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# **Libro de Resúmenes**

Jau-Chyn LIAO,  
José Antonio GÁMEZ VINTANED,  
José Ignacio VALENZUELA-RÍOS  
y Anna GARCÍA-FORNER (eds.)

## Fresh and brackish-water gastropods from the Tereñes Formation (Upper Jurassic, Asturias)

Munt, M.<sup>1</sup>, Delvene, G.<sup>2</sup>, Piñuela, L.<sup>2</sup> and García-Ramos, J.C.<sup>3</sup>

<sup>1</sup> Dept of Palaeontology, The Natural History Museum, Cromwell Road, SW7 5BD London, U. K.  
<m.munt@nhm.ac.uk>

<sup>2</sup> Museo Geominero, IGME, c/ Ríos Rosas, n.º 23, E-28003 Madrid, Spain, <g.delvene@igme.es>

<sup>3</sup> Museo del Jurásico de Asturias (MJA), E-333 28 Colunga (Asturias), Spain, <lpinuela.mja@gmail.com>

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### Introduction

Gastropods from the Spanish Jurassic have only rarely been studied. From Asturias, the earliest references are limited to «*melanias*», «*turritellas*» and «*nerineas*» by SCHULZ (1858). Subsequently, Hernández Sampelayo (1944) mentions pisolithic limestones with gastropods. ALMELA *et al.* (1955) reported gastropods, citing DUBAR (1925) as «*Alaria*», «*Cerithium*» and «*Natica*» and figure a sample with «*Chemnitzia*», «*Fusus*» and «*Procerithium?*». ALMELA & RÍOS (1962) noted these genera, additionally «*Paracerithium*» and «*Neritina*». RAMÍREZ DEL POZO (1969) recorded gastropods in several points, including «*Cerithium*». More recently SUÁREZ VEGA (1974) mentions gastropods present in the Jurassic, however, this is without any specific taxa being identified. Herein we describe previously unrecorded gastropod assemblages from the lower part of the Tereñes Formation (Kimmeridgian), which has many horizons with abundant, often mono-specific assemblages of small size specimens. Gastropods are often excellent guides to determining ancient environments; analogous nearest-living relatives can be used to determine parameters such as salinity, broad indications of water oxygen levels and turbulence. In this work we present taxonomic analysis, assemblage associations and palaeoenvironmental interpretations from the studied sections at playa de La Griega (Colunga) and Tereñes (Ribadesella), Asturias, northern Spain.

### Palaeontological material

At playa de La Griega, gastropods are concentrated in the same limestone bed where the enormous sauropod footprints. The best preserved ones are situated in the outline of the footprints, inside the displaced mud formed as a result of the treading of the dinosaur (PIÑUELA & GARCÍA-RAMOS, 2010). Shell fragments are present inside the footprints, probably destroyed by crushing during the activity of the dinosaurs, it is a monospecific assemblage of *Viviparus* sp. The record from Tereñes is more diverse; sampling was focused in the first metres of the logged section of GARCÍA-RAMOS *et al.* (2010), which is the part of the sequence where the gastropods are concentrated. *Viviparus* and *Blotium* have been determined and their presence/absence along the log marks the environmental changes in the ecosystem as is discussed below.

## Taxonomy

### *Viviparus* sp. (Viviparidae, Caenogastropoda)

Dextral, turbinate (maximum 11 mm high and 7.30 mm wide). Thick shelled with an apical angle between 32-51°; three to four inflated whorls separated by a deeply impressed suture; aperture is holostomatous, large and oval. We are reluctant to ascribe this material to any species due to poor preservation and the description based solely upon field measurements.

### *Viviparus* cf. *antiquus* Hückriede, 1967

Dextral, turbinate (maximum 8.4 mm high and 5.1 mm wide). Thick shelled with an apical angle of 30°-40°; four to five inflated whorls separated by a deeply impressed suture. Aperture is holostomatous, large and elongate. Growth lines are very fine, prosocline, numerous. These specimens are cautiously ascribed to *V. antiquus* due to their preservation and smaller apical angle than in *V. antiquus* which is 60°-65°. *V. cf. antiquus* is much more elongate with an irregular aperture than *Viviparus* sp. which is regular and oval.

### *Ellobium* sp. (Ellobiidae, Eupulmonata)

Dextral, oval in shape (maximum 2 mm high and 1.1 mm wide), thin shelled; four whorls, separated by a deeply impressed suture. The last whorl is more than half the height of the shell. The aperture is holostomatous, very elongate, narrow with an inner lip. In spite of the poor preservation we can compare our specimens to *E. ? koerti* Hückriede (1967) which is wider and with a greater number of whorls (6) than the Spanish specimens.

## Palaeoecological implications

All the gastropods from playa de La Griega have been identified as *Viviparus* sp. Extant *Viviparus* are found in freshwater environments and are able to live in rivers, lakes and ponds, as prosobranchs the water needs to be well oxygenated. On this basis we can suggest that at playa de La Griega freshwater conditions prevailed at the time of deposition of the limestone level where the footprints are recorded. Above the footprint bed the bivalve *Neomiodon* is present indicating the possible change to more brackish water conditions. *V. cf. antiquus* and *Ellobium* sp. have been recorded in the lower levels at Tereñes. The later is characteristic of brackish water conditions. The presence of them recorded in the marly limestone therefore marks changes from freshwater to brackish water conditions. The sequence may represent the coastal part of a shelf lagoon. The section begins with a shell bed comprising probably indeterminate *Viviparus*. Coinciding with level 154 of GARCÍA RAMOS *et al.* (2010) complete specimens of *V. cf. antiquus* are abundant. This is interpreted as freshwater conditions from here up to level 155 which contains calcareous nodules with dinosaur footprints. At this point *Ellobium* sp. becomes abundant and probably marks a change towards brackish water conditions. Some poorly preserved Neomiodontidae bivalves are present. These conditions remain up to the first dinosaur footprint of level 156. Then *Viviparus* is seen marking a return to freshwater conditions.

These changes in the fauna are subtle, however the gastropod record can be used to record environmental change through the sequence.

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