

REVIEW ARTICLE

LENTICUZONARIA: A NEW TETHYAN LAGENID BENTHIC FORAMINIFERAL GENUS

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ABSTRACT

Lenticuzonaria n. gen. is introduced here to include the Paleocene benthic Lagenid Foraminiferids from some Southern Tethyan localities (Egypt and Jordan) that characterized by planispirally enrolled symmetrical hyaline calcareous test, ornamented surface by elevated sutures with a row of tubercles or broken into a row of nodes along the sutures, and spinose surface. Some representatives of the new genus have been previously assigned to the genus *Vaginulinopsis* Reuss (1860), or *Lenticulina* Lamarck (1804), or *Marginulinopsis* Silvestri (1904). The new genus has a compiled characters between its lenticular test (as the genus *Lenticulina* Lamarck, 1804 with its planispirally enrolled test, unbroken continuous sutures and smooth surface), and also another genus *Percultazonaria* Loeblich & Tappan, 1986 (which has planispiral-uniserial test with ornamented surface mainly by elevated sutures that may costate or broken nodes). Two Paleocene species of the new genus are described here from two countries in the Southern Tethys: Jordan (*Lenticuzonaria hodaie*) and Egypt (*Lenticuzonaria misrensis*). These two species have planispirally enrolled symmetrical hyaline calcareous test with ornamented surface. *L. hodaie* has spinose ornamented surface, besides the elevated sutures, while *L. misrensis* has a row of nodes elevated sutures, but without spinose surface.

KEYWORDS

Lenticuzonaria, Benthic foraminifera, Lagenid, Paleocene, Tethys.

1. INTRODUCTION

The present study is mainly devoted to the systematic description of *Lenticuzonaria* n. gen. and other two related Paleocene species: *L. hodaie* Anan, n. sp. and *L. misrensis* Anan, n. sp., which have been recorded from the Paleocene outcrop of Jordan and Egypt, respectively (Fig. 1). *L. hodaie* was recorded from Tell Burma section, South Jordan (Figs. 2, 3), while *L. misrensis* from some outcrops in central and southern Egypt: Middle Paleocene outcrop of North Ain Amur section, Kharga Oasis (Central Egypt), Late Paleocene outcrop of Qreiya section, northeast Qena, Nile Valley (Central Egypt), and Late Paleocene outcrop of Wadi Abu Ghurra section, West Aswan (South Egypt), (Figs. 4, 5).

2. FAUNAL DISCUSSION

The new genus *Lenticuzonaria* has a compiled characters between its lenticular test as in the genus *Lenticulina* Lamarck (1804) with continuous unbroken sutures, and ornamented spinose surface with mainly elevated sutures that may costate or broken nodes as in the genus *Percultazonaria* Loeblich & Tappan (1986). The new genus in its only planispirally test differs from the Paleocene-Early Eocene *Marginulinopsis tuberculata* (Plummer, 1927) in its planispiral to uniserial test.

3. TAXONOMY

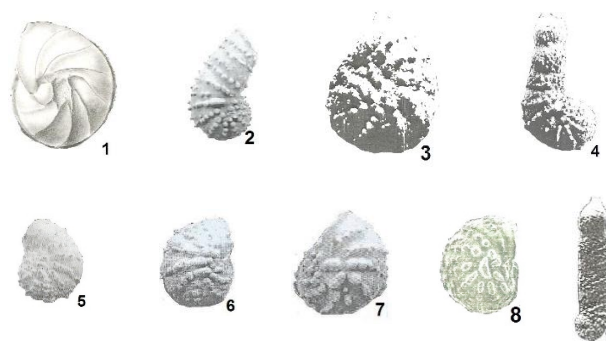


Plate 1: (1) *Lenticulina rotulata* Lamarck, 1804 x 30, (2) *Percultazonaria ameeri* Anan, 2015 x 30, the holotype (3) *Lenticuzonaria hodaie* Anan, n. sp., x 40, (4) *Percultazonaria wadiarabensis* (Futyan, 1976) x 40, (5-8) *Lenticuzonaria misrensis* Anan, n. sp. x 70: (5) *Marginulinopsis tuberculata*, after Anan & Sharabi, 1988; 6. *Lenticulina* sp., after Ali, 2003; 7. *Marginulinopsis tuberculata*, after Ali, 2003; 8. *Marginulinopsis tuberculata*, the holotype, after Youssef & Taha, 2012), (9) *Percultazonaria tuberculata* (Plummer, 1927) x 60.

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Lenticuzonaria Anan, n. gen. (benthic foraminifera) is treated here to belong the Suborder Lagenina of the taxonomy of Loeblich & Tappan (1988). Two species (*L. hodaie* and *L. misrensis*) belong to this genus are illustrated in Plate 1.

Order Foraminiferida Eichwald, 1830

Suborder Lagenina Délaque & Hérouard, 1896

Superfamily Nodosariacea Ehrenberg, 1838

Family Vaginulinidae Reuss, 1860

Subfamily Lenticulininae Chapman, Parr & Collins, 1934

3.1 Genus *Lenticuzonaria* Anan, n. gen.

Type species *Lenticuzonaria hodaie* Anan, n. sp.

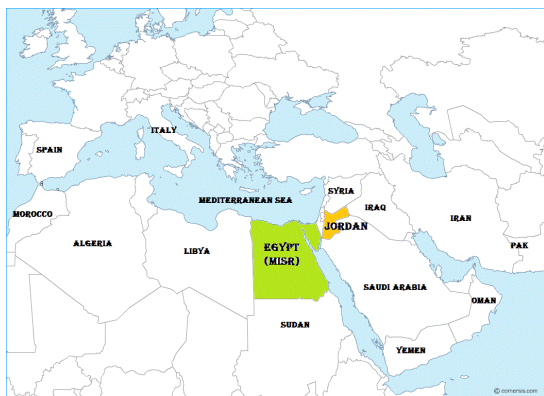


Figure 1: Geographic position of Egypt and Jordan, southeast of the Mediterranean Sea.

Etymology: This genus has a compiled characters between its lenticular test (as the genus *Lenticulina* Lamarck, 1804, Pl. 1, fig. 1), and ornamented surface mainly by elevated sutures that may costate or broken nodes (as the genus *Percultazonaria* Loeblich & Tappan, 1986, Pl. 1, fig. 2).

Holotype: The specimen illustrated here in Pl. 1, fig. 3.

Type locality: Tell Burma section, South Jordan (Figs. 2, 3).

Age: Paleocene.

Occurrence: In Jordan: Wadi Arab section, and Egypt: Ain Amur section (Kharga Oasis), Wadi Abu Ghurra section (west Aswan), Gabal El Borgia section (west Aswan), Qreiya section (North Qena) (Fig. 2).

Diagnosis: This genus has planispirally enrolled symmetrical test, calcareous hyaline perforated wall, surface ornamented by elevated sutures with a row of tubercles or broken into a row of nodes along the sutures that become progressively more prominent, aperture radial at the peripheral angle, commonly slightly produced.

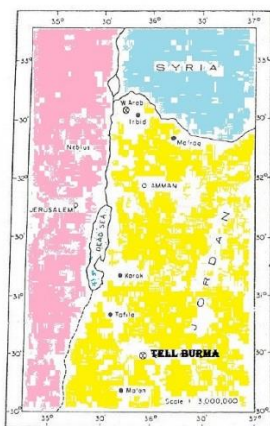


Figure 2: Geographic location of the Tell Burma section (South Jordan) and Wadi Arab section, North Jordan (Futyan, 1976).

Remarks: The figured specimen of the new genus *Lenticuzonaria* was originally described as a paratype of the *Vaginulinopsis wadiarabensis* of Futyan (1976, Pl. 1, fig. 4), which has a planispiral early portion, followed by erect uniserial later portion of the test.

3.2 *Lenticuzonaria hodaie* Anan, n. sp. (Pl.1, fig. 3)

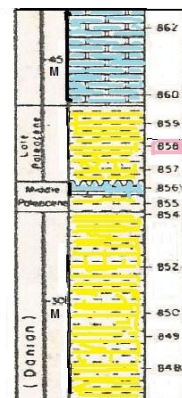


Figure 3: The stratigraphic position of shaley sample (858) of the holotype of *Lenticuzonaria hodaie* Anan, n. sp. from the Late Paleocene of Tell Burma section, South Jordan (Futyan, 1976).

1976 The paratype of *Vaginulinopsis wadiarabensis* Futyan, p. 524, pl. 81, fig. 7, from the Late Paleocene of Tell Burma section, south Jordan • (non the holotype, pl. 81, figs. 8, 9), from Late Paleocene of Wadi Arab section, North Jordan, Fig. 2).

Holotype: Illustrated specimen in Pl. 1, fig. 3.

Diameter: Length and width 0.43 mm.

Depository: The holotype is deposited in British Museum of Natural History (BMNH) P49111.

Etymology: In the memory of my late mother Hoda Anan.

Type locality: Tell Burma section, South Jordan, sample 858 (Fig. 3).

Age: Late Paleocene.

Diagnosis: This species has planispirally enrolled symmetrical test, calcareous hyaline perforated wall, spinose ornamented surface, elevated sutures with a row of nodes broken sutures, aperture radial at the peripheral angle, commonly slightly produced.

Remarks: This species is characterized by its planispirally test, sharp spinose periphery and surface, and elevated sutures with a row of tubercles.

3.3 *Lenticuzonaria misrensis* Anan, n. sp. (Pl. 1, figs. 5-8)

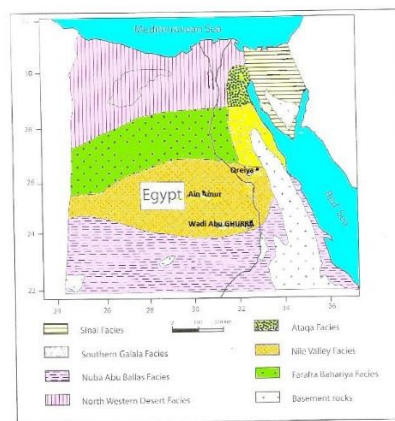


Figure 4: Geographic locations of the three Egyptian outcrops in central and southern Egypt in the Nile Valley Facies: Qreiya section, northeast Qena, Nile Valley, and North Ain Amur section, Kharga Oasis at Central Egypt, and Wadi Abu Ghurra section, West Aswan at South Egypt (Issawi et 1999).

1988 *Marginulinopsis tuberculata* (Plummer); Anan and Sharabi, p. 207, pl. 1, fig. 24 (Middle Paleocene, North Ain Amur section, Kharga Oasis, Central Egypt). • (Pl. 1, fig. 5).

2003 *Lenticulina* sp. 3; Ali, pl. 5, fig. 24 (Late Paleocene, Wadi Abu Ghurra section, West Aswan, South Egypt) •

2003 *Marginulinopsis tuberculata* (Plummer); Ali, p. 122, pl. 5, fig. 27 (Late Paleocene, Wadi Abu Ghurra section, West Aswan, South Egypt) • (Pl. 1, fig. 7).

2012 *Marginulinopsis tuberculata* (Plummer); Youssef and Taha, pl. 2, fig. 17 (Late Paleocene, Qreiya section, northeast Qena, Nile Valley, Central Egypt) the holotype. • (Pl. 1, fig. 8).

Holotype: Illustrated specimen in Pl. 1, fig. 8.

Paratypes: Illustrated specimens in Pl. 1, figs. 5-7.

Diameter: Length and width around 0.50 mm.

Etymology: After the Arab Republic of Egypt (Misr) (Figs. 1, 4)

Type locality of the Holotype: Qreiya section, northeast Qena, Nile Valley, Central Egypt, sample 8 (Fig. 5).

Age: Middle-Late Paleocene.

Diagnosis: This species has planispirally enrolled symmetrical test, calcareous hyaline perforated wall, surface ornamented by elevated sutures with a row of tubercles or broken into a row of nodes along the sutures that become progressively more prominent, aperture radial at the peripheral angle, commonly slightly produced.

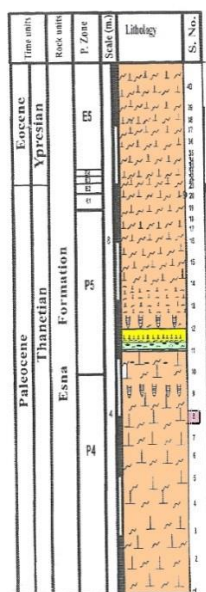


Figure 5: The stratigraphic position of sample 8 of the holotype of *Lenticuzonaria misrensis* Anan, n. sp. from the Late Paleocene of Qreiya section Central Egypt (Youssef & Taha, 2012).

Remarks: This species is characterized by its ornamented surface with a row of tubercles or broken into a row of nodes and elevated sutures with a row of tubercles. It differs from the *Marginulinopsis tuberculata* (Plummer, 1927) by its planispirally test than planispiral to uniserial test (Pl. 1, fig. 9).

4. PALEOGEOGRAPHY

Vrielynck et al. (1995) noted that for 260 Ma, the Tethys Ocean covered much of the face of the earth, from the Caribbean domain to the west to the Indonesian domain to the east. From the Late Cretaceous to the present, the Tethys has been closing, with sediments in the Caribbean, Alpine-Himalayan, and Indonesian belts. Prior to that, Tethys had spread and cut Pangaea as early as the Permian. Remnants of this ocean are found only in the Central Atlantic and the Mediterranean Sea. The new genus

Lenticuzonaria and its two new species *L. hodae* (was recorded in the Late Paleocene of southern Jordan, Tell Burma section by Futyan, 1976), and *L. misrensis* have wide geographic distribution in many localities in Egypt (recorded in central Egypt by Anan & Sharabi, 1988; and Youssef & Taha, 2012, and from southern Egypt by Ali, 2003). The Tethyan Realm had been connected with the Indo-Pacific Ocean to the east and with the Atlantic Ocean to the west via the Mediterranean Sea during the late Cretaceous and early Paleogene times (Rosenbaum et al., 2002; Anan, 2020b).

5. PALEOENVIRONMENT

Lenticuzonaria hodae n. sp. is recorded from the Late Paleocene in Tell Burma section (South Jordan) is accompanied also with other diagnostic keeled planktic foraminiferal (*Morozovella acuta* and *M. velascoensis*) as noted by Futyan (1976). This assemblage is characteristic of warm stratigraphic interval as noted by Frerichs (1971). The *Lenticuzonaria misrensis* n. sp. is recorded from central and southern Egypt, which located in the Nile Valley Facies, NVF (of Issawi et al., 1999). The NVF has middle-outer neritic environmental facies by some authors (i. e. LeRoy, 1953; Issawi et al., 1999; Anan, 2008) and considered here to be related to the Midway-Type Fauna (MTF) of Berggren & Aubert (1975).

CONCLUSIONS

The present study deals with the recording of two new Paleocene species of the new Lagenid benthic foraminiferal genus *Lenticuzonaria* in four localities in two countries in the Southern Tethys: Egypt and Jordan. *Lenticuzonaria hodae* from Tell Burma section in the Southern Jordan, and *Lenticuzonaria misrensis* from many section in Egypt, from north to south: Qreiya section, northeast Qena, Nile Valley, North Ain Amur section, Kharga Oasis; Wadi Abu Ghurra section, West Aswan. All these species shows an affinity with MTF middle-outer neritic environment (50-200 m) as most benthic foraminiferal assemblages in Tunisia (Berggren & Aubert, 1975), Egypt (LeRoy, 1953; Anan & Sharabi, 1988; Ali, 2003; Anan, 2015; Youssef & Taha; Anan, 2020), Jordan (Futyan, 1975), United Arab Emirates (Anan, 1993) and Pakistan (Haque, 1965; Gibson, 2007; Khawaja et al., 2018).

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