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SHORT NOTE – NOTA BREVE

# NEW DESCRIPTION OF THE ROTALIPORID SPECIES *BROTZENI* AND *GLOBOTRUNCANOIDES* SIGAL, 1948 BASED ON RE-EXAMINATION OF TYPE MATERIAL

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*Abstract*. This short note deals with the re-description and re-illustration of the holotypes of *Thalmanninella brotzeni* Sigal, 1948 and *Rotalipora globotruncanoides* Sigal, 1948, from Sidi Aissa, Algeria, middle Cenomanian. Both species are attributed to the genus *Thalmanninella*.

*Riassunto*. Questa breve nota ha per oggetto la ridescrizione e illustrazione degli olotipi di *Thalmanninella brotzeni* Sigal, 1948 e di *Rotalipora globotruncanoides* Sigal, 1948, provenienti da Sidi Aïssa, Algeria, Cenomaniano medio. Le due specie sono attribuite al genere *Thalmanninella*.

## Introduction

Sigal in 1948 erected two new species from North African Cenomanian strata, namely *Rotalipora globotruncanoides* and *Thalmanninella brotzeni*. Shortly after its erection, the latter first was included in *Rotalipora*, the only genus retained as valid by Bolli et al. (1957, p. 41) and Sigal (1958) who, however, disagreed with Bolli et al. (1957) in including the genus *Ticinella* Reichel, 1950 in *Rotalipora* Brotzen, 1942. According to Sigal (1958), his new family Rotaliporidae comprised the genera *Ticinella* Reichel, 1950, *Biticinella* Sigal, 1956, and *Rotalipora* Brotzen, 1942, whereas the taxonomic rank of *Thalmanninella* Sigal, 1948 was lowered from genus to morphogenus of *Rotalipora*. Second, *Th. brotzeni* became the index fossil of the homonymous zone extending from near the Albian/Cenomanian boundary through the Lower Cenomanian (i.e., Sigal 1977; Robaszynski et al. 1979).

On the contrary, the species *globotruncanoides* was ignored for several years by many authors except Wonders (1978) who included the species *globotruncanoides* in the genus *Thalmanninella* considering meanwhile the species *brotzeni* as a junior synonym of *Thalmanninella greenhornensis* (Morrow, 1934). Robaszynski et al. (1979) during the preparation of their Atlas failed to obtaining from Sigal the holotypes of both his species and re-described only the species *brotzeni* within the genus *Rotalipora*.

Gonzalez-Donoso & Linares (in Robaszynski et al. 1993), in their biostratigraphic study of Tunisian sections found (p. 456, Annexe 2) that the differences between *brotzeni* and *globotruncanoides* were too weak to validate both of them and considered *globotruncanoides*, being described first, as the valid taxon with *brotzeni* as its junior synonym including it in the genus *Rotalipora* (see also Bellier & Moullade 2002). Based on this synonymy the species *globotruncanoides* replaced the name of *brotzeni* as index species of the lowest Cenomanian zone (Robaszynski & Caron 1995; Gale et al. 1996), and, in addition, its first appearance was indicated as the primary criterion for identifying the base of the Cenomanian (Kennedy et al. 2004).

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Fig. 1 - Photograph of Sigal's original microslides, deposited at the Musée National d'Histoire Naturelle in Paris.

At the 1st Working Group meeting of CHRONOS (May 2004, Washington D.C.), S. Lipson-Benitah and M.R. Petrizzo first suggested that *brotzeni* and *globotruncanoides* are two discrete species. After re-examination of Sigal's original figures of *brotzeni* and *globotruncanoides* we reached the same conclusion supported by the fact that they exhibit a different growth rates and chamber morphologies. Ignoring where Sigal's collection was deposited, we looked at some type-samples delivered by Sigal to MC in 1979, now deposited at the Fribourg Geological Institute, along with Sigal's original hand-written notes. On one of the numerous cover-sheets there was a short hand-note by Sigal saying that in 1979 he deposited the type specimens at the Musée National d' Histoire Naturelle in Paris. Both of us recently had the opportunity to look at all Sigal's type specimens (Fig. 1).

This short note deals with the redescription of the holotypes of both *brotzeni* and *globotruncanoides*, also redrawn here (see Figs. 2a-d), supplemented with our observations also on the paratypes and new SEM photographs of topotype specimens (Pl. 1, figs. 1, 2). Unfortunately, because of the Museum's curatorial policy the holotypes and paratypes could not be photographed at the Scanning Electronic Microscope (SEM).

## Observations on **Thalmanninella brotzeni** Sigal, 1948

Fig. 2 a,b; Pl. 1, fig.1a-c

The microslide (reference F6 0843) contains two specimens (Text-fig. 1):

The **holotype** (Sigal 1948, Pl. I, figs. 5a-c; refigured in Sigal 1952, fig. 25) from the type-level of Sidi Aissa, Algeria, middle Cenomanian.

The **paratype** (Sigal 1948, Pl. II, fig.7) from middle Cenomanian of Morocco (Sigal did not specify if it was collected from the same level as the paratypes of *R. globotruncanoides*). The specimen illustrated by Sigal (1948) in Pl. II, fig. 6 is not present on the microslide.

**New Description**. Test coiled in a low to moderate trochospire, almost equally biconvex with an angular periphery in edge view marked by a keel in all chambers of the last whorl, generally beaded, smoother in the last one.

On spiral side 2.5 to 3 whorls, with 7 chambers in the last whorl, increasing gradually in size as added, crescentic in shape at least twice as longer than wider except the last chamber, and to minor extent the penultimate one, which becomes slightly more petaloid; equatorial outline initially compact and circular passing to very slightly lobate; intercameral sutures strongly curved backward marked by a slightly raised, finely beaded keel; spiral suture of the inner whorls marked by a slightly raised beaded keel located within a very gentle depression.

On umbilical side 7 chambers, subtriangular to subtrapezoidal, initially slowly increasing in size, the antepenultimate and penultimate slightly larger and the last chamber definitely larger and more inflated; intercameral sutures slightly curved marked by a very slightly raised to flush with test surface keel except the last one depressed and devoid of a visible keel; intercameral keels extend to the umbilical edge forming a more raised, fine periumbilical ridges, except on the last chamber that exhibits only an adumbilical inflation; umbilicus rather small and deep; primary aperture an umbilical-extraumbilical slit bordered by a thin lip at the base of a subvertical apertural face forming an

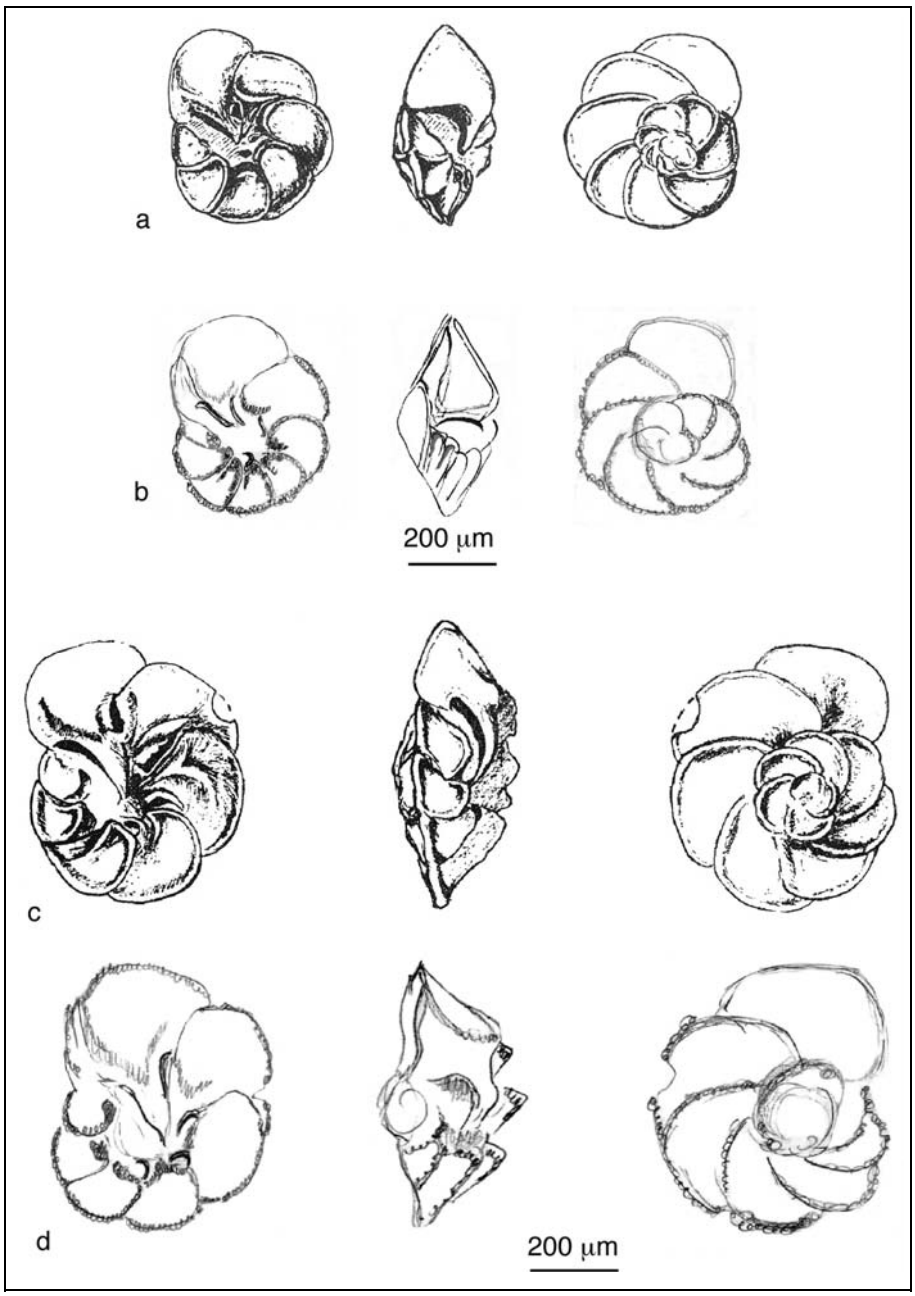


Fig. 2 - a, b: *Thalmanninella brotzeni* Sigal, 1948, holotype; a) reproduction of Sigal's original drawing; b) new drawings of the holotype by MC.
c, d: *Thalmanninella globotruncanoides* (Sigal, 1948), holotype; c) reproduction of Sigal's original drawing; d) new drawings of the holotype by MC.
Following Sigal's (1948) order, left: umbilical view; middle: edge view; right: spiral view.

abrupt angle with the surface of the last chamber; three supplementary apertures, bordered by a thin lip, including the last one, are visible within the umbilical area.

**Dimensions** of the holotype: diameter 0.48 mm, thickness 0.25 mm.

**Remarks**. *Thalmanninella brotzeni*, the type species of the genus *Thalmanninella*, differs from the species *globotruncanoides* for having an almost equally biconvex profile, a smaller size in average, a crescentic-shaped chambers separated by strongly curved backward intercameral sutures in spiral view and twisted in umbilical view, growing slowly in size, a smaller and deeper umbilicus, and supplementary apertures only umbilical in position.

One topotype of *Th. brotzeni* is illustrated in Plate 1, fig. 1a-c.

**Distribution**. From just below the Albian/Cenomanian boundary to lower Upper Cenomanian.

## Observations on **Rotalipora globotruncanoides** Sigal, 1948

### = *Thalmanninella globotruncanoides* (Sigal, 1948)

Fig. 2 c,d; Pl. 1, fig. 2a-c

The microslide (reference F6 0840) contains four specimens (Fig. 1):

The **holotype** (Sigal 1948, Pl. I, figs. 4a-c; refigured in Sigal 1952, fig. 24) from the type-level of Sidi Aissa, Algeria, middle Cenomanian.

Three **paratypes** (Sigal 1948, Pl. II, figs. 3a-b, 4a-b, 5) from middle Cenomanian of Morocco.

**New Description**. Test coiled in a low trochospire, umbilico-convex, spiral side almost plane with inner spire slightly raised, peripheral margin acute in edge view keeled on all chambers of the last whorl.

On spiral side 2.5 to 3 whorls, with 7 chambers on the last whorl, initially slightly crescentic then petaloid, enlarging rather rapidy in size; surface of the last two chambers slightly depressed (concave) in the central part giving to the trochospire an aspect almost plane; peripheral outline lobate especially in the last three chambers; intercameral sutures curved marked by a beaded keel, slightly raised in the first chambers of the last whorl becoming smoother and flush with test surface in the last two; spiral suture of the first whorls, possibly keeled, located in a gentle depression.

On umbilical side 7 chambers enlarging gradually but rather rapidly in size, subtrapezoidal with flat surface in the first three to four, the last three chambers becoming gradually more petaloid and inflated; intercameral sutures initially straight and oblique with respect to the equatorial margin, the last two sutures curved and strongly depressed; sutural beaded keels slightly visible and flush with test surface along the first four sutures, each extending to form a periumbilical ridge, absent in the antepenultimate one being replaced by a marked inflation at the umbilical side; sutural keels not visible or absent along the last two sutures; the last two more inflated chambers (with petaloid margin) exhibit a prominent smooth fold of the chamber surfaces, located in the inner part of each chamber, that bifurcates from the umbilicus half way towards the periphery; primary aperture umbilical-extraumbilical as a medium high arch at the base of a vertical apertural face; umbilicus rather large and shallow, partially covered by a triangular, long porticus extending from the last chamber; supplementary apertures, bordered by a thin lip, are umbilical in the early outer chambers, then they progressively migrate out the umbilicus along the inner part of the suture in the last three chambers, the last one being sutural.

**Dimensions** of the holotype: diameter 0.65 mm, thickness 0.28 mm.

**Remarks**. *Th. globotruncanoides* differs from *Th. brotzeni* for having larger size in average, a more petaloid chambers and faster growth rate, folded surface in the last two inflated and petaloid chambers, a larger and shallower umbilicus, a higher arched primary aperture, and supplementary apertures migrating along the sutures and out of the umbilical area through ontogeny.

It differs from *Th. greenhornensis* for having less numerous chambers in the last whorl, an umbilico-convex profile, raised umbilical sutures in the first chambers of the last whorl, and supplementary apertures migrating progressively out of the umbilical area, the last one being sutural. *Th. greenhornensis* is well differentiated by its numerous elongated chambers in the last whorl which curve backward both in spiral and umbilical sides and a symmetrically biconvex profile as discussed by Ando & Huber (2007).

One topotype of *Th. globotruncanoides* is illustrated in Pl. 1, fig. 2a-c.

**Distribution**. From the Albian/Cenomanian boundary to lower Upper Cenomanian.

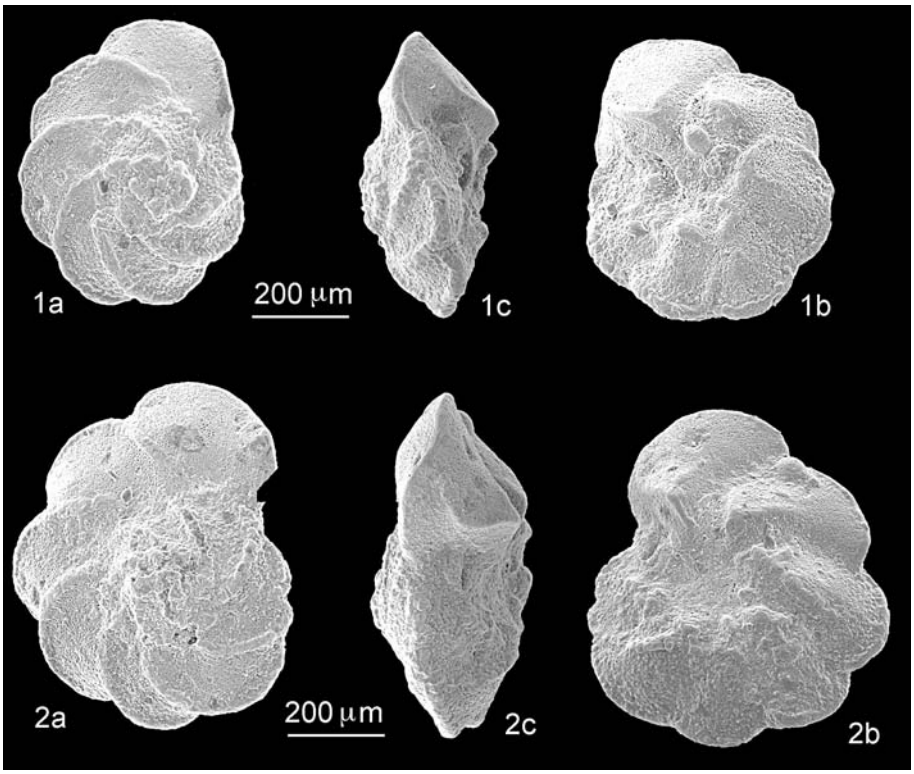


PLATE 1

Fig. 1 - *Thalmanninella brotzeni* Sigal, 1948, topotype, from the type-level of Sidi Aissa, Algeria, middle Cenomanian. a: spiral view; b. umbilical view; c: edge view.

Fig. 2 - *Thalmanninella globotruncanoides* (Sigal, 1948), topotype, from the type-level of Sidi Aissa, Algeria, middle Cenomanian. a: spiral view; b. umbilical view; c: edge view.

## Discussion and Conclusions

Although both species, *brotzeni* and *globotruncanoides*, are recorded very frequently in the literature and used as index species in biostratigraphic schemes (i.e. Sigal 1977; Robaszynski & Caron 1979, 1995),

there are very few papers in which the species concept is described. Moreover, it appears very clearly that before Gonzales-Donoso & Linares (1993) where the species *globotruncanoides* was indicated as the senior synonym, the name of *brotzeni* was the only one mentioned, since then the use switched to the name of *globotruncanoides* without any further comments and/or illustrations. This resulted in preventing the construction of an exhaustive synonymy list as the two species names have been given to either taxon indifferently by the various authors. However, because of the chronostratigraphic implications related to the correct identification of either species, we can specify that the specimen of *Rotalipora globotruncanoides* illustrated by Kennedy et al. (2004, Fig. 8. 13-15), although slightly distorted in spiral view, is definitely *Th. globotruncanoides* being similar to the topotype here illustrated (see Pl.1, 2a-c), whereas the somewhat distorted specimen illustrated in Fig. 8. 10-12 of Kennedy et al. (2004), again identified as *R. globotruncanoides*, is close to *Th. brotzeni*, the first appearance of which just predates that of the former species.

Recently, Ando & Huber (2007) illustrated one metatype each for *brotzeni* and *globotruncanoides* (Pl. A1), deposited by Sigal in the United States Natural Museum (USNM) collection, attributing them to the genus *Rotalipora*. According to these authors, both metatypes well correspond to the respective holotypes as described above. However, although they agree with our observations, they formulated the hypothesis (p. 174) that the two species having different size could represent "different ontogenetic stage of the same species", with *brotzeni* (smaller) as a possible "pre-adult form", and *globotruncanoides* (larger) as a "fully adult individual". Ando & Huber (2007) concluded that further study on "the entire population" is needed before validating or rejecting *brotzeni* and *globotruncanoides* as a discrete taxa. Meanwhile, Gonzalez-Donoso et al. (2007) further reiterated that the two species are synonym, including *globotruncanoides*, the only valid species for them, in the genus *Thalmanninella*.

In our opinion, following the typological approach used in CHRONOS, on the basis of the descriptions and remarks on the holotypes reported above the species *Thalmanninella globotruncanoides* and *Thalmanninella brotzeni* are not conspecific and must be considered two discrete taxa. From a stratigraphic point of view *Th. brotzeni* first occur slightly earlier than *Th. globotruncanoides*.

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