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A new species of *Ellobium* (Gastropoda: Panpulmonata: Ellobiidae) from the Miocene Mizunami Group in Gifu Prefecture, central Japan

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Abstract

Ellobium mizutanii sp. nov. is described from the lower Miocene Yamanouchi Member of the Akeyo Formation (Mizunami Group) in Shitaoki-cho, Mizunami City, Gifu Prefecture. This is the third fossil species of the genus *Ellobium* from the Cenozoic of Japan. The present species closely resembles *Ellobium chinense* (Pfeiffer), a living species that can be found in regions including Mikawa Bay (Aichi Prefecture, central Japan), northern Kyushu, and southern China, but differs in having an inflated body whorl and rather broadly expanded callus on the parietal area of the aperture.

Key words: Early Miocene, Mollusca, systematic, Akeyo Formation

1. Introduction

Modern members of the genus *Ellobium* are inhabitants of the upper to supraridial zones and estuarine environments in the tropical to warm temperate regions of the Indo-Pacific (Itoigawa et al., 2003). Despite the wide distribution of the modern species, *Ellobium* is poorly known in the fossil record. The following four species of *Ellobium* have been reported from the Cenozoic formations in Japan. These species are *Ellobium yatsuoensis* Tsuda, 1959, from the lower Miocene Kurosedani Formation, Do, Osawano-machi, Kaminiikawa-gun, Toyama Prefecture; *Ellobium* sp. 1 and *Ellobium* sp. 2 from the lower Miocene Yamanouchi Member, Akeyo Formation of the Mizunami Group in Akeyo-cho, Mizunami City, Gifu Prefecture (Itoigawa et al., 1974, 1981, 1982); and *Ellobium* cf. *aurisjudae* (Linnaeus) from the uppermost lower Miocene Kadonosawa Formation in Tate of Ninohe City, Iwate Prefecture (Matsubara and Komori, 2007). Among these, *E.* sp. 1 and *E.* sp.

2 from the Mizunami Group have not been formally described because they are poorly preserved. The present paper concerns with the proposal of a new species for *E.* sp. 2 based on the newly collected, well-preserved specimens from the Yamanouchi Member of the Akeyo Formation.

2. Occurrence

The holotype specimen was collected from the Yamanouchi Member in Shitaoki-cho, Mizunami City, Gifu Prefecture (35.363232° N, 137.237309° E) (Fig. 1). The paratypes were collected from the same member in Yamanouchi, Akeyo-cho, Mizunami City, Gifu Prefecture (Itoigawa et al., 1974, fig. IV-1-St. 87 (St. 281-282)). The Akeyo Formation is divided into four members: Tsukiyoshi, Togari, Yamanouchi and Hazama members in ascending order (Itoigawa et al. 1974) (Fig. 2). The Yamanouchi Member consists of massive, tuffaceous siltstone and fine-grained sandstone commonly with nodules, and lies over the

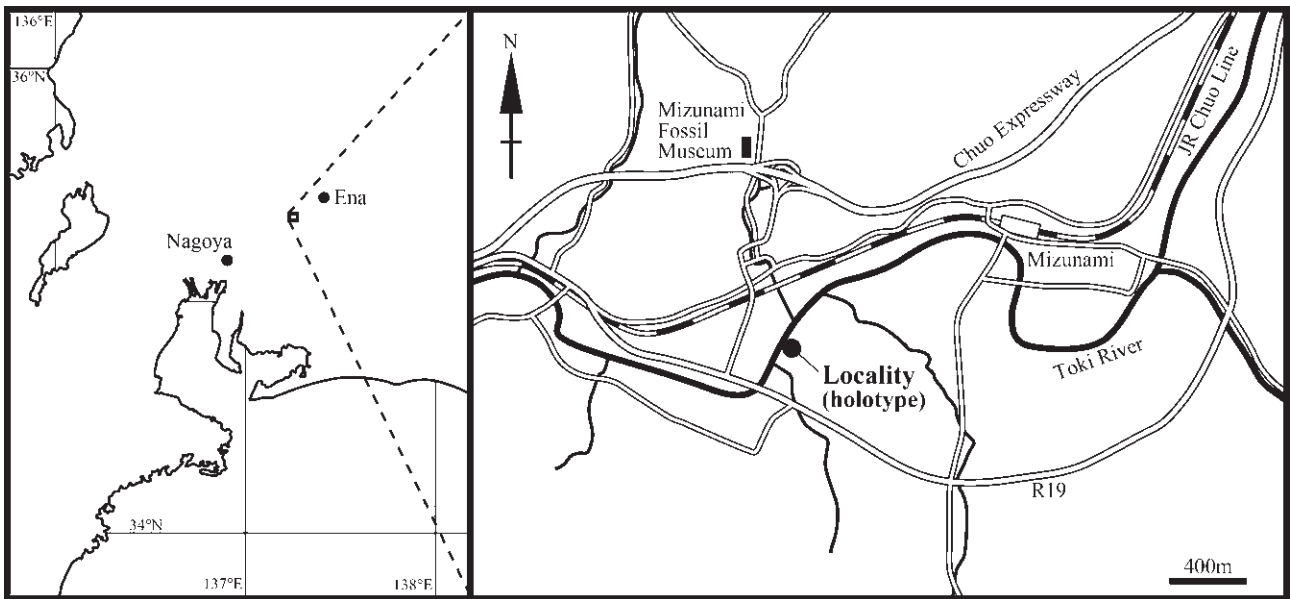


Fig. 1. Fossil locality of the holotype.

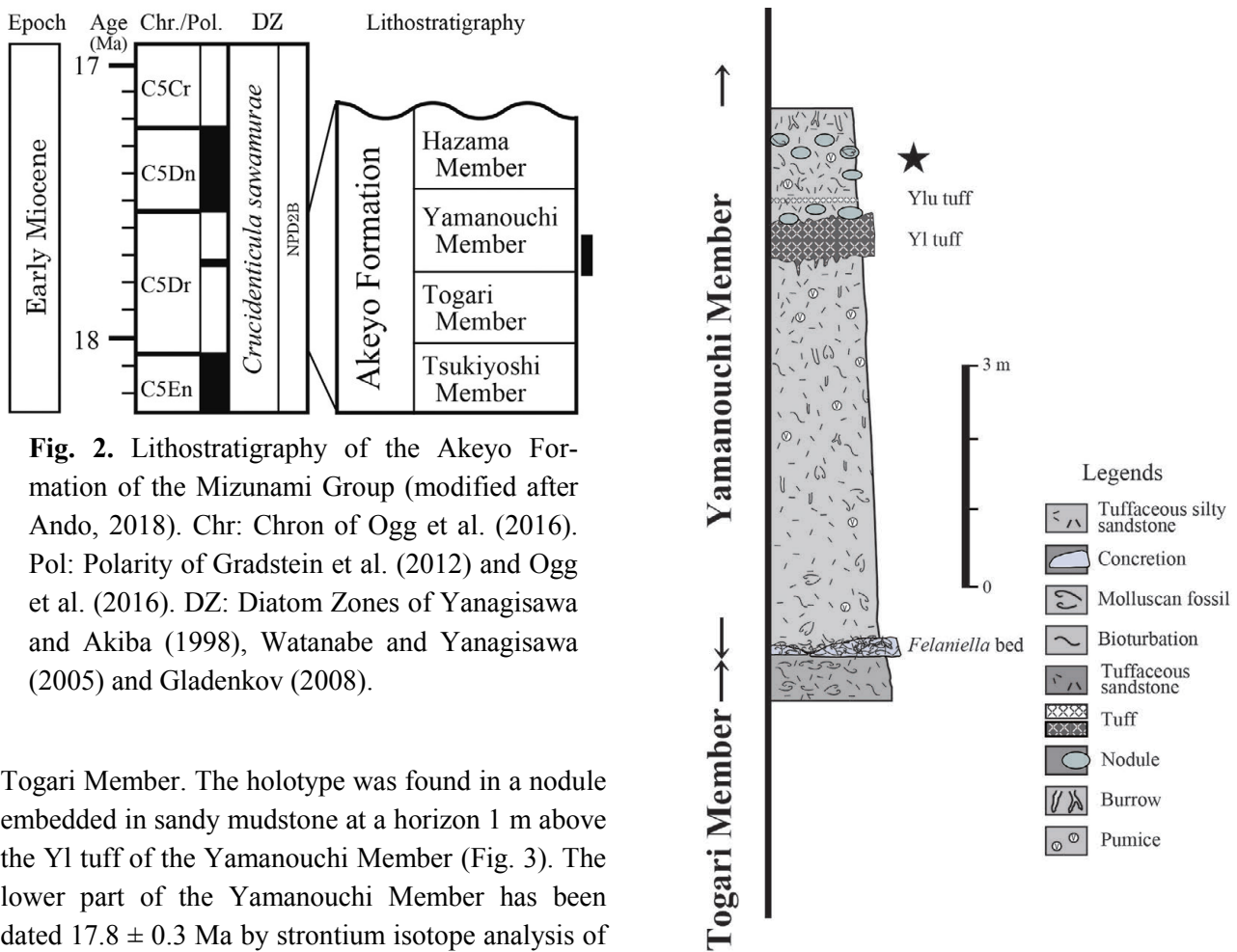


Fig. 2. Lithostratigraphy of the Akeyo Formation of the Mizunami Group (modified after Ando, 2018). Chr: Chron of Ogg et al. (2016). Pol: Polarity of Gradstein et al. (2012) and Ogg et al. (2016). DZ: Diatom Zones of Yanagisawa and Akiba (1998), Watanabe and Yanagisawa (2005) and Gladenkov (2008).

Togari Member. The holotype was found in a nodule embedded in sandy mudstone at a horizon 1 m above the Y1 tuff of the Yamanouchi Member (Fig. 3). The lower part of the Yamanouchi Member has been dated 17.8 ± 0.3 Ma by strontium isotope analysis of a *Crenomytilus grayanus* shell (Ando et al., 2020). Associated fossils are as follows: *Saccella miensis* Araki, *Kotorapecten egregius* (Itoigawa), *Cyclocardia siogamensis* (Nomura), *Lucinoma acutilineata* (Conrad), *Macoma izurensis* (Yokoyama), *Cultellus izumoensis* Yokoyama, *Periploma mitsuganoense* Araki, *Euspira*

meisensis Makiyama, *Turritella sagai* Kotaka, *Fulguraria yanagidaniensis* Araki and shark teeth.

Fig. 3. Columnar section of the holotype locality. Star indicates the holotype-bearing horizon.

3. Systematic description

Family Ellobiidae Pfeiffer, 1854

Genus *Ellobium* Röding, 1798

Type species: Ellobium midae Röding, 1798, by original designation.

Ellobium mizutanii sp. nov.

[New Japanese Name: Mizutani-Okamimi-Gai]
(Pl. 1)

1974 *Ellobium* sp. 2, Itoigawa et al., p. 194–195, pl. 60, figs. 17–19.

1981 *Ellobium* sp. 2, Itoigawa et al., pl. 47, figs. 24, 25.

1982 *Ellobium* sp. 2, Itoigawa et al., p. 298.

Diagnosis: This species is a large *Ellobium* characterized by having an inflated body whorl and a rather broad callus.

Description: Shell elongate oval, rather large in size for the genus, higher than wide, solid, moderate in thickness. Spire cyrtocoid, obtusely pointed, 3–5 whorls, occupying about 1/6–2/5 of the shell height, but individual variation remarkable. Aperture rather wide, 50–80% of body whorl. Outer lip weakly thickened. Columellar lip with one palatal and one columellar teeth, but without parietal one. Parietal area covered with expanded callus. Umbilicus closed, without fasciole. Several spiral striae under suture.

Measurements: See Table 1.

Material examined: MFM10097 (holotype), MFM 11837 (paratype), MFM11839 (paratype) and five specimens (MFM11172, 11838, 11840–11842). All specimens are housed in the Mizunami Fossil Museum.

Remarks: The present new species is closely allied to the extant *Ellobium chinense* (Pfeiffer, 1855) ranging from the Mikawa Bay (Aichi Prefecture, central Japan) to northern Kyushu and southern China, and living under litters in the splash zone of sheltered waters. The new species differs from the latter in having a more inflated body whorl (Table 1, Fig. 4) and a more broadly expanded callus on the parietal area of the aperture. *Ellobium yatsuoensis* Tsuda, 1959, from the Miocene Kurosedani Formation, Toyama Prefecture, is similar to the present new species, but is distinguishable from the latter species in its larger shell and higher spire. The larger present species also resembles *Ellobium* sp. 1 (Itoigawa et al., 1974, p. 194, pl. 60, fig. 16; Itoigawa et al., 1981, pl. 47, figs. 18a, b, 19a, b; Itoigawa et al., 1982, p. 298), but can be distinguished therefrom by the much larger shell size.

Etymology: This new species is named in honor of Mr. Takao Mizutani of the Tokai Fossil Society, who gave us every encouragement during the course of this study.

Locality and horizon of the holotype: Lower Miocene Yamanouchi Member, Akeyo Formation of the Mizunami Group at Shitaoki-cho, Mizunami City, Gifu Prefecture (Figs. 1–3).

Table 1. Specimen dimensions (in millimeters).

Scientific Name	Specimen/Locality	Shell Height	Shell Width	SH/SW	Average
		(SH)	(SW)		
<i>Ellobium mizutanii</i> sp. nov.	MFM10097 (Holotype)	39.7	23.9	1.7	1.7
	MFM11839 (Paratype)	33.5	20.4	1.6	
	MFM11837 (Paratype)	37.2	22.0	1.7	
	MFM11172	34.9	21.4	1.6	
<i>E. yatsuoensis</i>	JC1400092 (Holotype)	45.0	27.2	1.7	1.7
		37.5	19.0	2.0	
		32.4	17.1	1.9	
<i>E. chinense</i> * (living species)	Shonai River Estuary	35.5	19.6	1.8	1.9
		41.3	21.2	1.9	
		38.9	18.4	2.1	
	Yahagi River Estuary	32.8	18.9	1.7	
		33.6	18.0	1.9	
		31.7	18.3	1.7	
		32.4	18.8	1.7	
30.4	17.3	1.8			

*Spire (*E. chinense*) is in perfect condition and not eroded.

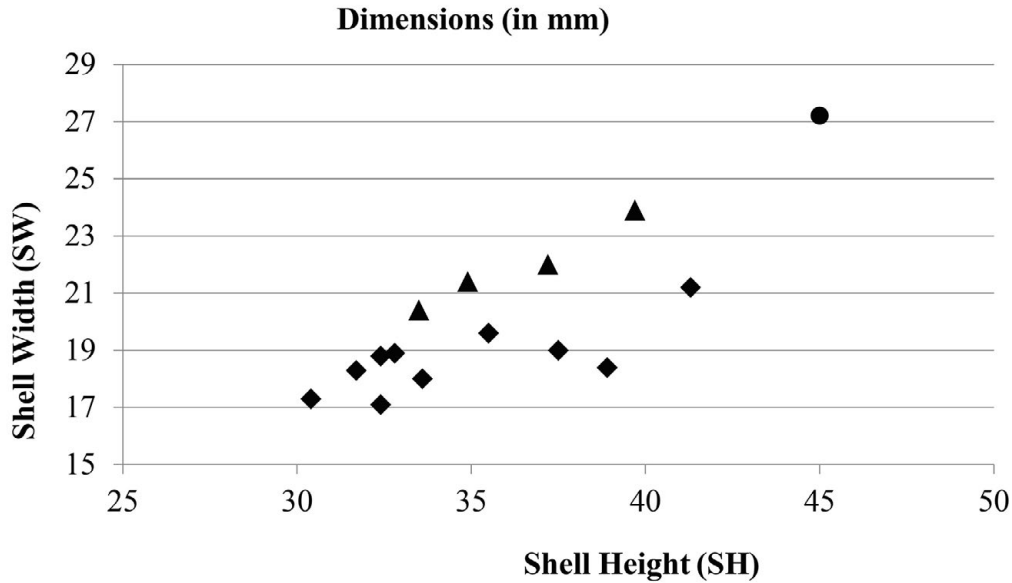


Fig. 4. Scatterplot of shell height vs. shell width. ▲: *Ellobium mizutanii* sp. nov., ●: *E. yatsuoensis*, ◆: *E. chinense*.

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DOI: 10.5575/geosoc.104.395

Appendix

Ellobium mizutanii Kawase and Ichihara, new species LSID: urn:lsid:zoobank.org:act:83666F8E-0DD0-4DAA-998A-8727EA2324F5

新称:ミズタニオカミガイ

Plate 1

Figs. 1a–d. *Ellobium mizutanii* sp. nov. Holotype, MFM10097. 1a, apertural view; 1b, dorsal view; 1c, right lateral view; 1d, apical view.

Figs. 2a–c. *Ellobium mizutanii* sp. nov. Paratype, MFM11839. 2a, apertural view; 2b, dorsal view; 2c, apical view.

Figs. 3a–c. *Ellobium mizutanii* sp. nov. Paratype, MFM11837. 3a, apertural view; 3b, dorsal view; 3c, apical view.

Scale bar represents 10.0 mm.

Plate 1

