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Revue de micropaléontologie

Revue de micropaléontologie 57 (2014) 45–56

Original article

Trimeridianellidae nov. fam., a Triassic spumellarian radiolarian family with simple initial skeleton and pyloniacean mode of growth

Trimeridianellidae nov. fam., une famille de radiolaires spumellaires triassiques avec un squelette initial simple et un mode de croissance pyloniacé

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Abstract

Based on several samples of Middle and Late Triassic age, the authors describe a new family of spumellarian Radiolaria – Trimeridianellidae Dumitrica and Tekin, characterized by a three-fold symmetry, a first shell of triangular prism type with 6 primary rays originated at the edges of two bases of the prism, or 3 meridian arches with 3 equatorial rays, and growth of pyloniacean type. The family comprises 4 monospecific new genera (*Enneacladus* Dumitrica, *Endoprisma* Dumitrica, *Trimeridianella* Dumitrica and Tekin, and *Tristylopyle* Dumitrica), 4 new species and one left in open nomenclature. In spite of their spotty occurrences and low diversity, the authors attempt to trace the evolution of the family, which is considered to be the result of heterochrony in ontogenetic growth, mostly of paedomorphic type. The family seems to be related to the Middle Triassic family Patruliidae Dumitrica with which it shares in common the simple microsphere with 6 primary rays and the pyloniacean mode of growth.

Keywords: Spumellarian Radiolaria; Triassic; Taxonomy; Romania; Italy; Turkey

Résumé

Basé sur quelques échantillons d'âges triassique moyen et supérieur, les auteurs décrivent une nouvelle famille de radiolaires spumellaires – Triméridianellidae Dumitrica et Tekin. Elle est caractérisée par une symétrie triradiaire avec un squelette initial de type prisme triangulaire avec soit 6 rayons primaires qui ont leur origine dans les arêtes des deux bases, soit avec 3 arcs méridiens et 3 rayons équatoriaux, ainsi qu'un mode de croissance pyloniacé. La famille comprends 4 nouveaux genres monotypiques (*Enneacladus* Dumitrica, *Endoprisma* Dumitrica, *Triméridianella* Dumitrica et Tekin, et *Tristylopyle* Dumitrica), 4 nouvelles espèces et une espèce en nomenclature ouverte. En dépit de leurs occurrences ponctuelles et leurs diversités basses, les auteurs retracent l'évolution de ces genres et espèces. Elle semble être le résultat de quelques phénomènes d'hétérochronie du développement ontogénétique, souvent de type paedomorphose. La famille semble être proche de la famille Patruliidae Dumitrica du Trias moyen avec laquelle elle a en commun la microsphère simple à 6 rayons primaires et le mode pyloniacé de croissance.

Mots clés : Radiolaires spumellaires ; Trias ; Taxonomie ; Roumanie ; Italie ; Turquie

1. Introduction

Despite the numerous studies published during the last 40 years, it became evident that we are still far from a complete knowledge of Triassic radiolarian diversity. It became also evident that the initial skeletal structures should represent the

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http://dx.doi.org/10.1016/j.revmic.2014.03.002
0035-1598/

main elements on which the taxonomy of Radiolaria should be based (Dumitrica, 1989, 2011, 2013a, 2013b, etc.). This is the consequence of the fact that these organisms grow in centrifugal direction and the first skeletal structures are the most conservative. If we manage to add to this the mode of ontogenetic growth, our classification will become even closer to rather natural taxonomy at family and genus level.

In the present contribution, we describe 4 new genera and species of the new Triassic radiolarian family Trimeridianellidae n. fam. that has as initial skeleton a simple triangular prism-shaped or trimeridian-shaped microsphere, a pyloniacean mode of growth (Dumitrica, 1989), and three-fold symmetry. Almost all these genera are so far monospecific and they have spotty occurrences. In spite of the difficulties to reconstruct in detail and confidently their evolution and relationships, we decided to make an attempt.

2. Location and age of samples

This study is based on samples coming from Romania, Italy and Turkey, and from several stratigraphic levels of the Middle and Late Triassic such as: middle Anisian (Pelsonian), late Anisian (late Illyrian) to probably early Ladinian (Fassanian), and middle Carnian (late Julian), as follows:

- **CRH** and **CRH 14**. Grey limestone of Gutenstein type with roe-like chert spherules, Fabricii Valley, Cristian village, Braşov district, Romania, Middle Anisian (Pelsonian), *Balatonites balatonicus* ammonoid zone and *Gondolella bulgarica* conodont zone. The samples were collected from the waste-dump of a fire-clay mine: 45°36′12.26″N/25°30′07.90″E, elevation 738 m;
- **CR 24**. Practically same location as above, on the right side of the road running from the Cristian village to the waste-dump. Bituminous light grey coloured micritic bedded limestone of Gutenstein type with layers of grey chert at the bottom of the beds (see Dumitrica, 1991a, 1991b for details). The sample comes from a small outcrop, completely covered at present, in the close vicinity of samples CRH and CRH 14;
- **Rc 4**. Buchenstein Formation, cherty limestone, latest Anisian, *Ladinocampe multiperforata* Zone, probably *Ladinocampe annuloperforata* Subzone, about 500 m northeast of Monte Anghebe, along the road to Recoaro, Vicentinian Alps, Southern Alps, North Italy (Dumitrica et al., 2013b);
- **BV 85-70**. Site Fociade (2400 m), Monte de Saline, SE of Marmolada massif, northern Italy. The sample was provided by Prof. Patrick De Wever and comes from the Livinallongo Formation, representing deposits of pelagic basin consisting of tuffaceous marls. Its radiolarian fauna was partly studied by Kellici and De Wever (1995) and considered to be early Ladinian in age, athough its age seems to be latest Illyrian on the basis of the presence of *Yeharaia annulata* Nakaseko and Nishimura;
- **ELB 1-4**. Late Julian (middle Carnian) cherty limestones, *Tetraporobrachia riedeli* Zone, Köseyahya Nappe, Elbistan area, SE Turkey (see Tekin and Bedi, 2007a, 2007b; Dumitrica et al., 2010, 2013a, 2013b for details).

Although we studied many samples from many other sections of Middle and Late Triassic age, most of them with well-preserved and rich radiolarian faunas, these are the only samples in which we could find the taxa herein described.

3. Taxonomy

To better understand the diversity and evolutionary trends of this family, we shall treat its members in chronological order, with the exception of the genus *Tristylopyle* Dumitrica n. gen., that will be discussed after the other three genera because of its different initial skeleton.

The family, the genus *Trimeridianella* and its type species have as authors Dumitrica and Tekin, the Anisian and probably early Ladinian genera and species have Dumitrica as author. The holotypes of the new species will be stored in the Musée de Géologie Lausanne (MGL) under the numbers 96905–96910.

Class RADIOLARIA Müller, 1858

Subclass POLYCYSTINA Ehrenberg, 1838, emend. Riedel, 1967

Order SPUMELLARIA Ehrenberg, 1875

Superfamily PATRULIOIDEA Dumitrica, 1989

Emended diagnosis: Triassic spumellarian Polycystina with pyloniacean mode of growth and a microsphere of tetrahedral or triangular prism type, or consisting of only three meridian arches, each type giving rise to six, three or even two primary rays/spines.

Remarks: The family Patruliidae Dumitrica is raised at the rank of superfamily to include in it also the family Trimeridianellidae nov. fam. The members of the family Patruliidae differ from those of the family Trimeridianellidae in only having a tetrahedral type first girdle (Dumitrica, 1989) and resemble in having a pyloniacean mode of growth. Also, they appeared and evolved in almost the same time interval. See more discussions in the last chapter of the article.

Range: Middle Anisian (Pelsonian) to middle Carnian (late Julian).

Family TRIMERIDIANELLIDAE Dumitrica and Tekin nov. fam.

Type genus: *Trimeridianella* Dumitrica and Tekin nov. gen.

Diagnosis. Spumellarian radiolarians of three-fold symmetry having as initial skeleton a triangular prism or three meridian arches and growing according to the pyloniacean mode. Skeleton formed of one or two, or possibly more repeating systems of usually two girdles. Primary and secondary rays in number of three, six or nine and bearing one or more nodes from which pairs of opposite branches arise in successively perpendicular planes.