FIRST RECORD OF BRACHIOPODS FROM THE EOCENE OF EGYPT

MARIA ALEKSANDRA BITNER¹ & MOHAMED BOUKHARY²

¹Institute of Paleobiology, Polish Academy of Sciences, ul. Twarda 51/55, 00-818 Warszawa, Poland (bitner@twarda.pan.pl)
²Department of Geology, Faculty of Science, Ain Shams University, Cairo, Egypt (moboukhary@yahoo.com)

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

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-VOIESTI, 1911; FABIANI, 1913; GOCHEV, 1933; ELLIOTT, 1938, 1954; ŽELENSKAYA, 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-
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 Carolina 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 Formation is of Priabonian age. The Bartonian/Priabonian boundary is marked by the presence of shark teeth and phosphatic band.

![Lithostratigraphic column of the Eocene deposits at El Basatin, Gebel Mokattam, collecting level of brachiopods indicated (after HUSSEIN et al., 2004).](image)

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

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):

<table>
<thead>
<tr>
<th>Specimen no.</th>
<th>Length</th>
<th>Width</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZPAL Bp.65/1</td>
<td>9.1</td>
<td>8.1</td>
<td>–</td>
</tr>
<tr>
<td>ZPAL Bp.65/2</td>
<td>10.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>ZPAL Bp.65/4</td>
<td>8.9</td>
<td>7.9</td>
<td>–</td>
</tr>
<tr>
<td>ZPAL Bp.65/5</td>
<td>76.9</td>
<td>5.7</td>
<td>2.7</td>
</tr>
</tbody>
</table>

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 deltoidal 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 & SISINGH, 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 (Elliot, 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; Pópiel-Barczyk & Barczyk, 1987), Hungary (Meznerics, 1943; Bitner & Dulai, 2008), Romania (Popescu-Voitești, 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 Elliot, 1938; Bitner, 2000; Bitner & Dulai, 2008); in the hard nummulitic limestone the species is usually rare, while large, smooth terebratulides dominate (Popescu-Voitești, 1911; Pópiel-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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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.