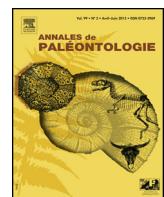




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## Original article

# *Hypowaagenia? bodenbenderi* (Behrendsen): A rare aspidoceratid ammonite from the Tithonian of the Neuquén Basin, Argentina



## *Hypowaagenia ? bodenbenderi (Behrendsen) : une rare ammonite aspidocératide du Tithonien du bassin de Neuquén, Argentine*

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## ABSTRACT

Among the ammonite collection from the Neuquén and Mendoza provinces made by G. Bodenbender, stands *Aspidoceras bodenbenderi* Behrendsen. This rare aspidoceratid is assigned to the lower Alternans Zone because of the associated *Parodontoceras calistoides* (Behrendsen), and can be most likely attributed to the recently established genus *Hypowaagenia* Schweigert & Schlampp.

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## RÉSUMÉ

Parmi la collection d'ammonites des provinces de Neuquén et de Mendoza réalisée par G. Bodenbender, se distingue *Aspidoceras bodenbenderi* Behrendsen. Cette rare aspidocératide est attribuée à la Zone Alternans en raison de la présence d'*Parodontoceras calistoides* (Behrendsen) associée. *A. bodenbenderi* peut très probablement être attribuée au genre récemment établi *Hypowaagenia* Schweigert & Schlampp.

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## RESUMEN

Entre los ammonites de la colección realizada por G. Bodenbender en las provincias Neuquén y Mendoza, sobresale *Aspidoceras bodenbenderi* Behrendsen. Este raro aspidocerátido es asignado a la parte baja de la Zona Alternans por estar asociado con *Parodontoceras calistoides* (Behrendsen), y puede asignarse con bastante seguridad al género *Hypowaagenia* Schweigert & Schlampp, recientemente establecido.

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## Introduction

Behrendsen (1891, 1892; spanish translation 1921) described part of the collection of ammonites made by G. Bodenbender during his geological survey through the Neuquén and Mendoza provinces. In his study of the ammonites collected from a locality named Arroyo Las Manzanas or Arroyo El Manzano (Fig. 1), Behrendsen (1892) introduced *Aspidoceras bodenbenderi*, based on a single specimen (Fig. 2).

This ammonite was collected from a level of black marly limestone, associated with a perisphinctid (Fig. 3) described as *Perisphinctes cf. lorioli* (Zittel, 1868) and another specimen mentioned as *Perisphinctes* sp. (Behrendsen 1892: 2). The specimen described as *P. cf. lorioli* is assigned to *Parodontoceras calistoides* Behrendsen, 1891, matching the morphotype of this species characteristic for the *vetustum* Horizon (Alternans Zone, Upper Tithonian). This morphotype, characterized by its coarse and barely flexuous ribbing in the adult phragmocone and bodychamber, is well recorded from the *vetustum* Horizon of the localities Arroyo Cieneguita (see Parent et al., 2011: fig. 23A) and Pampa Tril (see Parent et al., 2015: fig. 46A-B), both located in the Neuquén Basin as well.

The Tithonian rocks in the area of Arroyo Las Manzanas belong to the Vaca Muerta Formation which is exposed there along a short transect in the left bank downstream. This locality has never been studied, but seems to be promissory for the study of the Upper Tithonian (Alternans-Koeneni zones) faunal sequence according to the relatively good preservation of the fossils.

These two ammonites are refigured here photographically. *A. bodenbenderi* seems to belong to *Hypowaagenia* Schweigert & Schlampp, 2020, a recently established aspidoceratid genus of the subfamily Hybonoticeratinae.

The stratigraphic nomenclature used herein was discussed in Parent (2022).

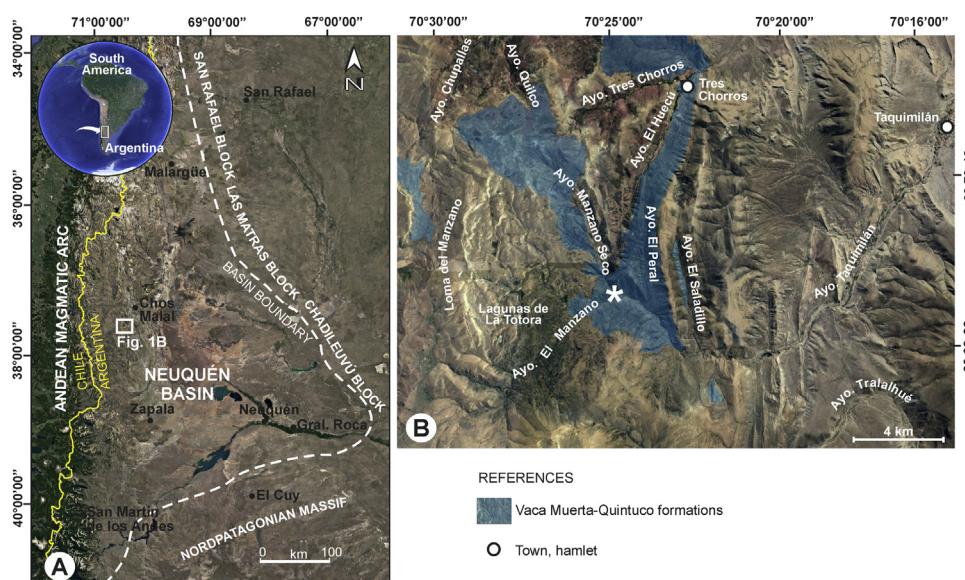
## Systematic Palaeontology

Order Ammonitida Fischer, 1882

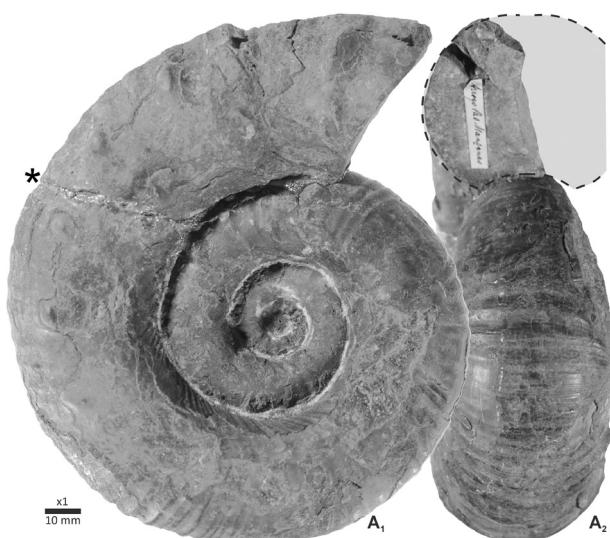
Suborder Ammonitina Fischer, 1882

Superfamily Aspidoceratoidea Zittel, 1895 sensu Parent, Schweigert and Scherzinger, 2020

Family Aspidoceratidae Zittel, 1895



**Fig. 1. A:** The Neuquén Basin with indication of the study area. **B:** Study area with indication of the collection site (asterisk) at Arroyo Las Manzanas or Arroyo El Manzano.  
A : Le bassin du Neuquén avec indication de la zone d'étude. B : Zone d'étude avec indication du site de collection (astérisque) à Arroyo Las Manzanas ou Arroyo El Manzano.



**Fig. 2.** *Hypowaagenia? bodenbenderi* (Behrendsen, 1892), holotype. Arroyo Las Manzanas, Vaca Muerta Formation, lower Alternans Zone. Specimen originally figured by Behrendsen (1892: pl. 2: 2 and pl. 3: 3), currently in the collection of the Geowissenschaftliches Zentrum der Georg-August-Universität, Geowissenschaftliches Museum, Göttingen, with the number GZG-INV-00569 (ex 498-19).—Natural size (x1). The asterisk indicates the last septum.  
*Hypowaagenia? bodenbenderi* (Behrendsen, 1892), holotype. Arroyo Las Manzanas, Formation Vaca Muerta, Zone Alternans inférieure. Spécimen figuré par Behrendsen (1892 : pl. 2 : 2 et pl. 3 : 3), actuellement dans la collection du Geowissenschaftliches Zentrum der Georg-August-Universität, Geowissenschaftliches Museum, Göttingen : GZG-INV-00569 (ex 498-19). — Grandeur nature (x1). L'astérisque indique le dernier septum.

Subfamily Hybonoticeratinae Olóriz, 1978

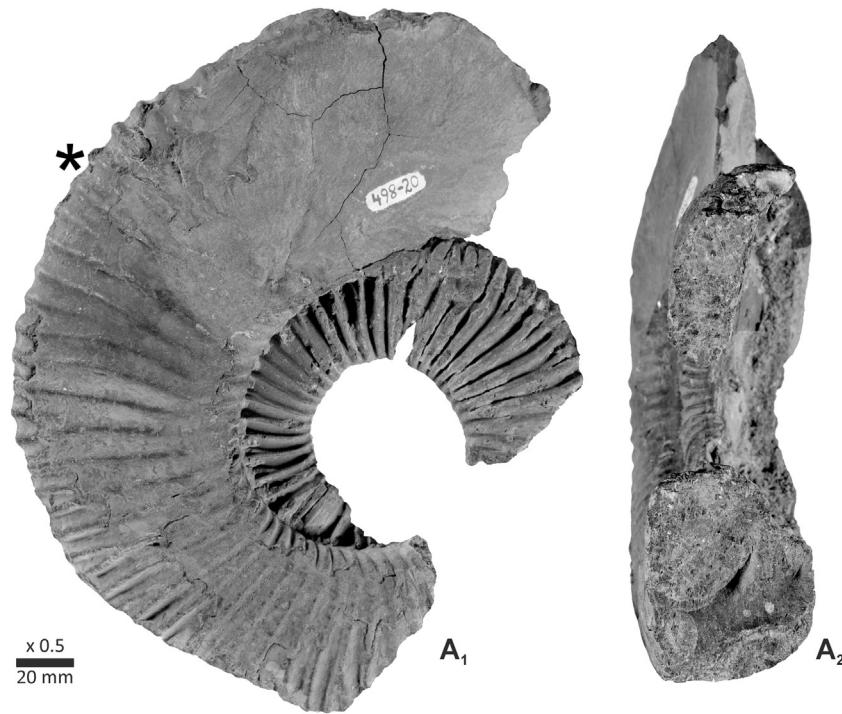
Genus *Hypowaagenia* Schweigert & Schlampp, 2020

Type species: *Hypowaagenia endressi* Schweigert & Schlampp, 2020; by original designation.

***Hypowaagenia? bodenbenderi*** (Behrendsen, 1892)

**Holotype.** The specimen figured by Behrendsen (1892: pl. 2: 1 and pl. 3: 3) as *Aspidoceras bodenbenderi*, herein refigured photographically in Fig. 2. Hitherto, this is the only specimen known of this species.

- REFERENCES  
■ Vaca Muerta-Quintuco formations  
○ Town, hamlet



**Fig. 3.** *Parodontoceras calistoides* (Behrendsen, 1891), adult macroconch with part of the body chamber. Arroyo Las Manzanas, Vaca Muerta Formation, lower Alternans Zone. Specimen originally figured by Behrendsen (1892: pl. 2: 1), currently in the collection of the Geowissenschaftliches Zentrum der Georg-August-Universität, Geowissenschaftliches Museum, Göttingen, with the number GZG-INV-00570 (ex 498-20). – Half natural size (x0.5). The asterisk indicates the last septum. *Parodontoceras calistoides* (Behrendsen, 1891), macroconque. Arroyo Las Manzanas, Formation Vaca Muerta, Zone Alternans inférieure. Spécimen figuré par Behrendsen (1892 : pl. 2 : 1), actuellement dans la collection du Geowissenschaftliches Zentrum der Georg-August-Universität, Geowissenschaftliches Museum, Göttingen : GZG-INV-00570 (ex 498-20). – Demi grandeur nature (x0.5). L'astérisque indique le dernier septum.

**Age.** The holotype was collected associated with a morphotype of *P. calistoides* (Fig. 3) typical of the *vetustum* Horizon (see Parent et al., 2011, 2015) which is at the base of the Alternans Standard Zone (see Parent, 2022).

**Description.** Moderately large macroconch; maximum preserved diameter  $D = 148$  mm. The body chamber begins at  $D = 132$  mm; at this point the ratios of the whorl width and height to the diameter are 0.38 and 0.33, respectively.

Evolute coiling with suboval, slightly wider than high whorl section throughout the ontogeny.

The ornamentation shows ontogenetic changes. Through 10–25 mm in diameter the whorls are bituberculated, with one perumbilical row and the other one in the upper third of the flanks. From about 25–30 mm in diameter the sculpture becomes strikingly irregular, almost without pattern; the tubercles become more sparse, and at some points almost undefined, gradually subdued in the ribs some of which end in a ventrolateral tubercle. The two outer whorls are densely ribbed by irregular, concave ribs which cross transversally the venter.

**Discussion.** The rather inflated whorls with tubercles through all the ontogeny are typical of the family Aspidoceratidae. The outer whorls exhibit an outer row of spines which is located close to the venter, a character that clearly excludes an assignment of this species to *Physodoceras*. On the other hand, the evolute, slender whorls exclude it from the very coarsely ribbed *Toulisphinctes* as well. The evolute coiling with persistent and rather dense ribbing crossing the venter uninterrupted, and especially the ventromarginal row of tubercles suggest the specimen could belong to *Hypowaagenia*. A morphologically close aspidoceratid is “*Aspidoceras*” *acanthomphalum* Zittel, 1870, which seems to be a mesoconchiate *Hypowaagenia* (see Schweigert & Schlamp, 2020, Fözy et al., 2022).

## Final Remarks

*H.? bodenbenderi* adds to the known fauna of Tithonian aspidoceratids of the Neuquén Basin which is neither very abundant nor very diverse, perhaps paralleling the worldwide pattern.

If our placement of *Aspidoceras bodenbenderi* in *Hypowaagenia* is correct, this would be the stratigraphically youngest record of this rare genus and expands its geographical distribution enormously. The latter fact, however, would be not very surprising, since many other aspidoceratid genera have similarly large distributions (e.g., *Peltoceratoides*, *Gregoryceras*, *Hybonoticeras*, *Pseudohimalayites*; see Gygi & v. Hillebrandt 1991, Cecca, 1999, Parent et al., 2020).

## Disclosure of interest

The authors declare that they have no competing interest.

## Acknowledgements

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