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New Valanginian–Hauterivian neocomitid ammonites from the Neuquén Basin, Argentina

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ABSTRACT

Three distinct, rich neocomitid faunas occur in the Agrio Formation (middle Valanginian to lowermost Barremian). In the ammonite sequences between, neocomitids are very rare and limited to two thin horizons. The lower, upper Valanginian level has yielded *Neocomites* (*Varlheideites*) cf. *peregrinus* Rawson and Kemper, *Neocomites* (*Varlheideites*) sp. nov.? and *Rodighieroites* sp. which are widely distributed taxa. The upper level contains *Comahueites aequalicostatus* gen. et sp. nov., which appears endemic to the basin.

1. Introduction

The Agrio Formation (middle Valanginian to lowermost Barremian) contains one of the most important Early Cretaceous ammonite faunas in the Southern Hemisphere. The taxa consist of both endemic and more widely distributed genera belonging to several different families that replaced one another in a series of faunal turnovers (Rawson, 2007: fig. 7). On three occasions neocomitids appeared suddenly in the basin to form thriving, evolving populations. The earliest was the *Neohoploceras/Karakaschiceras* fauna, described by Aguirre-Urreta (1998), the second formed the faunas of the *Pseudofavrella angulatiformis* zone (Aguirre-Urreta and Rawson, 1999, 2010) and the last was the *Hoplitocrioceras* fauna (Aguirre-Urreta and Rawson, 2001a). But between these faunal sequences neocomitids are very rare, represented by only a few, mainly fragmentary, undescribed forms from two distinct horizons, one upper Valanginian and the other lower Hauterivian. These taxa form the subject of this paper.

2. Stratigraphy and fossil localities

The Agrio Formation of the Neuquén Basin crops out along the eastern foothills of the Andes in west-central Argentina (Fig. 1). It is a predominantly marine sequence of black and dark grey to green shales with thinner interbeds of sandstones, tuffs and calcareous coquinas. Weaver (1931) described its type locality in the Río Agrio section of central Neuquén Province, dividing the unit into three members: the lower and upper members form a thick marine series, now named the Pilmatué and Agua de la Mula members (Leanza and Hugo, 2001) which are separated by the non-marine sandstones of the Avilé Member. The age of the Agrio Formation can be tightly bracketed based on its ammonite fauna. Though both its base and its top are diachronous, in the central part of the basin where the Agrio Formation is at its thickest, the base is upper lower Valanginian (*Olcostephanus* (*Olcostephanus*) *atherstoni* zone) while the uppermost levels can reach the lowermost Barremian (*Sabaudiella riverorum* zone). Towards the basin margins the lowest levels are late Valanginian in age (*Pseudofavrella angulatiformis* zone) while towards the southern part of the basin the top levels are late Hauterivian in age (*Crioceratites diamantensis* or *Paraspiticeras groeberi* zones).

The late Valanginian fauna described here is concentrated in the northern area of Neuquén province while the early Hauterivian species is more widely distributed across the basin (Fig. 1).

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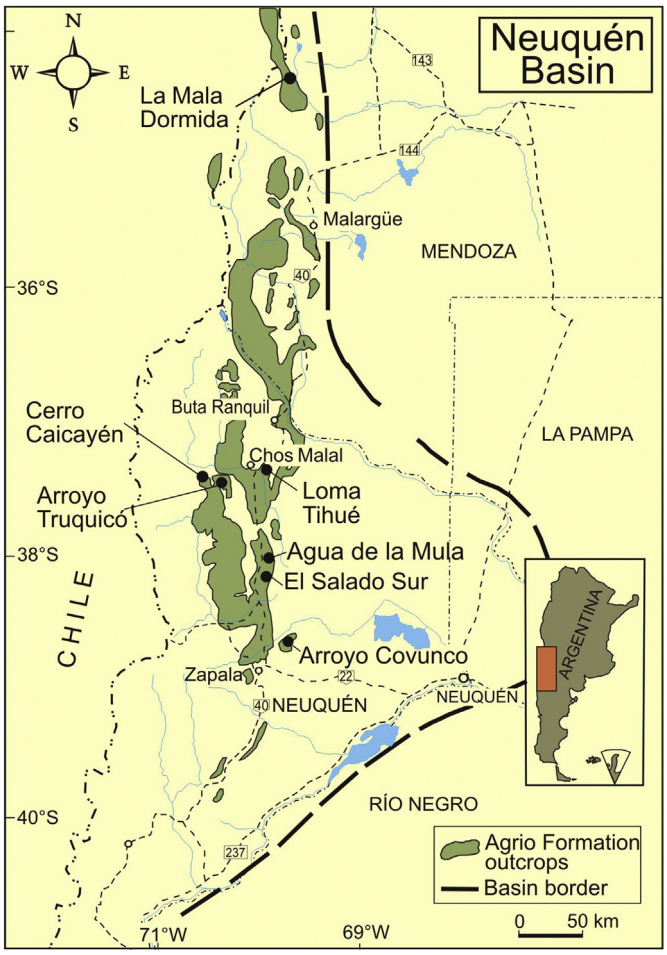

Fig. 1. The Neuquén Basin in west-central Argentina showing outcrops of the Agrio Formation, basin borders and location of studied localities.

2.1. La Mala Dormida (34°35′S, 69°36′W)

This is a classic locality of the central Andes, discovered by Gerth (1925: fig. 17). It is reached (at present only on foot) along a winding, precarious rocky track from the settlement of Las Aucas in southern Mendoza, some 10 km north of Paso El Perdido. Though the section is poorly exposed, it comprises the whole of the (condensed) Agrio Formation which is here composed of yellowish silty limestones. Only one body chamber fragment (CPBA 20064) of *Comahueites aequalicostatus* gen. et sp. nov. has been recovered from the same horizon as *Olcostephanus* (*O.*) *laticosta* (Gerth).

2.2. Cerro Caicayén (37°26′S, 70°24′W)

Close to the Arroyo Rahueco and Puesto Contreras, this locality is about 7 km east of Cerro Caicayén and 8 km south of the Río Neuquén. Access lies 13 km to the southwest of Chos Malal off national road 40 onto provincial road 6 towards Estancia Rahueco, along the road to Oscar mine. The whole Mulichinco Formation and the lower Pilmatué Member of the Agrio Formation are well exposed here (Fig. 2). Part of a body chamber (CPBA 20895) and two fragments of phragmocones (CPBA 20896-97) of *Neocomites* (*Varlheideites*) cf. *peregrinus* Rawson and Kemper were collected from olive-grey shales associated with abundant *Steinmanella caicayensis* Lazo and Luci.

2.3. Arroyo Truquicó (37°28′S, 70°18′W)

This is a classic section where Bodenbender collected the first Early Cretaceous marine fossils from the Neuquén Basin (Bodenbender, 1892), described by Behrendsen (1892). The section is located southeast of Chos Malal, approximately10 km from where the Arroyo Truquicó joins the Río Neuquén. Access is from provincial road 6 off national road 40 towards Estancia Chiappe and then provincial road 30 for about 3 km, to the south-east on the road to Tres Chorros. The lower part of the Pilmatué Member is well exposed (Fig. 2) where it is composed of dark shales with calcareous nodules interbedded with coquinas packed with bivalves. A single partly crushed specimen (CPBA 20894) of *Neocomites* (*Varlheideites*) sp. nov.? was found in the shales.

2.4. Loma Tilhué (37°22′S, 70°13′W)

This locality is close to Chos Malal, 2.4 km north of the bridge over the Río Neuquén. Access is from a gravel road off national road 40 to the east, leading to Chos Malal rubbish dump. Part of the Mulichinco Formation and a complete, though poorly exposed section of the Agrio Formation are exposed in this area. Ammonites are rare and a single fragment of *Rodighieroites* sp. (CPBA 20890) was preserved in a calcareous nodule in gray shales.

2.5. Agua de la Mula (38°03′S, 70°01′W)

This is another classic section of the Agrio Formation on the western flank of Cordillera del Salado, described by Weaver (1931). Access is from the east side of national road 40, 80 km south of Chos Malal, along a gravel road to a dry oil well. The whole Agrio Formation is very well exposed here where we have measured detailed sections (Fig. 2). Two phragmocone fragments (CPBA 19279.1, 19279.3), two body chambers fragments (CPBA 18392-93) and one body chamber? fragment (CPBA 19279.2) of *Comahueites aequalicostatus* gen. et sp. nov. have been recovered, associated with *Olcostephanus* (*O.*) *laticosta* (Gerth) and *O. (Jeannoticeras) agrioensis* Aguirre-Urreta and Rawson (Aguirre-Urreta and Rawson, 2001b, p. 766).

2.6. El Salado Sur (38°11′S, 70°03′W)

The section lies 15 km south of Agua de la Mula; access is eastward from national road 40 along a gravel road leading to the Pampa Amarga oil wells. About 1 km south of the track there are extensive exposures of the complete Agrio Formation. One of us (PFR) measured a detailed section through the *O.* (*O.*) *laticosta* beds here (Fig. 2), which can be correlated closely with the equivalent beds at Agua de La Mula (17 km to the north) where *Olcostephanus* is more abundant (Aguirre-Urreta and Rawson, 2001b, p. 767). Two incomplete specimens (CPBA 19265, 19278) of *Comahueites aequalicostatus* gen et sp. nov. were collected in beds in the upper part of the subzone, above the last *O.* (*O.*) *laticosta* and below the first appearance of *Hoplitocrioceras* (see Fig. 2).

2.7. Arroyo Covunco (38°41′S, 69°56′W)

Access to this locality is 21 km due northeast of Zapala on provincial road 14 towards Covunco Centro and then some 9 km northeast of this town on provincial road 3, on the right bank of Arroyo Covunco. There are patchy exposures of the Pilmatué Member and a succession of grey silty shales packed with small *Ceratostreon* sp. oysters yielded *Olcostephanus* (*O.*) *laticosta* (Gerth) and three specimens of *Comahueites aequalicostatus* gen. et sp. nov. (CPBA 20898.1–3).