

# A neotype for *Globorotalia margaritae* Bolli and Bermúdez

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## Abstract

A neotype for the planktonic foraminiferal species *Globorotalia margaritae* Bolli and Bermúdez is described and figured together with a para- and a hypotype. It is an index form stratigraphically restricted to the Lower Pliocene where it had a widespread geographic distribution in tropical to temperate seas.

## Resumen

Se describe e ilustra el neotipo de la especie de foraminífero platónico *Globorotalia margaritae* Bolli y Bermúdez, así como un paratipo y un hipotipo. Se trata de una forma que es índice estratigráfico del Plioceno Inferior, donde tiene una amplia distribución geográfica en mares de tropical a templados.

## Introduction

Some years ago Dr. R. Cifelli, curator at the Department of Paleobiology of the National Museum of Natural History, Smithsonian Institution, Washington, D.C., informed one of the authors (Bolli) that the holotype of *Globorotalia margaritae* was accidentally lost from the Museum's collection, and asked to provide a replacement specimen to be designated as neotype.

Because the type locality material still available proved to be rather poor in preservation and number of specimens, it became necessary to resample the locality. This caused some delay in obtaining, describing and figuring a suitable specimen. The specimen eventually selected as neotype is very close to the lost holotype in general morphology, number of chambers and size. Also figured here are a slightly smaller paratype from the type locality, and a very typical, slightly larger specimen of

## Carta del Dr. Bolli al Dr. Bermúdez desde Zurich, el 8 de marzo de 1977:

«Dear Pedro,

Many thanks for your letters of January 4 and 11 and for the three samples with *Globorotalia margaritae*. I have now completed the manuscript on the neotype of this species, of which a copy is enclosed. I hope everything is in good order including the specimens selected for illustration which were in his usual excellent way executed by Larry Isham. If you have any comments or suggestions for changes or additions, please let me know immediately. I have written to Dr. Ellison, Editor of the «Journal of Foraminiferal Research» to have the paper published in this journal. If it should take too long there, I have an offer from Saito to have it out in «Micropaleontology». If you wish to order reprints, please inform me how many.

Thank you for writing to Gustavo Furrázola Bermúdez for some unwashed *Globorotalia palmerae* material. So far, I have not received it, but I guess mail is slow with Cuba. Should we remain without answer, do you think one should contact one of the two addresses shown on the enclosed circular which I received a few days ago?

With best regards.

Sincerely,  
M. Bolli

Encl: Manuscript Neotype *Globorotalia margaritae*  
Circular from Cuba

excellent preservation from an outcrop on Araya Peninsula.

The authors wish to thank Richard Cifelli for his encouragement to provide and describe a neotype for *Globorotalia margaritae*, and Lawrence B. Isham, both from the National Museum, Washington, D.C., for so ably illustrating the specimens figured on Plate 1.

The three specimens figured on Plate 1 are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C., under the numbers USNM 245121 to 245123.

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### *Globorotalia margaritae* Bolli and Bermúdez

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Shape of test low trochospiral, compressed and elongate; equatorial periphery slightly lobate; axial periphery acute with a thin keel. Spiral side rounded-convex, umbilical side less convex. Wall calcareous, finely perforate, surface smooth except for early chambers of last whorl, in particular on umbilical side, which may be covered by small pustules. Chambers strongly compressed, seen from the spiral side elongate, fairly narrow and distinctly curved;

about 12 in number arranged in 2-2 whorls; the 4-5 chambers of the last whorl increasing fairly rapidly in size. Sutures on spiral side strongly curved and slightly depressed; on umbilical side slightly sigmoid between last chamber, curved between earlier ones, more distinctly depressed than on spiral side. Umbilicus very narrow. Aperture a low arch, bordered above by a small lip; interiomarginal, umbilical-extraumbilical. Coiling sinistral. Largest diameter of neotype: 0.36 mm. *Remarks.* The neotype compares in its general shape, number of chambers and size (largest diameter .36 mm against .37 mm of the holotype) very closely with the lost holotype.

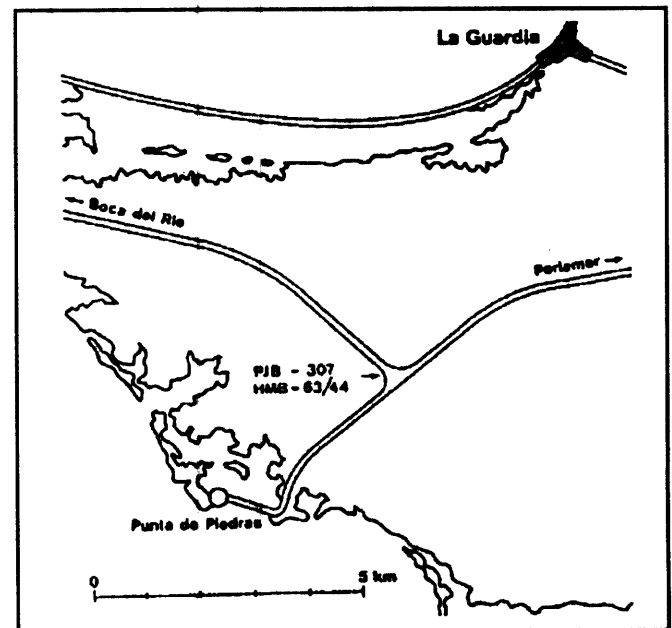
*Globorotalia margaritae* differs from *Globorotalia menardii* d'Orbigny, which it resembles to some extent, in its generally smaller size, in the more convexly rounded spiral side, in the more delicate peripheral keel and, seen from the spiral side, in the distinctly elongate, narrower and more strongly curved chambers. Compared with *Globorotalia menardii*, *G. margaritae* has a much shorter stratigraphic range, restricted to the Lower Pliocene.

#### Geographic distribution

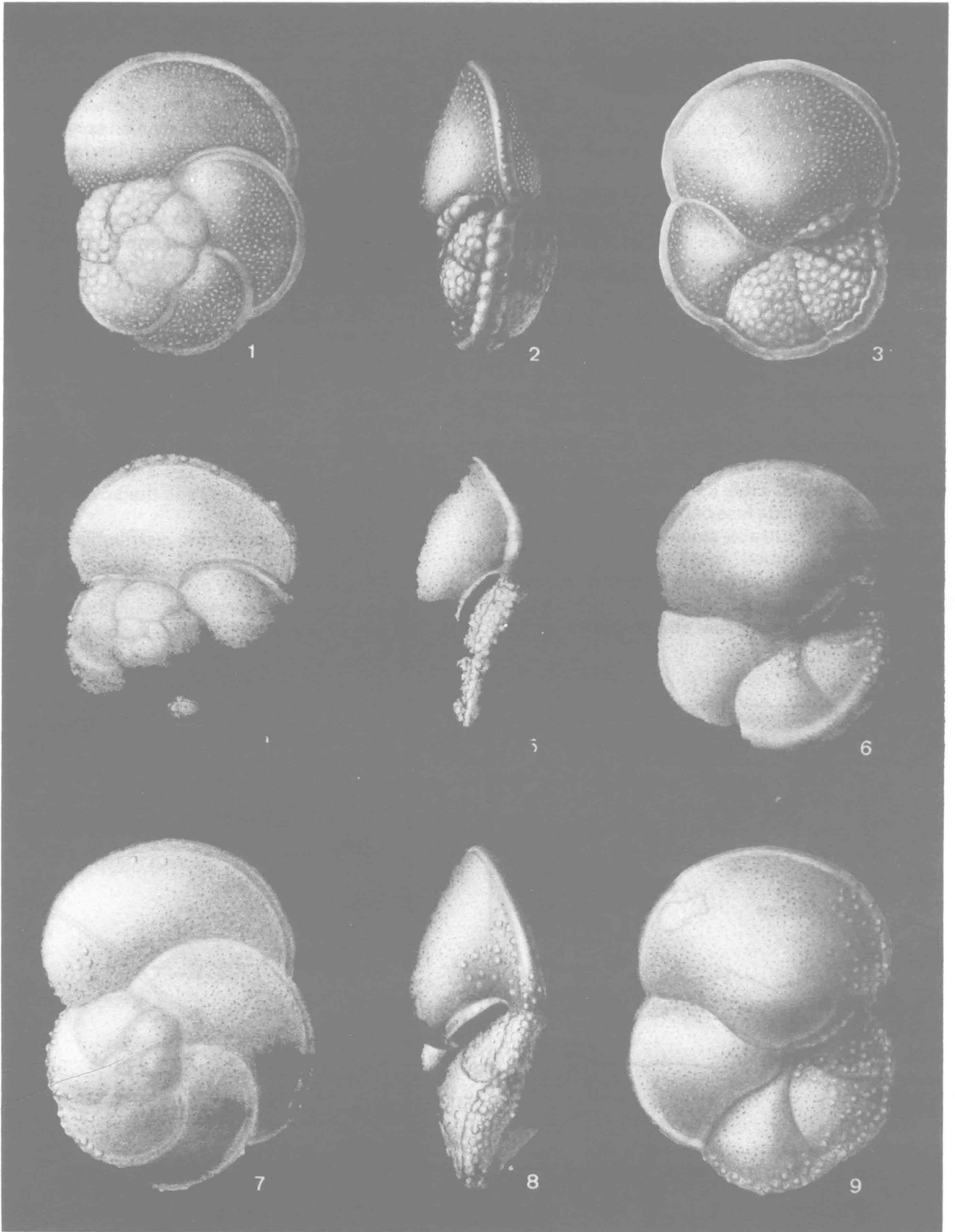
Subsequent to its original description from Margarita Island, *Globorotalia margaritae* became reported from a steadily increasing number of localities.



Text figure 1  
Key map showing location of detail map text figure 2 on Margarita Island and of text figure 3 on Araya Peninsula.



Text figure 2  
Map showing type locality of *Globorotalia margaritae* (PJB-307, HMB-63/44) on Margarita Island



From within the Caribbean region the species was listed and/or illustrated from the Araya Peninsula (Bermúdez and Bolli, 1969), from several sites of DSDP Legs 4 and 15 (Bolli, 1970; Bolli and Premoli Silva, 1973), Jamaica (Bolli, 1970) and from Falcón, Venezuela (Díaz de Gamero, 1970). Outside the Caribbean the species was reported world-wide from a great number of localities that include many DSDP sites in the Atlantic, Mediterranean, Pacific and Indian Ocean, and from land section such as Java, Italy, etc.

From this wide geographic distribution it became apparent that *Globorotalia margaritae* is a cosmopolitan species that lived in both tropical and temperate environments, and is thus useful for the dating and correlation of Lower Pliocene sediments across a considerable latitudinal span. Biostratigraphers have increasingly made use of the wide geographic distribution and restricted stratigraphic range of this species.

**Stratigraphic range, *Globorotalia margaritae*  
Zone, Lower Pliocene**

Based on mollusc evidence from the Cubagua Formation of eastern Venezuela, Bolli and Bermúdez (1965) in their original description assigned *Globorotalia margaritae* an Upper Miocene age. This age was maintained by Bolli (1966) for the Bodjonegoro-1 section in Java, by Bolli (1966a) in his «Zonation of Cretaceous to Pliocene marine sediments based on planktonic foraminifera», and in Bermúdez' and Bolli's (1969) paper on the Miocene to Recent sediments of coastal central and eastern Venezuela.

The age of *Globorotalia margaritae* and the zone based on it came under discussion during the session of the Committee on Mediterranean Neogene Stratigraphy (CMNS) held 1967 in Bologna, and again during a follow-up meeting in 1968 attended by a group of micropaleontologists specialized in planktonic foraminifera. Their conclusions were published in Citi *et al.* (1968). Based on a number of Italian sections they recognized and agreed on that the range of *Globorotalia margaritae* is to be regarded as restricted to the Lower Pliocene instead of Upper Miocene as originally reported. This view was widely accepted from then on, eg. by Bolli (1970) and Bolli and Premoli Silva (1973) for the Caribbean, Cita (1973) for the Mediterranean, and Cita (1975) in her discussion on the Miocene-Pliocene boundary.

Cita (1973) subdivided *Globorotalia margaritae* into the three subspecies *Globorotalia margaritae primitiva*, *G. margaritae margaritae*, (corresponding to the originally described species) and *G. margaritae evoluta*. Based on these subspecies, which form an evolutionary sequence within the Lower Pliocene she established an older *Globorotalia margaritae* and a younger *Globorotalia margaritae margaritae evoluta* Subzone.

On paleomagnetic evidence quoted by Cita (1975), the duration of *Globorotalia margaritae*, and of the zone based on it, from its appearance at the Miocene/Pliocene boundary (5.25–5.4 m.y.) to the extinction of the species (3.32 m.y.) is approximately 2 m.y.

*Globorotalia margaritae* is a generally recognized index species for the tropical to temperate Lower Pliocene.

**Plate 1**

***Globorotalia margaritae* Bolli and Bermudez; all figures x  
155**

1-3 Neotype: 1, spiral view; 2, edge view; 3, umbilical view.

From type locality, Margarita Island. Sample PJB-307.  
USNM 245121.

4-6 Paratype: 4, spiral view; 5, edge view; 6, umbilical view.

From type locality, Margarita Island. Sample HMB-63/44.  
USNM 245122.

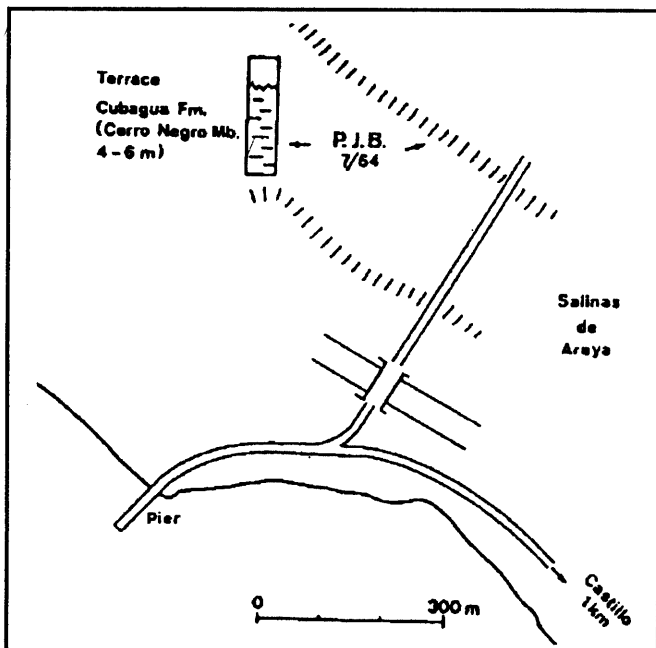
7-9 Hypotype: 7, spiral view; 8, edge view; 9, umbilical view.

From western end of Araya Peninsula. Sample PJB-7/64.

### Localities of figured specimens

For the neotype and paratype (Plate 1, figures 1–3 and 4–6) the locality is the same as for the lost holotype: Road cut on the highway leading from Porlamar to Punta las Piedras, immediately West of the junction where the highway to Boca del Rio branches off, about 1.5 km SW of Las Hernandez; Island of Margarita, State of Nueva Esparta, Venezuela (text figures 1,2). The type locality is situated in the Las Hernandez beds, a local equivalent of the Cubagua Formation recognized on neighbouring Cubagua Island and on the western end of Araya Peninsula. The neotype was collected by P. J. Bermudez, sample number PJB-307 (USNM 245121), the paratype by H. M. Bolli, sample number HMB 63/44 (USNM 245121).

The hypotype figured on Plate 1, figures 6–9, was collected by P.J. Bermudez, sample number PJB 7/64, from acancereous clay outcrop in the Cerro Negro Member of the Cubagua Formation near the western end of Araya Peninsula (text-figures 1, 3). This locality contains a fauna which is richer and better preserved than that of the type locality on Margarita Island.



**Text figure 3**  
Map showing PJB-7/64 outcrop of Cubagua Formation, with well preserved *Globorotalia margaritae*

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