*Journal of Micropalaeontology*, **14**: 53–57. 

# *Eoguttulina palomerensis*, a new foraminiferal species from the Pliensbachian–Toarcian boundary (Early Jurassic) of SW Europe

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**ABSTRACT** - An Early Jurassic foraminiferal species, reported previously under the name of *Eoguttulina* sp. 1, from the uppermost Pliensbachian sediments of western Central Portugal, is formally described and its stratigraphical distribution in SW Europe more precisely defined. The short stratigraphic range (uppermost Pliensbachian, *spinatum* Zone, *hawskerense* Subzone to lowermost Toarcian, *tenuicostatum* Zone, *mirabile* Subzone) and the distinctive morphology of *Eoguttulina palomerensis* sp. nov. (Lagenina, Polymorphinidae) make it an extremely useful biostratigraphic marker for this boundary interval. *J. Micropalaeontol.* **14**(1): 53–57, April 1995.

## INTRODUCTION

This note describes a new species, *Eoguttulina palomerensis*, that, although figured in the literature (Exton, 1979), has previously been left in open nomenclature.

Many Pliensbachian foraminiferal species, such as *Marginulina prima* d'Orbigny, *Ichthyolaria sulcata* (Bornemann) and *Paralingulina tenera* (Bornemann), are long-ranging and known to cross the Pliensbachian–Toarcian boundary (Copestake, 1985; Riegraf, 1985; Ruget, 1985). Marked changes in the foraminiferal assemblages take place at various stratigraphic levels throughout the early Toarcian (especially in the *tenuicostatum* and *serpentinus* Zones, cf. Arias *et al.*, 1992). At present, however, the Pliensbachian–Toarcian boundary is not well constrained by means of foraminifera. *Eoguttulina palomerensis* sp.nov. also crosses the boundary, but its exceptionally short range (*hawskerense–mirabile* Subzones) renders it probably the most stratigraphically significant calcareous species for the stage boundary interval in question.

## LITHOSTRATIGRAPHY AND BIOSTRATIGRAPHIC ZONAL SCHEME

The Jurassic deposits of the Iberian Range (Spain) crop out discontinuously in two broad belts running approximately NW–SE from Burgos to the Mediterranean coast. The localities considered in this study are shown in Fig. 1 and comprise:

**Barranco de las Alicantas Section** (labelled 1C.T)
Sierra de la Demanda (Burgos, NE Castrovido village; topographic map sheet no. 277: 'Salas de los Infantes', scale 1:50 000). Section logged bed by bed. Biostratigraphic reference scale based on ammonites (zones and subzones) established by Comas-Rengifo *et al.* (1988).

**Muro de Aguas Section** (labelled 2M)
Sierra de los Cameros (Logroño, NNW Muro de Aguas village; topographic map sheet no. 281: 'Cervera del Río Alhama', scale 1:50 000). Section logged bed by bed. Biostratigraphic reference scale based on ammonites (zones and subzones) established by Comas-Rengifo (unpublished data) and A. Goy (unpublished data).

**Moneva Section** (labelled MO)
Rama Aragonesa (Zaragoza, SE Moneva village; topographic map sheet no. 467: 'Muniesa', scale 1:50 000). Because of the locally poor exposure, individual lithological units have not been recognized in detail. Biostratigraphic reference scale based on ammonites (zones) established by A. Goy (unpublished data).

**Rambla del Salto Section** (labelled SP)
Rama Castellana (Teruel, E Torre La Cárcel Village; topographic map sheet no. 541: 'Santa Eulalia', scale 1:50 000). Section logged bed by bed. Biostratigraphic reference scale based on ammonites (zones and subzones) established by Comas-Rengifo & Goy (1978) and Comas-Rengifo *et al.* (1985).

The succession examined embraces part of two formations, the 'Calizas Bioclásticas de Barahona' and the 'Alternancia de margas y calizas de Turmiel' respectively, defined by Goy *et al.* (1976). The Barahona Formation, in its upper part Domerian (Late Pliensbachian) in age, comprises nodular bioclastic limestones with intercalated marls and marly limestones. The overlying Turmiel Formation, roughly coinciding with the Toarcian, consists of rhythmically alternating limestones and marls, extremely rich in ammonites throughout. Of the latter, only the lower part (comprising the *tenuicostatum*, *serpentinus* and the lower part of the *bifrons* Zones) has been considered in this study.

## MATERIAL AND METHODS

A total of 53 samples (10 from the Baranco de las Alicantas Section, 18 from the Muro de Aguas Section, 11 from the Moneva Section, and 14 from the Rambla del Salto Section) were collected and examined for foraminifera. *Eoguttulina palomerensis* sp. nov. has been found in only 5 samples (Fig. 1). In most of these samples, the sediment consists of marl or marly limestone. Processing involved initially soaking

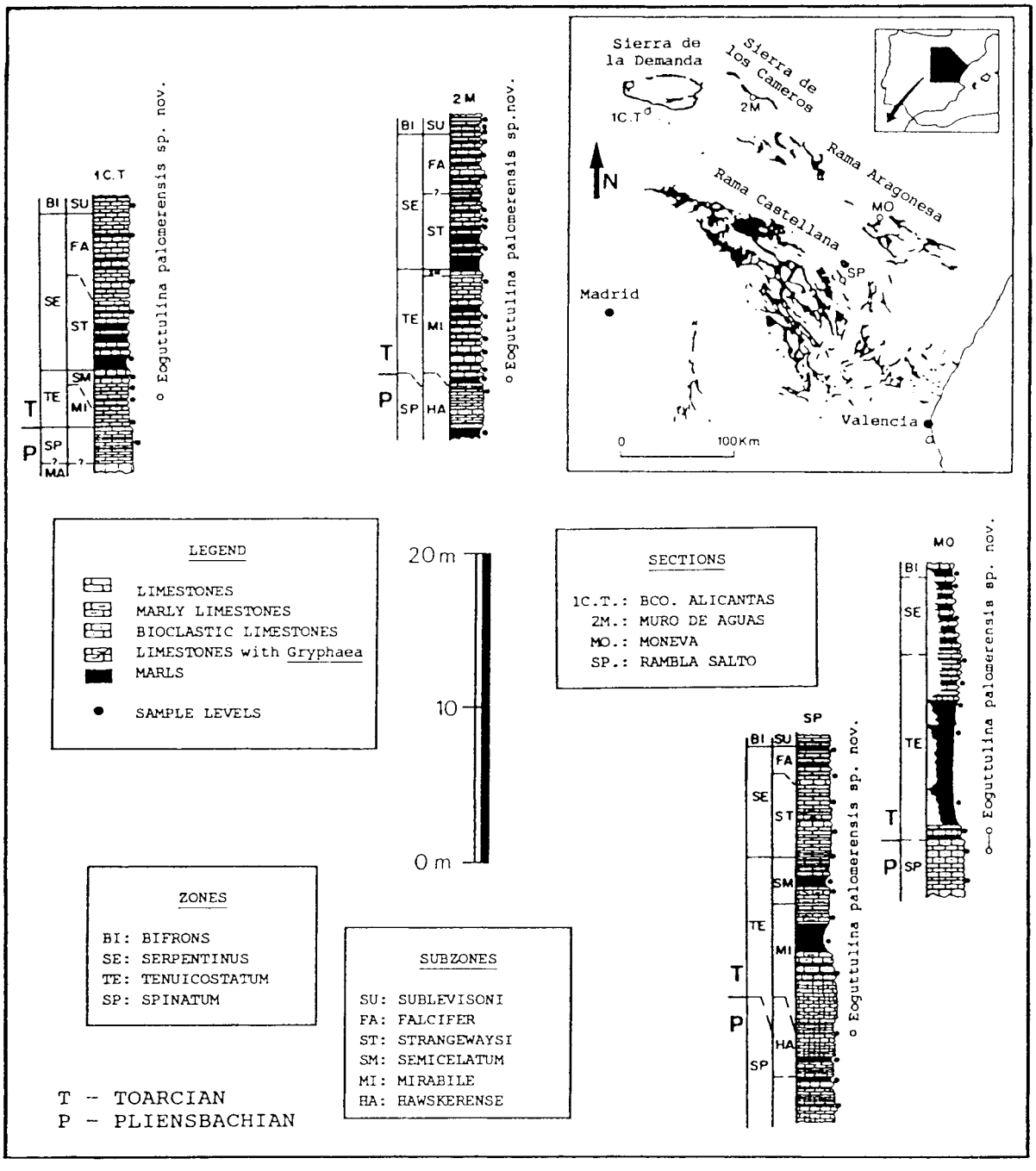


**Fig. 1.** Jurassic outcrops of the Iberian Range, Spain, showing location of sections studied and the position of samples containing *Eoguttulina palomerensis* Herrero sp. nov. The biostratigraphic framework is based on ammonites. 1C.T = Barranco de las Alicantas Section; 2M = Muro de Aguas Section; MO = Moneva Section; SP = Rambla del Salto Section.

## Explanation of Plate 1

**Fig. 1 a, b** *Eoguttulina palomerensis* Herrero sp. nov. Holotype, SP.182.530.3. (1b, showing detail of broken radial aperture). From the Rambla del Salto Section, *spinatum* Zone, *hawskerense* Subzone. **Figs 2, 4–12, 14** *Eoguttulina palomerensis* Herrero sp. nov. Paratypes, respectively SP.182.530.1, SP.182.466 (longitudinal section), SP.182.465 (longitudinal section), SP.182.44.3, SP.182.530.24, SP.182.463 (longitudinal section), SP.182.44.1, SP.182.44.4, SP.182.530.2. SP.182.530.4 and SP.182.44.2. From the Rambla del Salto Section, *spinatum* Zone, *hawskerense* Subzone. **Fig. 3** *Eoguttulina palomerensis* Herrero sp. nov. MO.L4.2.531.5. From the Moneva Section, uppermost *spinatum* Zone. **Fig. 13** *Eoguttulina palomerensis* Herrero sp. nov. MO.L5.1.1.532.7. From the Moneva Section, lowermost *tenuicostatum* Zone. Scale bars 100 $\mu$m.

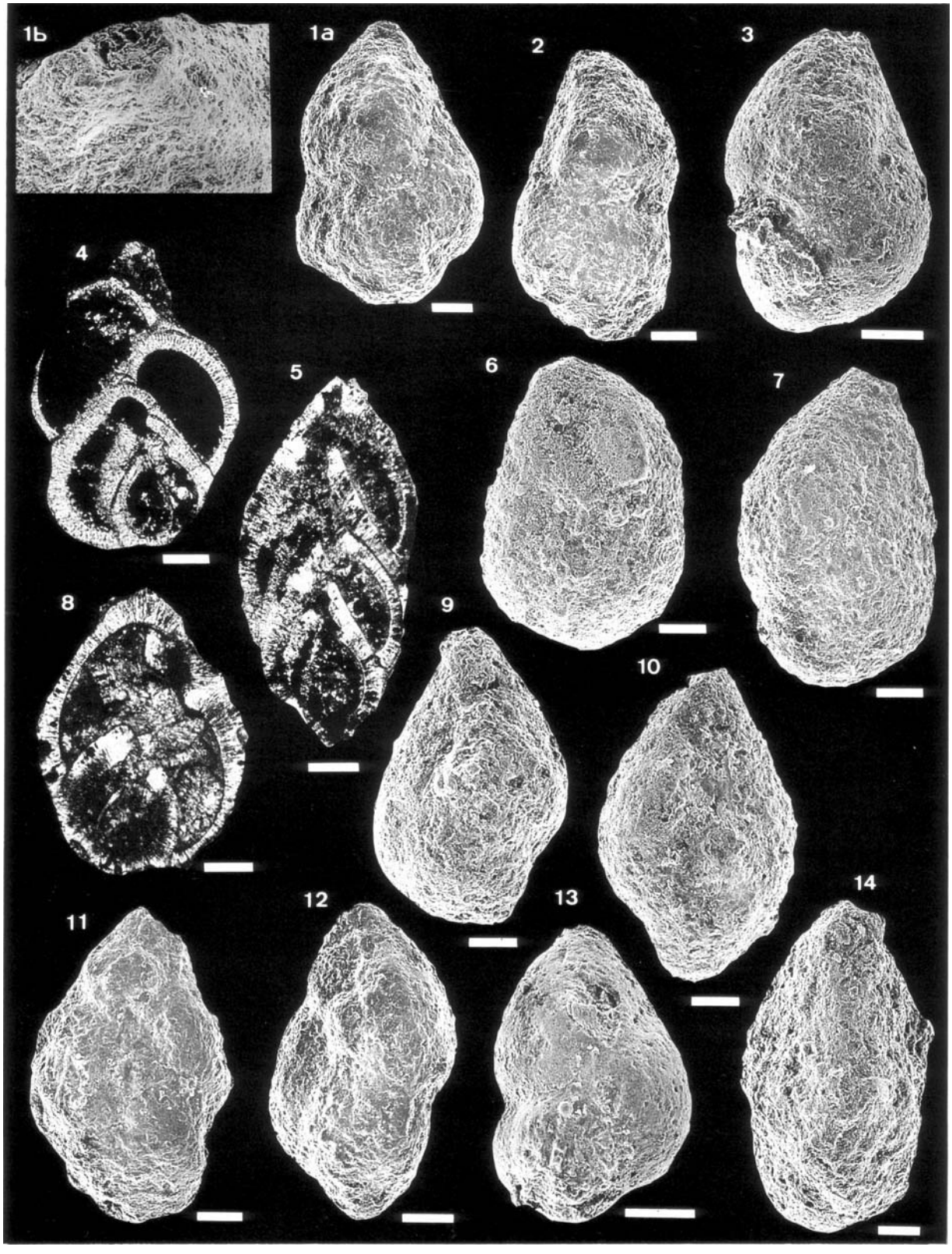


**Plate 1**

100–300 g of dry and coarsely crushed sediment in a solution of sodium hydroxide, hydrogen peroxide and water for 2–3 days. The sample was then washed through sieves of mesh diameters 1000, 500, 250, 125 and 60 $\mu$m. The foraminifera were picked out under a stereoscopic microscope (Wild M-8). Oriented sections of individual specimens were obtained by embedding them in a synthetic resin and then thin-sectioning. The specimens illustrated in Plate 1 were photographed either by scanning electron microscope (Jeol JSM-6400) or under a petrographic microscope (Leitz EF 25-0250).

## SYSTEMATIC DESCRIPTION

Suborder **Lagenina** Delage & Hérouard, 1896
Superfamily **Nodosariacea** Ehrenberg, 1838
Family **Polymorphinidae** d'Orbigny, 1839
Genus ***Eoguttulina*** Cushman & Ozawa, 1930
*Eoguttulina palomerensis* Herrero sp. nov.
Pl. 1, figs 1–14; Fig. 2

1979 *Eoguttulina* sp. 1 Exton, 51, pl. 5, fig. 14.
1991 *Eoguttulina* sp.nov. Herrero, pl. 1, fig. 1.
1992 *Eoguttulina* sp.nov. Herrero *in* Arias *et al.*, pl. 1, fig.2.

**Derivation of name.** Refers to the Sierra Palomera where the type locality is situated.

**Diagnosis.** A tear-drop shaped *Eoguttulina* characterized by an acute, slightly produced apertural end and short, globular and inflated chambers added in an irregular spiral.

**Holotype.** SP.182.530.3. Figured in Pl. 1, figs 1a,b. Length 0.75 mm; maximum and minimum diameters in transverse section 0.51 and 0.37 mm respectively.

**Paratypes.** 57 specimens. Figured: SP.182.530.1 (Pl. 1, fig. 2), SP.182.466 (Pl. 1, fig. 4), SP.182.465 (Pl. 1, fig. 5), SP.182.44.3 (Pl. 1, fig. 6), SP.182.530.24 (Pl. 1, fig. 7), SP.182.463 (Pl. 1, fig. 8), SP.182.44.1 (Pl. 1, fig. 9), SP.182.44.4 (Pl. 1, fig. 10), SP.182.530.2 (Pl. 1, fig. 11), SP.182.530.4 (Pl. 1, fig. 12), SP.192.44.2 (Pl. 1, fig. 14).

**Depository of types.** Departamento de Paleontología, Facultad de Ciencias Geológicas, Universidad Complutense, Madrid, Spain.

**Material.** 78 specimens: 48 complete and relatively well preserved, 30 damaged. 58 from sample SP.182, Rambla del Salto Section; 18 from samples MO.L4.2 and MO.L5.1.1, Moneva Section; 1 from sample 1C.T.7, Barranco de las Alicantas Section and 1 from sample 2M.264, Muro de Aguas Section. See Fig. 1 for location of samples.

**Type locality.** Rambla del Salto Section (along pathway from Torre La Cárcel to Ermita de la Virgen del Castillo), Sierra Palomera, N Teruel, Iberian Range, Spain. Topographic map sheet no. 451: 'Santa Eulalia', scale 1:50,000, grid reference 30TXK 507 989.

**Type level.** Sample SP.182, uppermost Pliensbachian, *spinatum* Zone, *hawskerense* Subzone; above sample SP.177 containing the ammonites *Pleuroceras* sp. and *Emaciaticeras emaciatum* Fucini, and below sample SP.185 with *Emaciaticeras* sp. of Comas-Rengifo (1982). Lithological unit G in Arche *et al.* (1977). Microfacies: bioclastic marly limestone; bioturbated wackestone with crinoid columnals, plates and spines of echinoids, holothurian sclerites, ophiuroid remains, bivalve and brachiopod shells and shell fragments, ostracod carapaces, and occasionally fish teeth.

**Description of holotype.** Test free, robust, tear-drop shaped in lateral view; elliptical in longitudinal and transverse sections; globular proloculus followed by 5 globular and inflated chambers, added in irregular spiral; successive chambers rapidly increasing in diameter and lacking extensive overlap. Last chamber quite strongly produced and extending back over about half the length of the test. Sutures curved, flush in early chambers and depressed in later stages, giving a lobulate margin. Aperture poorly preserved, rounded, radiate, terminal, eccentric and mounted on short neck. Thick, finely perforate calcareous hyaline wall with unornamented surface.

**Dimensions.** Specimens examined range from 0.18 to 0.97 mm in length; maximum and minimum diameters of transverse sections vary between 0.13 and 0.55 mm and between 0.13 and 0.51 mm respectively. The measurements of the specimens figured are specified in Table 1.

**Remarks.** Juvenile specimens show round longitudinal and transverse sections. In adult specimens the arrangement of the chambers is an irregular spire (variations in coiling are illustrated in Fig. 2). Chamber numbers vary from 2 in

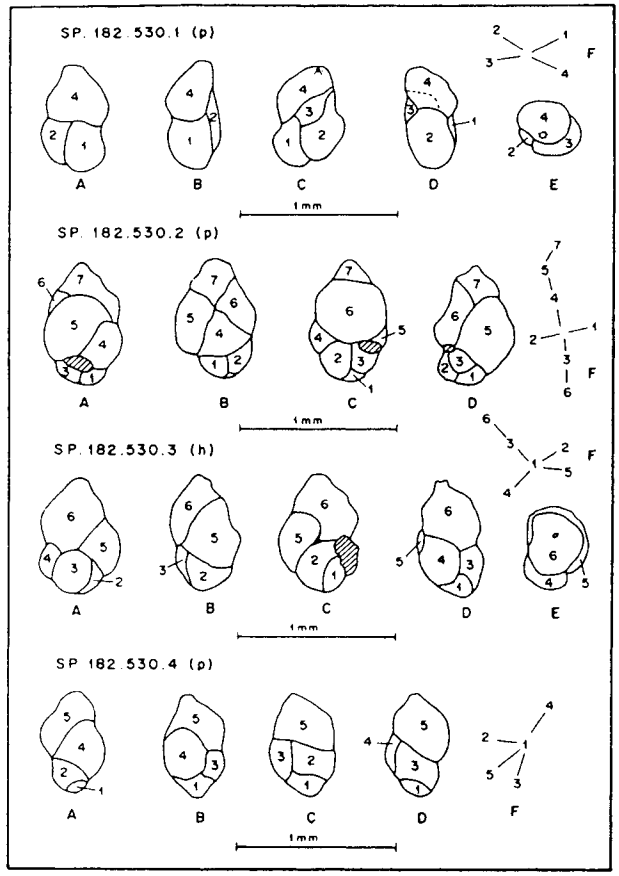


**Fig. 2.** Chamber arrangement in *Eoguttulina palomerensis* Herrero sp. nov. A, B, C and D are lateral views; E is an oral view; F shows the type of coiling. (h): holotype; (p): paratypes. Chambers are numbered consecutively. (Camera lucida drawings.)

juvenile specimens to 7 in adults. The last chamber occupies half or less of the full length of the test. In some cases the test wall is visibly affected by recrystallization and the final chamber partially broken off, the radiate aperture thus being recognizable in a few specimens only.

Lloyd (1962) suggested that the major criteria for the distinction of the different species of *Eoguttulina* were the test shape in lateral view, the degree of overlap of later chambers over earlier ones, the type of sutures and the nature of the test surface, including the size and disposition of the pores. This last character cannot be seen in detail from the external surface of the specimens, however in thin section the pores can be seen to be fine (Pl. 1, figs. 4, 8). *E. palomerensis* has quite a distinctive morphology that allows it to be distinguished easily from other Jurassic species of the genus. It differs, for instance, from *E. liassica* (Strickland) and *E. bilocularis* (Terquem) in test size, type of coiling, in its globular and inflated chambers and in the shape and size of its final chamber. Likewise, it can be separated from *E. polygona* (Terquem) on its test shape and size, and on the shape of the chambers.

**Occurrence.** Reported from the uppermost Pliensbachian (*spinatum* Zone, *hawskerense* Subzone) in the Zambujal Section, western Central Portugal (Exton, 1979). In the Iberian Range it has been recorded from the Sierra de la Demanda (lowermost Toarcian, *tenuicostatum* Zone, *mirabile* Subzone), the Sierra de los Cameros (uppermost Pliensbachian, *spinatum* Zone, *hawskerense* Subzone), the Rama Aragonesa (uppermost Pliensbachian–lowermost Toarcian, *spinatum* and *tenuicostatum* Zones) and from the Rama Castellana (uppermost Pliensbachian, *spinatum* Zone, *hawskerense* Subzone). Total known range: uppermost Pliensbachian (*spinatum* Zone, *hawskerense* Subzone)–lowermost Toarcian (*tenuicostatum* Zone, *mirabile* Subzone).

| | Transverse section | | | |
|---|---|---|---|---|
| | Length | Max. Diam. | Min. Diam. | Types |
| RAMBLA DEL SALTO | | | | |
| SP.182.44.1 | 0.68 | 0.49 | 0.44 | p |
| SP.182.44.2 | 0.88 | 0.55 | 0.51 | p |
| SP.182.44.3 | 0.66 | 0.49 | 0.42 | p |
| SP.182.44.4 | 0.71 | 0.51 | 0.46 | p |
| SP.182.530.1 | 0.73 | 0.42 | 0.37 | p |
| SP.182.530.2 | 0.77 | 0.51 | 0.44 | p |
| SP.182.530.3 | 0.75 | 0.51 | 0.37 | h |
| SP.182.530.4 | 0.69 | 0.38 | 0.37 | p |
| SP.182.530.24 | 0.73 | 0.53 | 0.42 | p |
| SP.182.463 | 0.60 | 0.46 | 0.38 | p |
| SP.182.465 | 0.77 | 0.48 | 0.40 | p |
| SP.182.466 | 0.69 | 0.48 | 0.42 | p |
| MONEVA | | | | |
| MO.L4.2.531.5 | 0.57 | 0.38 | 0.33 | |
| MO.L5.1.1.532.7 | 0.51 | 0.35 | 0.29 | |

**Table 1.** Dimensions (in mm) of the specimens figured of *Eoguttulina palomerensis* Herrero sp. nov.

## ACKNOWLEDGMENTS

The author is grateful to Professor J. Haynes, to Dr J. Whittaker and to Otto Kälin for the critical review of the manuscript. The revision of the English version was undertaken by Eva Rodrigo y Sanz and Otto Kälin. The SEM photographs were taken at the Centro de Microscopía of the Universidad Complutense de Madrid and prints made by Eulogio Martín. This work has been supported financially by the Project PB88-0066DGICYT-CSIC.

**Manuscript received April 1993**
**Manuscript accepted October 1994**

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