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REMARKS ON THE FORAMINIFERAL GENUS *ROTALIPORA*  
BROTZEN

*Abstract.*—The taxonomic status of *Rotalipora turonica* Brotzen, type species of the genus *Rotalipora*, is discussed. Figure 11-4 of Brotzen is selected as a lectotype for *Rotalipora turonica*. *Rotalipora* is restricted to include only forms with secondary apertures on the umbilical side and a well-developed keel.

## INTRODUCTION

The genus *Rotalipora* was created by Brotzen in 1942, taking his *Rotalipora turonica* as the type species. Unfortunately, Brotzen failed in designate the holotype of *R. turonica*. He illustrated two quite different specimens under *R. turonica* (Brotzen, 1942, figures 10 and 11-4). The original illustrations of Brotzen are here reproduced in Figures 1 and 2 of Plate XXXIV.

For several years different authors have questioned whether *Rotalipora turonica* is a junior synonym of *Rotalipora cushmani* (Morrow) or it is a separate species. However, not attention has been given to the fact that Brotzen erected *R. turonica* in a syntypic series. Up to now there has not been any formal designation of a lectotype for *R. turonica*. Thus, *R. turonica* was regarded as a junior synonym of *R. cushmani* by Loeblich and Tappan (1961) and by Pessagno (1967). On the other hand, Klaus (1959) regarded *R. turonica* as a separate species. *Rotalipora turonica* was considered to be a subspecies of *Rotalipora cushmani* by Neagu (1970, p. 65). However, the latter author included in his synonymy for *Rotalipora cushmani turonica* (Brotzen) (sic!) both of the specimens illustrated by Brotzen in 1942.

In order to avoid future taxonomic misidentifications and to clarify the taxonomic status of *Rotalipora* a lectotype of *Rotalipora turonica* is herein designated and the type species of the genus is re-described.

*Acknowledgements.*—The author wishes to express his gratitude to the Geosciences Division of the University of Texas at Dallas for the use of the Scanning Electron Microscope.

Family **Rotaliporidae** Sigal, 1958Type genus: *Rotalipora* Brotzen, 1942

*Remarks.* — The diagnosis of Rotaliporidae given by Longoria (1973) is followed herein. According to this emended definition, the family Rotaliporidae is restricted to include Globigerinacea with true secondary apertures on the umbilical side formed at the edge of the ventral prolongation of the chamber, here termed *lingula*, (Latin = tongue) and a well — developed peripheral keel.

Rotaliporidae differs from Ticinellidae Longoria in lacking of imperforate cover-plate with accessory apertures formed by the long imperforate porticus extending from the border of the primary aperture to the umbilicus but having instead perforate extensions of the ventral side of the chambers with secondary apertures.

Genus *Rotalipora* Brotzen, 1942Type species: *Rotalipora turonica* Brotzen, 1942

*Emended definition.* — Test trochospiral with well-developed single keel. Primary aperture extra umbilical-umbilical, often bordered by imperforate flaps. Chambers inflated on both spiral and umbilical sides, with imperforate ridges or costellae on the surface, ventral side of the chambers extending into the umbilical area (herein termed *lingula*) to fuse with the previous *lingula*, leaving secondary apertures on its edge which often are located on the suture. Sutures curved, depressed on the umbilical side, curved, depressed to raised on the spiral side. Wall calcareous, radial, hyaline, perforate.

*Remarks.* — The members of the genus *Rotalipora* are characterized by been trochospiral, with strongly developed single keel and by having secondary sutural apertures formed at the edge of the extension of the perforate ventral side of the chambers. *Rotalipora* Brotzen differs from *Thalmaninella* Sigal and *Pseudoticinella* Longoria in lacking of imperforate umbilical cover-plate formed by the fusion of the long imperforate portici but having instead *lingula* which are perforate extensions of the ventral side of the chambers and by having secondary apertures instead of intra or infralaminar accessory apertures.

The following are the species here regarded to be included in *Rotalipora*: *Rotalipora turonica* Brotzen, *Rotalipora cushmani* (Morrow), *Rotalipora montsalvensis* Klaus, *Rotalipora minor* Klaus and *Rotalipora thoemi* Hagn and Zeil.

*Range.* — Middle Cenomanian to lowermost Turonian.

*Occurrence.* — World-wide.

*Rotalipora turonica* Brotzen

(Pl. XXXIV, Figs. 2, 3c)

1942. *Rotalipora turonica* Brotzen; F. Brotzen, p. 32, Text-fig. 11—4. (non fig. 10).1970. *Rotalipora cushmani turonica* (Brotzen); T. Neagu, p. 66, Pl. 27, Figs 1—6.

*Emended definition.* — Test as with the genus, biconvex with generally seven to eight chambers in the last whorl, all of them about the same size. Chambers highly vaulted both spirally and umbilically, petalloid on spiral side, petalloid to subtrapezoidal on umbilical side. Sutures curved, somewhat raised on the spiral side, depressed and straight to curved on umbilical side. Chambers often possessing a few imperforate discontinuous costellae on both spiral and umbilical sides. Umbilicus wide, shallow, often with very large lingula and one to two secondary apertures per suture.

*Remarks.* — Brotzen (1942, p. 32) originally described *Rotalipora turonica* in a syntypic series from the Lower Turonian of Pomerania. The specimens are deposited at the Riksmuseet Stockholm. To avoid further confusion concerning the identification of this taxon, Text-figure 11—4 of Brotzen (1942, p. 34) is herein designated the lectotype of *Rotalipora turonica* Brotzen. Figure 10 of Brotzen (1942, p. 33) is herein assigned to *Rotalipora cushmani* (Morrow).

*Range.* — Upper Cenomanian to lowermost Turonian.

*Occurrence.* — USA: Britton Formation of Texas, Greenhorn Limestone of Kansas. Rumania: Eastern Carpathians.

*Rotalipora cushmani* (Morrow, 1934)

(Pl. XXXIII, Figs 1a-d; Pl. XXXIV, Figs 1, 3a)

1934. *Globorotalia cushmani* Morrow; A. L. Morrow, p. 199, Pl. 31, Figs. 2, 4.1942. *Rotalipora turonica* Brotzen; F. Brotzen, p. 32, Text-fig. 10 (non Text-fig. 11—4).non 1950. *Globotruncana (Rotalipora) montsalvensis* Mornod; L. Mornod, p. 584, Text-figs. 4—1, 7—1, 2.non 1950. *Globotruncana (Rotalipora) montsalvensis* var. *minor* Mornod; *ibid.*, p. 581, Text-figs. 8—1a, 2, 3, 4.

*Emended definition.* — Test as with the genus, biconvex with generally five chambers in the last whorl, increasing rapidly in size as added. Chambers vaulted both spirally and umbilically, of crescent-shape on both spiral and umbilical sides. Sutures curved, somewhat raised on the spiral side, depressed and curved on umbilical side. Umbilicus wide, shallow, of ten, with large lingula, one to two secondary apertures on the edge of the lingula.

*Remarks.* — *Rotalipora cushmani* was originally described from the Lower Turonian, Greenhorn Limestone of Kansas by Morrow (1934). It was regarded as a senior synonym of *Rotalipora turonica* Brotzen and *Rotali-*

*pora montsalvensis* Mornod by Loeblich and Tappan (1961) and by Pessagno (1967). The former authors failed in distinguishing both species on basis of the height of the spire. Pessagno (op. cit., p. 292) stated "From the analysis of *Rotalipora cushmani* indicates that there is a considerable variation in the T'X/TX value of *R. cushmani* at any given North America locality".

The present author agrees with Pessagno in the fact that there is a wide range of convexity of the spiral side of the *R. cushmani*. However, as a general rule *R. turonica* has much lower spiral side (higher T'X/TX value). In addition *R. cushmani* differs from *R. turonica* 1) by having crescent-shape rather than petalloid chambers on the spiral side and 2) by having generally five rapidly increasing chambers (occasionally six) rather than seven to eight chambers of the same size in the last whorl.

*Rotalipora cushmani* differs from *Rotalipora montsalvensis* Mornod by having less pronounced inflated chambers as seen in peripheral view and by always having imperforate costellae on the surface of the chambers.

The holotype and paratypes of *Globorotalia cushmani* Morrow deposited in the U.S. National Museum (Cushman Collection) were examined by the author. A close comparison of the specimen illustrated by Brotzen (1942) in figure 10 with Morrow's types of *R. cushmani*, shows that it indeed is referable to this species. The analysis of topotypic material of *R. cushmani* from the Greenhorn Limestone demonstrated that both *R. cushmani* and *R. turonica* occur together but their distinction is possible based on the characteristics given above for both species. A topotype of *R. cushmani* is herein illustrated (Pl. XXXIII, Fig. 1).

*Range.* — Upper Cenomanian to lowermost Turonian.

*Occurrence.* — World-wide.

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UWAGI O RODZAJU *ROTALIPORA* BROTZEN (FORAMINIFERIDA)

*Streszczenie*

W pracy przedyskutowano znaczenie taksonomiczne *Rotalipora turonica* Brotzen, 1942, gatunku typowego rodzaju *Rotalipora* Brotzen, 1942. Spośród dwóch okazów opisanych i ilustrowanych pod tą nazwą gatunkową przez Brotzena, jeden wybrano jako lektotyp (Brotzen, 1942, Fig. 11—4), drugi (*l.c.*, Fig. 10) zidentyfikowano jako okaz *Rotalipora cushmani* (Morrow, 1934).

Podano nową diagnozę rodzaju *Rotalipora* Brotzen, ograniczając jego zakres do form o wtórnych aperturach na stronie umbilikalnej i o dobrze rozwiniętym kilu.

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ХОЗЕ ФРАНЦИСКО ЛОНГОРИА

ПРИМЕЧАНИЯ НА ТЕМУ РОДА *ROTALIPORA* BROTZEN (FORAMINIFERIDA)

*Резюме*

В работе обсуждается таксономическое значение *Rotalipora turonica* Brotzen, 1942, типичного вида рода *Rotalipora* Brotzen, 1942. Из двух экземпляров, описанных и проиллюстрированных Бротценом под этим видовым названием, один избран в качестве лектотипа (Brotzen, 1942, фиг. 11—4), второй (1. с. фиг. 10) определен в качестве *Rotalipora cushmani* (Morrow, 1934).

Приводится новый диагноз рода *Rotalipora* Brotzen в котором к нему относятся лишь формы с вторичными апертурями на умбиликальной стороне и с хорошо выраженным килем.

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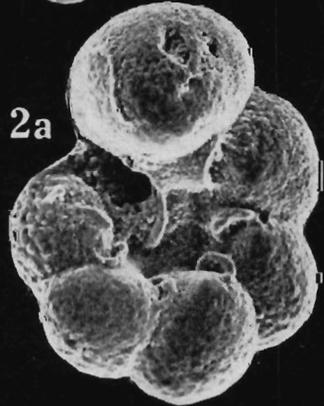
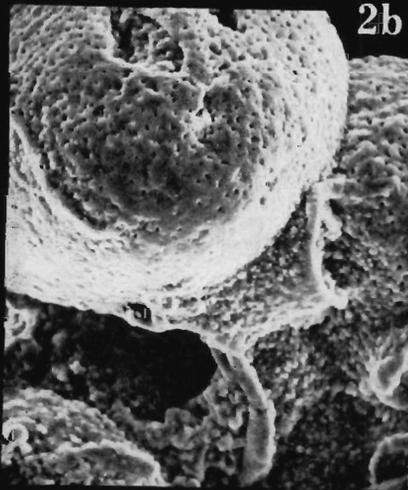
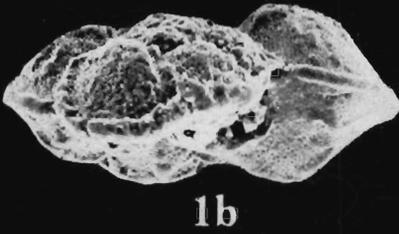
## EXPLANATION OF PLATES

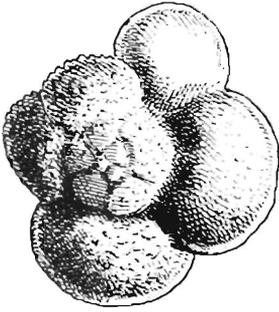
## PLATE XXXIII

- Fig. 1. *Rotalipora cushmani* (Morrow): Scanning Micrograph of a topotype from the Greenhorn Limestone; *a* spiral side, note imperforate costellae on the surface of the chambers; *b* peripheral view; *c* umbilical side; *d* close-up of the last chamber as viewed from umbilical side. Note perforate lingula and two secondary apertures. Maximum diameter of the test 535  $\mu$
- Fig. 2. "*Ticinella*" *aprica* (Loeblich & Tappan): Scanning Electron Micrograph, Britton Formation, Texas; *a* umbilical side, note imperforate umbilical cover-plate formed by the long imperforate porticus extending from the border of the primary aperture to the umbilicus, leaving accessory apertures; *b* close-up umbilical area. Note that porticus extends from the border of the primary aperture. Maximum diameter of the test 440  $\mu$

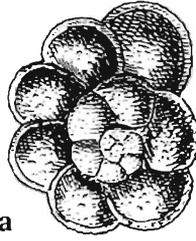
## PLATE XXXIV

- Fig. 1. Specimen illustrated by Brotzen (1942) in Text-figure 10. Here regarded as belonging to *Rotalipora cushmani* (Morrow).
- Fig. 2. Specimen illustrated by Brotzen (1942) in Text-figure 11—4. Herein designated *montsalvensis* Mornod; and *c* *Rotalipora turonica* Brotzen.
- Fig. 3. Schematic vertical section of *a* *Rotalipora cushmani* (Morrow); *b* *Rotalipora montsalvensis* Mornod; and *c* *Rotalipora turonica* Brotzen.





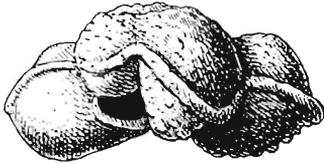
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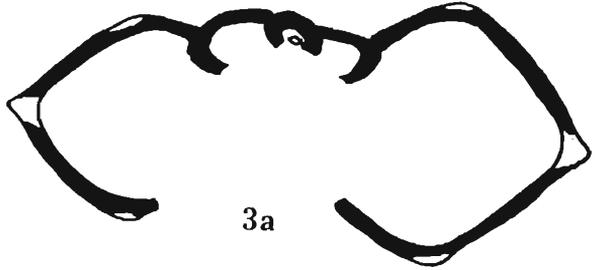
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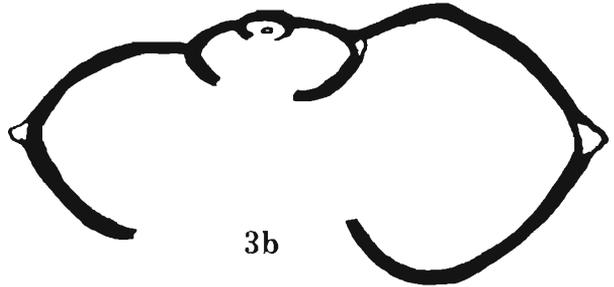
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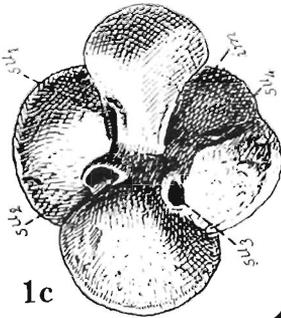
1b



3a



3b



1c



3c