Assignation to Radiolaria of two Upper Jurassic species previously described as Foraminifera: systematic consequences

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Abstract — Two species described in 1867 by Karrer as foraminifera (Lagena dianae Karrer and Orbulina neojurensis Karrer) from the Oxfordian cherty limestones near Vienna (Austria) are in all probability Radiolaria. This fact has both systematical and historical consequences: (a) Lagena dianae becomes a senior synonym of Mirifusus mediodilatatus (Rüst), a common and characteristic species of the Upper Jurassic, and has priority over this name and over all the other synonyms of this species; (b) F. Karrer and not Zittel should be considered as the first who described pre-Tertiary radiolarians.

Attribution aux radiolaires de deux espèces jurassique supérieure précédemment décrites comme foraminifères. Conséquences systématiques

Résumé — Deux espèces de microfossiles décrites en 1867 par Karrer comme foraminifères (Lagena dianae Karrer et Orbulina neojurensis Karrer) dans les calcaires siliceux de l'Oxfordien près de Vienne (Autriche) sont très probablement des radiolaires. Ce changement d'attribution a des implications d'ordre systématique et historique : (a) Lagena dianae devient un synonyme senior de Mirifusus mediodilatatus (Rüst), une espèce commune et caractéristique du Jurassique supérieur, et a la priorité sur ce nom et sur tous les autres synonymes de cette espèce. (b) F. Karrer, et non Zittel, doit être considéré comme le premier qui a décrit des radiolaires « pré-Tertiaires ».


Guidés par ces recommandations nous proposons d'utiliser un nom d'espèce initialement décrit comme foraminifère mais dont l'appartenance aux radiolaires ne fait, pour nous, aucun doute.

En 1867, F. Karrer [2], décrit une microfaune de foraminifères provenant de niveaux marneux rouges épais de 8-10 cm intercalés dans des calcaires à silexite rouges affleurant dans deux carrières abandonnées entre Lainz et St. Veit, près de Vienne (Autriche). Ces marnes contiennent des radiolaires de Cidaris, des plaques d'Asterias, des dents de poissons, des bryozoaires et de nombreux Aptychus latus Voltz, A. lamellosus Voltz et Belemnites canaliculatus Schlothe., ce dernier indiquant un âge Oxfordien. La faune de foraminifères comprend quatre espèces : Biluculina antiqua Karrer, Nodosaria triloculata Karrer, Lagena dianae Karrer et Orbulina neojurensis Karrer.

Les spécimens que décrit Karrer, bien conservés et minutieusement illustrés, sont facilement reconnaissables. Les deux dernières espèces, les plus fréquentes dans cette faune, ne sont pas des foraminifères mais des radiolaires bien qu'ils soient inclus dans le Catalogue de Foraminifères d'Ellis et Messina [3]. Nous reproduisons ici les figurations originales (fig. 2 a-h, 3).

La description et l'illustration de Lagena dianae correspondent à un Mirifusus mediodilatatus (Rüst) selon l'acception de la plupart des auteurs (fig. 1) ou à Mirifusus baileyi Pessagno [4]. Aux caractères morphologiques on peut ajouter l'argument stratigraphique, ce morphotype ayant été trouvé dans l'Oxfordien inférieur ([8], [9]). Notre proposition sera indiscutable.

Note présentée par Jean DERCOURT.
lorsque nous aurons ré-examiné le matériel original. Nous ne connaissons pas la situation de la collection de Karrer (et Ellis et Messina sont muets sur ce point [3]). De ce fait, une étude du gisement décrit par Karrer devrait être entreprise.

*Orbulina neojurensis* (fig. 3) n’est ni un *Orbulina*, dont les espèces sont limitées au Néogène, ni même un foraminifère. En tenant compte de son âge et de sa co-occurrence avec *Mirifusus* il pourrait s’agir d’*Archaeocenosphaera* Pessagno et coll. [10].

**CONCLUSION.** — Considérer ces deux espèces comme radiolaires plutôt que comme foraminifères implique :

1. du point de vue systémique, le morphotype correspondant à *L. dianae* étant un radiolaire, ce nom doit être utilisé, en tant que synonyme senior de *M. mediodilatatus*, espèce souvent citée dans les travaux de biostratigraphie des radiolaires, sur lequel il a priorité (C.I.N.Z. Art. 23) et sur tous les synonymes subséquents. Il ne peut être objecté que ce nom est *nomen oblitum*, puisqu’il en serait de même de *Lithocampe mediodilatata* Rust qui, bien que décrit depuis 1885 [11], n’a été utilisé que récemment ([4], [8], [9], [15]). Pessagno considère *Mirifusus baileyi* comme espèce différente de *M. mediodilatatus* [4]; il devra alors utiliser *Mirifusus dianae* (Karrer), qui, par ses fortes rides annulaires et son ornementation en zig-zag, devient synonyme senior de cette espèce.

2. qu’utiliser ce nom rend justice, et hommage, à un prédécesseur;

3. des conséquences historiques. Il est en effet admis que Zittel [16] fut le premier à décrire des radiolaires « anti-tertiaires ». On doit maintenant préciser que Félix Karrer, neuf ans avant lui, décrivit les premiers radiolaires même s’il ne les avait pas reconnus en tant que tels.

**INTRODUCTION.** — Priority is one of the basic principles of zoological nomenclature, and the International Code of Zoological Nomenclature, art. 23 [1] states clearly that “the valid name of a taxon is the oldest available name applied to it”. The purpose of this principle is “to promote stability of names and is not intended to be used to upset a long accepted name in its accustomed meaning through the introduction of an unused name that is its senior synonym”.

Guided by these recommendations we propose to introduce in the literature of fossil Radiolaria a species initially described as being in Foraminifera but whose radiolarian nature cannot let, in our opinion, any doubt at present.

In 1867, in a paper focused on several foraminiferal faunas of Austria, F. Karrer [2], a well known micropaleontologist of his time, described a very poor Upper Jurassic assemblage that, fact unknown so far, seems to be of equal interest for the knowledge of fossil Radiolaria and for the history of radiolarian research.

This assemblage comes from 8-10 cm thick red marly intercalations in the red cherty limestones exposed in two long-abandoned quarries between Lainz and St. Veit near Vienna. The marls contain frequent specimens of *Aptychus latus* Voltz, *A. lamelllosus* Voltz and *Blemnites canalculatus* Schloth., the latter indicative of an Oxfordian age, as well as small fossil remains represented by spines of *Cidaris*, fragments of *Asterias*, fish teeth and bryozoans. The foraminiferal fauna found is poor and only four species, all of them new, could be determined as follows: *Biloculina antiqua* Karrer, *Nodosaria triloculata* Karrer, *Lagena dianae* Karrer and *Orbulina neojurensis* Karrer.

As one can see from the carefully illustrated plate which accompanies the paper, the specimens are well preserved and consequently the species are easily recognizable. The
first two species, very rare in this fauna, do not raise any problems regarding their foraminiferal nature. It is not the case for the other two species which were the most frequent in the assemblage and which, in the present state of knowledge, cannot be considered as foraminifers any longer but as radiolarians. We are ignorant as regards their subsequent recognition in the other Upper Jurassic foraminiferal faunas but both of them were included by Ellis and Messina [3] in their monumental Catalogue of Foraminifera.

In order to make our discussion easier we reproduce here the original figures of these two species (Fig. 2 a-b, 3).

In a free translation the original description of Lagena dianae (Fig. 2 a-b) is as follows: “The new species Lagena dianae differs so essentially from all other species so far described (Lagena apiculata Reuss, Oolina lanceolata Terquem, Lagena franconica Gümbel, Lagena stilla Schwager) that a simple look at its illustration is sufficient to see the differences, so that the erection of the species is justified.

The new Lagena is perfectly round in cross-section and pear-shaped, with the aperture situated at the more-or-less pointed end and surrounded by an areola. At the opposite end, which is also rounded, is a solid spine that passes gradually to the inflated shell.

The ornamentation of the small foraminifer is perfectly visible. Around its whole circumference there are 12-15 prominent bands resembling generally a compressed necklet; the deep groove between two such bands comprises dense small pits which sometimes are disposed in such a way that a zigzagged band results. The circumferential bands are, on the contrary, smooth. The shell size hardly reaches 3/4 mm. Although the whole foraminiferal fauna of these marls must be considered poor, the number of specimens of this beautiful species is not at all insignificant; in spite of the poor material it is represented by a dozen individuals”.

Both the illustrations and description of this species correspond to the radiolarian Mirifusus mediodilatatus (Rüst) as understood by most authors (Fig. 1) or to Mirifusus baileyi Pessagno [4]. The aperture which the author described represents the opening from the distal end of any species of Mirifusus. A problem could arise with the areola around the aperture, a morphologic character common to some foraminifers but absent in radiolarians. This character results quite probably from the nodes of the shell or the bars between pores. To understand this we must think of the times when the paper was written, when microscopes were not of the quality of those used in modern times and when Mesozoic Radiolaria had not yet been discovered, the only knowledge of Radiolaria being that found in the very few papers published by Erhenberg [5], Müller [6] and Haeckel [7]. Moreover the subjective factor of any observation should not be excluded. The “solid spine” situated at the other end of the species represents certainly the proximal part of Mirifusus, comprising the cephalis and first postcephalic chambers whose diameter increases gradually towards the inflated part to form the characteristic conical proximal part of the shell. The author illustrated on the lower part of this “spine” the slightly emphasized circumferential ridges known with this radiolarian species on the conical proximal part. Besides the shell shape the most convincing character permitting one to synonymize Lagena dianae with Mirifusus mediodilatatus is the superficial shell ornamentation which impressed Karrer so much. He remarked the strong circumferential ridges with nodes which he compared, in a rather stretched way to a compressed necklet, and the zigzagged ornamentation in the deep grooves between these ridges that resulted from the disposition of the small pits existing in the grooves. This
ornamentation is one of the most distinctive characters of the outer layer of Mirifusus mediodilatatus and M. baileyi. If one compares the original illustration (Fig. 2a, b) and scanning electron microscope image (Fig. 1) one can see that the number of such circumferential ridges and grooves is similar in both of them. The only difference between the two images is the exaggerated thickness of these ridges in Karrer's illustration. This is probably due to a subjective factor: the author was very impressed by these ridges so that he unconsciously exaggerated this characteristic feature.

To these morphologic characters one can add the stratigraphic argument: the range of this radiolarian species comprises in its lower part the Oxfordian ([8], [9]).

Certainly the indisputable argument in supporting this reconsideration remains the investigation of the type-material. We do not know the situation of Karrer's collection, and neither do Ellis and Messina [3] give information as regards the depository of type specimens. It is possible that it is still in Vienna. If not we think that in Karrer's paper there is enough information to locate and resample the type locality.

As regards Orbulina neojurensis (Fig. 3), Karrer mentions that it is the most frequent species, being represented by a hundred specimens. He describes it as having a perfectly spherical shell with a very doubtful, frequently absent aperture. Over the whole circumference the shell is covered by a network of angular meshes within which are large rounded pores. Most specimens are corroded, but well preserved specimens, as the illustrated one, can be found. Diameter of the shell is 0.5 mm.

Certainly this species is not an Orbulina, whose species are known only in the Neogene. Taking into account its age and co-occurrence with Mirifusus we regard it as a species of the recently defined radiolarian genus Archaeocenosphaera Pessagno et. al. [10].

CONCLUSIONS. - Considering these two species as radiolarians rather than foraminifer has several consequences:
(1) The main implication is of a systematic order. If Lagena dianae is a radiolarian, as we believe, then it follows that this species becomes a senior synonym of Mirifusus mediodilatatus, a species frequently quoted in papers devoted to the biostratigraphy of Upper Jurassic radiolarians, and has priority (I.C.Z.N. Art. 23) over this name and over all the synonyms of the species; its synonymy is the following:

- Lagena dianae Karrer, 1867, p. 365, Pl. 3, Fig. 8a, 8b [2].
- Lithocampe mediodilatata Rüst, 1885, p. 316, Pl. 40 (15), Fig. 9 [11].
- Stichocapsa perpastata Rüst, 1885, p. 319, Pl. 42 (17), Fig. 10 [11].
- Stichocapsa petzholdtii Rüst, 1885, p. 319, Pl. 42 (17), Fig. 7 [11].
- Stichocapsa saturnalis Rüst, 1898, p. 67, Pl. 19, Fig. 4 [12].
- Stichocapsa ovata Hinde, 1900, p. 43, Pl. 4, Fig. 40 [13].
- Stichocapsa ovatoidea Zhamoida, 1972, p. 125, Pl. 6, Fig. 3, 5, 6, [14].
- Mirifusus baileyi Pessagno, 1977, p. 83, Pl. 10, Fig. 6-8, non Pl. 11, Fig. 9-11 [15].
- Mirifusus? mediodilatata (Rüst); Pessagno, 1977, p. 84, Pl. 11, Fig. 1, 2 [15].

One could object that this name, not used until the present in radiolarian literature, is a nomen oblitum. We consider that this is not the case, as its introduction in the blooming literature of these microfossils does not cause confusion or disturb the stability of a long-accepted name; Lithocampe mediodilatata Rüst, although described since 1885 [11] was only used in recent years ([4], [8], [9], [15]) and Mirifusus baileyi Pessagno was described only 13 years ago [5]. In case Mirifusus baileyi is considered an independent species, as some authors [4] have done, Mirifusus dianae (Karrer), by its strong circumferential ridges and zigzagged ornamentation, becomes a priority name of this taxon.

(2) By the introduction of this name one renders justice and, at the same time, pays homage to the valuable work of this forerunner.

(3) The reconsideration of the status of the two species has consequences on the history of radiolarian research. It is admitted that Zittel [16] was the first who described pre-Tertiary radiolarians. As a result of this finding one should consider that in fact it was Felix Karrer who had unconsciously done it nine years earlier, and in a manner sufficient to recognize his species and use them in the modern literature.

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