

**DISCUSSION ON OMPHALOCYCLUS
BRONN 1853, ORBITOIDES
CONCAVATUS RAHAGHI, 1976 AND
PRAEOMPHALOCYCLUS NOV. GEN.**

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SUMMARY : It is here suggested that Orbitoides concavatus Rahaghi, 1976, which was described from the Campanian sediments of Western Iran, does not belong to the genus Orbitoides but is a primitive type of Omphalocyclus.

Key Words: Praeomphalocyclus, omphalocyclus, orbitoides concavatus, campanian sediments, rahaghi, western Iran.

INTRODUCTION

Orbitoides concavatus Rahaghi was first observed in the Senonian deposits exposed near Kermanshah (Figure 1). Its age was determined as Campanian by the associated fauna (1).

According to Rahaghi's (1) original description, the test is discoidal, plano-convex, and biconcave, the traces of the equatorial chambers are observed on the test surface. The free side of the test has a central depression and is ornamented by rounded or elongated tubercules which may be fused together to give a vermiform appearance. These properties are not seen on all of the specimens. In some specimens the traces of the septum are on both sides of the test (Plate 1, Figures 1-6). The embryo consists of three chambers in the equatorial section of the macrospheric individuals, the protoconch is nearly circular, the deuterocoenoch is subcircular or reniform in shape, the third embryonic chamber is often reniform and can be designated as first auxiliary chamber (Plate 1, Figure 10). The embryo of the microspheric individuals is circular and is followed by biserial stage. This heterohelical stage is composed of four or more series of chambers (Plate 1, Figures 7-9), the test is thick in the axial sections and the height of the chambers gradually increases towards the periphery, no pillars and lateral chambers are seen on both sides of the equatorial chambers (Plate 1, Figures 13-15).

DISCUSSION

For several reasons the studied benthic foraminifer can not be considered as a species of *Orbitoides*. The properties of the macrospheric embryo described by Rahaghi (1) do not clearly indicate a macrospheric test of a genus *Orbitoides*. In the macrospheric embryo of the genus *Orbitoides*, the deuterocoenoch completely surrounds the protoconch (2-5). However, in Rahaghi's description of the macrospheric embryo of *O. concavatus* Rahaghi, the protoconch is not completely surrounded by the deuterocoenoch (Plate 1, Figure 10). This indicates that this organism is more similar to the genus *Omphalocyclus* which has a macrospheric embryo where the deuterocoenoch does not surround the protoconch completely (2-6).

Although Rahaghi (1) does not give any information on the width/height ratio of the equatorial chambers in the equatorial sections of the foraminifer, the width of the equatorial chambers increases gradually from the center to the periphery of the test (Plate 1, Figures 11-12). This feature is a clear indication of an *Omphalocyclus* rather than an *Orbitoidinae* origin, because in *Omphalocyclus*, the increase of width/height ratio of equatorial chambers in equatorial sections is a determinative character (2-6).

In our previous experience, the biserial heterohelical stage is more pronounced in the embryo of *Omphalocyclus* than *Orbitoidinae*. Thus, it may also indicate an *Omphalocyclus* origin (2, 5, 7-9).

Rahaghi (1) mentions in his paper that there are no pillars and lateral chambers in the axial sections and the heights of the chambers increase towards the periphery of the test. Also these properties strongly

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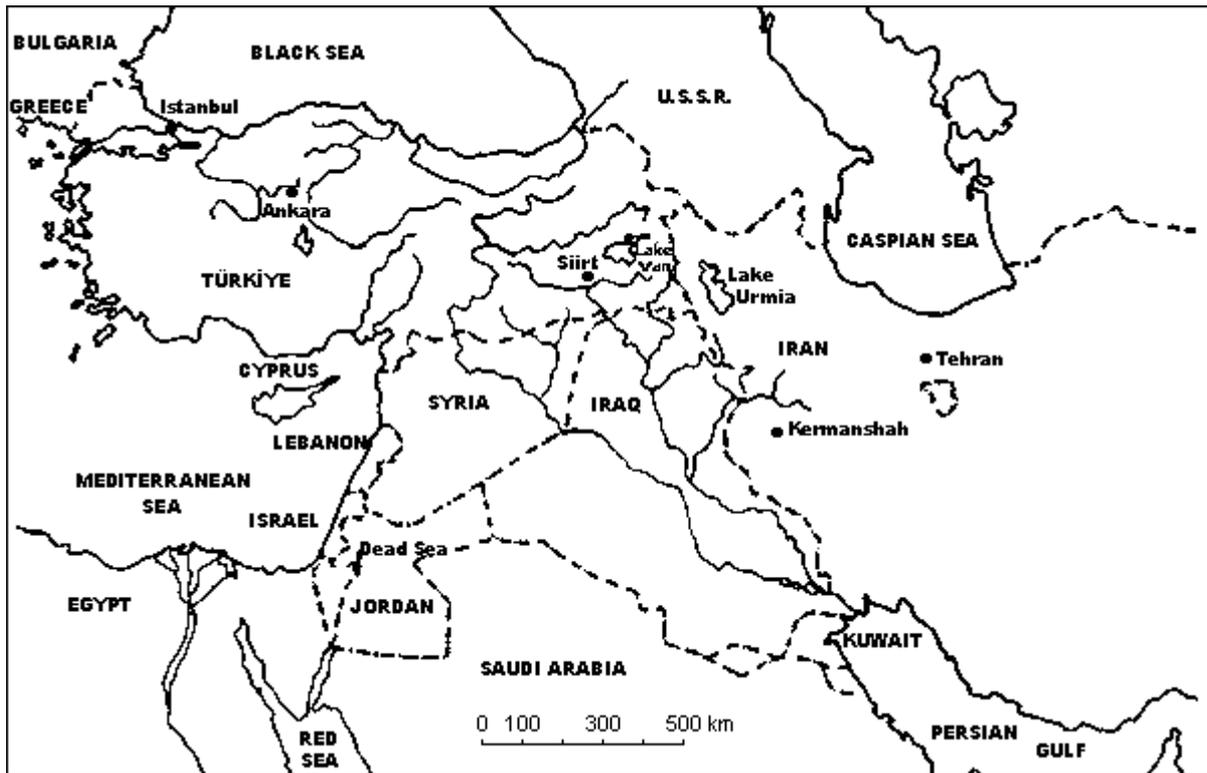


Figure 1: Index map of Iran and Turkey showing the locations of the Kermanshah and Siirt areas.

indicate an *Omphalocyclus* origin rather than the *Orbitoidinae* (2, 5, 6, 9-14). Besides, if there are no pillars present in tests, the vermiform ornaments seen on the surface could not be the traces of the pillars as argued by Rahaghi (1). These ornaments must be the traces of the equatorial chamber walls as seen on the tests surfaces of the *Omphalocyclus* (2, 5, 6, 14, 15).

Therefore, it can be concluded that the species described by Rahaghi (1) could not be included in *Orbitoides*. Neumann (16) also agreed on this but identified some of his specimens as *Planorbulina cretae* (Marsson) (1) and some others as *Planorbulinella dordoniensis* Hofker Sr. (1).

In the equatorial sections of the genus *Planorbulina*, approximately seven planispirally-coiled chambers follow the microspheric embryo (17). Apart from this, the septae are observed to be inclined in the axial sections of this genus (16). In the equatorial sections of the microspheric forms of the genus *Planorbulinella*, the embryo is followed by a planispirally coiled 10-14 chambers (18). Freudenthal (18) also indicated that both surfaces of the tests of this species are convex or inflated.

The microspheric forms of *Orbitoides concavatus* Rahaghi do not bear the above-mentioned properties. In contrast, in these forms, circular embryos are

followed by a heterohelical stage (1). Besides, in the axial section of these organisms under discussion, the septums are perpendicular to the test-walls (1). Therefore, to our opinion, the determinations made by Neumann (16) are also wrong based on the discussion above.

In our study of the specimens from core samples of the Çelikli well (NW Siirt, SE Anatolia, text-figure 1) an axial section of a passage is present between *Orbitoides concavatus* Rahaghi and *Omphalocyclus macroporus* (Lamarck) (Plate 1, Figure 16). In this section, central part of the organism exhibit a similar development to that of *Orbitoides concavatus* Rahaghi whereas the peripheral part indicate a development of *Omphalocyclus macroporus* (Lamarck). The diameter of the test is 2.8 mm and the diameter of the central part resembling *Orbitoides concavatus* Rahaghi is 1.1 mm.

This form which implies a possible genetical relationship between *Orbitoides concavatus* Rahaghi and *Omphalocyclus macroporus* (Lamarck), has been found together with *Orbitoides apiculatus* Schlumberger, *O. medius* (d'Archiac), *Omphalocyclus macroporus* (Lamarck), *Lepidorbitoides socialis* (Leymerie), *L. cf. minor* (Schlumberger), *Clypeorbis mamillata* (Schlumberger), *Dictyoconella complanata* Henson, *Sulcoperculina sp.*, *Goupillaudina sp.*, *Cuneolina sp.*,

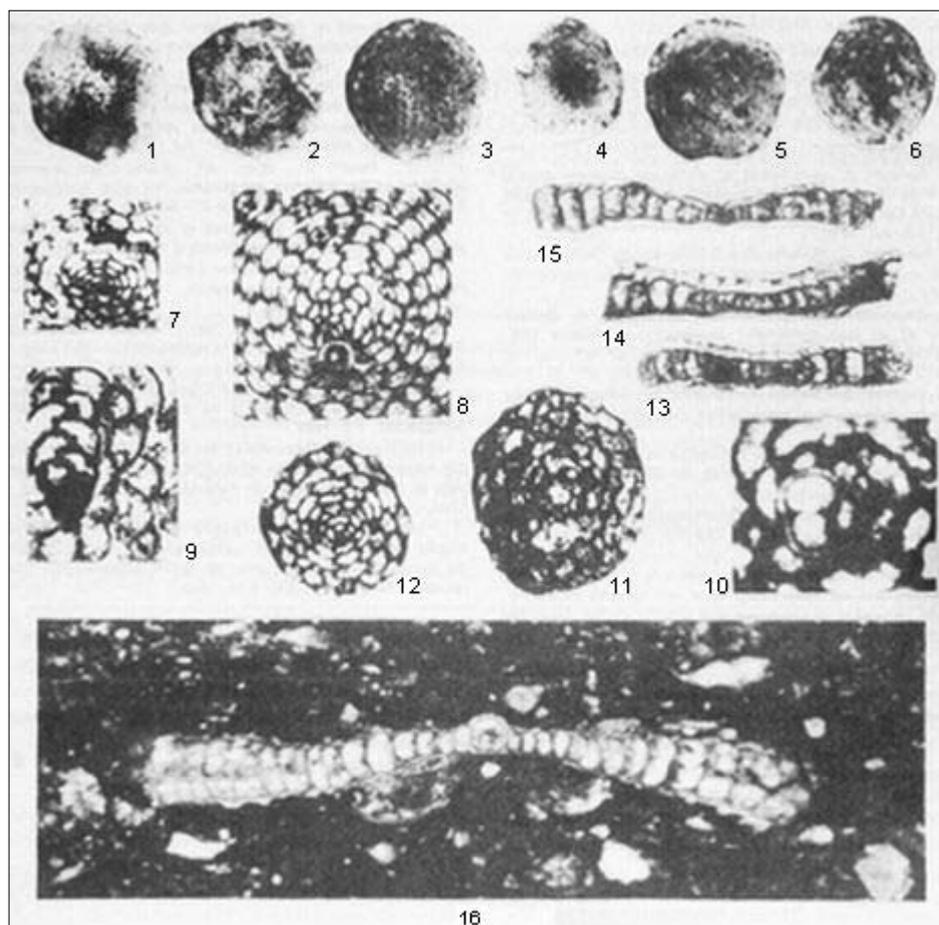


Plate 1: Different views of praeomphalocyclus concavatus (Rahaghi).

1-15, *Orbitoides concavatus* Rahaghi, all specimens are from Kermanshah area, West Iran. 1-6, External views, x 20. 7-9, Portions of equatorial section showing initial biserial chambers. 7, x 60; 8, x 56; 9, x 160. 10, Portion of equatorial section showing bilocular embryonic apparatus, x 144. 11-12, Equatorial section of megalospheric form, x 40. 13-15, Axial sections. 13-14, x 56; 15, x 36. 16, Axial section of the passage between *Praeomphalocyclus* and *Omphalocyclus*, x 47.5, from Siirt area, South-East Turkey.

and *Sirtina (Iranites) ornata* (Rahaghi) indicating an age of Middle-Late Maastrichtian. *Orbitoides concavatus* Rahaghi, however, has been found together with *Orbitoides tissoti* Schlumberger, *Sirtina (Iranites) ornata* (Rahaghi), *Sirtina (Neumannites) granulata* (Rahaghi) indicating the Campanian period.

CONCLUSION

Based on the above discussion, *Orbitoides concavatus* Rahaghi, *Planorbulina cretae* (Marsson) and *Planorbulinella dordoniensis* Hofker Sr. (16) are synonymous and are of *Omphalocyclinae* origin. Therefore, we here propose the now generic name of *Praeomphalocyclus concavatus* (Rahaghi) for these species.

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