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A Globotruncana Fauna from Kiveri-Argos Area, Greece

By G. Christodoulou and N. Marangoudakis (Athens)¹⁾

With 4 textfigures and 1 plate

ABSTRACT

A microfauna, consisting of five species, of the genus *Globotruncana*, enclosed in a thin marly layer of the Olonos limestone series (Kiveri village, Argos area, Greece), is studied. An upper Campanian age is indicated.

Study of isolated *Globotruncana* specimens has not been undertaken before in Greece. In this country, *Globotruncana concavata* (BROTZEN) is here recorded for the first time.

INTRODUCTION

The 1:50.000 sheet of the Argos area (Eastern Peloponnesus, Greece), was geologically mapped during the summer of 1961. At the village of Kiveri, outcrops of

limestones of the Olonos sequence occur which are of upper Cretaceous age. From this sequence a sample of a thin marly layer intercalated in the limestones was taken and examined. After special laboratory treatment, a great number of specimens belonging to the genus *Globotruncana* was isolated. The study of this fauna has disclosed the presence of 5 species whose association implies an upper Campanian age.

The pelagic Olonos sequence appears in the Eastern Peloponnesus to be overthrust onto the Tripolitza sequence. The latter consists of dolomites and limestones of a shallow marine facies – ranging from the Triassic to the lower Priabonian – and of flysch. The thickness of the Tripolitza sequence exceeds at certain places 1000 m, while at others, mainly due to tectonical reasons, it is much less or even absent.

The Tripolitza sequence overlies unconformably an association of metamorphic rocks consisting of phyllites, quartzites and marbles.

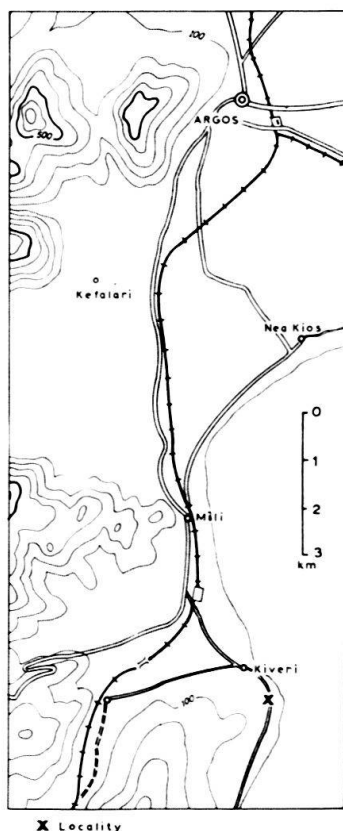


Fig. 1. Sketch-map of the Kiveri-Argos area, Greece.

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In the eastern Peloponnesus area there also occur neogene deposits which, in some places, have risen to altitudes exceeding 600 m, and thick diluvial deposits, especially in the valleys and the estuaries of the torrents.

Technique

The sample was crushed by pressing and left for some hours in a bath of hydrogen peroxide (Perhydrol) solution. Then it was washed on a sieve of 100 mesh and dried. Particles ranging from 0.2 to 2 mm in size were separated and studied. Among them there were numerous specimens of *Globotruncana* filled with calcite and partly covered with rock material.

The specimens were further cleaned by boiling in a water solution of Beloran (a soft soap produced by CIBA, Basel, Switzerland) and leaving them for half an hour in a sonblaster (The NARDA Ultrasonics Corp., Westburg, L.I., New York) in water. Finally we had to clean them further under the microscope with a thin steel needle.

When cleaning foraminifera in a sonblaster, it is recommended to place the small fossils not directly in the cup of the apparatus but in a smaller one, i.e. a small porcelain dish (of a $\phi \leq 6$ cm) or a much smaller crucible. The latter, filled up to $\frac{1}{3}$ of its height with cleaning liquid, floats on the surface of the water which fills the cup of the apparatus up to $\frac{1}{2}$ or $\frac{1}{3}$ of its height. Three or four crucibles can float near each other at the same time. Pure water is recommended as cleaning liquid too. It gives, in many cases, very good results.

The above method, in use in the laboratories of the Greek Institute for Geology and Subsurface Research, saves much time and trouble.

Sketches were drawn under the microscope with a LEITZ drawing apparatus. Photographs were taken with Leitz Panphot in the laboratories of the Institute for Geology and Subsurface Research, Hippocrates Str. 1, Athens, Greece, where the original material is also kept.

MICROPALEONTOLOGY

The following five species were recorded:

Globotruncana arca (CUSHMAN 1926)

(Pl. I, fig. 5 a-c, 7 a-c)

- 1926 *Pulvinulina arca* CUSHMAN. – CUSHMAN, C. L. F. R., Contr., 2, p. 23, pl. 3, fig. 1 a-c.
 1951 *Globotruncana arca* CUSHMAN. – TILEV, p. 57, fig. 18, 19.
 1957 *Globotruncana arca* CUSHMAN. – SACAL & DEBOURLE, p. 59, pl. 27, figs. 7, 8, 11.
 1957 *Globotruncana (Globotruncana) arca* (CUSHMAN). – EDGELL, p. 110, pl. 1, figs. 10–12.
 1962 *Globotruncana arca* (CUSHMAN). – HERM, p. 65, pl. 7, fig. 3.
 1964 *Globotruncana arca* (CUSHMAN). – OLSSON, p. 162, pl. 4, figs. 1–3.

Remarks: Typical forms of this species are relatively rare (less than 10 % of the whole fauna). Specimens of medium size. Dorsal side convex, ventral side almost flat. The band between the two keels is relatively narrow. There are present transitional forms between the above species and *G. lapp. lapparenti*.

Range : Campanian to Maestrichtian. CITA (Riv. Ital. Pal. Strat. 54, 1948, p. 5) has recorded this species also from the Santonian.

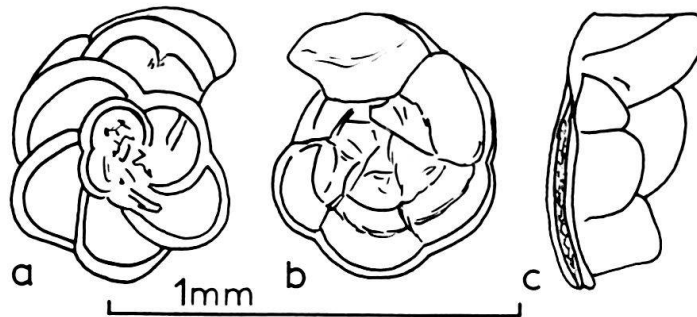


Fig. 2. *Globotruncana concavata* (BROTZEN)

Globotruncana concavata (BROTZEN 1934)

(Pl. I, fig. 1 a-c. Textfig. 2 (a-c))

1934 *Rotalia concavata* n. sp. – BROTZEN, Deutsch. Ver. Paläst. Zeitschr., p. 66, pl. 3 b.

1952 *Globotruncana asymetrica* n. sp. – SIGAL, p. 35, fig. 35.

1952 *Globotruncana ventricosa* (WHITE). – CARBONNIER, p. 116, pl. 6, fig. 1 a-c.

1953 *Globotruncana* aff. *concavata* (BROTZEN). – DE KLASZ, p. 236, pl. 6, fig. 2 a-c.

1962 *Globotruncana concavata* (BROTZEN). – HERM, p. 70, pl. 5, fig. 4.

Remarks : The species is represented by only one specimen. This is similar to *G. asymetrica* n. sp. (SIGAL, 1952, p. 35, fig. 35) and very close to *G. concavata* (BROTZEN) (HERM, 1962). HERM, as well as many other authors, considers *G. asymetrica* SIGAL as a synonym of *G. concavata* (BROTZEN).

Range : The species is well developed in the lower Senonian and lower Campanian, but it is also recorded from Turonian (SIGAL 1952) and upper Cenomanian (CARBONNIER 1952). BROTZEN has described the species (1934) from the Santonian-Campanian sediments of Palestine.

Globotruncana lapparenti lapparenti BOLLI 1944

(Pl. I, fig. 2 a-c, 6 a-c)

1936 *Globotruncana lapparenti* n. sp. – BROTZEN, Sverig. Geol. Unders., ser. C. 396, p. 175.

1944 *Globotruncana lapparenti lapparenti* nom. nov. – BOLLI, Ecl. Geol. Helv., 37, p. 230, fig. 1, abb. 15, 16, pl. 9, fig. 11.

1949 *Globotruncana (Globotruncana) lapparenti* BROTZEN 1936. – REICHEL, p. 613, pl. 16, fig. 9, pl. 17, fig. 9.

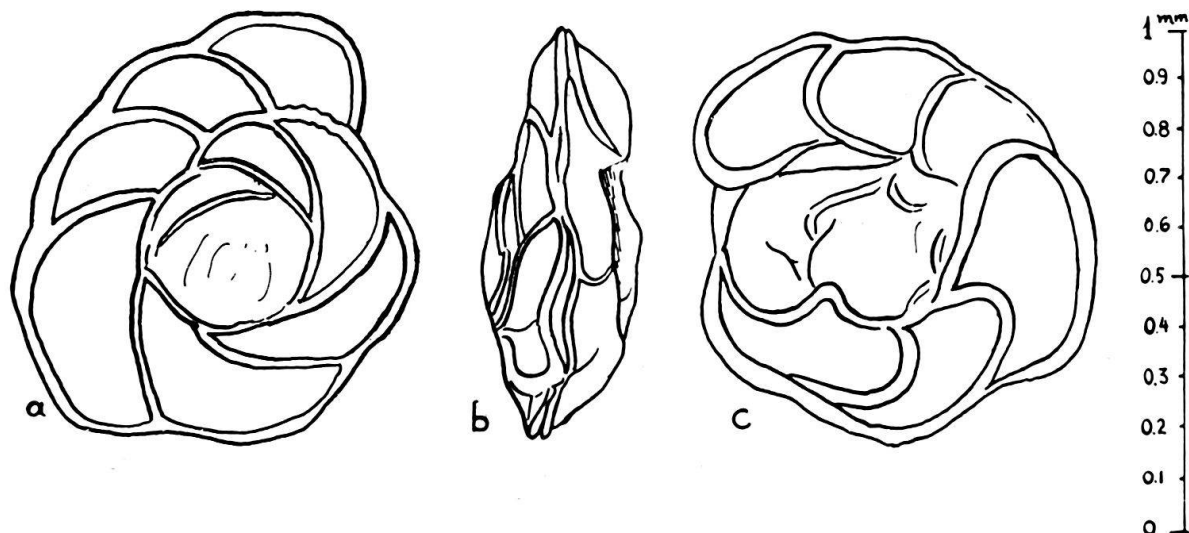
1954 *Globotruncana lapparenti lapparenti* BROTZEN 1936. – HAGN & ZEIL, p. 39, pl. 3, fig. 3, pl. 6, figs. 5, 8.

Remarks : The typical forms of the species are rare, but there are also transitional forms to *G. arca* and *G. lapp. coronata*. Specimens of medium size, with a dextral (90 %) or sinistral (10 %) coiling.

Range : Turonian to Maestrichtian.

Globotruncana lapparenti coronata BOLLI 1944

(Textfig. 3 a-c)

1942 *Globotruncana linnei* (D'ORBIGNY) *tipica*. – GANDOLFI, p. 127, fig. 46 (2 a-c).1944 *Globotruncana lapparenti coronata* nom. nov. – BOLLI, Ecl. Geol. Helv., 37, p. 233, fig. 1, abb. 21-22, p. 9, figs. 14-15.1951 *Gl. (Globotruncana) lapparenti coronata* BOLLI. – NOTH, p. 76, pl. 5, fig. 8 a-c.1952 *Globotruncana coronata* BOLLI. – SIGAL, p. 34, fig. 36.1954 *Globotruncana lapparenti* BROTZEN *coronata* BOLLI 1944. – HAGN & ZEIL, p. 43, pl. 3, fig. 4, pl. 7, figs. 1-3.1964 *Globotruncana coronata* (BOLLI 1944). – HERM, p. 76, pl. 6, fig. 5.Fig. 3. *Globotruncana lapparenti coronata* BOLLI.

Remarks: Specimens of large size, biconvex. Typical forms are rare, having two keels, with a narrow band among them or tending to meet each other. There are transitional forms from *G. lapp. lapparenti* and to *G. lapp. tricarinata*. Some of them are very close to the latter.

Range: Main development Turonian to Santonian. It has also been recorded from upper Senonian (NOTH 1951, SIGAL 1952, HERM 1962).

Globotruncana elevata elevata (BROTZEN 1934)

(Pl. 1, fig. 10 a-c, 11 a-c. Textfig. 4, No. 1, 3, 5, 6, 9)

1934 *Rotalia elevata* n. sp. – BROTZEN, Deutsch Ver. Paläst. Zeitschr. 157, p. 66, pl. 3, fig. c.1953 *Globotruncana andori* n. sp. – DE KLASZ, p. 233, pl. 6, fig. 1 a-c.1955 *Globotruncana (Globotruncana) elevata elevata* (BROTZEN). – DALBIEZ, p. 169, textfig. 9 a-c.1956 *Globotruncana elevata elevata* (BROTZEN). – KNIPSCHER, p. 51, pl. 4, figs. 1-3, 5, abb. 1.1964 *Globotruncana stuarti elevata* (BROTZEN). – OLSSON, p. 169, pl. 5, fig. 7 a-c.

Remarks: Specimens of relatively large size. Forms greatly varying in shape. Dorsal side strongly convex to flat or slightly concave (always with a small elevation). Ventrally, the chambers are varying in height, from relatively short to distinctly high. The ratio of the height of the last chamber to the height of the first chamber of the last whorl is also widely ranging. Direction of coiling: dextral 100 %. Frequency: about 50 % of the whole fauna.

Range: Santonian to lower Maestrichtian. Very abundant in the Campanian.

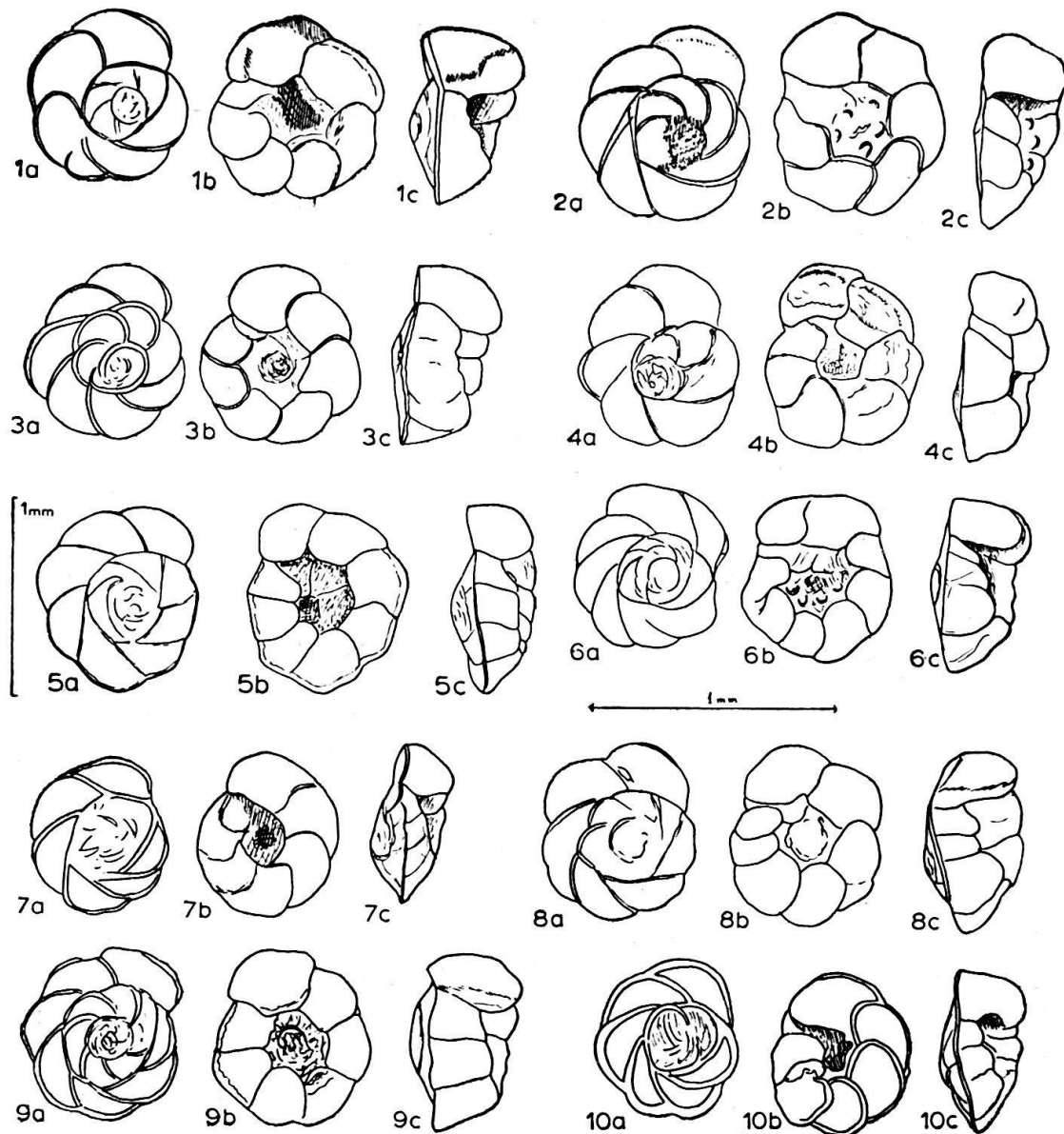


Fig. 4. *Globotruncana* gr. *elevata* (BROTZEN). No. 5, $\times 23$, all others $\times 27.5$. No. 8 a-c corresponds to Pl. 1, fig. 13. No. 9 a-c corresponds to Pl. 1, fig. 8.

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Plate I

- 1 a–c: *Globotruncana concavata* (BROTZEN)
- 2 a–c: *Globotruncana lapparenti lapparenti* BROTZEN
- 3 a–c: *Globotruncana* cf. *arca* (CUSHMAN)
- 4 a–c: *Globotruncana* gr. *elevata*
- 5 a–c: *Globotruncana arca* (CUSHMAN)
- 6 a–c: *Globotruncana lapparenti lapparenti* BROTZEN
- 7 a–c: *Globotruncana arca* (CUSHMAN)
- 8 a–c: *Globotruncana* gr. *elevata*
- 9 a–c: *Globotruncana* gr. *elevata*
- 10 a–c: *Globotruncana elevata elevata* (BROTZEN)
- 11 a–c: *Globotruncana elevata elevata* (BROTZEN)
- 12 a–c: *Globotruncana* gr. *lapparenti* (transitional form to *Gl. lapp. coronata* BOLLI)
- 13 a–c: *Globotruncana* gr. *elevata*

All figures $\times 27.5$

- 1 a–c corresponds to textfig. 2
- 8 a–c corresponds to textfig. 4, No. 9
- 13 a–c corresponds to textfig. 4, No. 8

