

# *Lembulus forlii* n. sp. from the Pliocene of Italy (Bivalvia, Nuculanidae)

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## Abstract

A new *Lembulus* species (Bivalvia, Nuculanidae) is described from the Pliocene (Zanclean-Piacenzian) of Northern Italy. *Lembulus forlii* n. sp. is closely similar to *Lembulus pella* (Linné, 1758), from which it differs mainly by being more elongate, with a longer, curved rostrum and a finer sculpture.

## Riassunto

Viene descritta una nuova specie di *Lembulus* (Bivalvia, Nuculanidae) del Pliocene (Zancleano-Piacenziano) italiano. Il materiale proviene da tre località, due in Toscana (Spicchio e Cedda) ed una in Emilia Romagna (Lugagnano). *Lembulus forlii* n. sp. è notevolmente simile a *Lembulus pella* (Linné, 1758), l'unica specie in precedenza nota per questo genere nel Plio-Pleistocene. La nuova specie si distingue per la conchiglia più allungata, il rostro più lungo e curvo e la scultura più fine.

## Key words

Bivalvia, Nuculanidae, *Lembulus*, new species, Pliocene, Italy.

## Introduction

In recent years some investigations on the protobranch of the Mediterranean Sea have been carried out (e.g. Di Geronimo & La Perna, 1996; La Perna, 2003, 2008; Della Bella & Tabanelli, 2004; La Perna et al., 2004). These papers mainly deal with Pleistocene to Recent deep water species, and only one of them (La Perna, 2008) includes the genus *Lembulus*, without new species described. For some years, one of the authors (E.P.) has been collecting a large amount of material from several Italian Pliocene localities and in the process of sorting out the species, some new species have been encountered. Among them, there is a distinct member of the genus *Lembulus*, here described as a new species. The genus *Lembulus*, described by Risso (1826), is characterized by having a robust, strongly convex shell, with a short, stout, bicarinate rostrum terminating into a pointed tip. The com-marginal sculpture is weak, but a dense pattern of well defined, oblique striae is present. It ranges from the Early Miocene (Cossmann & Peyrot, 1913) and is still present in the Atlantic (from Portugal to West Africa, south to Angola), including the Mediterranean (Poppe & Goto, 1993; Giannuzzi-Savelli et al., 2001; La Perna, 2008). The type was fixed by Gray (1847) as *Lembulus rossianus* Risso, 1826, a synonym of *Arca pella* Linné, 1758 (Arnaud, 1977; La Perna, 2008). *Lembulus pella* was the only species known for the genus in Plio-Pleistocene of the Mediterranean area. *Arca interrupta* Poli, 1795, *Nucula rostrata* Borson, 1823 and *L. pella* var. *anterotunda* Sacco, 1898 are all synonyms of *L. pella* (La Perna, 2008).

## Material and methods

36 The material originated from three localities, two in

Tuscany (Spicchio and Cedda) and one in Emilia Romagna (Lugagnano). Spicchio (Firenze) is an outcrop near Empoli, of Piacenzian age (Dominici et al., 1997). Cedda (Siena) is an outcrop near Poggibonsi (5 km East), referred to the Early-Middle Pliocene (Brunetti & Della Bella, 2008). Lugagnano (Piacenza) is a classic Pliocene locality near Piacenza, of Zanclean age (Rio et al., 1988).

The following abbreviations are used: BD = Bruno Dell'Angelo collection (Genova, Italy); EP = Eivind Palm collection (Denmark); IGF = Museo di Storia Naturale, Sezione di Geologia e Paleontologia, Firenze (Italy); MZB = Museo di Zoologia dell'Università di Bologna, Bologna (Italy).

Dimensions (in mm) are given as length × height × width (for complete shells) or length × height (for single valves).

## Systematics

Class Bivalvia Linné, 1758  
Subclass Protobranchia Pelseneer, 1889  
Order Nuculoida Dall, 1889  
Family Nuculanidae H. & A. Adams, 1858  
Genus *Lembulus* Risso, 1826 ex Leach ms  
Type species: *Arca pella* Linné, 1758

*Lembulus forlii* n.sp.  
(Fig. 1A-H)

## Type material

Holotype: Spicchio (Piacenzian), 1 valve (MZB 45686, 11.3 × 5.7 mm). Paratypes: Spicchio (Piacenzian), 2 shells

(max 13 × 7 × 2.7 mm), 28 valves (EP, max 13 × 7 mm), 2 valves (MZB 45687, respectively 10.8 × 5.5 and 8.3 × 4.4 mm), 1 valve (BD, 9.8 × 5 mm); Lugagnano (Zan-  
clean), 1 shell (IGF 15692E, 8 × 4.3 × 3.5 mm), 2 shells  
(max 10 × 5 × 3.5 mm), 1 valve (EP, 11 × 6 mm); Cedda  
(Pliocene), 21 valves (EP, max 12.2 × 6.5 mm).

## Description

Medium sized, inaequilateral, aequivalve, rather robust, moderately convex shell. Umbo opisthogyrate, at about 2/5 from posterior margin. Rostrum long, slightly bent, making the length about twice the height; rostrum tip somewhat pointed. A rounded, rather strong keel bounds the rostrum dorsally; another weaker keel from umbo to postero-ventral margin, defines a slightly concave rostral area. Anteriorly, a weak radial keel. Ornamentation oblique, consisting of closely spaced ribs; growth striae irregularly spaced. Resilifer small, triangular. Hinge plate moderately thick. Anterior teeth row a little shorter than posterior. Posterior row reach about 2/3 of the total posterior margin. Hinge strong with chevron-shaped

teeth, 14 anteriorly, 18 posteriorly in the holotype. Pallial line not well defined; pallial sinus rounded, wide, rather deep. Muscle scars well impressed.

## Type locality

Spicchio (Firenze, Tuscany).

## Distribution

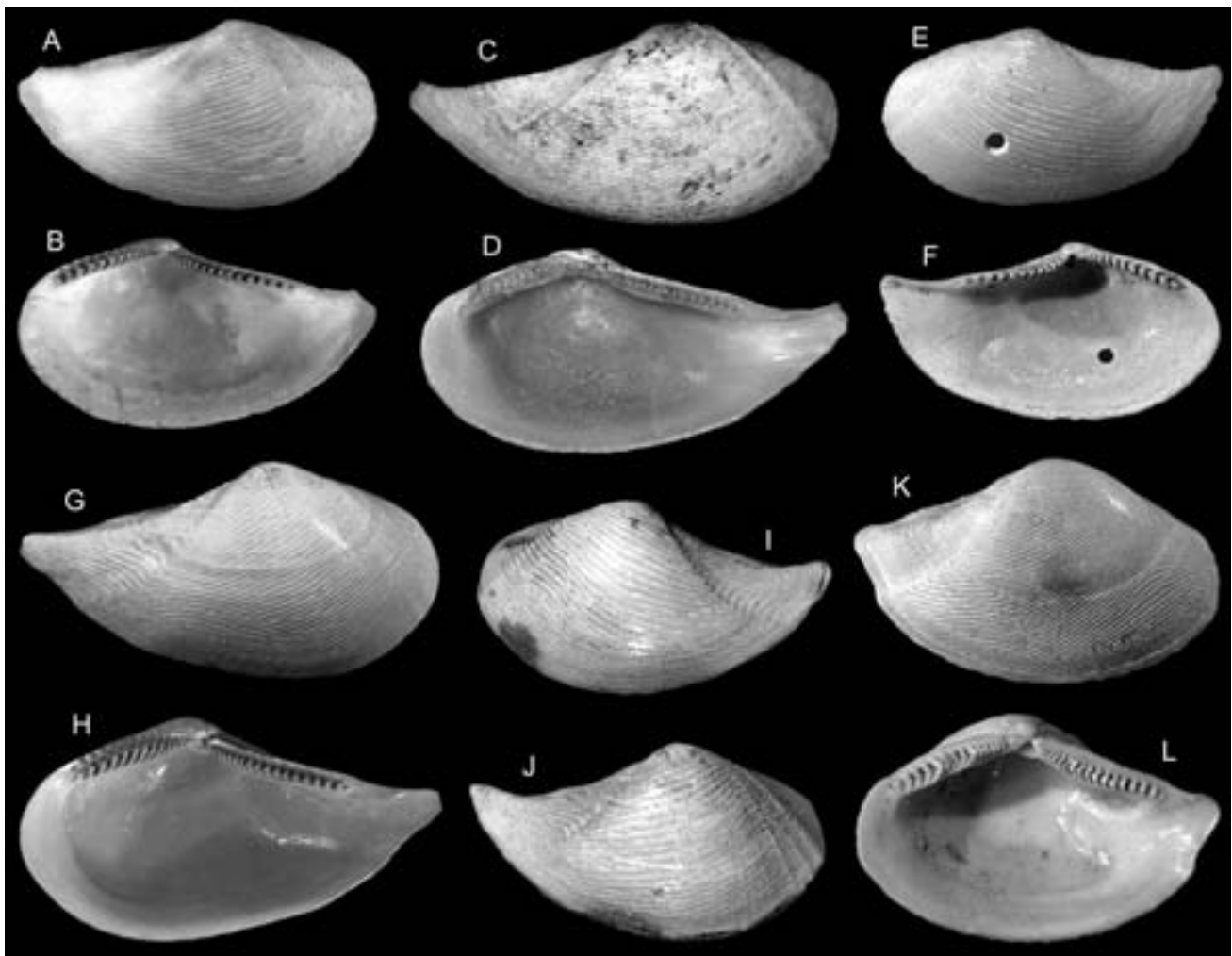
*Lembulus forlii* n.sp. is so far only known from the three localities mentioned above, all of Pliocene age (Zan-  
clean-Piacenzian).

## Etymology

Named after our good friend Maurizio Forli.

## Discussion

*Lembulus forlii* n.sp. (Fig. 1A-H) is notably similar to *L. pella* (Fig. 1K, L), but the shell is more elongate, and the rostrum markedly longer and more pointed in the new species. The umbo is clearly closer to the center in *L.*



**Fig. 1. A-H.** *Lembulus forlii* n. sp. **A, B.** Spicchio (Firenze), length 7 mm; **C, D.** Holotype (MZB 45686), Spicchio (Firenze), length 11.3 mm; **E, F.** Spicchio (Firenze), length 6.2 mm; **G, H.** Cedda (Siena), length 11 mm; **I, J.** Paratype (IGF 15692E), Lugagnano (Piacenza), length 8 mm (both valves); **K, L.** *Lembulus pella* (Linné, 1857), Pietrafitta (Siena), length 11 mm.

**Fig. 1. A-H.** *Lembulus forlii* n. sp. **A, B.** Spicchio (Firenze), lunghezza 7 mm; **C, D.** Olotipo (MZB 45686), Spicchio (Firenze), lunghezza 11.3 mm; **E, F.** Spicchio (Firenze), lunghezza 6.2 mm; **G, H.** Cedda (Siena), lunghezza 11 mm; **I, J.** Paratipo (IGF 15692E), Lugagnano (Piacenza), lunghezza 8 mm (entrambe le valve); **K, L.** *Lembulus pella* (Linné, 1857), Pietrafitta (Siena), lunghezza 11 mm.

*pella*, i.e. the shell is distinctly more inaequilateral in the new species. Even in younger specimens (Fig. 1E, F), the rostrum is longer and the umbo is more posterior than in *L. pella*. The keel impression is weaker, and the posterior bicarinate shape typically seen in *L. pella*, is very weak or absent in the new species. The ornamentation in *L. forlii* n.sp. is tighter than usual in *L. pella*, though *L. pella* is very variable in that respect. The whole surface gives an impression of smoothness, whereas in *L. pella*, the ribs are slightly more pronounced. In *L. forlii* n.sp., the hinge rows make a wider angle and the ligament pit is notably smaller, than in *L. pella*.

*Lembulus emarginatus* (Lamarck, 1819) perhaps belong to yet another, may be a Miocene species, but it is unclear what Lamarck really meant, when he described the species (for a more detailed discussion, see La Perna, 2008). The figures in literature, attached to that name, are very similar to *L. pella* and they do not have the long, bent rostrum, so characteristic in *L. forlii* n.sp.

*Lembulus undatus* (DeFrance, 1825), a Miocene species, has coarse, transversal ridges, giving the appearance of a wavy surface. Some specimens we have seen (from Aquitaine, South of France) have more, other less of these ridges, but *L. pella* and *L. forlii* n.sp. never has such a sculpture.

*Lembulus forlii* n. sp. is only found in clayey deposits, whereas we have seen thousands specimens of *L. pella* and none of the new species in the sandy deposits in the Siena-Firenze area. The presence of *L. pella* is well documented in the Italian Pliocene and Pleistocene (Sacco, 1898; Cavallo & Repetto, 1992; La Perna, 2008). At Spicchio, there are some sandy-clayey lenses where *L. pella* can occasionally be found. These shells show the typical characters of this species, whereas neither *L. forlii* n.sp. nor intermediate forms have been found. These observations support the interpretation of *L. forlii* n.sp. as a distinct species, and not as an ecophenotype of *L. pella* which lived in muddy bottoms or deeper waters. Also at Melograni (near Pietrafitta and Bibbiano, San Gimignano), where the sediment is richer in pelitic fraction than in most of the other sandy localities in the Siena area, typical shells of *L. pella* are found, whereas *L. forlii* n.sp. has been never found.

The two valves we have seen from Ciuciano, a place with deeper water deposits (Forli & Dell'Angelo, 2000), are *L. pella*, but the species is very rare here, presumably because it was too deep for optimal living conditions. Most probably, due to its close resemblance to *L. pella*, *L. forlii* n.sp. has been always confused with the former and its stratigraphic distribution could be wider than that hitherto known.

## Acknowledgements

We wish to thank Antonio Bonfitto (MZB) who prepared the illustration and Birgitte Palm, wife of the first author, for the photographs. We especially thank Rafael La Perna (Università di Bari) for his helpful comments

and constructive criticism, that greatly improved the quality and completeness of the manuscript.

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