2009, in press). This belt is characterized by shallow-water carbonate sedimentation from the Triassic to the early Miocene, with local and sometimes large stratigraphic gaps. The sedimentary model for the Mesozoic is a carbonate platform with scarps of variable inclinations and heights that came into existence in the Late Triassic and was deformed by the upper Miocene tectonic events.

Facies analysis

Studies carried out in the last decades demonstrated that the Matese sequences were deposited on a wide open shelf (Ruberti 1997; Ruberti et al. 2007). The Upper Cretaceous shallow-water limestones show the preponderance of skeletal components (molluscs and benthic foraminifers) and the lack of non-skeletal grains (foramol assemblages; Carannante et al. 1993). The most prominent sediments of the studied stratigraphic interval are rudist-dominated fine- to coarse-grained lithologies (type a in Fig. 2). Rudists spread over all the shelf

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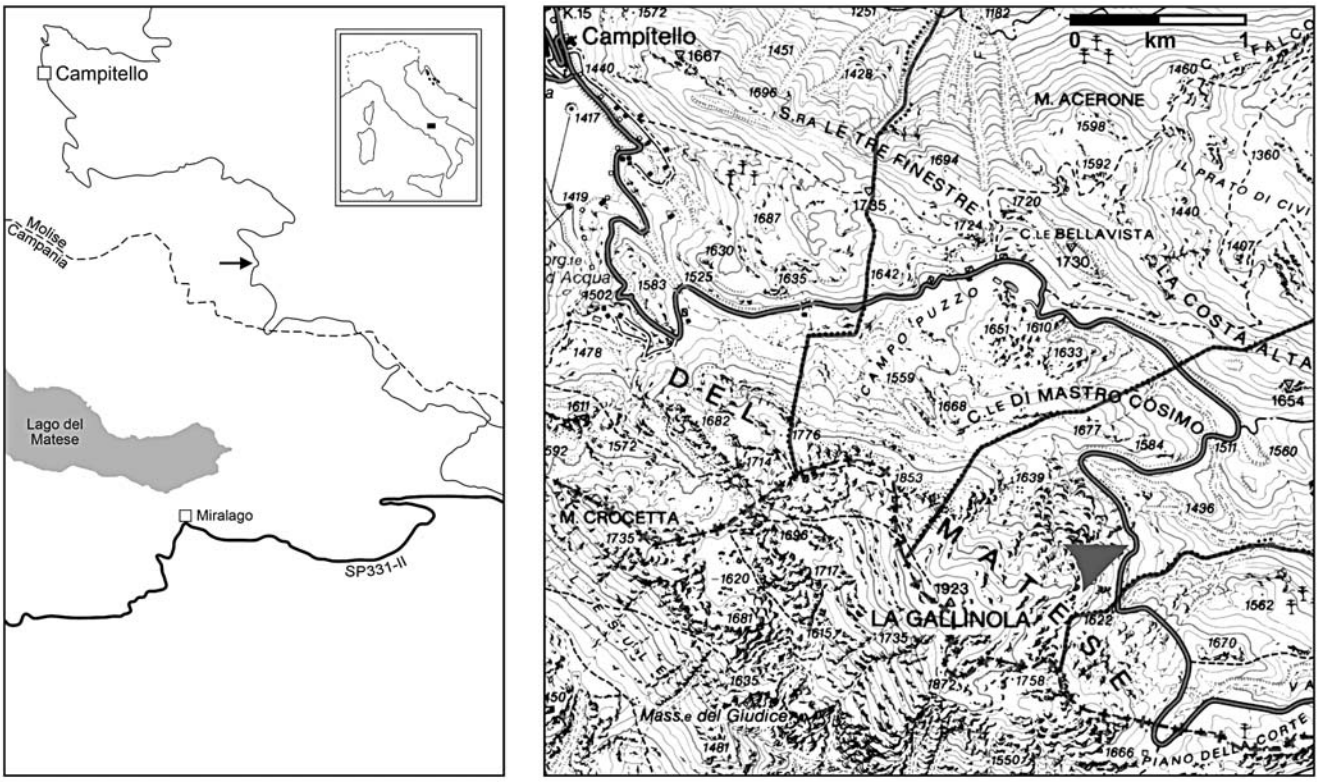

Fig. 1 - Location of sample C55 (arrows) with *Cuneospirella samnitica* gen. n., n. sp., southeast of Campitello (Molise).

sectors, from more open and external areas to more internal ones, occupying different substrata and furnishing the bulk of the skeletal component. Rudists grew in loose sediments giving rise to limited and scattered rudist-rich bodies whose relief on the surrounding sea bed was slight and limited to the last generation of individuals which grew with constratal pattern (sensu Gili et al. 1995). The randomly-arranged "mound-type" structures interfingered with bioclastic talus made up of over 90% of more or less bioeroded rudist shell fragments and other bioclasts. In these enviromnents rudists were highly diversified. Large elongated cylindro-conical hippuritids (mostly pertaining to the genera *Hippurites* and *Vaccinites*), thick-shelled radiolitids and plagioptychids largely dominate.

Bioerosive processes acting on these assemblages produced loose, bioclastic debris that were dominated by calcite and were not involved in significant early diagenetic cementation processes (Carannante et al. 1993; 1997; 2009). No rigid frameworks characterized these rudist accumulations that did not develop into true reefs. As a consequence, both storm- and wind-induced currents and waves controlled the sedimentary arrangement of the shifting biogenic sediments (Carannante et al. 1993; 2007). The occurrence of thick amalgamated tempestites and the proximality of the tempestite parameters are indicative of deposition from high-energy storm waves and currents on the inner ramp.

The rudist-rich beds are commonly sealed by cross-laminated, bioclastic rudstone to grainstone. Locally, erosive/bioerosive surfaces truncate these beds, followed by a few dm of packstone-wackestone (type b in Fig. 2). These deposits represent the incoming of shallower and/or more restricted water conditions around the rudist colonized areas following the shallowing of sea level.

Location and stratigraphic position of the studied material

Sample C55 containing the new foraminifer *Cuneospirella samnitica* gen. n., n. sp. comes from one of the thin silty horizons, which are intercalated in the Upper Cretaceous rudist-bearing bioclastic rudstones (type b in Fig. 2, arrow). It was collected in the Piano della Corte area, east of Mount La Gallinola (1923m), at the road between Campitello Matese and the junction with the provincial road 331-II (Fig. 1, arrows), sheet Campobasso no. 401. The outcrop parameters are: Gauss_Boaga 2472604.580, 4587323.294; 41°26′07.28″ N, 14° 25′57.82″E.

The micritic sediment is characterized by the abundant occurrence of cylindrical tubular segments, described by De Castro (1989) from the Apennines (?Coniacian-Santonian) under the name *Aeolisaccus barattoloi*, considered actually as belonging to the cy-

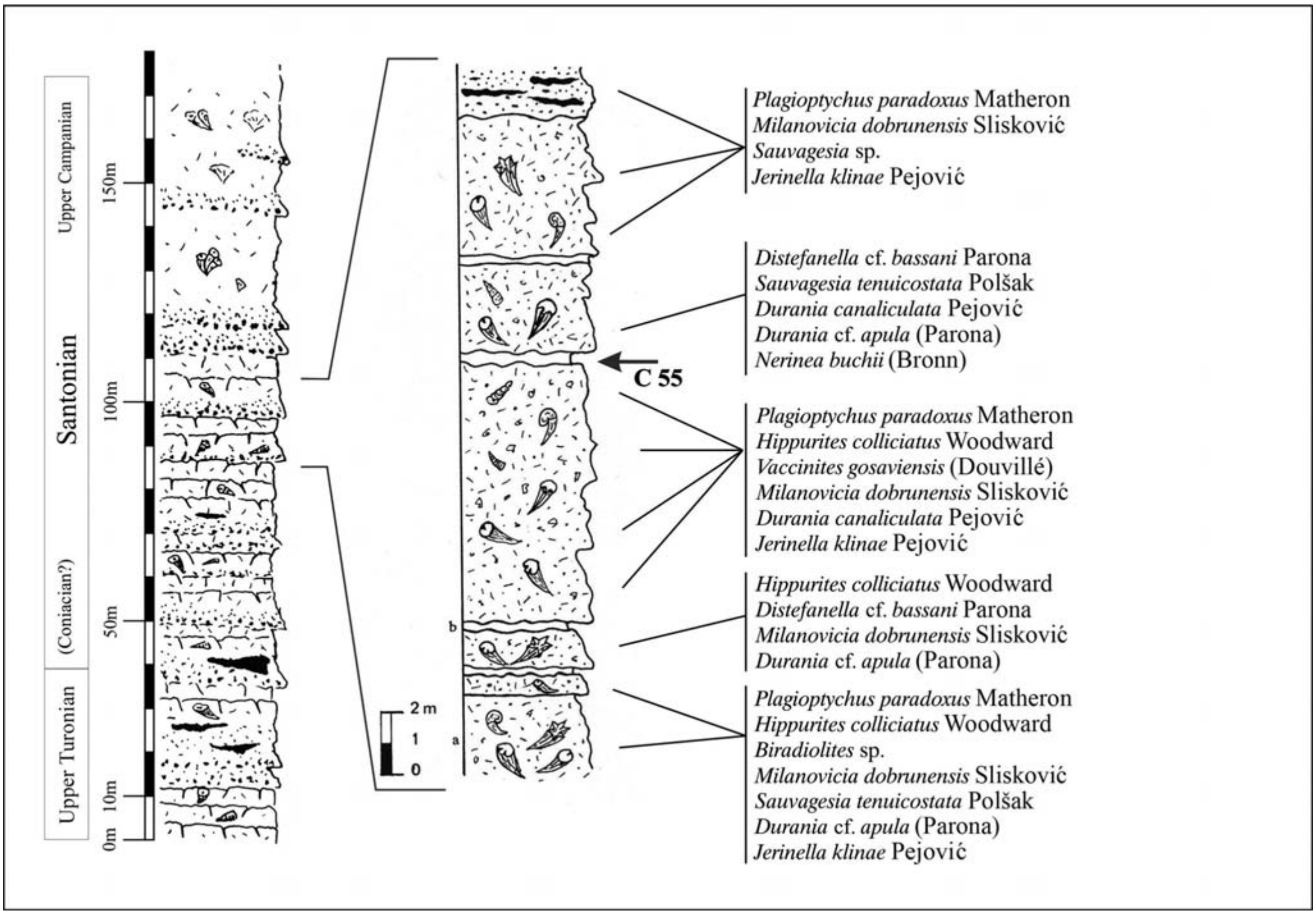

Fig. 2 - Schematic stratigraphic log of the Upper Cretaceous carbonate successions in the central Matese area. On the right a close-up of the log related to the Piano della Corte outcrop showing the position of sample C55 with *Cuneospirella samnitica* gen. n., n. sp. and the different rudist associations.- a: bioclastic rudstone; b: silty packstone-wackestone resting on erosive/bioerosive surfaces.

nobacteria. Besides frequent specimens of the new foraminifer *Cuneospirella samnitica* gen. n., n. sp., the sample contains smaller benthic foraminifers, *Pseudolituonella* sp., valvulinids, miliolids and thin-shelled smooth ostracods.

The rudist associations indicate a Santonian age.

Systematic paleontology

Class **Foraminiferida** Eichwald, 1830

? Order **Lituolida** Lankaster, 1895

? Family Spiroplectamminidae Cushman, 1927

Cuneospirella gen. n.

Type species: *Cuneospirella samnitica* n. sp.

Derivation of name: cuneus (lat.) = wedge; spirella (lat.) = small spiral. The name refers to the cuneiform adult stage and the spiral early stage of the test.

Diagnosis: Test free, microgranular; early stage planispiral and biumbilicate; adult stage rectilinear, cuneiform and biserial; external part of chambers subdivided into chamberlets by partitions; aperture consisting of a single interiomarginal row of openings.

Remarks. The genus *Spiroplectammina* Cushman, 1927 differs from *Cuneospirella* by its agglutinated wall, their undivided chambers and the interiomarginal slit-like aperture.

The suprageneric systematic position of the genus *Cuneospirella* is still problematic, because its wall is calcareous microgranular, whereas the Order Lituolida (including the family Spiroplectamminidae) is characterized, according to the foraminiferal classification of Loeblich & Tappan (1992) and Kaminski (2004), among others by an agglutinated test. In view of this unclear situation, we regard *Cuneospirella* only with reservation as belonging to the Spiroplectamminidae, although the arrangement of his chambers is exactly the same as that of this family.

Cuneospirella samnitica gen. n., n. sp.

Pl. 1, figs A-U; Pl. 2, figs A-G

Derivation of name: The name refers to the old Roman region Samnium, where the Matese Mountains are lying.

Holotype: Median section (SMF XXVII 7563), shown in Pl. 1, fig. E and Pl. 2, fig. C. The thin section is stored in the Forschungsinstitut Senckenberg, Frankfurt am Main.

Type locality: Road between Campitello and the junction with the provincial road 331-II. Sheet Campobasso no. 401 (Molise region, central Italy).

Age: Santonian.

Material: 25 thin-sections of sample C55, containing more than 200 specimens.

Diagnosis: See diagnosis of the monotypic genus.

Description. The test of *Cuneospirella samnitica* gen. n., n. sp. consists of two morphologically different parts: (1) an early bulbous stage, and (2) a subsequent more or less rectilinear cuneiform stage.

(1) The subglobular to nautiloid early stage is planispiral and biumbilicate (Pl. 1, figs F, O). The deep umbilici are funnel-shaped extending up to the embryo in the centre of this stage (Pl. 2, fig. A). Consequently, this early part is evolute. The planispiral is made on an average of 3.5 whorls increasing considerably in height during ontogeny from 0.02 to 0.12 mm (Pl. 1, figs E, G, H, J, U).

The embryo (Pl. 2, figs A, C-E) is made of a protoconch (mean diameter: 0.03 mm) and an undivided deuteroconch (mean diameter: 0.05-0.06 mm). The passage between the deuteroconch and the first postembryonic chamber is a simple aperture (Pl. 2, fig. E). The median plane of the embryo (proto- and deuteroconch) is perpendicularly directed to the median plane of the following spiral stage.

In axial sections, the postembryonic chambers are at first crescent-shaped, later on becoming arched (Pl. 2, fig. A). The first chambers are undivided, but subsequently a system of rather regularly spaced partitions develops, which are perpendicularly directed to the septa. These partitions, whose number increases parallel to the growth of chambers, subdivide the external part of each chamber into rectangular chamberlets being higher than broad (Pl. 1, figs M-N, Q-R; Pl. 2, figs A-B, F). Partitions are generally in alignment from one chamber to the next. Transverse partitions are lacking. The internal, undivided space of the chamberlets of each chamber forms in their entirety an arched preseptal passage (longitudinal section: Pl. 2, fig. A, lowermost chamber; transverse sections: Pl. 2, fig. E, last five chambers).

(2) The following adult stage is in form of a slender rectilinear or slightly curved wedge with elliptic outline in transversal section (Pl. 2, fig. G). This stage has a maximal length of 1.12 mm, increasing in diameter at least up to 0.42 mm or even more. In some specimens the adult stage is remarkably turned away from the early spiral stage (Pl. 1, figs I, K, M, O), forming with the latter an angle up to 80° (Pl. 1, fig. F). This deformation could be due, at least in some cases, to the diagenetic compaction of the originally muddy sediment, but it is more probable that these forms have to be regarded as teratological.

The slightly arcuate chambers of the rectilinear stage are biserially arranged, alternating in position from one row to the other. Each row is made of maximally 10 chambers (Pl. 1, fig. A), whose septa are vaulted in growth direction. The outer part of the chambers is subdivided into rectangular chamberlets by partitions which are perpendicularly directed to the septa, sometimes thickening at their free ends (Pl. 1, fig. G). Larger chamberlets may be subdivided in their outermost part by shorter secondary partitions of same direction. In the older chambers of the biserial stage occasionally a single rudimentary transverse partition occurs, whereas in the younger and larger chambers two or more transverse partitions can be observed (Pl. 1, fig. A). Longitudinal sections of the preseptal passages in the internal part of the chambers are visible in Pl. 1, figs L, P. The aperture of each chamber is a single row of openings.

Remarks. Chiocchini et al. (1994, Pl. 21, figs 11-12) presented from the upper Turonian of the Abruzzo region (central Italy) under the name *Spiroplectammina multicamerata* Said & Kenawy, 1957 two median sections of a foraminifer showing a planispiral early stage, followed by a short biserial stage with only two chambers per row. The chambers of these specimens are undivided; the character of their apertures is not recognizable. In our opinion, this form or a structurally similar morphotype could be a primitive ancestor of *Cuneospirella samnitica* gen. n., n. sp.

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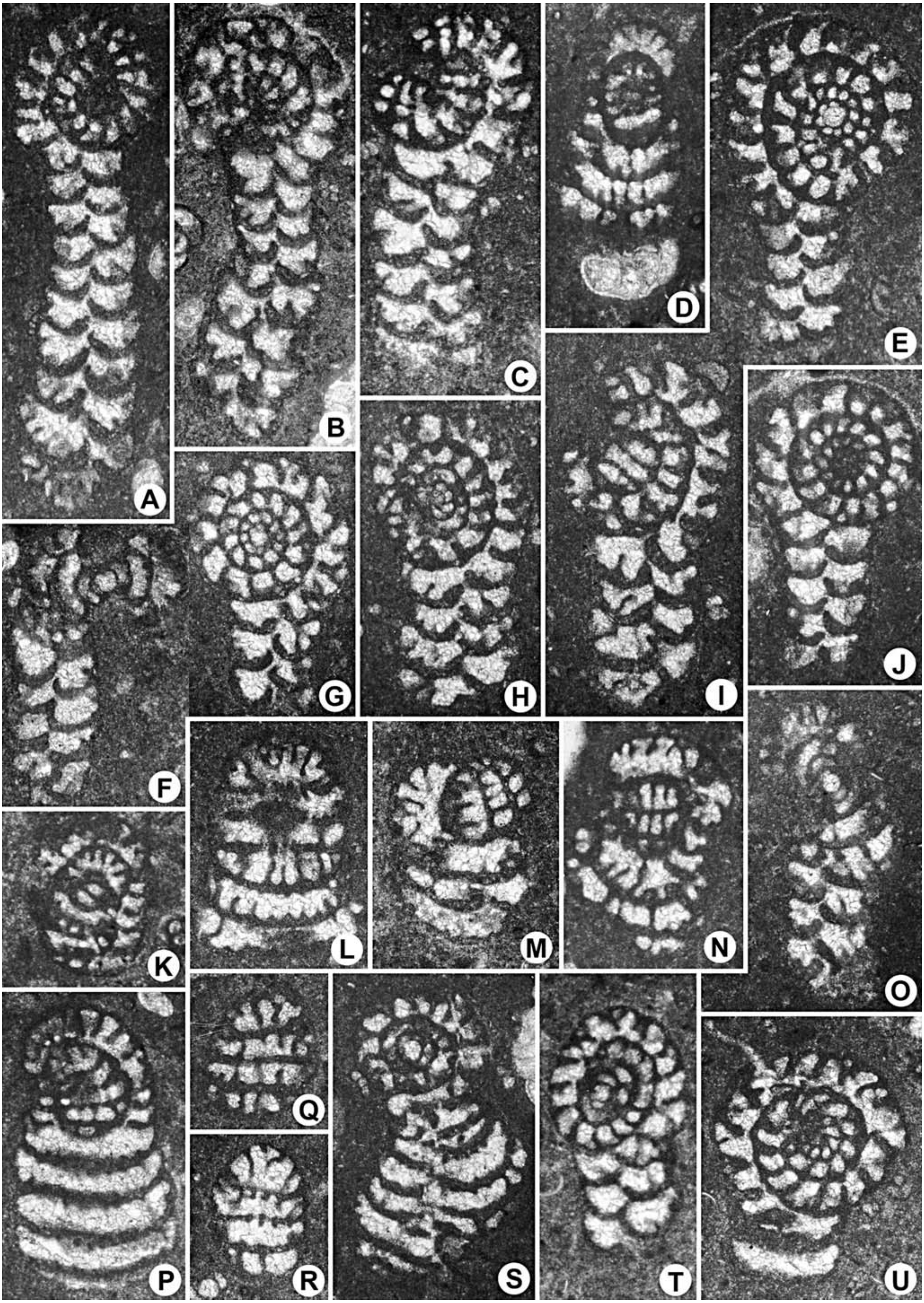
PLATE 1

Cuneospirella samnitica gen. n., n. sp. - Piano della Corte, Matese Mountains (central Italy). x60.

Fig. A - Submedian section (SMF XXVII 7541). Fig. B - Submedian section (SMF XXVII 7550). Fig. C - Submedian section (SMF XXVII 7547). Fig. D - Longitudinal section, perpendicularly directed to the median plane (SMF XXVII 7549). Fig. E - Holotype. Median section (SMF XXVII 7563). Fig. F - Axial section through the spiral stage, followed by the strongly turned aside biserial stage (SMF XXVII 7550). Fig. G - Median section (SMF XXVII 7558). Fig. H - Somewhat oblique median section (SMF XXVII 7556). Fig. I - Subaxial section through the spiral stage, followed by the turned aside biserial stage (SMF XXVII 7541). Fig. J - Median section (SMF XXVII 7551). Fig. K - Young specimen (SMF XXVII 7546). Fig. L - Tangential section, perpendicularly directed to the median plane (SMF XXVII 7559). Fig. M - Tangential section through a young specimen showing the strongly turned aside biserial stage (SMF XXVII 7554). Fig. N - Tangential section, perpendicularly directed to the median plane (SMF XXVII 7547). Fig. O - Axial section through the spiral stage, followed by the strongly turned aside biserial stage (SMF XXVII 7542). Fig. P - Tangential section, perpendicularly directed to the median plane (SMF XXVII 7539). Fig. Q -Tangential section (SMF XXVII 7563). Fig. R - Tangential section (SMF XXVII 7554). Fig. S - Oblique median section (SMF XXVII 7562). Fig. T - Somewhat oblique median section (SMF XXVII 7552). Fig. U - Median section through the spiral stage (SMF XXVII 7548).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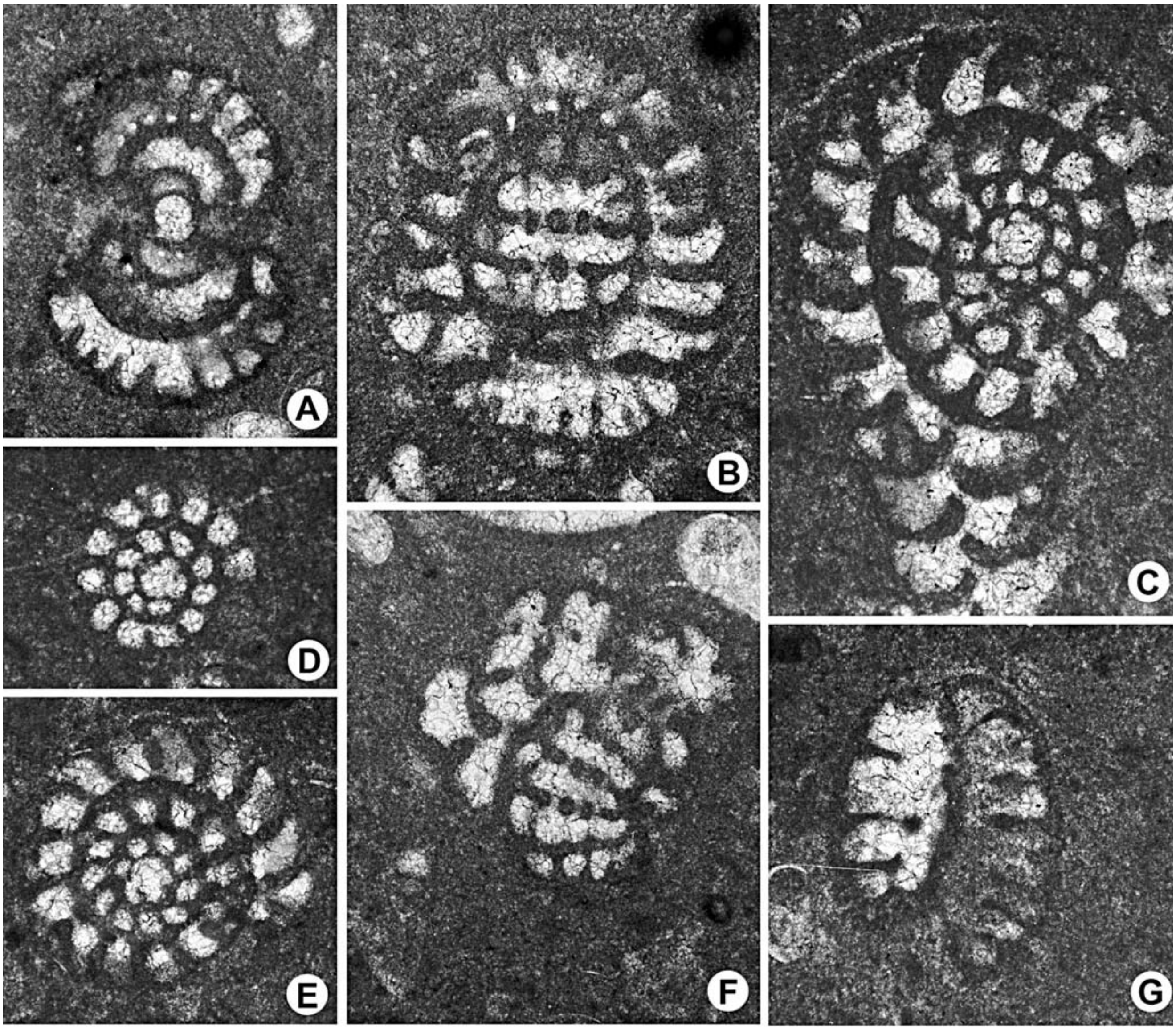

PLATE 2

Cuneospirella samnitica gen. n., n. sp. - Piano della Corte, Matese Mountains (central Italy). x100.
Fig. A - Axial section through the early stage showing some rows of circular interiomarginal openings (SMF XXVII 7557). Fig. B - Subaxial section through the early stage showing perforated septa (central part) (SMF XXVII 7556). Fig. C - Holotype, median section (enlarged detail of PI. 1, fig. E) (SMF XXVII 7563). Fig. D - Equatorial section through the early stage (SMF XXVII 7558). Fig. E - Equatorial section through the early stage (SMF XXVII 7551). Fig. F - Tangential section showing perforated septa (SMF XXVII 7559). Fig. G - Transversal section through the biserial adult stage (SMF XXVII 7560).

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