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FIRST RECORD OF BRACHIOPODS FROM THE EOCENE OF EGYPT

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The brachiopod species *Terebratulina tenuistriata* (Leymerie) has been identified in the Middle Eocene (Bartonian) nummulitic limestone of the Upper Building Stone Member of the Mokattam Formation at El Basatin of Gebel Mokattam, Cairo, Egypt. The brachiopod is associated with *Nummulites farisi* Hussein, Boukhary & Kamal, *N. praestriatus* Boukhary & Kamal and *N. bullatus* Azzaroli. This is the first record of brachiopods from the Eocene of Egypt and northern Africa. *T. tenuistriata* is common and widely distributed in the Eocene deposits of Europe, and the present record extends its geographical range further south, to the southern shelf of the Tethys.

Key words: Brachiopoda, *Terebratulina*, Middle Eocene, Bartonian, Egypt

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Vrsta ramenonošca *Terebratulina tenuistriata* (Leymerie) determinirana je iz srednjeeocenskog (Barton) numulitskog vapnenca formacije Mokattam u području El Basatin, Gebel Mokattam, Kairo, Egipat. Ramenonožac je povezan s *Nummulites farisi* Hussein, Boukhary & Kamal, *N. praestriatus* Boukhary & Kamal i *N. bullatus* Azzaroli. Radi se o prvom nalazu ramenonožaca iz eocena Egipta i sjeverne Afrike. Vrsta *T. tenuistriata* je uobičajena i široko rasprostranjena u eocenskim naslagama Europe, i ovaj nalaz predstavlja širenje njenog areala na jug, do južnog šelfa Tetisa.

Ključne riječi: Brachiopoda, *Terebratulina*, srednji eocen, Barton, Egipt

INTRODUCTION

Eocene brachiopods, although relatively rare and of low diversity, are widely distributed in Europe, being known from many localities (e.g. VINCENT, 1893; DONCIEUX, 1905, 1926; POPESCU-VOITESTI, 1911; FABIANI, 1913; GOCHEV, 1933; ELLIOTT, 1938, 1954; ZELINSKAYA, 1975; POPIEL-BARCZYK & BARCZYK, 1987; CALZADA & URQUIOLA, 1994; BITNER, 2000; BITNER & DIENI, 2005; BITNER & DULAI, 2008). They have not been, however, reported so far from the Eocene of North Africa, and the pres-

ent paper represents the first record of Eocene brachiopods from Egypt. Only one species, *Terebratulina tenuistriata* (Leymerie, 1846), has been recognized in the investigated material which consists of 14 specimens that are all damaged and/or crushed. This new discovery of *T. tenuistriata* extends its geographical distribution southwards to the southern shelf of the Tethys in Africa, and may suggest that the hitherto distribution does not reflect a true biogeographic pattern but rather a lack of investigations.

The brachiopods studied here are deposited at the Institute of Paleobiology, Polish Academy of Sciences, Warszawa under the number ZPAL Bp.65.

GEOLOGICAL SETTING

The studied Eocene section of El Basatin (Fig. 1) is situated in the southern part of Gebel Mokattam, about six kilometres to the south of the Citadel, Greater Cairo, Egypt. The Gebel Mokattam section comprises two formations, the Mokattam Formation at the base and the Maadi Formation above (SAID & MARTIN, 1964; BOUKHARY, 1988; BOUKHARY & KAMAL, 1993; HUSSEIN *et al*., 2004; Fig. 2). The Mokattam Formation consists of two members, Upper Building Stone and Giushi. The Upper Building Stone Member is represented mainly by hard limestone with the larger foraminifera, such as *Nummulites farisi* Hussein, Boukhary & Kamal, 2004, *N. prae-*

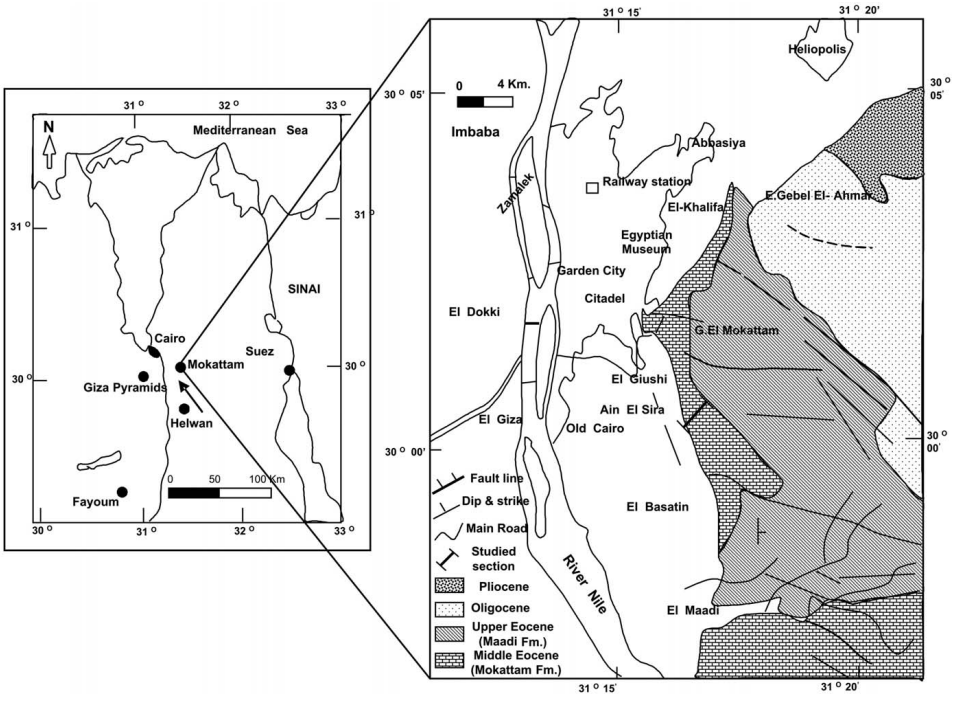

Fig. 1. Map of the studied area (after SAID & MARTIN, 1964).

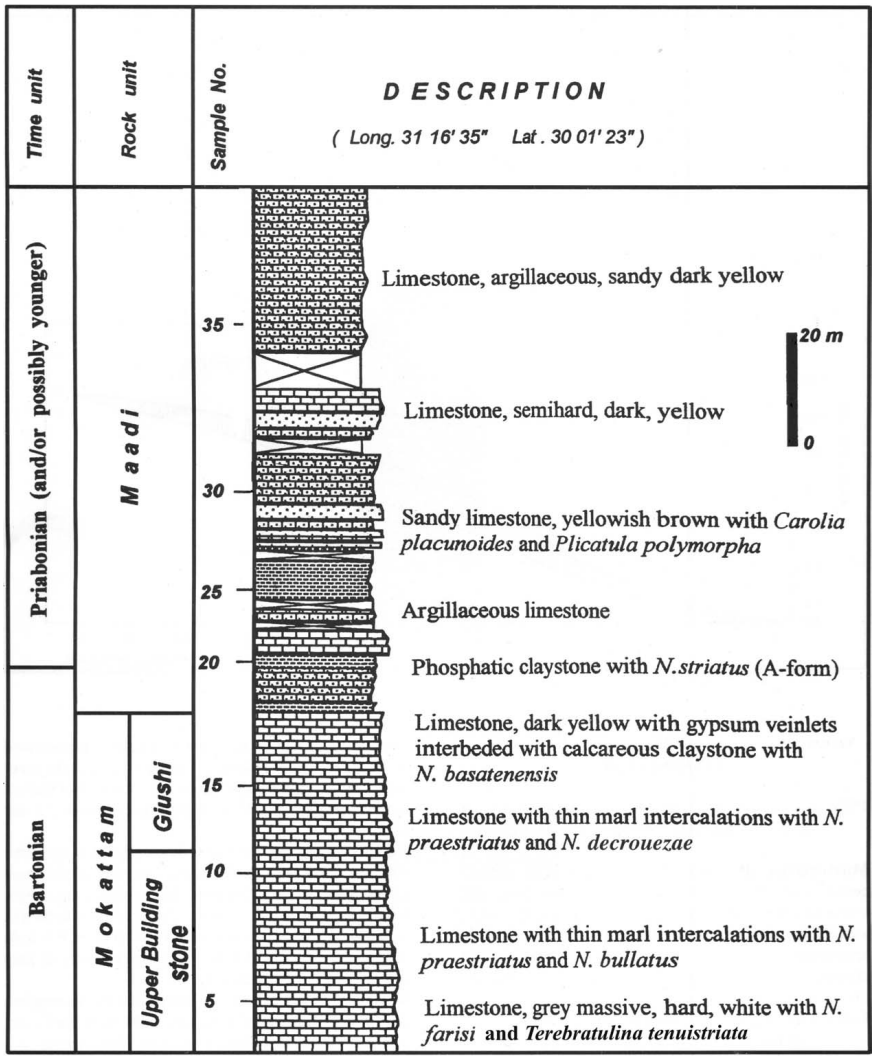

Fig. 2. Lithostratigraphic column of the Eocene deposits at El Basatin, Gebel Mokattam, collecting level of brachiopods indicated (after HUSSEIN *et al.*, 2004).

striatus Boukhary & Kamal, 1993 and *N. bullatus* Azzaroli, 1952. The investigated brachiopods originate from this part of the section (Fig. 2). The Giushi Member consists of nummulitic and bryozoan marly limestone with clayey intercalations with *Nummulites decrouezae* Boukhary, 1988, *N. praestriatus* and *N.* aff. *pulchellus* Hantken, 1929. The Maadi Formation is characterized by marly limestone and shales with the bivalve *Carolia placunoides* Cantraine, 1838 near the top. The Mokattam Formation and the basal part of the Maadi Formation are of Bartonian age while most of the Maadi Foramtion is of Priabonian age. The Bartonian/Priabonian boundary is marked by the presence of shark teeth and phosphatic band.

SYSTEMATIC PALAEONTOLOGY

Superfamily Cancellothyridoidea Thomson, 1926

Family Cancellothyrididae Thomson, 1926

Subfamily Cancellothyridinae Thomson, 1926

Genus *Terebratulina* d'Orbigny, 1847

Type species: *Anomia retusa* Linnaeus, 1758.

***Terebratulina tenuistriata* (Leymerie, 1846) (Fig. 3A–F)**

1846 *Terebratula tenuistriata* Leymerie, p. 363, pl. 15, fig. 11.

1911 *Terebratulina striatula* Sow. – POPESCU-VOITESTI, p. 16–17.

2000 *Terebratulina tenuistriata* (Leymerie) – BITNER, p. 118, figs. 2, 3, 4A–F, 5A–G (cum syn.).

2008 *Terebratulina tenuistriata* (Leymerie) – BITNER & DULAI, p. 33–35, fig. 4.1–8.

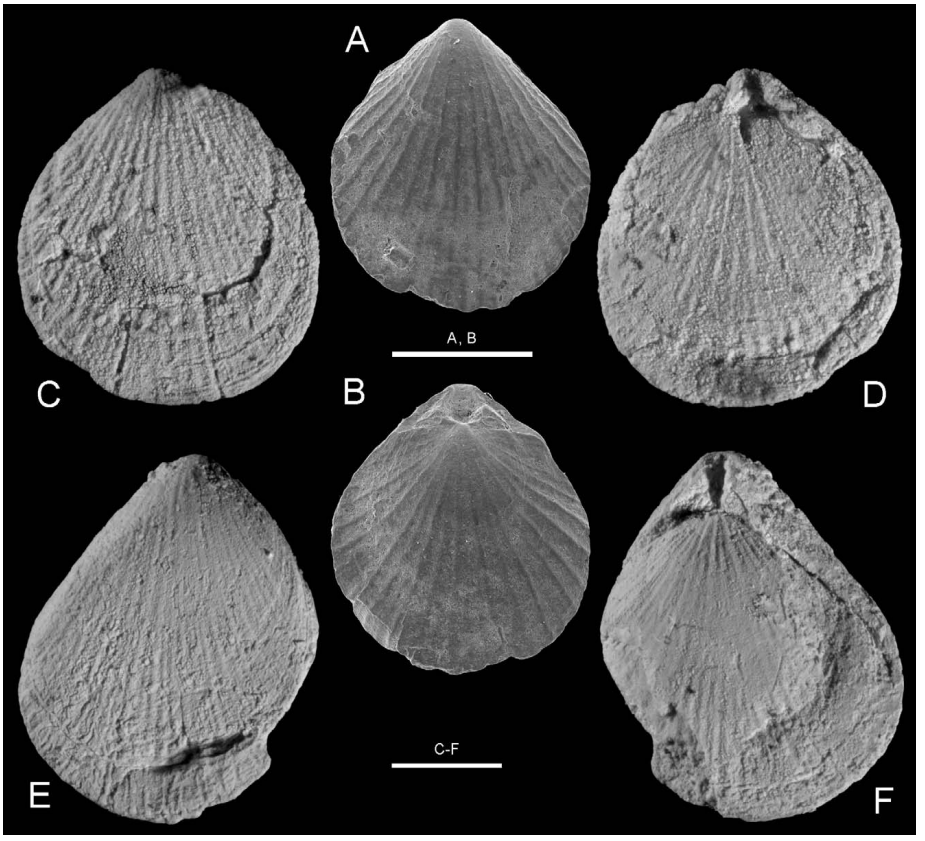

Fig. 3. *Terebratulina tenuistriata* (Leymerie), Middle Eocene (Bartonian), El Basatin, Gebel Mokattam, Egypt; A, B, ventral and dorsal views of young complete specimen, SEM, ZPAL Bp.65/3; C–F, ventral and dorsal views of two complete specimens, ZPAL Bp.65/1–2. Scale bars: A, B, 2 mm, C–F, 3 mm.

Material: 14 complete specimens, all crushed and/or damaged.
Measurements (in mm):

Specimen no.	Length	Width	Thickness
ZPAL Bp.65/1	9.1	8.1	–
ZPAL Bp.65/2	10.0	–	–
ZPAL Bp.65/4	8.9	7.9	–
ZPAL Bp.65/5	?6.9	5.7	2.7

Remarks. The investigated specimens, although poorly preserved, agree well with those hitherto described (LEYMERIE, 1846; DONCIEUX, 1905, 1926; ELLIOTT, 1938; BITNER, 2000; BITNER & DULAI, 2008). They differ, however, from the specimens from France and Spain in being much smaller. They are most similar in size to the specimens described from Hungary (BITNER & DULAI, 2008). The maximum observed length of the studied specimens is about 10 mm. They are elongate oval to subtriangular in outline. Their surface is covered with numerous fine ribs that increase in number by intercalation. In young individuals the ribs are coarser and less numerous (see Fig. 3A, B). The foramen is incomplete, elongately oval, bordered by two small, triangular deltidial plates. The state of preservation precludes investigations of internal structures.

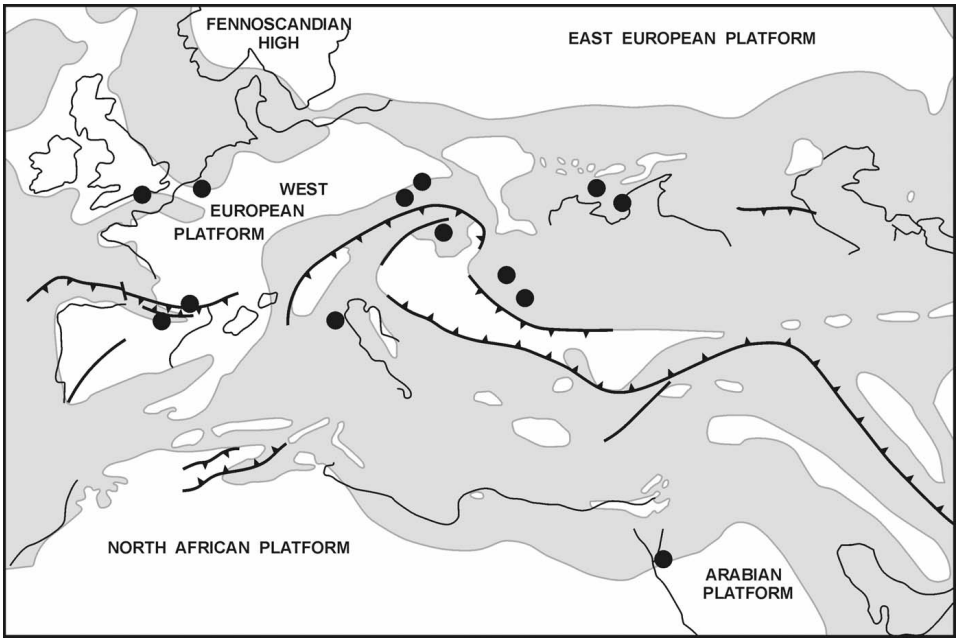

Fig. 4. Geographic distribution of *Terebratulina tenuistriata* (Leymerie) in the Eocene (data from different sources, see above; paleobiogeographic map after MEULENKAMP & SISSINGH, 2003, simplified).

DISCUSSION

Terebratulina tenuistriata (Leymerie, 1846) is a common and widespread species in the Eocene throughout the whole of Europe (Fig. 4), from England (ELLIOTT, 1938), through Belgium (DAVIDSON, 1874; VINCENT, 1893), France (LEYMERIE, 1846; DONCIEUX, 1905, 1926), Spain (BITNER, 2000), Italy (DAVIDSON, 1870; FABIANI, 1913), to Poland (BARCZYK, 1973; POPIEL-BARCZYK & BARCZYK, 1987), Hungary (MEZNERICS, 1943; BITNER & DULAI, 2008), Romania (POPESCU-VOITESTI, 1911), Bulgaria (GOCHEV, 1933) and Ukraine (ZELINSKAYA, 1975). The present discovery of *T. tenuistriata* in the Middle Eocene Mokattam Formation at El Basatin, Greater Cairo, Egypt considerably extends the biogeographic range of this species, as well as Eocene brachiopods, further south, to the southern margin of the Tethys Ocean.

T. tenuistriata is found in two different rocks. In the marly deposits it is abundant, dominating in the assemblage (see ELLIOTT, 1938; BITNER, 2000; BITNER & DULAI, 2008); in the hard nummulitic limestone the species is usually rare, while large, smooth terebratulides dominate (POPESCU-VOITESTI, 1911; POPIEL-BARCZYK 1996; BITNER, DULAI & GALACZ, in prep.). In the studied nummulitic limestone *T. tenuistriata* is also rare, however it is the only brachiopod found.

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REFERENCES

BARCZYK, W., 1973: Brachiopods *Terebratulina delheidi* Vincent in the Nummulite Eocene of the Tatra Mts. Acta Geol. Pol. **23**, 491–497.

BITNER, M.A., 2000: Lower Eocene (Middle Ilerdian) brachiopods from the Campo region, Central Pyrenees, north-eastern Spain. Rev. Esp. Paleont. **15**, 117–128.

BITNER, M.A. & I. DIENI, 2005: Late Eocene brachiopods from the Euganean Hills (NE Italy). Eclogae Geol. Helv. **98**, 103–111

BITNER, M.A. & A. DULAI, 2008: Eocene micromorphic brachiopods from north-western Hungary. Geol. Carpath. **59**, 31–43.

BOUKHARY, M., 1988: *Nummulites bullatus* Azzarol, 1952, from Egypt and its biostratigraphic significance. N. Jb. Geol. Paläont. Abh. **177**, 243–262.

BOUKHARY, M. & D. KAMAL, 1993: *Nummulites praestriatus* n. sp. from the Giushi Member (Biarritzian), Gebel Mokattam, Greater Cairo, Egypt. N. Jb. Geol. Paläont. Mh. **10**, 585–595.

CALZADA, S. & M.M. URQUIOLA, 1994: Sobre las *Argyrotheca* (Brachiopoda) del Eoceno surpirenaico. Batalleria **4**, 17–25.

DAVIDSON, T., 1870: On Italian Tertiary Brachiopoda. Geol. Mag. **7**, 359–370, 399–408, 460–466.

DAVIDSON, T., 1874: On the Tertiary Brachiopoda of Belgium. Geol. Mag. **11**, 150–159.

DONCIEUX, L., 1905: Catalogue descriptif des fossiles nummulitiques de l'Aude et de l'Hérault. Première partie. Montagne Noire et Minervois. Ann. Univ. Lyon, n. s. I, **17**, 1–184.

DONCIEUX, L., 1926: Catalogue descriptif des fossiles nummulitiques de l'Aude et de l'Hérault. Deuxième partie (Fascicule III). Corbières septentrionales. Ann. Univ. Lyon, n. s. I, **45**, 1–80.

ELLIOTT, G.F., 1938: A London Clay Brachiopod. Proc. Geol. Ass. **49**, 128–134.

ELLIOTT, G.F., 1954: New Brachiopoda from the Eocene of England, France and Africa. Ann. Mag. Nat. Hist., s. 12, **7**, 721–728.

FABIANI, R., 1913: I Brachiopodi terziari del Veneto. Mem. Ist. Geol. R. Univ. Padova **2**, 3–42.

GOCHEV, P., 1933: Paläontologische und stratigraphische Untersuchungen über das Eocän von Varna. Zeit. Bulg. Geol. Gesellsch. **5**, 1–82.

HUSSEIN, A.I.M., M. BOUKHARY & D. KAMAL, 2004: *Nummulites farisi* n. sp. (*Nummulites partschi* Group) from the Bartonian of El Basatin, Gebel Mokattam, Egypt. Rev. Paléobiol. **23**, 169–179.

LEYMERIE, M.A. 1846: Mémoire sur le terrain à Nummulites (Epicrétacé) des Corbières et de la Montagne Noire. Mém. Soc. Géol. France, série 2, **1**, 337–373.

MEULENKAMP, J.E. & W. SISSINGH, 2003: Tertiary palaeogeography and tectonostratigraphic evolution of the Northern and Southern Peri-Tethys platforms and the intermediate domains of the African-Eurasian convergent plate boundary zone. Palaeogeogr., Palaeoclimat., Palaeoecol. **196**, 209–228.

MEZNERICS, I., 1943: Die Brachiopoden des ungarischen Tertiärs. Ann. Hist.-Nat. Mus. Nat. Hung. **36**, 10–60.

POPESCU-VOITESTI, I., 1911: Contribution à l'étude de la faune du calcaire nummulitique d'Albeşti (Muscel). An. Inst. Geol. României **4**, 1–35 (for 1910).

POPIEL-BARCZYK, E. 1996: Typ Brachiopoda. In: MALINOWSKA, L.& M. PIWOCKI (eds.), Budowa geologiczna Polski III. Atlas skamieniałoseci przewodnich i charakterystycznych, 3a, 1, kenozoik, trzeciorzed, 239–246.

POPIEL-BARCZYK, E. & W. BARCZYK, 1987: Eocene brachiopods from Wola Luzanska and Skalnik in the Central Carpathians. Acta Geol. Polon. **37**, 93–104.

SAID, R. & L. MARTIN, 1964: Cairo area geological excursion notes. Guide Geol. Archaeol. Egypt, Petrol. Explor. Soc. Libya, 6th ann. Field conf. 107–121.

VINCENT, E., 1893: Contribution à la paléontologie des terrains tertiaires de la Belgique. Brachiopodes. Ann. Soc. Roy. Malac. Belgique **28**, 38–64.

ZELINSKAYA, V.A., 1975: Brakhiopody paleogena Ukrainy. Naukova Dumka, Kiev, 148 pp.

SUMMARY

First record of brachiopods from the Eocene of Egypt

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Middle Eocene deposits at El Basatin crop out in the southern part of Gebel Mokattam about six kilometres southwards from the Citadel, Greater Cairo, Egypt. The section comprises two formations, Mokattam and Maadi. The brachiopod fauna is represented by only one species *Terebratulina tenuistriata* (Leymerie, 1846). The brachiopods were found in the lower part of the Upper Building Stone Member of the Mokattam Formation and are associated with such larger foraminifera: *Nummulites farisi* Hussein, Boukhary & Kamal, 2004, *N. praestriatus* Boukhary & Kamal,

1993 and *N. bullatus* Azzaroli, 1952. The Upper Building Stone Member is characterized by hard nummulitic limestone of Bartonian age. Although *T. tenuistriata* has a very wide distribution in Europe, from England through Belgium, France, Spain, Italy to Poland, Hungary, Romania, Bulgaria and Ukraine, it is recorded here for the first time from the Eocene of Egypt. This new occurrence extends its geographical range southwards to the southern shelf of the Tethys in Africa.