On the Cretaceous occurrences of Ammogloborotalia Zheng, 2001 (Foraminifera)

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Abstract. Three species of agglutinated foraminifera from Cretaceous deep-water deposits that have been described as trochamminids are here transferred to the genus Ammogloborotalia Zheng, 2001. These species are Trochammina abrupta Geroch, 1959; Trochammina quinqueloba Geroch, 1959, and Ammoanita globorotaliaeformis Gradstein and Kaminski, 1999. A fourth species, Ammogloborotalia sp.1, which is probably a new species from the Turonian of the southern East Carpathians of Romania is reported here for the first time. We hereby extend the known stratigraphic range of the genus Ammogloborotalia to the Late Jurassic (Tithonian).

Key words: Foraminifera, Cretaceous, Ammogloborotalia, East Carpathians, Romania.

INTRODUCTION

The trochaminaceans comprise a diverse superfamily of trochospirally-coiled agglutinated foraminifera that occur in all marine environments. Detailed systematic work by Paul Brönnimann, John Whittaker and co-workers in the 1980s and early 1990s demonstrated that the trochaminid group comprises forms with diverse morphologies. In a series of studies published over the span of about 15 years, Brönnimann and co-workers introduced 21 new generic names and emended many of the previously described genera (Kaminski, 2004). As part of their work on the revision of the trochaminaceans, the definition of the genus “Trochammina” was more precisely and narrowly defined (Bronnimann and Whittaker, 1984, 1988). A consequence of the revision of the trochaminacean genera is the fact that numerous species originally described as “Trochammina” can now be placed in any of a number of different genera that are defined based on test shape and apertural characteristics.

Species of “Trochammina” have been known from the Cretaceous deep-water deposits in the Polish Carpathians for the past half-century. In 1959, Prof. Stanislaw Geroch described a species of “Trochammina” from the Lower Cretaceous of the Polish Carpathians that he named Trochammina quinqueloba, and in 1966 he named a second species Trochammina abrupta. Both species were described as having a flat spiral side, but their apertural characteristics were unknown. In the first studies of Cretaceous agglutinated foraminifera from the Deep-Sea Drilling Project cores, Krasheninnikov (1974) was aware of the fact that some deep-water trochospirals did not conform to the traditional definition of the genus Trochammina. He described a new species (T. gyroidinaeformis) with a flat spiral side and a conical shape, and remarked that it “could possibly be regarded as a new independent genus”. Sieglie and Baker (1987) introduced the name Ammoanita for a “keeled” biconvex trochospiral from the Upper Cretaceous, and in a more recent study, Gradstein et al. (1999) described a species with similar gross morphology as Ammoanita from the Albian of offshore mid Norway.

Recently Zheng (2001) described the new genus Ammogloborotalia (type species: Ammogloborotalia stellaris Zheng, 2001) from Holocene deep-water deposits of the East China Sea. In our opinion, forms that conform to the description of this new genus can also be found in older deposits. In this paper we report the occurrence of a probable new species of Ammogloborotalia from the lowermost Turonian of the southern East Carpathians, and we present a review of previously described species that we now assign to the genus Ammogloborotalia Zheng, 2001.

MATERIAL STUDIED

In this study we re-examined material from the ODP Leg 123, Hole 765C which recovered a diverse DWAF fauna from sediments of Tithonian to Hauterivian age. Assemblages from this site were previously described by Kaminski et al. (1992). We also re-examined the type specimens of Ammoanita globorotaliaeformis Gradstein and Kaminski, 1999, which are housed in the Palaeontology Department of The Natural History Museum in London. Additional material was examined from lowermost Turonian
Systematic paleontology

Subfamily Trochammininae SCHWAGER, 1877

**AMMOLLOBOROTALIA** ZHENG, 2001


Type species: *Ammogloborotalia stellaris* ZHENG, 2001, by original designation (monotypic).

**Description**

Zheng (2001) described the new genus *Ammogloborotalia* as follows: “Test free, trochospiral, conical, dorsal side flattened, evolute, ventral side convex, involute. Periphery truncate, peripheral angle subacute. Chambers increasing rapidly in breadth along a vertical axis. Suture not very distinct, slightly depressed. Wall coarsely agglutinated, surface coarsely finished. Aperture short, arched slit-like, at the ventral side of the final chamber, basal, near the umbilical end”.

**Remarks**

According to Zheng (2001), the new genus resembles *Adercotryma* in its coiling along a vertical axis, but differs from it in being trochospiral, with the dorsal side evolute. The type specimens of Zheng’s new species were recovered from a 2100 m deep station in the East China Sea.

The generic characteristics that are useful for separating the Cretaceous *Globorotalia*-like trochaminids include the overall shape of the test and the nature of the sutures on the dorsal side (Table 1). *Ammogloborotalia* ZHENG, 2001 has a flat or slightly convex spiral side, sutures that are slightly depressed and radial or only very weakly arched. *Insculptarenula* Loeblich and Tappan, 1985 differs in having a spiral side flattened to concave, with elevated strongly arched spiralling sutures that give the test a sculptured appearance.

The genus *Ammoanita* Seiglie and Baker, 1987 differs in having a biconvex test and in at least one species (*A. ruthvenmurrayi*), the spiral side is highly convex as in the genus *Contusotruncana*.  

Table 1. Generic characteristics of Cretaceous *Globorotalia*-like trochaminids.

<table>
<thead>
<tr>
<th>Genus</th>
<th>Dorsal Side</th>
<th>Sutures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammogloborotalia</td>
<td>Flat to slightly</td>
<td>Depressed, radial</td>
</tr>
<tr>
<td></td>
<td>convex</td>
<td></td>
</tr>
<tr>
<td>Ammoanita</td>
<td>Convex to highly</td>
<td>Depressed, slightly</td>
</tr>
<tr>
<td></td>
<td>convex</td>
<td>arched</td>
</tr>
<tr>
<td>Insculptarenula</td>
<td>Flat to concave</td>
<td>Raised, strongly arched</td>
</tr>
</tbody>
</table>

**Remarks**

In the type description of the species *Trochammina abrupta*, Geroch (1966) mentioned that the aperture is not visible. In well-preserved specimens from ODP Hole 765C, the aperture appears as a high narrow extra umbilical arch, midway between the umbilicus and periphery. The spiral side is slightly convex to flat.

**Description**

Test medium size, coiled trochospirally, with a flat spiral side and elevated ventral side. Test is comprised of two and
a half whorls with 6 chambers in the last whorl. Periphery is acute, but not keeled. Chambers on the ventral side are triangular, and the final chambers are moderately inflated. Sutures on ventral side are radial and slightly depressed. Sutures on spiral side are radial or only slightly arched, flush or slightly depressed. Wall is comprised of medium to fine grains, with a moderately rough surface. Aperture a low, extraumbilical interiomarginal arch, half way between the umbilicus and the periphery.

Remarks

Differs from *Ammogloborotalia globorotaliaeformis* in possessing fewer chambers in the final whorl and straight sutures on the ventral side. Our species is from the lowermost Turonian deep-water deposits of southern East Carpathians, Romania, situated near Stoenești, west of Dâmbovița Valley. The type-level is the first foraminifera-bearing sample directly above the Cenomanian-Turonian black shale corresponding to Oceanic Anoxic Event 2 (OAE-2) in Romania.

**DISCUSSION AND CONCLUSIONS**

The genus *Ammogloborotalia*, described from the modern East China Sea is not monotypic and restricted to Holocene, but fossil species that can be assigned to this genus can be found in latest Jurassic to Cretaceous deep-water deposits from the North Atlantic and Tethys. We now recognize at least four species of *Ammogloborotalia* in addition to the type species, two of them ranging from the Late Jurassic (Tithonian) (Kaminski et al., 1992). Additionally, the deep-water trochamminid described by Krasheninnikov (1974) from the Upper Cretaceous of the Indian Ocean (*Trochammina gyroidaeformis*) likely belongs in the genus *Ammogloborotalia*.

Currently, there are three genera of trochamminids known from the Cretaceous that have *Globorotalia*-like morphology: *Insulparenula* Loeblich and Tappan, 1985; *Ammoanita*, Seilgie and Baker, 1987; and *Ammogloborotalia*, Zheng, 2001. The distinctive character of *Ammogloborotalia* is its flat to slightly convex spiral side with radial sutures that are not raised or strongly arched.

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**REFERENCES**


Figs. 1-3. Ammoloborotalia abrupta (GEROCH), n.comb., (PF 68299), Tithonian, ODP Site 765, Argo Abyssal Plain, Indian Ocean, figured in spiral view (scale bar = 75 μm), umbilical and edge views (scale bar = 86 μm).

Figs. 4-6. Ammoloborotalia abrupta (GEROCH), n.comb., (PF 68300), Tithonian, ODP Site 765, figured in spiral (scale bar = 75 μm), umbilical (scale bar = 86 μm) and edge views (scale bar = 75 μm).

Figs. 7-9. Ammoloborotalia quinqueloba (GEROCH), n.comb., (PF 68302), Tithonian, ODP Site 765, figured in spiral, umbilical and edge views (scale bar = 50 μm).

Figs. 10-12. Ammoloborotalia quinqueloba (GEROCH), n.comb., (PF 68301), Tithonian, ODP Site 765, figured in spiral, umbilical and edge views (scale bar = 50 μm).
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**PLATE II**

**Figs. 1-4.** *Ammogloborotalia globorotaliaeformis* (Gradstein and Kaminski, 1999), n.comb., holotype (PF 66923), Albian, 3110 m depth in the 6507/8-2 well, offshore Norway, figured in spiral, umbilical and edge views (scale bar = 75 μm). Fig. 4. Apertural view (scale bar = 231 μm).

**Figs. 5-6.** *Ammogloborotalia globorotaliaeformis* (Gradstein and Kaminski, 1999), n.comb., paratype (PF 66922), Aptian, offshore Norway, figured in umbilical and edge views (scale bar = 86 μm).

**Figs. 7-9.** *Ammogloborotalia globorotaliaeformis* (Gradstein and Kaminski, 1999), n.comb., paratype (PF 66925), Aptian, offshore Norway, photograph in reflected light (taken using the PalaeoVision System) figured in spiral, umbilical and edge views (scale bar = 100 μm).

**Figs. 10-12.** *Ammogloborotalia sp.* 1 (PF 68303), Turonian, near Stoenești, west of Dâmbovița Valley, Romania, figured in spiral, umbilical and edge views (scale bar = 100 μm).

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