

The type species of the genus *Orbitolina* D'Orbigny, 1850 (Foraminifera)

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ABSTRACT—A number of species have been suggested as type species of the genus *Orbitolina* d'Orbigny, 1850, notably *Madreporites lenticularis* Blumenbach, 1805, *Orbulites concava* Lamarck, 1816 and *Orbitolina gigantea* d'Orbigny, 1850. It is shown that the correct type species is *Orbitolina gigantea*, although this is in fact a species of coral. Consequently in order to preserve the concept of *Orbitolina* as a foraminiferal genus, we herein recommend to the ICZN the proposal of *Orbulites concava* as a replacement type species. This would negate the need for a major revision of orbitolinid taxonomy and allows the genus *Palorbitolina* Schroeder, 1963 to remain valid.

INTRODUCTION

The typically Tethyan, Cretaceous larger foraminiferal genus *Orbitolina* was erected by d'Orbigny in 1850. Because of uncertainty in the original designation of a type species for this genus, a number of species have since been referred to as “type species”. This has led to some confusion concerning the taxonomic concept of the genus and may have rendered other genera invalid because of problems with type species priority. In particular, the commonly used generic name *Palorbitolina* Schroeder, 1963 has been thought by some to be invalid, because the type species of that genus, *Madreporites lenticularis* Blumenbach, 1805, has been described, e.g. by Douglass, Loeblich and Tappan (1964), as the type species of *Orbitolina*. If this were the case it would have tremendous taxonomic implications. Not only would the name *Palorbitolina* be unavailable, but most species commonly regarded as belonging to *Orbitolina* would have to be assigned to a new genus. This is because Schroeder (1964a,b; 1975) has shown that *Palorbitolina* is morphologically and phylogenetically distinct from *Orbitolina*. Therefore if the true nature of *Orbitolina* is that commonly regarded as *Palorbitolina* (i.e. that of the species *lenticularis*), then other species thought today to be *Orbitolina* (e.g. *O. concava* (Lamarck, 1816) (*Orbulites*) or *O. texana* (Roemer, 1849) (*Orbitulites*)) could not belong to that genus because of the observations of Schroeder (*opp. cit.*).

To clarify these problems a detailed examination of the original description of the genus *Orbitolina* and subsequent type species designations has been carried out.

DISCUSSION

Original designation

The first problem to address in this review is to establish if d'Orbigny designated a type species for *Orbitolina* in his original 1850 description.

Orbitolina is first mentioned on page 143 of volume 2 of the “Prodrome de Paléontologie stratigraphique universelle des animaux mollusques & rayonnés faisant suite au cours élémentaire de Paléontologie et de Géologie stratigraphiques”. There is no mention of *Orbitolina* in either volume 1 or 3 of this book.

The entry on page 143 reads:

“ORBITOLINA, d'Orbe., 1847. Ce sont des Orbitolites a côtés inégaux, l'un encroûte, l'autre avec des loges.

*342. lenticulata, d'Orb., 1847. *Orbitolites lenticulata*, Lamarck, 1816; Lamouroux, 1821, pl. 72. fig. 13–16. Perte-du-Rhône (Ain), St-Paul-de-Fenouillet (Aude).”

In this text “d'Orb., 1847” refers to the manuscript date. *Orbitolites lenticulata* Lamarck 1816 is synonymous with *Madreporites lenticularis* Blumenbach, 1805, variously referred to *Orbitolina* or *Palorbitolina*.

It is important to note that volume is arranged in stratigraphic order. Hence the first species mentioned under *Orbitolina* is *lenticulata* in the section “Foraminifères”, within the chapter “19e étage – Albien”.

Within the subsequent chapters the following species are listed:

20e étage – Cenomanien; pages 184–185:

“ORBITOLINA, d'Orb., 1847. Voy. t.2, p148.

*743. plana, d'Archiac, 1837, Mém. Soc. géol. de France, t.2., p.178. France, Fouras, La Malle (Var).

*744. mamillata, d'Archiac, 1837, id., t.2, p.178. Fouras.

*745. *concava*, Lamarck, 1816. Anim. sans vert., 2, Michelin, 1842, Icon. zoophyt., p.28, pl.7, fig. 9 (mala). *Orbitolina conica*, d'Archiac. France, Ballon, St-Paulet, près le Pont-St-Espirit, Fouras.”

22e etage – Senonien; pages 279–280:

“ORBITOLINA, d'Orb., 1847. Voy. p.148.

*1350. *gigantea*, d'Orb., 1847. Espèce qui atteint jusqu'à 10 centimètres de diamètre; concave en dessous, convexe en dessus. France, Royan, Pérignac (Charente-Inférieure).

*1351. *radiata*, d'Orb., 1847. Espèce pourvue de rayons qui convergent du bord au centre. France, Royan.”

In total six species are listed under the genus *Orbitolina* in stratigraphic order. D'Orbigny does not indicate any particular species to be the type, and the stratigraphic nature of the volume implies that the first mentioned species under a genus is not necessarily the type.

It is clear, therefore, that no type species was designated for *Orbitolina* by d'Orbigny, and that *lenticulata* (= *lenticularis*) is not automatically the type species simply because it is listed first. This was first noted by Schroeder (1963) in a paper which established *lenticularis* as type species of the new subgenus (later genus) *Palorbitolina*.

Unfortunately, Douglass (1960a,b), Hofker (1963; 1966a,b) and most importantly Douglass, Loeblich and Tappan (1964) in the definitive “Treatise on Invertebrate Paleontology” regard *Madreporites lenticularis* Blumenbach, 1805 as type species. According to the last-named authors (page C309); *Orbulites lenticulata* Lamarck, 1816 (= *Madreporites lenticularis* Blumenbach, 1805) is the type species of the genus by original designation (monotypy).

As demonstrated above there is neither an original type species designation by d'Orbigny, nor is the genus monotypic in the reference containing the original description.

Subsequent designation

All six species recorded by d'Orbigny (1850) under *Orbitolina* have equal claim as type species. According to Article 69(a) of the International Code of Zoological Nomenclature (ICZN) (Ride *et al.*, 1985), the first published designation of a type species subsequent to the original publication of the genus should be regarded as the only valid one.

There are, in fact, several subsequent quotations which could be regarded as designations of a type species for *Orbitolina*.

(i) According to Parker and Jones (1860:35) “the conical, hemispherical and flattened forms of *Orbitolina* so common in the Cretaceous deposits, and known under twelve or more different names, are referable to one specific type, namely the *O. concava*, Lamarck, sp. and to this type not only these large . . .” However, this

quotation, nor any that follow it in the text, is not really valid as a type designation, as these authors were not using type in the sense of “type species of a genus”, but rather as an indication of the “typical form of a species.” Indeed on page 38 we read “we regard it (*O. concava*) as the type of a species including numerous varieties”. In their recent monograph of foraminifera genera, Loeblich and Tappan (1988:166) cited this reference by Parker and Jones (*op. cit.*), as a valid subsequent designation of a type species, and thus regarded *Orbulites concava* Lamarck, 1816, as the correct type species of *Orbitolina*. As noted above, we cannot agree with their opinion that the Parker and Jones reference is a valid subsequent designation, although for different reasons, as will be shown, we would recommend that *O. concava* be regarded as type species.

(ii) Ellis and Messina (1940 *et seq.*) reported that *Orbitolina lenticularis* Blumenbach, 1805 was designated as type species by Dollfus (1905). They regarded this designation as invalid because a species named *lenticularis* was “not among the species originally included under the generic name by d'Orbigny.” In fact d'Orbigny (1850:143) cited *Orbitolites lenticulata* Lamarck, 1816, which is synonymous with *Madreporites lenticularis* Blumenbach, 1805.

The reference “Dollfus, 1905” of Ellis and Messina relates to a review by that author on a paper published by Prever (*in Prever and Silvestri*, 1905). In this review Dollfus (1905:232) pointed out: “Il [= Prever] considère que le Genre *Dictyocornis* [he means *Dictyocornus*] Blackenhorn, fondé pour quelques espèces d'Égypte, est bien rigoureusement synonyme [with *Orbitolina*]; il le compare aux Genres voisins et commence par établir que le type du G. *Orbitolina* est *O. lenticularis* Blum. sp. (*Madreporites*) 1796, espèce de la Perte du Rhône.” However, the second half of this statement made by Dollfus is wrong; Prever has never designated *O. lenticularis* as type species of *Orbitolina*. On the contrary, *O. lenticularis* belongs to the species which were eliminated by this latter author (1905:469; “il lavoro di revisione compiuto, mi ha obbligato a distruggere parecchie delle specie già istituite ed anche di quelle or nominate, ed in cambio a crearne delle nuove”).

(iii) Cushman (1928:182) designated *Orbitolina gigantea* d'Orbigny as type species of *Orbitolina*. Subsequently Douvillé (1933:199) demonstrated that this species is a coral belonging to the genus *Cyclolites* Lamarck.

(iv) Davies (1939:786) pointed out that “*O. concava* seems to be the form best indicated in the ‘Prodrome’ itself. It is also the best for studying the genus, being usually better preserved as well as much larger than *O. lenticularis*. It should obviously, in my opinion, be taken as the type of *Orbitolina*.”

Davies (*op. cit.*) therefore selected *O. concava* as type species. By doing so he hoped to alleviate the taxonomic problems caused by Cushman's designation of the coral *O. gigantea* (= *Cyclolites*) as type species. In fact Cushman in the 1950 edition of his text, named *O. concava* as the type species. A number of other workers have also agreed with Davies's opinion that *O. concava* should be regarded as the type species of *Orbitolina*. These include Henson (1948) and Sahni and Sastri (1957).

(v) Thalmann (1950:509) proposed *Orbitolina texana* (Roemer, 1849) (= *Orbitulites texanus* Roemer, 1849) as a substitute type species in place of *Orbitolina concava*. However, since this species is not among those originally included under the generic name by d'Orbigny, it can be immediately excluded from consideration as a type species (ICZN Article 69a). (vi) Douglass (1960a:28) and Douglass, Leoblich and Tappan (1964:C309) considered *Orbitolina lenticularis* to be the type species of the genus. Douglass (*op. cit.*) is of the opinion that "only one species is referred to the genus in this, the original description. The genus as described is therefore monotypic, even though five other species are referred to it in later sections of the volume." As demonstrated above, the stratigraphic nature of the "Prodrome" implies that the first mentioned species under a genus is not necessarily the type. For this reason, the arguments of Douglass and Douglass *et al.* (*op. cit.*), which were also followed by Hofker (1963:220; 1966b:9), are invalid (see also Schroeder, 1963:351).

CONCLUSIONS AND RECOMMENDATIONS

It is clear that despite the arguments of Douglass (1960a), Hofker (1963) and Douglass, Leoblich and Tappan (1964), no original designation of a type species of *Orbitolina* was made by d'Orbigny (1850), nor was the genus monotypic in the original description. Hence, *Madreporites lenticularis* (= *Orbitolina lenticularis*) is not automatically the type species.

The first designation of a type species is that of Cushman (1928), who nominated *Orbitolina gigantea* d'Orbigny, 1850. According to Douville (1933) this taxon is a species of the coral genus *Cyclolites*. In strict observance of the International Code of Zoological Nomenclature, *Orbitolina* d'Orbigny, 1850 is a synonym of *Cyclolites* Lamarck, 1801 (see Wells, 1956:F386).

If one accepts this situation, then the numerous species regarded as belonging to *Orbitolina* would have to be assigned to a new genus. Therefore we recommend the suppression of *Orbitolina gigantea* as type species and the recognition of *Orbitolina concava* as replacement type species of *Orbitolina*, as originally suggested by Davies (1939). This will negate the need for a major revision of orbitolinid taxonomy and allow

the genus *Palorbitolina* to remain valid. In this context an official application has been made to the International Commission on Zoological Nomenclature to implement the above recommendations (Case 2663, Schroeder and Simmons, 1988).

It is worth noting that *Orbitolina concava* (= *Orbulites concava* Lamarck, 1816) is not the same taxon as *Orbitolites concava* Lamarck, 1801. As demonstrated by Parker and Jones (1860) and Schroeder (1962), the earlier named species (in fact a bryozoan) cannot be considered as the type of *Orbitolina concava*. Hence it is *Orbitolina concava* (Lamarck, 1816) that should be regarded as the valid type species of the genus *Orbitolina*.

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