

# AN OCCURRENCE OF THE AUGURITID AMMONOID *CELAECERAS* IN THE LOWER DEVONIAN OF NORTHERN SPAIN

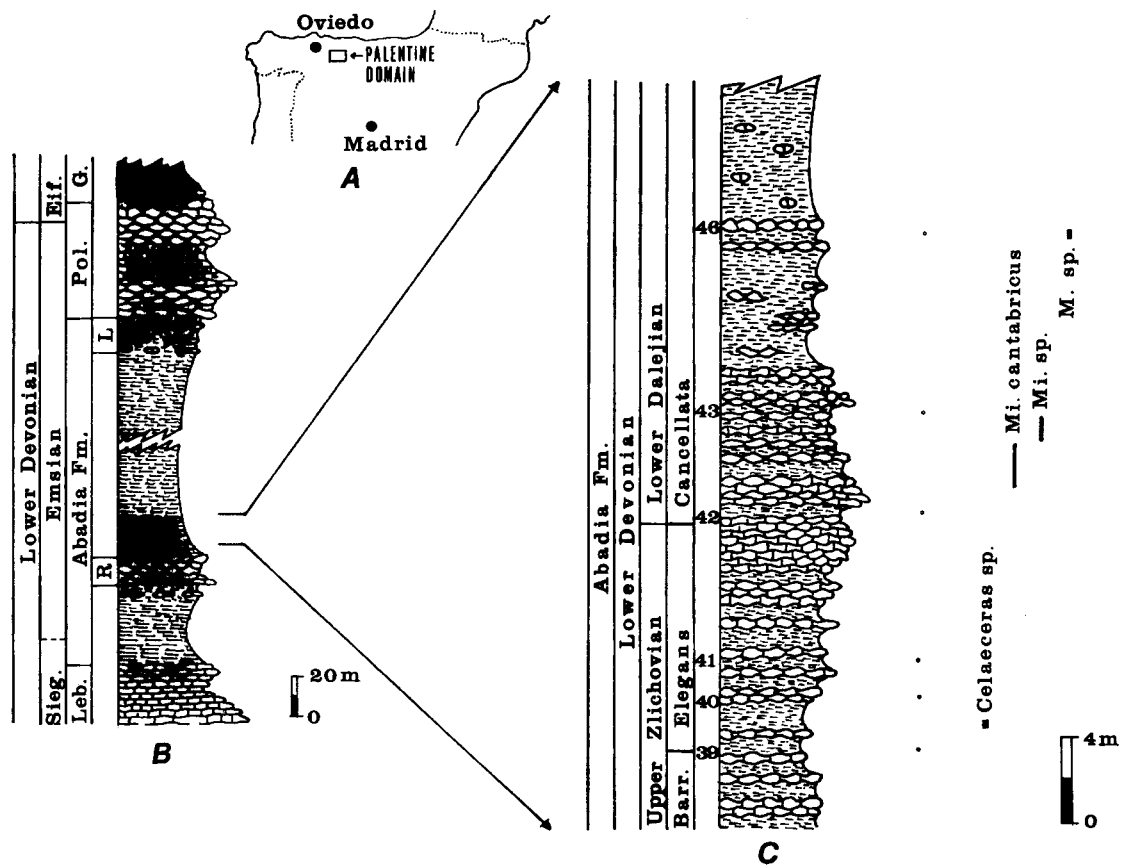
by J. R. MONTESINOS and J. L. GARCÍA-ALCALDE

**ABSTRACT.** The rare Bohemian genus *Celaeceras*, a primitive auguritid ammonoid with a rather bizarre suture, has been found in late Emsian strata (Upper Zlichovian) in the Palentine Domain of northern Spain. This occurrence provides the first precise age for the genus, and considerably extends its palaeogeographical range in the Devonian of northern Gondwanaland.

THE affinity of the Palentian Devonian succession of northern Spain (Text-fig. 1A) with that of Bohemia and the Harz Mountains, the Hercynian/Bohemian Magnafacies of Erben (1962, 1964a), has been recognized by many workers (Brouwer 1964; Jahnke *et al.* 1983; García-Alcalde *et al.* 1988, 1990). Lower Devonian ammonoids are relatively common in the area. Particularly interesting is a primitive fauna, comprising representatives of the simple-sutured genera *Mimagoniatites*, *Erbenoceras* and *Mimosphinctes* (Kullmann 1960; Montesinos and Truyols-Massoni 1987; Montesinos 1991), which has been known for many years from beds of the Abadia Formation, above the Requejada Member (Text-fig. 1B–C). During recent research, the bizarre genus *Celaeceras* Hyatt, 1884 has also been identified.

*Celaeceras*, the type species of which, *C. praematurum* (Barrande, 1867, p. 110; 1877, pl. 522, figs 1–4), was originally described from Bohemia (Chlupáč and Turek 1983). It has a more complex suture than any other Lower Devonian or lower Middle Devonian goniatite, and its affinities are problematical. Bogoslovskiy (1961) described a very similar form from the Ural Mountains. He named it *Augurites* and assigned it to a new family, the Auguritidae, and a new Suborder, the Auguritida. The genera *Celaeceras* and *Augurites* have been regarded as synonyms by most authors (House 1964; Erben 1966; Solle 1972; Chlupáč and Turek 1983). The type material of both genera is of late Emsian age. This is also the age of the last known auguritid genus, *Gaurites* Bogoslovskiy, 1984 from the Zerafshan Range in the Tien-Shan. The new Spanish material has been found in beds correlating with the dacryoconarid *elegans* Zone (Lütke 1979, p. 284; Alberti 1993), and this is a more precise age constraint (M. Truyols-Massoni, pers. comm. 1993).

The widespread palaeogeographical distribution of the Auguritidae (Text-fig. 2) is similar to that of other primitive ammonoid faunas. It suggests a greater capacity for pelagic spreading than other contemporary marine organisms. *Celaeceras sensu stricto* seems to have spread throughout northern Gondwanaland, on the northern tropical side of the Rheic Ocean. On the other hand, *Augurites* and *Gaurites* colonized respectively, the northern, Laurussian part of Baltica, and south Kazakhstan in the southern tropical boreal zone. According to recent palaeogeographical reconstructions (Bergström 1990; Scotese and McKerrow 1990), this distribution encompasses a linear separation between extreme auguritid occurrences of more than 6000 km. Specifying the point of origin of auguritids would be pivotal to an understanding of their evolution, but the sparse distribution of the group makes this difficult. Considering general morphology and the more simple ventral suture, *Gaurites* is a good candidate for the ancestral stock; this agrees with the views of Bogoslovskiy (1984). Models of ocean pattern circulation, such as that of Bergström (1990) for the Silurian, would partially support this hypothesis. Bergström's model is characterized by a great



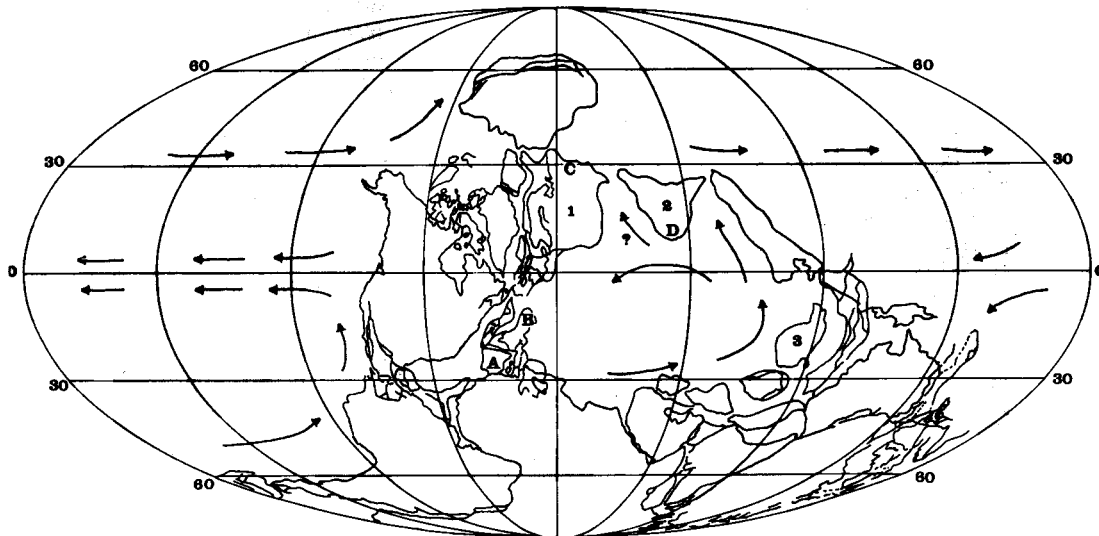
TEXT-FIG. 1. Map and sections illustrating the Lower Devonian localities in northern Spain. A, locality map showing the Palentine Domain. B, generalized Lower Devonian section in the Palentine Domain. C, detailed sequence in the Arauz stream section showing substage and dactyloconarid zone boundaries, numbered collecting horizons and the distribution of Lower Devonian goniatites. Abbreviations: R, Requejada Member; L, Lezna Member; Leb., Lebanza Formation; Pol., Polentinos Formation; G., Gustalapedra Formation; Sieg., Siegenian; Eif., Eifelian. M., *Mimagoniatites*; Mi., *Mimosphinctes*; Barr., *barrandei* Zone.

counter-clockwise gyre in the Paratethys area, with diverging currents towards the Northern Hemisphere between the South China, Kazakhstan and Baltica plates.

#### SYSTEMATIC PALAEOLOGY

Order ANARCESTIDA Miller and Furnish, 1954  
 Suborder AGONIATITINA Ruzhencev, 1957  
 Superfamily AUGURITACEAE Bogoslovskiy, 1961  
 Family AUGURITIDAE Bogoslovskiy, 1961

*Remarks.* Two or three genera are currently referred to the Auguritidae. As already stated, *Augurites* may be a junior synonym of *Celaeceras*; in addition, there is *Gaurites*. House (1964), who



TEXT-FIG. 2. Distribution of auguritid ammonoids shown on an Emsian palaeogeographical map (modified from Scotese (1986) with ocean circulation pattern based on Bergström (1990)). Abbreviations: A, Spain; B, Bohemia; C, Ural Mountains; D, Tien-Shan; 1, Baltica Plate; 2, Kazakhstan Plate; 3, South China Plate.

had examined the holotypes of *Celaeceras* and *Augurites*, recommended that these two genera be treated as synonyms. Bogoslovskiy (1984) rejected this and emphasized differences in involution, umbilical covering and whorl cross-section. Chlupáč and Turek (1983) took the view that the differences between the holotypes were unclear (compare Text-fig. 4C–E with Bogoslovskiy 1961, pl. 7, figs 4–5 and text-fig. 4a–b). However, despite the clear similarities between the two genera, we think it advisable, for the time being at least, to keep them separate in view of the often sparse and fragmentary material available and the wide geographical distance between them.

The general view (Bogoslovskiy 1961, 1969, 1984; Erben, 1964b; Chlupáč and Turek 1983), though far from clear, is that the auguritids arose from anetoceratid stock (strongly-ribbed, VO-sutured, evolute shells with poor hydrodynamic characters) probably via mimagoniatitids (weakly sculptured, VO:D-sutured, more or less involute, hydrodynamically advanced shells).

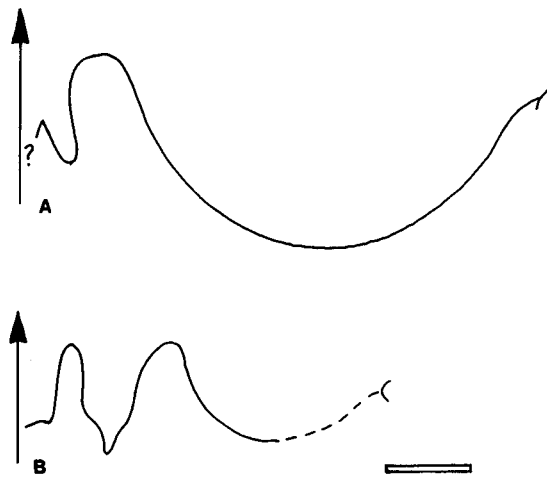
#### Genus *CELAECERAS* Hyatt, 1884

*Type species.* *Goniatites praematurus* Barrande, 1887, p. 110, pl. 522, figs 1–4.

*Diagnosis* Involute, lenticular, and laterally-flattened shell; perforate and rather broad umbilicus; sutural formula,  $V_{1-1} V_{1-2} V_2 O:D$ . The  $V_{1-2}$  lobe is within a funnel-shaped ventral lobe; rounded, broad, nearly omnilateral lateral lobe (Text-figs 3B, 4C–D).

*Remarks.* Sufficient comment has already been made on the great similarity between *Celaeceras* and *Augurites*. *Gaurites* differs from *Celaeceras* in lacking the  $V_{1-2}$  lobe and in the occurrence of a small umbilical lobe.

Despite the distinctive shell features of *Celaeceras* compared with near-contemporary ammonoids such as *Mimagoniatites*, *Mimosphinctes*, *Anetoceras* and *Erbenoceras*, the genus had rather meagre evolutionary success. On present data, there are only one or two species of *Celaeceras*, which are of Late Zlíchovian age (and doubtfully Dalejan). Only four specimens are known.



TEXT-FIG. 3. Suture diagrams of *Celaeceras*. A, *Celaeceras* sp., from the Palentine Domain, northern Spain; based on DPO 113.901; drawn at whorl height 35 mm. B, *Celaeceras praematurum* (Barrande); based on the holotype from the uppermost part of the Zlichov Limestone, Praha-Zlichov, Svagerka (see Chlupáč and Turek 1983). Scale bar represents 10 mm.

*Celaeceras* sp.

Text-figures 3A, 4A-B

**Material.** A fragment of an internal calcareous mould, rather well preserved. Palaeontological Collections, University of Oviedo, DPO 113.901. The specimen comes from the 1.3 m-thick un-named bed overlying M-39 in the nodular marly limestone-marlstone-shale alternations above the Requejada Member of the Abadia Formation in the Arauz section (Palentine Domain, northern Palencia). It occurs some metres below beds with *Mimosphinctes cantabricus* Kullmann, *M. cf. tripartitus* Eichenberg and *Mimagoniatites erbeni* Kullmann (see Montesinos 1991). The level is referred to the dacryoconarid *elegans* Zone of the Upper Zlichovian (Text-fig. 1C).

**Description.** A lenticular whorl fragment (height, 37 mm; width, 10.5 mm) showing the last four septa of the phragmocone, and the beginning of the body-chamber. The suture is badly preserved in the ventral area (Text-figs 3A, 4A). There is a narrow, deep and rounded  $V_2$ , but the rounding could be due to abrasion. A broad, rather than deep, O lobe extends over most of the whorl side. Judging from the partially preserved umbilical border, the umbilicus was rather wide.

**Remarks.** The lenticular profile and lateral suture of the specimen allows assignment to *Celaeceras*. The fragmentary nature of the specimen prevents detailed comparison with *C. praematurum*, the type species.

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TEXT-FIG. 4. Illustrations of *Celaeceras* from Spain and the Czech Republic. A-B, *Celaeceras* sp.; internal calcareous mould from the Abadia Formation, Arauz Section (Lower Devonian, Palentine Domain, northern Palencia, Spain); A, lateral view, B, ventral view. From 1.3 m above the M-39 level (see Text-fig. 1), DPO 113.901;  $\times 1.5$ . C-E, *Celaeceras praematurum* (Barrande), holotype, from Svagerka. C, lateral view of fragment of a whorl in restored position to the corresponding external mould, coated with ammonium chloride sublimite;  $\times 1$ . E, lateral view of the uncoated fragment;  $\times 1$  (photos for C and E kindly supplied by I. Chlupáč). D, apertural view of the fragment, coated with ammonium chloride;  $\times 1$  (photo for D kindly supplied by M. R. House).



TEXT-FIG. 4. For caption see opposite.

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