

# Upper Pliensbachian-Middle Toarcian foraminiferal assemblages at Camino Section (Basque-Cantabrian Basin, Spain)

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## Summary

Boreal foraminiferal faunas have been recorded in the Upper Pliensbachian-Middle Toarcian at Camino Section (Western Sector of the Basque-Cantabrian Basin, Spain). The results reveal stepwise extinction, replacement and renewal events along the Pliensbachian-Toarcian transition. The extinction of typical long-ranging Lower Jurassic foraminiferal species takes place mainly in the *Tenuicostatum* Zone of the Toarcian. Besides this, the most significant renewal event occurs in the *Serpentinum* Zone with the first appearance of the genus *Citharina* represented by various species. Typical Lower Toarcian species are recorded in the *Tenuicostatum* Zone both in the *Paltum* and *Semicelatum* Subzones.

Keywords: Foraminifera, Biostratigraphic Events, Lower Jurassic, North Spain.

## 1. Introduction

The Camino outcrops are located in the Western Sector of the Basque-Cantabrian Basin (Figure 1) and provide one of the most complete and representative stratigraphic successions of the Lower Jurassic (ROBLES *et al.*, 1988). Lower Jurassic foraminifera are poorly known in this basin with only a detailed study on Pliensbachian assemblages (HERRERO, 1998). The aim of this paper is to show the foraminiferal successions at Camino Section in order to identify the main biostratigraphic events recorded from uppermost *Gibbosus* Subzone (*Margaritatus* Zone) to lowermost *Bifrons* Subzone (*Bifrons* Zone).

Following QUESADA *et al.* (2005) Camino is situated in the Reinosa Swell Palaeogeographical Domain. The studied rock interval consists of rhythmic hemipelagic alternations of marls, marly limestones, limestones and minor organic-rich shales deposited in oxic-suboxic outer ramp environments. The Section was logged bed by bed and precisely dated with ammonites by BRAGA *et al.* (1988), GOY *et al.* (1994) and GOY (2013, pers. comm.). Fresh 25 marl and marly limestone samples were collected and examined for foraminifera and organic carbon (TOC). The TOC analyses of the 25 samples studied in this paper were performed at Geochem Laboratory. The other 11 complementary TOC values included in Figure 2 come from QUESADA (1995, pers. comm.) and QUESADA *et al.* (2005).

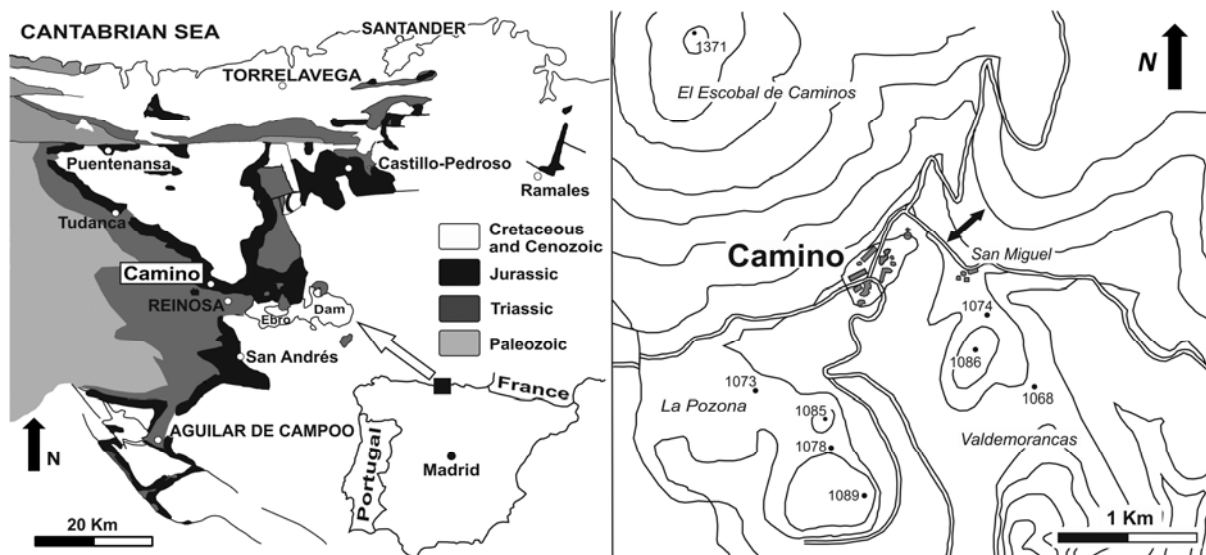


Figure 1: Jurassic outcrops in the Western Sector of the Basque-Cantabrian Basin and location of Camino Section (modified from Robles *et al.*, 1988 and topographic sheet map 1:25,000, respectively).

## 2. Results

More than 5,000 specimens and 50 species have been recorded. The stratigraphical ranges of selected taxa are shown in Figure 2. The identified species belong to Textulariina, Lagenina, Spirillinina and Robertinina Suborders, being the lagenids the best represented both in terms of number of species and specimens. Only two species, *Lenticulina gottingensis* (Bornemann) and *Planularia cordiformis* (Terquem), are present along the entire stratigraphical interval from the uppermost Gibbosus Subzone to lowermost Bifrons Subzone.

The richness data (species number) and the number of foraminifera per sample (foraminifera per gram ratio) allow pointing out an increase in diversity up to the uppermost Paltum Subzone while a significant decrease of the number of specimens and species is seen from the lowermost Semicelatum Subzone onwards. This change in the diversity trend can be related with the two peaks of TOC values obtained for that interval. According to QUESADA *et al.* (2005) the Upper Pliensbachian and Toarcian sediments are included in a long-term transgression/regression cycle, where the deepening trend culminates with the development of a Lower Toarcian Black Shale Horizon. However, it seems improbable that such a low TOC values (1.5-2) would have been the only cause to produce the observed change in the trend diversity (see GÓMEZ & GOY, 2011 for a discussion).

The stratigraphic distributions of foraminiferal species show that no significant biostratigraphic events occurred at the Pliensbachian/Toarcian boundary. As in other European Basins (see HERRERO, 2008 for a revision) the stepwise extinction of typical long-ranging Lower Jurassic species took place mainly in Early Toarcian times (*Tenuicostatum*

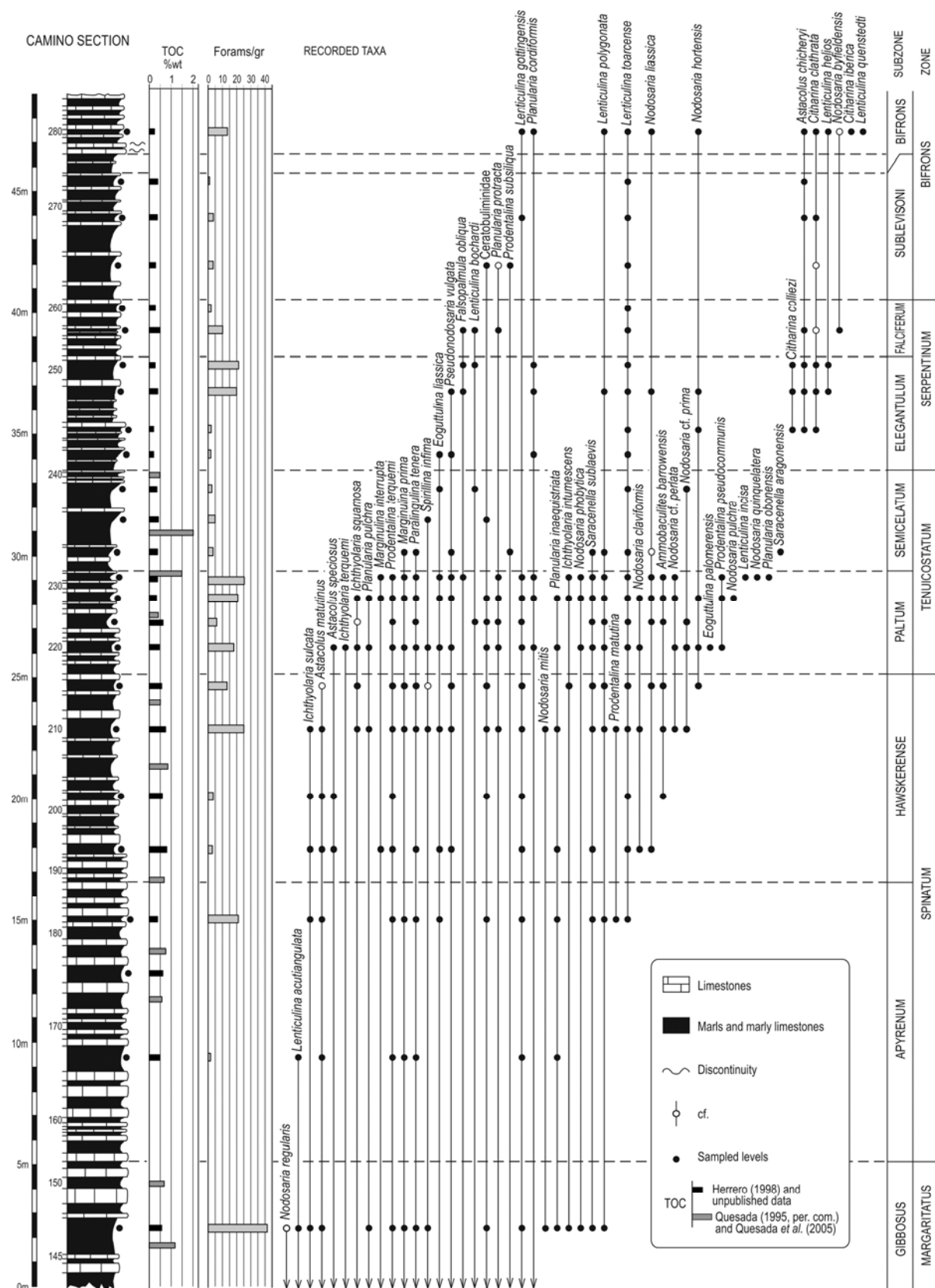


Figure 2: Range chart of selected foraminiferal taxa at Camino Section.

Zone) at Camino Section. Only the species *Ichthyolaria sulcata* (Bornemann), *Astacolus matutinus* (D'Orbigny) and *Prodentalina matutina* (D'Orbigny) have their last record in the

upper part of the Hawskerense Subzone of the Spinatum Zone. The species *Astacolus speciosus* (Terquem), *Ichthyolaria terquemi* (D'Orbigny), *Planularia pulchra* (Terquem), *Marginulina interrupta* Terquem, *Prodentalina terquemi* (D'Orbigny), *Planularia inaequistriata* (Terquem) and *Ichthyolaria intumescens* (Bornemann) have their last record in the Paltum Subzone, and *Marginulina prima* D'Orbigny, *Paralingulina tenera* (Bornemann) and *Saracenella sublaevis* (Franke) disappear in the Semicelatum Subzone. The Lower Toarcian species *Eoguttulina palomerensis* Herrero, *Planularia obonensis* (Ruget) and *Saracenella aragonensis* (Ruget) have single records in the Tenuicostatum Zone. The first record of *Citharina colleezi* (Terquem), *C. clathrata* (Terquem), *Astacolus chicheryi* (Payard), *Lenticulina helios* (Terquem) and *Nodosaria byfieldensis* Barnard takes place in the Serpentinum Zone, and the first appearance of *Citharina iberica* Ruget and *Lenticulina quenstedti* (Gümbel) occur in the Bifrons Subzone of the Bifrons Zone.

### **3. Acknowledgements**

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