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ScienceDirect
Annales de Paléontologie 93 (2007) 249–260
ANNALES DE PALÉONTOLOGIE
http://france.elsevier.com/direct/ANNPAL/

Original article

A Middle Cambrian edrioasteroid from the Murero biota (NE Spain) with Australian affinities

Un édrioastéroïde avec des affinités australiennes dans le Cambrien moyen du biote de Murero (NE de l'Espagne)

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Available online 19 November 2007

Abstract

A Middle Cambrian edrioasteroid belonging to the genus *Cambraster* is described from the Middle Cambrian Murero biota (Cadenas Ibéricas, NE Spain). Up to now, this genus was known only from Australia and France. This represents the first record of the class Edrioasteroidea in the Cambrian of Spain. Moreover, preliminary results on the diversity and biostratigraphic position of Cincta, Eocrinoidea and Edrioasteroidea from this area are reported.
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Résumé

Un échantillon d'édrioastéroïde du genre *Cambraster* provenant du biote de Murero (Cambrien moyen des chaînes Ibériques, NE de l'Espagne) est décrit. Jusqu'à présent, ce genre n'était connu qu'en Australie et en France. C'est la première fois qu'un représentant de la classe Edrioasteroidea est décrit dans le Cambrien espagnol. De plus, des résultats préliminaires concernant la diversité et la position biostratigraphique des Cincta, Eocrinoidea et Edrioasteroidea des chaînes Ibériques sont également présentés.
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Keywords: Edrioasteroid; *Cambraster*; Middle Cambrian; Murero biota; Spain

Mots clés : Édrioastéroïde ; *Cambraster* ; Cambrien moyen ; Biote de Murero ; Espagne

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0753-3969/$ – see front matter © 2007 Elsevier Masson SAS. All rights reserved.
doi:10.1016/j.annpal.2007.09.003

1. Introduction

Professor Georges Ubaghs (1916–2005) was one of the most important palaeontologists who ever studied Palaeozoic echinoderms. His papers have inspired many researchers to work on various interesting and problematic fossil groups. His contribution to the knowledge of Spanish Cambrian echinoderms was particularly notable (Colchen and Ubaghs, 1969; Ubaghs and Vizcaïno, 1990). Following his path, we present here some new results on echinoderms from the Cambrian of Murero biota (Cadenas Ibéricas, NE Spain).

Edrioasteroids are a small group of early echinoderms with the characteristic 2-1-2 ambulacral pattern, and flattened thecae (at least, in early forms), ranging from Early Cambrian to Early Carboniferous.

Several Cambrian echinoderms have been conventionally classified as edrioasteroids (Smith, 1985). They can be included into the eight genera *Cambraster*, *Cambroblastus*, *Chatsworthia*, *Edriodiscus*, *Hadrodiscus*, *Stromatocystites*, *Totiglobus*, and *Walcottidiscus*. Up to now, they have been recorded from the Czech Republic (Pompeckj, 1896), France (Cabibel et al., 1959; Termier and Termier, 1969; Ubaghs, 1971, 1998), North America (Bell and Sprinkle, 1978; Sprinkle, 1985; Guensburg and Sprinkle, 1994; Smith, 1985), Australia (Jell et al., 1985; Smith and Jell, 1990), China (Parsley, 2002), Morocco (Clausen, 2004a) and Iran (Kruse and Zhuravlev, in press).

Although other echinoderm groups have been described from the Cambrian of Spain (Prado et al., 1860; Barrois, 1882; Gislén, 1927; Richter and Richter, 1940; Henningsmoen, 1958; Schroeder, 1973; Ubaghs and Vizcaïno, 1990; Friedrich, 1993; Sdzuy, 1993; Gil Cid and Domínguez, 1995, 2002; Clausen, 2004a, 2004b), edrioasteroids were only mentioned (Liñán et al., 1996; Lefebvre and Fatka, 2003) or briefly described (Schmitt, 1974). Here, we report the first complete description of a Spanish Cambrian edrioasteroid. It consists in a single specimen of *Cambraster*, with strong Australian affinities.

2. Geological setting and stratigraphy

De Verneuil (1862) first discovered Cambrian trilobites (the primordial fauna) near the village of Murero. Since the works of Lotze (1961) and Sdzuy (1961), Murero was considered a reference locality for the study of the Lower–Middle Cambrian in Europe, because of its stratigraphical continuity and accurate trilobite zonation. Since the work of Conway Morris and Robison (1986), the presence of Burgess Shale-type faunas has also been documented.

The Murero biota (late Lower to Middle Cambrian in age) is composed of highly diverse assemblages of both skeletonized and soft-bodied fossils. Skeletonized fossils are represented by trilobites, bradoriids, brachiopods, echinoderms, and small shelly fossils. The soft-bodied fossils consist in algae, sponges, lobopods, crustaceans (*Isoxys*, *Tuzoia*), palaeoscolecids, sponges (*Leptomitus*, *Crumillospongia*, *Choia*) and *incertae sedis* groups. Trace fossils are also present. The more abundant fossils are trilobites by far, with seventy species recorded in a 200 m-thick succession of shales representing *ca*. 10 million years.

The Murero biota occurs in the late Lower through Middle Cambrian shales of the upper Valdemiedes, Mansilla and Murero formations, cropping out in several localities near the village of Murero (Cadenas Ibéricas, Zaragoza province, NE Spain). All these fossiliferous sites share a taxonomical composition, age, and preservational style.

The specimen described herein was collected from the Murero Formation in the valley of Isuela river (Zaragoza province; Fig. 1). The Murero Formation (which is the uppermost unit of

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