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A new hermit crab (Crustacea, Anomura, Paguroidea) from the mid-Cretaceous of Navarra, Northern Spain

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Abstract

Recent fieldwork (June 2008) in the reefal limestones near Alsasua, Navarra (northern Spain) has resulted in the discovery of a new species of diogenid hermit crab, *Annuntidiogenes worfi* sp. nov., which appears closely related to the type species of the genus, *A. ruizdegaonai* Fraaije *et al.*, 2008, from Monte Orobe and also of mid-Cretaceous (Albian-Cenomanian) age. The new specimen represents only the third paguroid carapace of Cretaceous age to be described and formally named.

Keywords: Crustacea, Anomura, Diogenidae, Albian-Cenomanian, Spain, new taxon.

Resumen

Recientes trabajos de campo (Junio de 2008) en las calizas arrecifales cercanas a la localidad de Alsasua, Navarra (Norte de España) han proporcionado el hallazgo de una nueva especie de cangrejo ermitaño diogénido, *Annuntidiogenes worfi* n. sp., estrechamente relacionado con la especie tipo del género, *A. ruizdegaonai* Fraaije *et al.*, 2008, del Monte Orobe, en depósitos adscritos al Cretácico medio (Albiense-Cenomaniense). El nuevo ejemplar es el tercer registro de un caparazón de pagúrido preservado en depósitos del Cretácico.

Palabras clave: Crustacea, Anomura, Diogenidae, Albiano-Cenomaniano, España, nuevo taxón.

Introduction

The general palaeontology and sedimentology of Albian-Cenomanian reefal deposits in the Alsasua area (Navarra, northern Spain) have previously been outlined by Ruiz de Gaona (1943, 1952, 1954) and López-Horgue *et al.* (1996). Strata exposed at the disused quarry at Monte Orobe proved richly fossiliferous and yielded numerous decapod crustaceans, which were listed, described, illustrated and/or discussed by Van Straelen (1940, 1944), Ruiz de Gaona (1943), Via Boada (1981, 1982), Gómez-Alba (1989) and López-Horgue *et al.* (1996). In addition, Fraaije *et al.* (2008) have recently erected three new genera and two new species of anomurans and brachyurans on the basis of a small faunule from Monte Orobe contained in the collections of the Institut royal des Sciences naturelles de Belgique (Brussels).

Fieldwork in the area (June 2008) has shown that, six years ago, the abandoned quarry at Monte Orobe was nearly completely filled with refuse from the then newly constructed motorway 'Autovia del Norte', which connects Alsasua and San Sebastian. However, about four kilometres south of Monte Orobe, a new decapod-rich locality has been discovered by three of us (RHBF, AAK and PA); this is an abandoned quarry at Koskobilo, which is within the same Albian-Cenomanian reefal complex, referred to as the Aldoirar reef (López-Horgue *et al.*, 1996). In these reefal limestones, anomurans (galatheids, paguroids and porcellanids) are comparatively well represented. To date, the following taxa have been noted: *Paragalathea ruizi* (Van Straelen, 1940), *P. straeleni* (Ruiz de Gaona, 1943) (= *Galathea alsasuensis* Van Straelen, 1944), *P. multisquamata* Via Boada, 1981, *Eomunidopsis navarrensis* (Van Straelen, 1940), *E. orobensis* (Ruiz de Gaona, 1943), *Annuntidiogenes ruizdegaonai* Fraaije *et al.*, 2008 and *Annieporcellana dhondtae* Fraaije *et al.*, 2008. To this list we here add a second species of *Annuntidiogenes* from the area, with a peculiar ornament, *Annuntidiogenes worfi* sp. nov.

Systematic palaeontology

Order Decapoda Latreille, 1802
 Infraorder Anomura MacLeay, 1838
 Superfamily Paguroidea Latreille, 1802
 Family Diogenidae Ortmann, 1892
 Genus *Annuntidiogenes* Fraaije *et al.*, 2008

Type species. *Annuntidiogenes ruizdegaonai* Fraaije *et al.*, 2008, by original designation.

Diagnosis. Shield ovate, divided into distinct regions by grooves, ornamented with scabrous, irregular setal pits; long central-anterior gastric furrow (after Fraaije *et al.*, 2008).

Annuntidiogenes worfi sp. nov.

Figure 1

Material. Holotype, and sole specimen known to date, is MGSB 75.288 (Museo Geológico del Seminario de Barcelona), an incomplete carapace from the Albian-Cenomanian reefal limestones at the disused Koskobilo quarry, north of the small village of Olazti, near motorway A1 (Autovia del Norte), 2 km southwest of Alsasua. Carapace length (as preserved): 5.5 mm, carapace width: 4 mm.

Diagnosis. Shield elongated, divided into distinct regions by grooves; long central anterior gastric furrow dividing a coarsely ornamented anterior gastric region; short, narrow anterior lateral margins.

Etymology. Named after Worf, played by American actor Michael Dorn, one of the main characters in both Star Trek films (The Next Generation, Deep Space Nine) and in subsequent films based on The Next Generation, in reference to the wrinkled ornament of the anterior gastric region.

Description. Anterior region, postantennal projections and rostrum not preserved; broadly oval-shaped tumid anterior gastric region divided by a long central gastric groove, ornamented by scabrous ridges extending parallel to the groove which divides the gastric and anterior region; posterior part of gastric region smooth with irregularly distributed large setal pits, more abundant anteriorly; two small, yet distinct, ovoid tumid areas present close to the relatively small triangular posterior lateral regions; anterior lateral margins very small, smooth and elongated; posterior margin, cervical furrow and *linea transversalis* not preserved (for use of terminology, see Fraaije *et al.*, 2008).

Discussion. *Annuntidiogenes worfi* sp. nov. differs from the similar-aged type species of the genus, *A. ruizdegaonai*, and from the late Maastrichtian *A. sunuciorum* Fraaije *et al.*, 2008 from southern Limburg (the Netherlands), in having a wrinkled, scabrous anterior gastric region and distinctly shorter and narrower anterior lateral margins. The new species can be distinguished from the Late Jurassic pylochelids *Jurapylocheles malutka* and *Ammopylocheles mclaughlinae* (see van Bakel *et al.*, 2008) in having curved lateral regions and a gastric process, and from the Late Jurassic parapagurid *Eotylaspis wehnerae* in having a scabrous ornament and a much more convex anterior gastric margin. The Late Jurassic diogenid *Eopaguropsis loercheri* (see van Bakel *et al.*, 2008) is comparable in having curved lateral margins, but differs mainly in showing a shorter central gastric furrow with gastric process and in lacking carapace differentiation by grooves.

The groove pattern and differentiation into regions seen in *Annuntidiogenes* is most closely comparable to the carapace morphology of the extant diogenid *Aniculus*



Figure 1. *Annuntidiogenes worfi* sp. nov., holotype (MGSB 75.288) from the Albian-Cenomanian reefal limestones at the abandoned Koskobilo quarry, Alsasua area, Navarra (northern Spain). Scale bar in millimetres.

Dana, 1852 (see Forest, 1984); the former differs in having a broader gastric region and smaller, less extensive lateral regions. Species of *Aniculus* inhabit shallow reefal waters of the Indo-Pacific, a setting which is closely comparable to the ecological niche *Annuntidiogenes* would have occupied during the Albian-Cenomanian.

The holotype of *A. worfi* sp. nov. was collected near the top of the reef, from coarse-grained calcarenites rich in algae, larger foraminifera, brachiopods, corals, small pectinid bivalves and other decapod crustaceans. Predominant in the associated decapod crustacean assemblages are galatheids (c. 80%); dynomenids account for c. 10%, goniodromitids for c. 5% and others for c. 5%. Of special note is the fact that gastrodorids are also fairly common at the Koskobilo site, accounting for c. 1 % of assemblages collected. This enigmatic group, which has recently been transferred to the Paguroidea (see van Bakel et al., 2008), was hitherto known exclusively from Upper Jurassic reefal facies in southern Germany and Poland and thus is a good example of a refugia species, or Lazarus taxon (*sensu* Kauffman and Harries, 1996; Harries et al., 1996). The absence of cephalopods and the paucity of gastropods and other molluscan shells potentially suitable for paguroid inhabitation in the associated fauna, could indicate that mid-Cretaceous paguroids in the Alsasua area inhabited small crevices within the coralline-algal framework of these reefs.

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