

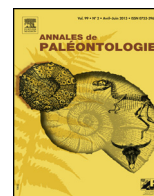


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Original article

First record of Late Callovian to Early Oxfordian heteromorph ammonites



Découverte d'ammonites hétéromorphes du Callovien supérieur et de l'Oxfordien inférieur

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ABSTRACT

The outstanding discovery of two heteromorph ammonites in Late Callovian and Early Oxfordian deposits, where such ammonites were deemed absent, substantially reduce the interval without heteromorph ammonite known into the Jurassic. A new species is described for the Early Oxfordian: *Acuariceras acucostis* sp. nov.; the Late Callovian *Parapatoceras* cf. *tuberculatum* is also studied. These latter expands our knowledge of the latest Parapatoceratinae and complete their stratigraphic distribution. The evolution of ornamentation between *A. acuaricus/Paracuarceras incisum* and *A. acucostis* sp. nov., from which it is derived, tends toward a net reinforcement of the ribs at least on the body chamber. Without the preservation of the suture lines however, it is difficult to know the relationships maintained between the new species and the genera *Acuariceras* and *Paracuarceras*. It is not excluded that these two genera, which are distinguished only on the basis of relatively discrete suturing criteria, could be synonymous.

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RÉSUMÉ

La découverte exceptionnelle de deux ammonites hétéromorphes dans des dépôts du Callovien supérieur et de l'Oxfordien inférieur, où ce type d'ammonites est réputé absent, réduit sensiblement l'intervalle sans ammonite hétéromorphe connu dans le Jurassique. Une nouvelle espèce est décrite pour l'Oxfordien : *Acuariceras acucostis* sp. nov., qui élargit notre connaissance des derniers Parapatoceratinae et complète leur distribution stratigraphique. L'évolution de l'ornementation entre *A. acuaricus/Paracuarceras incisum* et *A. acucostis* sp. nov., à partir desquels il est dérivé, tend vers un net renforcement au moins sur la chambre d'habitation. Cependant, sans la préservation des lignes de suture, il est difficile de connaître les relations entretenues entre la nouvelle espèce et les genres *Acuariceras* et *Paracuarceras*. Il n'est pas exclu que ces deux genres, qui se distinguent uniquement sur la base de critères suturaires relativement discrets, soient synonymes.

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1. Introduction: Mesozoic occurrences of heteromorph ammonites

1.1. The Mesozoic heteromorph groups

During the Mesozoic Era, heteromorph ammonites are usually known in the Cretaceous with the vast diversification of the

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Ancyloceratina Wiedmann, 1966 (since late Valanginian-early Hauterivian), the Turrilitina Beznosov and Michailova, 1983 (since late Hauterivian), and also the Protancyloceratina Vermeulen, 2005. However, older occurrences of uncoiled ammonites exist, in the Late Triassic, Middle Jurassic and Late Jurassic.

The earliest occurrence of Mesozoic uncoiled ammonites is the Triassic Choristocerataceae Hyatt, 1900 (with Choristoceratidae Hyatt, 1900, Cochloceratidae Hyatt, 1900 and Rhabdoceratidae Tozer, 1979). They range over an interval between the Norian and Rhaetian (Fig. 1), and then they go out with no known descendants.

The older heteromorph Cretaceous ammonites belong to the Protancyloceratina and derive from late Jurassic forms of the genus *Protancyloceras* Spath, 1924 (Fig. 1). According to Cecca (1997), the *Protancyloceras* appeared with *P. guembeli* (Oppel, 1865) in the northern Carpathians early Tithonian (late Hybonotum Zone). However, an older specimen has been collected in the lower part of the same zone by Sarti (1999) in the Southern Alps (Trento Plateau, Italy), where it is extremely rare (one specimen over several thousand ammonites). Its ancestor is unknown with certainty, but Cecca suggested that it could derive from *Hybonotoceras* Breistroffer, 1947 (Aspidoceratidae Zittel, 1895, Hybonoticeratinae Breistroffer, 1947) because of a similar ventral groove and raised strong ribs. Nevertheless, as the earliest *Protancyloceras* have no ventral groove (Sarti, 1999), the best challenger is probably the one proposed by Scheigert and Zeiss (1998): the genus *Berkhemeria* Schweigert and Zeiss, 1998, which the type-species *B. scherzingeri* Schweigert and Zeiss, 1998 appears at the earliest part of the Hybonotum Zone, the Eigeltingense Horizon. If this link was confirmed, the *Protancyloceras* would come from the Perisphinctidae Steinmann, 1890 (Perisphinctaceae Steinmann, 1890), and more specifically from the Passendorferiinae Meléndez, 1989.

Except the Tithonian diversification of the subfamily Protancyloceratinae, the lone other Jurassic known occurrence of

heteromorph ammonites is in the Middle Jurassic with two iteratively groups (Fig. 1), distinguished within the Parkinsoniidae Buckman, 1920; they have been fully reviewed by Dietl (1978). The oldest group corresponds to the *Spiroceras* Quenstedt, 1858 diversification (subfamily Spiroceratinae Hyatt, 1900), appearing in the Niortense Zone (Baculata Subzone, late Bajocian), just after the rising of the genus *Strenoceras* Hyatt, 1900 from which they may derive. The Spiroceratinae disappear without known descendants in the Parkinsoni Zone (Acris Subzone) (Pavia, 1971).

The second subfamily (Parapatoceratinae Buckman, 1926) ranges from the late Bathonian (Retrocostatum Zone) (Fernandez-Lopez, 2001) to the early Middle Callovian (Anceps Zone) (Fig. 1). Following Dietl (1978), it appears that the Parapatoceratinae are probably not directly related to the *Spiroceras* phyletically, but may derive from *Epistrenoceras* Bentz, 1928. The genus *Parapatoceras* Spath, 1924 has the most extensive stratigraphic range, from the late Bathonian to the Middle Callovian. The genus *Paracuariceras* Schindewolf, 1963 is only known in the Callovian. It appears in the Bullatus Zone and disappears before the end of the Anceps Zone. The genus *Acuariceras* is the earliest but it has a shorter stratigraphic range, only occurring in the Anceps Zone.

No more now than by the time of Dietl's work (1978), there are reliable data on possible heteromorph ammonites from the early to middle Bathonian. Thus, there is no phylogenetic relationship between these different Mesozoic occurrences, and the concerned groups were each time turned off with no known descendants, except for the Protancyloceratina, which continue and diversify mainly in the Early Cretaceous.

So, during the Mesozoic, there are three wide time-ranges considered as lacking heteromorph ammonites (zones I, II and III on Fig. 1), two of them extending through the Jurassic. Particularly, this is acute during the whole Lias (Early Jurassic), and between late Middle Callovian to Late Kimmeridgian (late Middle to Topmost Jurassic).

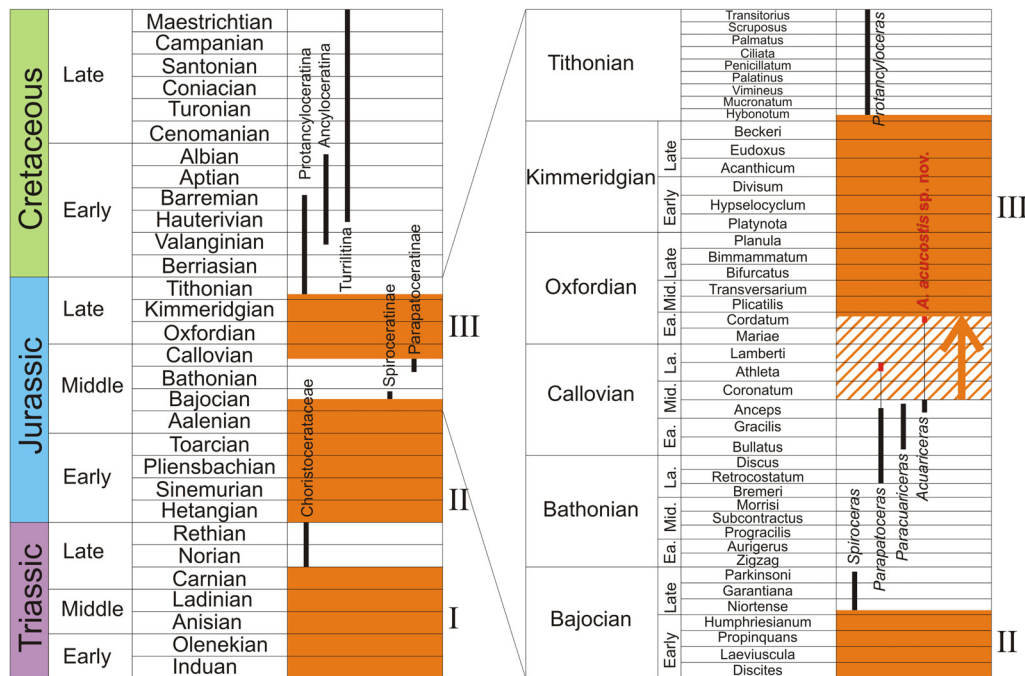


Fig. 1. Range chart of the occurrences of heteromorph ammonite groups in the Mesozoic. The three orange bands, zones I, II and III, shows the ranges without heteromorphs according to the literature data. The new specimens here described are in red. The orange arrow shows the reduced interval without heteromorph ammonites at the Dogger/Malm boundary.

Répartition des occurrences des groupes d'ammonites hétéromorphes au cours du Mésozoïque. Les trois bandes orange (zones I, II et III) montrent les zones réputées sans ammonites hétéromorphes d'après les données de la littérature. Les nouveaux spécimens décrits dans le présent travail sont en rouge. La flèche orange montre la réduction de l'intervalle sans ammonites hétéromorphes à la limite Dogger/Malm.

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