DESCRIPTION OF SOME NEW MIDDLE TRIASSIC RADIOLARIANS FROM THE CAMP COVE FORMATION, SOUTHERN BRITISH COLUMBIA, CANADA

DESCRIPTION DE NOUVEAUX RADIOLARIENS DU TRIAS MOYEN DE LA FORMATION DE CAMP COVE, COLOMBIE BRITANNIQUE MERIDIONALE, CANADA

by

Fabrice CORDEY *, Patrick DE WEVER *, Paulian DUMITRICA **, Taniel DANELIAN *, Norio KITO *, Bruno VRIELYNCK *

ABSTRACT. - A radiolarian association extracted from one sample of siliceous argillite in the Camp Cove Formation, Harrison Lake package (southern British Columbia, Canada), permits to establish a Middle Triassic age. From this association are described four new species: one from Oertlisponginae subfamily and three from Capnuchosphaeridae family.

RESUME. - Une association de radiolaires provenant d'un échantillon d'argilite siliceuse de la Formation de Camp Cove, série de Harrison Lake (Colombie Britannique meridionale, Canada) permet de dater cette Formation du Trias moyen. De cette association sont décrites quatre nouvelles espèces : une appartenant à la sous-famille des Oertlisponginae et trois appartenant à la famille des Capnuchosphaeridae.

Key-words: Radiolaria - Middle Triassic - British Columbia - Taxonomy (new taxa - Spongoserrula - Sarla).
Mots-cles : Radiolaires - Trias moyen - Colombie Britannique - Taxonomie (nouveaux taxons - Spongoserrula - Sarla).

INTRODUCTION

One sample (MV890) of siliceous argillite of the Camp Cove Formation (southern British Columbia, Canada) contains a well-preserved radiolarian fauna. This formation, exposed in the southwest side of Harrison Lake (Fig. 1) in the Coast Plutonic Complex is the oldest unit of the Harrison Lake package (Monger, 1986). This package is a stratigraphic succession of sedimentary and volcanic rocks, originally named by Crickmay (1925, 1930) and described by Arthur (1986); it belongs to a regional area trapped in Cretaceous time between the Insular superterrane (Wrangellia + ? Alexander terranes) to the west and the continental american margin to the east (Monger, 1986). The Camp Cove Formation is stratigraphically overlain by the Harrison Lake Formation (Lower to Middle Jurassic) (Fig. 1).

The diagnostic radiolarians from this association permits to establish a Middle Triassic (Ladinian ?) age. This is the first age assignment in the Camp Cove Formation. It permits as well to date the base of the Harrison Lake package.
Conodonts extracted in the same locality suggested the same Middle Triassic age (Orchard in Arthur, 1986). Later, conodonts extracted from the same sample than the radiolarian association (MV890) indicated an upper Anisian-Lower Ladinian age (Gondolella constricta MOSHER and CLARK, identified by B. Vrielynck) consistent with the radiolarian age.

THE RADIOLARIAN ASSOCIATION

The siliceous argillite sample (MV890) was etched with dilute hydrofluoric acid after usual radiolarian extraction techniques (Dumitrica, 1970; Pessagno and Newport, 1972; De Wever, 1982). In the radiolarian association were identified Baumgartneria sp. cl. B. curvispina DUMITRICA, Plafkerium cochleatum (AKASEKO and NISHIMA RA), Kahlerosphaera sp. cl K. aspinosa KOZUR and MOSTLER, Spongoserrula rarauana DUMITRICA, Pseudotylosphaera nazarovi (KOZUR and MOSTLER), and Sarla kretaensis KOZUR and KRAHL. Their reasonable common age range is in the Middle Triassic, possibly Ladinian.

With these species were discovered some new forms, tentatively described in this paper: (1) one new species belonging to the genus Spongoserrula DUMITRICA; (2) three new species of the genus Sarla PESSAGNO.

TAXONOMIC DESCRIPTIONS

Suborder SPUMELLARIA EHRENBURG, 1875
Family SPONGURIDAE HAECKEL, 1862 emend. PESSAGNO, 1973
Subfamily OERTLISPONGINAE KOZUR and MOSTLER emend. DUMITRICA, 1982

The skeleton of the Oertlisponginae sub-family consists of (1) a shell which is formed by a latticed microsphere surrounded by a concentric (5-10 layers) and spherical spongy shell. This shell is generally removed by reason of a selective dissolution during the fossilization; (2) spines, a minor and a main one; the main spine is in most cases the only preserved element.

Type genus: Oertlispongus DUMITRICA, KOZUR and MOSTLER, 1980.

Genus Spongoserrula DUMITRICA, 1982

Type species: Spongoserrula rarauana DUMITRICA, 1982.

Original description: Spine asymmetrical, curved and lamellar, with a variable number of teeth on the external side.

Spongoserrula deWi n.sp.
(PI. 1, fig. 1-5)

Holotype: PI. 1, fig. 4, sample MV890, coll. FSL no 167 073.

Description (cl. Fig. 2): Broad, curved lamellar spine with variable number of teeth (three to five) on the external side. Long and prominent first tooth called the spur tooth. Others teeth decreasing in size toward the distal end but conserving the same shape. Stem commonly thin. Root thin, sometimes larger than the stem at its proximal part.
I. TRIASSIC RADIOLARIANS FROM CANADA

Family CAPNUCHOSPHAERIDAE DE WEVER, 1979
emend. KOZUR and MOSTLER, 1979 emend.
PESSAGNO, 1979 emend. BLOME, 1983

Genus Sarla PESSAGNO, 1979

Type species: Sarla prietoensis PESSAGNO, 1979.

Sarla ariana n.sp.

(PI. 1, fig. 8-11)

Holotype: PI. 1, fig. 9, sample MV 890, coll. FSL n° 167 074.

Description: Cortical shell with three spines. Surfaces of cortical shell planiform to slightly convex; sides concave to vertical. Two-layered cortical shell with: (1) an inner layer of thin polygonal pore frames; (2) a secondary outer layer consisting of nodes interconnected by thin bars to form triangular, tetragonal or polygonal pore frames on the top and the bottom of the cortical shell. Nodes of outer layer superimposed on vertices of inner layer.

Remarks: S. dehli differs from S. rarauana DUMITRICA by the presence of a long and prominent spur tooth and by having all teeth pointed. It is closely related to S. cristagalli DUMITRICA by the general morphology of the spine but differs by the importance of the main tooth and the general sharpness of teeth.

Dimensions (10 specimens, in micrometers):
Maximum length with teeth: min. 265-max. 335 (average 292).
Maximum breadth with first tooth: 290-416 (365).
Length of the spur tooth: 125-200 (171).
Length of root: 40-50 (46).
Diameter of stem: 25-50 (35).

Occurrence: Middle Triassic (upper Anisian-lower Ladinian) strata of the Camp Cove Formation, Harrison Lake package, southern British Columbia, Canada.


Fig. 2. - Morphology of skeleton of Spongoserrula dehli n.sp. (after Oerlisponginae skeleton in Dumitrica, 1982).

Fig. 3. - Morphology of Sarla ariana n.sp. A: lateral view of the cortical shell. B: horizontal view of the test.

Morphologie du test de Spongoserrula dehli n.sp. (d’apres Dumitrica, 1982).

Morphologie du test de Sarla ariana n.sp. (d’apres Dumitrica, 1982).
Primary spines coplanar, triradiate in axial section. Angles between them commonly similar, varying sometimes from 100 to 140°. One spine extends straightforward, two are twisted dextrally. Twisted spines on average shorter than straight one.

Remarks: Sarla ariana n.sp., and others species of Sarla described herein, as well as S. kretaensis KOZUR and KRAHL (1984) present in the association, differ from Sarla already known by (cf. Fig. 3): (1) the more or less cylindrical shape of the cortical shell; (2) the presence of massive nodes on top and bottom of the cortical shell.

On the basis of the external shape of the cortical shape which resembles Emiluvia FOREMAN, we were tempted to create a new genus. But Dumitrica observed on similar morphotypes their internal structure, composed of a two-layered cortical shell and a medullary shell, as in Sarla PESSAGNO, Plakkerium PESSAGNO, Pseudostylosphaera KOZUR and MOSTLER, Sepsagon DUMITRICA, KOZUR and MOSTLER, Parasepsagon DUMITRICA, KOZUR and MOSTLER, Weverisphaera KOZUR and MOSTLER, Hindeosphaera KOZUR and MOSTLER, the difference between these genera being the number of spines and their correspondance relative to the eccentrical spicule. By reason of the importance of internal structure in radiolarian taxonomy, we consider that our morphotypes must be integrated to the genus Sarla. Sarla ariana n.sp., differs from S. integrita n.sp., by possessing two twisted spines, and from S. kretaensis KOZUR and KRAHL (1984) by having spines longer and without secondary grooves.

It differs from Sarla delicata BLOME (1983) and from S. plena BOME (1983) by having a conical cortical shell with massive nodes, and one straight spine.

Dimensions (6 specimens, in micrometers):
- Lenght of straight spine: min. 210-max. 265 (average 240).
- Diameter of cortical shell: 110-120 (117).
- Height of cortical shell: 83-125 (110).


Occurrence: Middle Triassic (upper Anisian-lower Ladinian) strata of the Camp Cove Formation, Harrison Lake package, southern British Columbia, Canada.

Sarla integrita n.sp.

(Pl. 2, fig. 2)

Holotype: Pl. 2, fig. 2, sample MV890, coll. FSL n° 167 075.

Description: Cortical shell with three spines. Surfaces of cortical shell planiform to slightly convex; sides concave to vertical. Cortical shell with: (1) an inner layer of thin polygonal pore frames; (2) a secondary outer layer consisting of nodes interconnected by thin bars to form triangular, tetragonal or polygonal pore frames on the top and the bottom of the cortical shell. Nodes of outer layer superimposed on vertices of inner layer. Three primary spines equal, coplanar, at 120°. Each spine sharp-pointed, commonly broader at half length, triradiate in axial section, e.g. possessing three ridges alternating with three grooves.

Remarks: Sarla integrita n.sp., differs from Sarla ariana n.sp., by the absence of twisted spines. It is related to Sarla soustra n.sp., by the general shape and dimensions of the skeleton but differs by the absence of secondary grooves along the entire length of the spines, even though some beginning of hollowing is observed for some specimens which could be intermediate forms between the two species.

It differs from S. integrita n.sp., differs from S. longispinosa (KOZUR and MOSTLER, 1979) by having a cylindrical cortical shell with massive nodes and spines broader. It differs from S. (?) sp. B of Pessagno (1979) by having a real two-layered cortical shell with massive nodes, and spines longer and thinner.

Dimensions (4 specimens, in micrometers):
- Lenght of spines: min. 330-max. 420 (average 370).
- Diameter of cortical shell: 110-125 (120).

Etymology: From integritas (Latin), figurative meaning of straightness which caracterizes the spines.

Occurrence: Middle Triassic (upper Anisian-lower Ladinian) strata of the Camp Cove Formation, Harrison Lake package, southern British Columbia, Canada.

Sarla soustra n.sp.

(Pl. 2, fig. 1, 3-5, 8)

Holotype: Pl. 2, fig. 8, sample MV890, coll. FSL n° 167 076.

Description: Cortical shell with three spines. Surfaces of cortical shell planiform to slightly convex; sides concave to vertical. Cortical shell with: (1) an
inner layer of thin polygonal pore frames; (2) a secondary outer layer consisting of nodes interconnected by thin bars to form triangular, tetragonal or polygonal pore frames on the top and the bottom of the cortical shell. Nodes of outer layer superimposed on vertices of inner layer.

Spines equal, coplanar. Each spine possesses three primary grooves and three secondary ones alternating with six secondary ridges. Hollowing responsible for transforming each primary ridge in two secondary ridges and one secondary groove along the totality of the spine, sometimes slight or inexistant near the cortical shell.

Remarks: *Sarla soustra* n.sp., is closely related to *S. integrita* n.sp., by its shape and dimensions but differs by the presence of secondary ridges and grooves.

Dimensions: (6 specimens, in micrometers):
- Lenght of spines: min. 200-max. 320 (average 280).
- Diameter of cortical shell: 105-135 (120).


Occurrence: Middle Triassic (upper Anisian-lower Ladinian) strata of the Camp Cove Formation, Harrison Lake package, southern British Columbia, Canada.

*Sarla kretaensis* KOZUR and KRAHL

(Pl. 2, fig. 7, 9-11)


Description: Cortical shell with three spines. Surfaces of cortical shell planiform to slightly convex; sides concave to vertical. Cortical shell with:
- (1) an inner layer of thin polygonal pore frames; (2) a secondary outer layer consisting of nodes interconnected by thin bars to form triangular, tetragonal or polygonal pore frames on the top and the bottom of the cortical shell. Nodes of outer layer superimposed on vertices of inner layer. Three primary spines of equivalent lenght, in the same plan, endly sharp-pointed. One spine extends straightward, two are twisted dextrally. Each spine possesses three primary grooves and three secondary ones alternating with six secondary ridges. Secondary hollowing generally extending from cortical shell to half-spine. Twisted spines on average shorter than straight one.

Remarks: *S. kretaensis* KOZUR and KRASHL, as *S. ariana* n.sp., *S. integrita* n.sp., and *S. soustra* n.sp., possesses a cylindrical cortical shell with massive nodes. It differs from *S. ariana* n.sp., by having shorter and broader spines and secondary ridges and grooves, and from *S. soustra* n.sp., by having two twisted spines.

Dimensions of our specimens (5 specimens, in micrometers):
- Lenght of straight spine: min. 120-max. 205 (average 165).
- Diameter of cortical shell: 105-115 (112).

Occurrence: - Upper Longobardian of the Phyl­lite Group, Crete Island, Greece (Kozur and Krahl, 1984).
- Middle Triassic (upper Anisian-lower Ladi­nian) strata of the Camp Cove Formation, Harrison Lake package, southern British Columbia, Canada.

---

**PLATE I**

Scanning electron micrographs of the radiolarian association (sample MV890) from the Camp Cove Formation (Harrison Lake, southern British Columbia). S.E.M. of M.N.H.N., Paris. Pictures by O. Fay (U.P.M.C., Paris VI). For each figure are mentioned the magnification and the picture number from our collection.


1-5. *Spongoserrula dehli* n.sp.
- 1: x 200, n° 85-320. 2: magnification of the root of fig. 3, x 600, n° 85-319. 3: x 200, n° 85-318. 4: holotype, x 200, n° 85-316. 5: x 200, n° 85-313.

6-7. *Spongoserrula rarauana* DUMITRICA.
- 6: x 190, n° 85-301. 7: x 200, n° 85-311.

8-11. *Sarla ariana* n.sp.
- 8: x 150, n° 85-337. 9: holotype, x 160, n° 85-325. 10: lateral view of the cortical shell of the holotype, x 300, n° 85-326. 11: horizontal view of the cortical shell of the holotype, x 300, n° 85-327.
ACKNOWLEDGMENTS. The field study was supported by the Geological Survey of Canada, Ashcroft-Hope project directed by J.W.H. Monger (G.S.C., Vancouver), as well as C.N.R.S. - ASP - Cordilleres Americanes n° 950078 and CNRS-GRECO 88, CNRS UA-319. We would like to thank A.J. Arthur (University of British Columbia, Vancouver) and J.W.H. Monger for showing us the Camp Cove Fm exposures.

BIBLIOGRAPHY


PLATE 2

Scanning electron micrographs of the radiolarian association (sample MV890) from the Camp Cove Formation (Harrison Lake, southern British Columbia). S.E.M. of M.N.H.N., Paris. Pictures by O. Faÿ (U.P.M.C., Paris VI). For each figure are mentioned the magnification and the picture number from our collection.


1,3-5,8. Sarla soustra n.sp.
1: X 150, α0 85-341. 3: X 150, n° 85-333. 4: X 150, n° 85-332. 5: horizontal view of the cortical shell of fig. 8, X 300, n° 85-324. 8: holotype, X 150, α0 85-323.

2. Sarla integrita n.sp., holotype, X 150, n° 85-322.

6. Pseudostylosphaera nazarovi (KOZUR and MOSTLER), X 200, α0 85-328.

7,9-11. Sarla kretensis KOZUR and KRAHL.