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A new species of *Andiceras* Krantz (Cephalopoda: Ammonoidea) from the Late Jurassic-Early Cretaceous of the Neuquén Basin, Mendoza, Argentina. Systematics and Biostratigraphy

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ABSTRACT. A new ammonoid species of the Andean endemic genus *Andiceras* Krantz is here described from upper Tithonian-lower Berriasian levels of the Vaca Muerta and Chachao Formations of the Mendoza Group, in north-western Mendoza Province, Argentina. *Andiceras planulatus* sp. nov. lies between the last beds with representatives of the *Substeueroceras koeneni* Assemblage Zone of late Tithonian age and the first bed yielding elements of the *Argentiniceras noduliferum* Assemblage Zone of early Berriasian age, according to the traditional Andean ammonoid zonation scheme. The particular stratigraphic position of *Andiceras planulatus,* together with its easily recognizable morphology makes this species a good potential biostratigraphic marker for the Jurassic-Cretaceous boundary in the Andean region.

Keywords: Ammonoidea, Andiceras, Tithonian, Berriasian, Neuquén Basin, Vaca Muerta Formation, Chachao Formation, Argentina.

RESUMEN. Una nueva especie de *Andiceras* Krantz (Cephalopoda: Ammonoidea) del Jurásico Tardío-Cretácico Temprano de la Cuenca Neuquina, Mendoza, Argentina. Sistemática y bioestratigrafía. Se describe una nueva especie de amonoideo perteneciente al género andino endémico *Andiceras* Krantz. Los restos asignados a *Andiceras planulatus* sp. nov. se disponen estratigráficamente entre los últimos niveles con representantes de la Biozona de Asociación de *Substeueroceras koeneni* de edad tithoniana tardía, y los primeros elementos de la Biozona de Asociación de *Argentiniceras noduliferum* de edad berriasiana temprana, de acuerdo al esquema clásico de biozonación andina. La posición estratigráfica particular de esta nueva especie, junto con su morfología de fácil identificación, la convierten en un potencial buen marcador bioestratigráfico para el reconocimiento del límite Jurásico-Cretácico en la región andina.

Palabras clave: Ammonoidea, Andiceras, Tithoniano, Berriasiano, Cuenca Neuquina, Formación Vaca Muerta, Formación Chachao, Argentina.

1. Introduction

The Neuquén Basin of west-central Argentina is located between 32 and 40º South and comprises a nearly continuous sedimentary infill from Late Triassic to Cenozoic (Fig. 1a). The basin was limited eastward by the Sierra Pintada System, southeastward by the Patagonian Massif, and to the west by a discontinuous volcanic arc which allowed its communication with the Pacific Ocean (Howell *et al.*, 2005). The outcrops extend along a narrow belt over the Central Andes and widen southeastward to form the Neuquén Embayment (Bracaccini, 1970). The Mendoza Group (Groeber, 1946), in the study area, includes the Tordillo (Kimmeridgian), Vaca Muerta (lower Tithonian-lower Berriasian), Chachao (lower Berriasian-lower Valanginian), and the Agrio (upper Valanginian-Hauterivian) Formations. The Vaca Muerta Formation was deposited during one of the most extended transgressions in the basin and it is characterized by the rhythmic alternation of bituminous dark shales, marls and calcareous beds. During the Tithonian the Vaca Muerta Formation was deposited over a homoclinal carbonate-siliciclastic ramp system that probably turned into a distally steepened ramp during the Berriasian (Mitchum and Uliana, 1985; Kietzmann *et al*., 2008; Kietzmann and Vennari, 2008). The prevailing restricted bottom conditions with deficient oxygenation allowed the excellent preservation of many fossil groups, including a variety of vertebrates and invertebrates, among which ammonoids are the most abundant.

In southern Mendoza, the Vaca Muerta Formation grades up transitionally into the Chachao Formation, characterized principally by yellowish, bioclastic packstones mainly composed by ostreoids and pectinids. From upper Tithonian to lower Berrisian levels of the top of the Vaca Muerta Formation and the base of the Chachao Formation, some ammonoid specimens assignable to a new species have been recovered. *Andiceras planulatus* sp. nov. is here proposed as a new form of *Andiceras* Krantz, a genus firstly described from upper Tithonian-lower Berriasian sedimentites in Mendoza Province (Krantz, 1926). This new species may have a high biostratigraphic potential as it is located between the late Tithonian *Substeueroceras koeneni* and the early Berriasian *Argentiniceras noduliferum* Assemblage zones. Although two biostratigraphic schemes have been proposed for the Late Jurassic-Early Cretaceous Andean succession (Leanza, H. 1981a-b; Riccardi, 1988 *versus* Leanza, H. 1996; Riccardi, 2008), the authors still favour the first one (the traditional one) for reasons later explained in the text.

Most of the material described here was collected by Beatriz Aguirre-Urreta and Pamela Álvarez in the summer of 1995 and it is stored in the Palaeontological Collection of the Buenos Aires University, Argentina (CPBA). For the purpose of comparison, type material of other species included in the genus *Andiceras* is also figured; these specimens are housed in the Geoscience Centre of the University of Göttingen, Museum, Collections and Geopark, Germany (GZG) (Steuer collection) and in the Steinmann Institute for Geology, Mineralogy and Palaeontology of the Bonn University, Germany (IPB), (Krantz collection).

Dimension of the specimens are indicated in mm: D: diameter; H: whorl height; W: whorl width and U: umbilical diameter.

2. Geographical and Geological setting

The measured Vaca Muerta Formation section (95 m) is located in western Mendoza, north of Laguna Diamante, on the eastern bank of Arroyo Durazno, near Real de las Coloradas (34ºS, 69ºW) (Fig. 1b). It comprises a complete section of the unit, including both its lower contact with the Tordillo Formation and its upper transitional boundary with the Chachao Formation (Fig. 2a).

After a basal microbial laminated mudstone bed, the sedimentary succession continues upward with a monotonous alternation of shales, bearing calcareous nodules, marls with massive and laminar mudstones, and some thin intercalations of calcareous sandstones.

Higher up, the Chachao Formation is represented by bioclastic packstones intercalated with some massive mudstones and marls/shales beds (Fig. 2b).

Ammonites are very abundant all through the section until the base of the Chachao Formation, where shallow-water bivalves start to be dominant. Pectinids, oysters, gastropods and some vertebrate remains are also frequently found associated with the ammonoid fauna. The fossils here described have been collected from levels situated in the last part of the Vaca Muerta Formation and the basal portion of the Chachao Formation, just above a bed yielding representatives of *Himalayites andinus* Leanza, H. included in the *Substeueroceras koeneni*

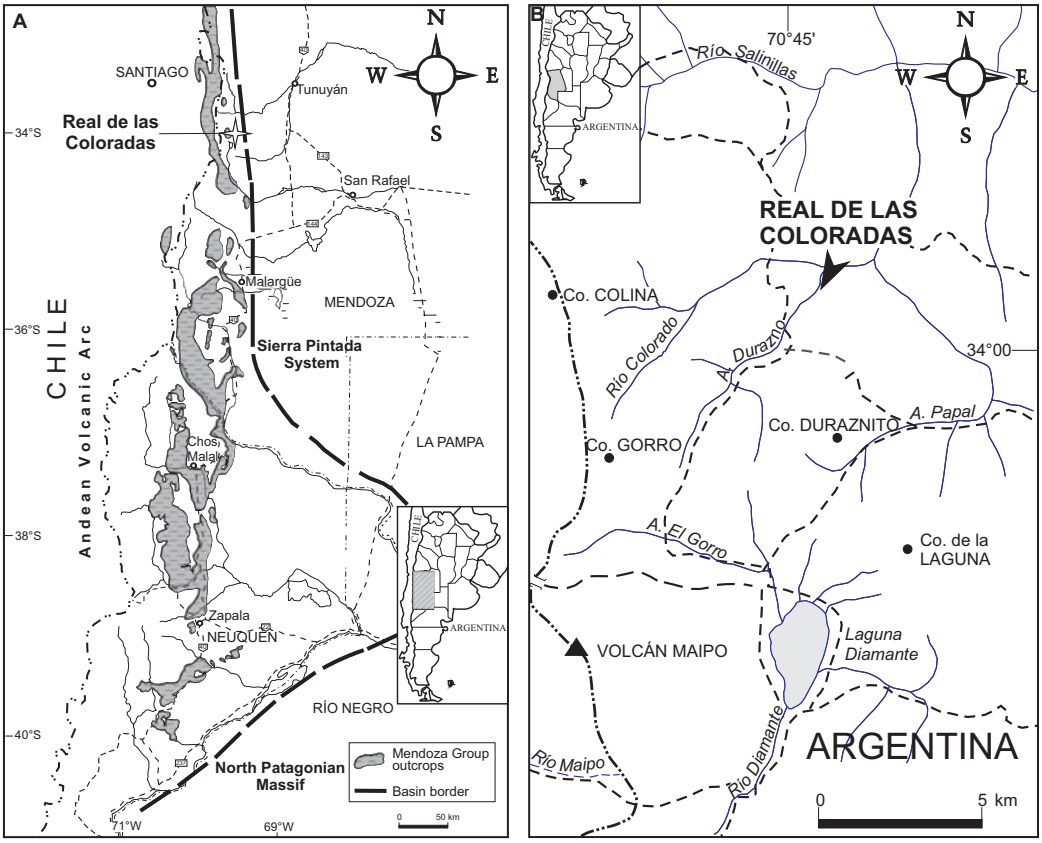

FIG. 1. **a**. Mendoza Group outcrops in the Neuquén Basin and its boundaries during the Late Jurassic-Early Cretaceous (modified from Gulisano *et al.*, 1984 and Riccardi, 1988); **b.** Location map of the study area.

Zone, and below levels containing *Groebericeras* Leanza, A., which has been previously studied by Aguirre-Urreta and Álvarez (1999), and traditionally included in the *Argentiniceras noduliferum* Zone.

3. Systematic Paleontology (by Vennari, V.V.)

Superfamily Perisphinctaceae Steinmann, 1890
Family Neocomitidae Salfeld, 1921
Subfamily Berriasellinae Spath, 1922
Genus *Andiceras* Krantz, 1926

? 2011. *Krantziceras*. Parent *et al.,* p. 40.

Type species: *Andiceras trigonostomum* Krantz, 1926 (Krantz, 1928 spanish translation), p. 451, pl. 16, fig. 3, 4. Subsequent designation by Arkell (in Arkell *et al*., 1957, p. L352). Lectotype designated by Parent *et al.* (2011) refigured here (Fig. 3 C1-C3).

Remarks: In 1926, Krantz (p. 451, pl. 16, figs. 3, 4) raised the genus *Andiceras* for some specimens recovered from upper Tithonian-lower Berriasian sediments from the Arroyo Durazno and Arroyo Paraguay localities of the Mendoza Province, Argentina [not from Paraguay as stated in Arkell *et al.* (1957) and Wright *et al.* (1996) in both editions of the Treatise on Invertebrate Paleontology: Mollusca 4]. At that time Krantz erected two new species within this genus: *A. trigonostomum* (type species by subsequent designation by Arkell *et al.,* 1957), and *A. acuticostum* (Fig. 3A1, A2). Additionally *A*. cf. *theodorii* (Burckhardt, non Oppel, 1863), *A. theodorii* (Steuer, non Oppel) and *A. fallax* (Steuer) (Fig. 3 B1, B2), were also incorporated into this group by Krantz in the same work. But, although well preserved specimens are known for the last two species, *A*. cf. *theodorii* (Burckhardt, 1903, p. 163-164, pl. 10, fig. 21, 22) is figured only as a small

whorl fragment, on which the generic diagnostic features cannot be well recognized. Unfortunately, we were unable to obtain a modern photograph of the specimen figured as *Odontoceras theodorii* by Steuer (1897, 1921 Spanish translation) so that it could be included here together with the other type specimens of the species involved in this genus.

The genus *Andiceras* embraces evolute discoidal shells with subrounded to flattened venters and whorl sections higher than wide, with their maximum width attained at or near the umbilical seam. Whorls sections range from subtriangular with a relatively low H/W ratio (*A. trigonostomum*) to suboval with a higher H/W ratio (*e.g.*, *A. acuticostum* and *A. planulatus* here described). Umbilical seam always rounded but variable pronounced and umbilical wall steeper on outer whorls. Sculpture characterized by dichotomous ribs, sligtly rursiradiate on umbilical wall and rectiradiate to prorsiradiate over the flanks, frequently after rib bifurcation takes place. Some simple and polygyrated ribbing does occur, but intercalary ribs are not observed. On external whorls ribs show no interruption over the venter when shell material is preserved, although a variable persistent ventral depression can be developed. Suture line is characterized by a deep trifid lateral lobe and auxiliary lobes that may exhibit a slight external orientation.

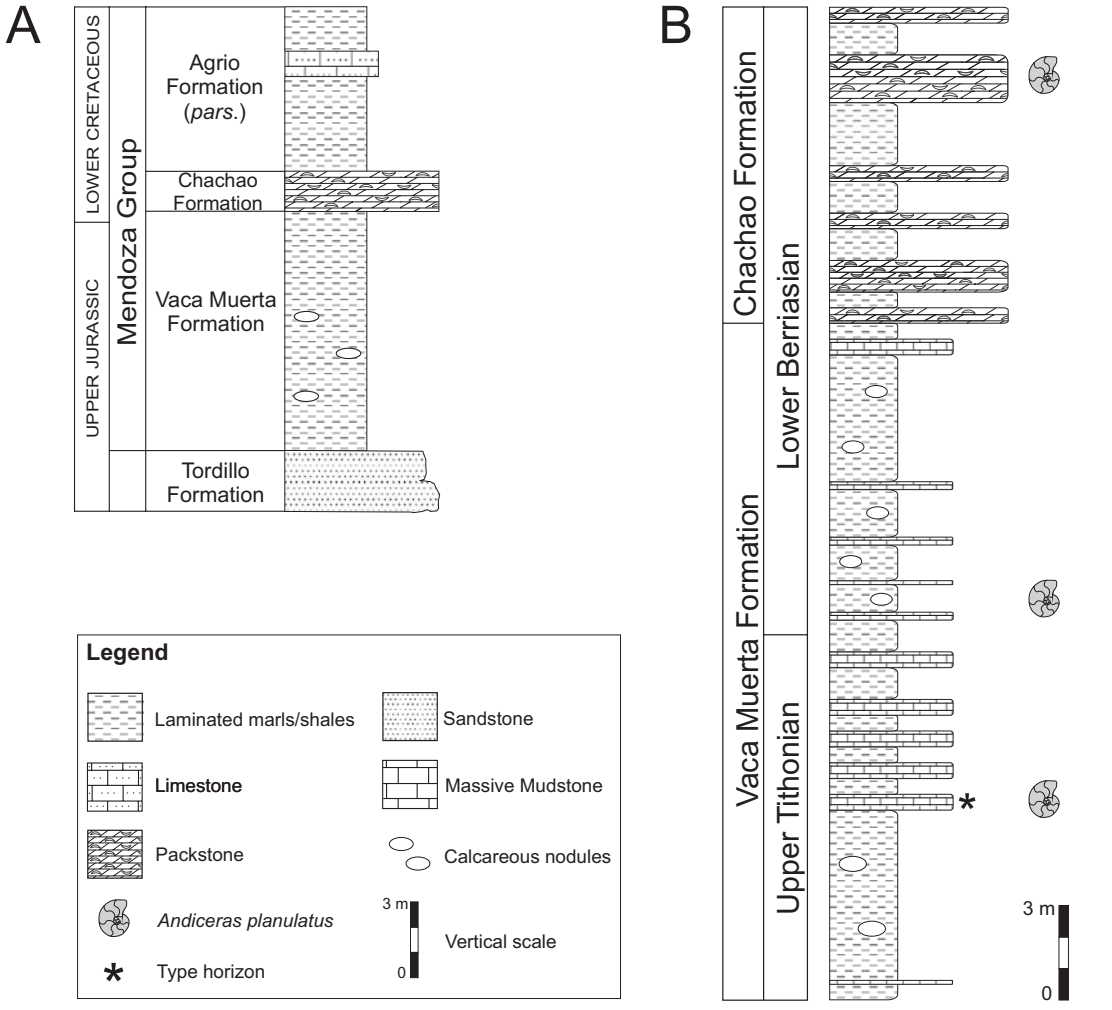

FIG. 2. **a**. General stratigraphic section of the Mendoza Group in the study area. Not to scale; **b**. Upper levels of the Real de las Coloradas' stratigraphic section with *Andiceras planulatus* sp. nov. Vennari beds and type horizon situation.

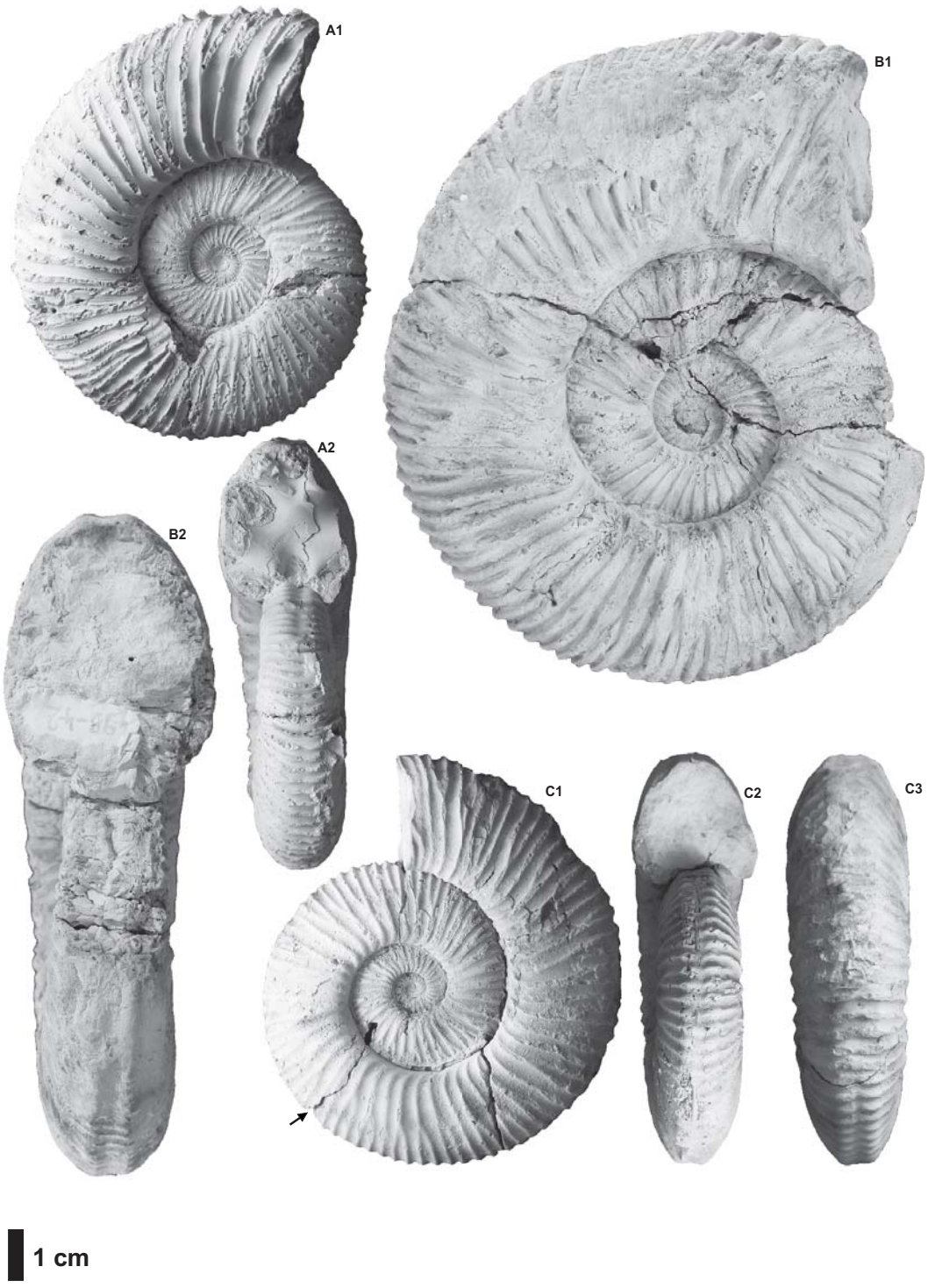

FIG. 3. **A1**, **A2**. *Andiceras acuticostum* Krantz (1926), Holotype IPB 24. Arroyo Durazno, Mendoza; **B1**, **B2**. *Andiceras fallax* (Steuer non Oppel, 1897), Holotype GZG 499-42 (Steuer Col.). Malargüe, Mendoza; **C1**, **C2, C3**. *Andiceras trigonostomum* Krantz (1926), *Andiceras* Type species, Holotype IPB 23 (Gerth Col., 1754). Arroyo Paraguay, Mendoza. All specimens recovered from late Tithonian-early Berriasian sediments. The little arrow indicates the beginning of the living chamber. All figures X1.

Specimens assignable to *Andiceras* have not been cited frequently in the literature. Five years after Krantz's first description of the genus, Weaver (1931, p. 51) mentioned the presence of *Andiceras trigonostomum* at a locality in the Vaca Muerta Ridge, near Las Lajas, Neuquén Province. Nevertheless, the association of those specimens with *Windhauseniceras internispinosum* (Krantz) of middle Tithonian age casts doubts on their identification. More recently, from the Real de las Coloradas section in northern Mendoza, Aguirre-Urreta and Álvarez (1999) mentioned the discovery of some specimens assigned to an '*Andiceras* faunule' (some of them figured here), placed between the late Tithonian *Substeueroceras koeneni* Zone and the early Berriasian *Argentiniceras noduliferum* Zone. Aguirre-Urreta (2001) then proposed a zone named *Andiceras trigonostomum*.

The recent concern raised by Parent *et al.* (2011, p. 42) about the validity of *Andiceras* is not justified. The genus *Andiceras* Krantz fits perfectly well the requirements of the Art. No. 12 of the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature, 1999) so it can not be considered a *Nomen Dubium* as stated by those authors. Moreover, *Krantziceras* in Parent *et al.* (2011, p. 40) is most probably a junior synonym of *Andiceras*.

Records of *Andiceras* outside Argentina are dubious and scarce. Spath (1939) included *Andiceras fallax* in his new genus *Parandiceras* from northern Pakistan. Some morphological differences, related principally to whorl section and ornamentation, as well as its association with neocomitids of Early Valanginian age (Fatmi, 1977), do not seem to support this designation. From Central America, Verma and Westermann (1973) reported the presence of *Andiceras* from Mexico. During the revision of the ammonoid fauna from the upper part of El Pastor Member of the La Caja Formation, they assigned *Perisphinctes lenki* Aguilera*, Perisphinctes dolfussi,* Aguilera (probably a synonym of the former), and *Perisphinctes monserrati* Aguilera, (the three of them in Castillo and Aguilera, 1895), to *Andiceras.* Nevertheless, neither their morphological features nor their stratigraphic position coincide with those of Krantz's genus. *Perisphinctes lenki* is more involute and exhibits coarser ribbing than the Argentinean forms, and *P. monserrati*'s whorl section, markedly wider than high, is dissimilar to that of *Andiceras*. On the other hand, the associated fauna is composed of *Pseudolissoceras zitteli* and *Schaireria neoburguensis* among other Middle Tithonian genera. They all come from what the authors call Virgatosphinctinae beds, of early mid Tithonian age, as verified by Olóriz *et al*. (1996, 1999) who also figured two new (somewhat distorted) specimens of *Andiceras lenki* (Aguilera) from the same unit, and one small specimen assigned to *Andiceras* but without specific designation due to its reduced size and bad preservation (Olóriz *et al.*, 1999). Verma and Westermann (1973) studied specimens are here considered morphologically closer to *Aulacosphinctoides,* recovered from the same beds, than to *Andiceras* (*e.g.,* compare the holotype of *P. lenki*, pl. 43, fig. 2a-b, with *Aulacosphinctoides lauri*'s lectotype, pl. 27, fig. 3a-b in Verma and Westermann's publication).

Also from Mexico, but from the Chinameca Formation, Cantú-Chapa (2006) assigned a small evolute specimen to *Andiceras monserrati* (Aguilera). Although it superficially resembles *Andiceras*, its size and the fact that whorl H/W ratio is unknown cast doubts on its taxonomic assignment.

In addition to the aforementioned *Andiceras* references, and the external mould of a whorl fragment of *Andiceras* (?) sp. of dubious stratigraphic position from Antarctica (Thomson, 1979), the authors do not have knowledge of other specimens assigned to this genus outside western Argentina. Therefore, *Andiceras* seems to be an endemic genus, of high local biostratigraphic value, due to its particular stratigraphic occurrence and its easily recognizable morphology.

Andiceras planulatus sp. nov.
Fig. 4: A-G; Fig. 5: A-H; Fig. 6; Fig. 7E; Table 1

Holotype: Specimen CPBA 20700.1 (Fig. 4 A1-A3).
Paratypes: Specimens CPBA 20702.1 (Fig. 4 B1-B3) and CPBA 20700.3 (Fig. 4 G1-G3).
Derivation of the name: From its remarkable flat serpenticonic shell.
Additional material: Twenty-two well preserved and almost complete specimens (CPBA 20700.2; CPBA 20700.4-20700.6; CPBA 20701.1-20701.3; CPBA 20702.2-20702.16) from Real de las Coloradas section, Mendoza Province, Argentina.
Type locality and horizon: Western Mendoza, Argentina, Real de las Coloradas section, on the eastern bank of Arroyo Durazno, north of Laguna Diamante. Material comes from a 22 m interval in the highest beds of the Vaca Muerta Formation and

TABLE 1. DIMENSIONS OF FIGURED SPECIMENS (mm).

Specimen	D	H	W	U	H/W	U/D
CPBA 20700.2	49.63	16.37	12.33	22.26	1.33	0.45
CPBA 20701.1	51.62	17.28	13.56	22.64	1.27	0.44
CPBA 20702.1	55.24	16.6	14.83	25.2	1.12	0.46
CPBA 20702.2	63.05	19.18	15.47	30.26	1.24	0.48
CPBA 20702.3	77.83*	20.01	15.72*	39.16	-	-
CPBA 20701.2	74*	20.98*	12.75*	36.87	-	-
CPBA 20700.3	76.87	20.97	12.20*	40.83	-	0.53
CPBA 20701.3	84.35	24.4	16.48	40.15	1.48	0.48
CPBA 20700.1	101.38	27.83	22.43	52.05	1.24	0.51
CPBA 20702.6	58.53	20.35	16.26	25.71	1.25	0.44
CPBA 20702.7	66.97	21.5	16.21	31.52	1.33	0.47
CPBA 20702.9	38.64	12.22	9.77	16.17	1.25	0.42
CPBA 20702.10	34.36	12.9	9.72	13.72	1.33	0.40
CPBA 20702.11	115.3*	32.89	-	54.75	-	-
CPBA 20700.5	55.12*	17.9	14.01	31.64	1.28	-

D: Diameter; **H:** whorl height; **W:** whorl width; **U:** umbilical diameter.

***** Approximate measurement

the basal portion of the Chachao Formation (Fig. 2B). Type horizon containing the holotype CPBA 20700.1 and the paratype CPBA 20700.3 is situated 70 m above the base of the section and 14.5 m below the first bioclastic packstone intercalation of the Chachao Formation. It consists of a 0.5 m thick laminated mudstone bed. The paratype CPBA 20702.1 is located 12 m upwards in a 1.5 m thick bioclastic packstone.

Diagnosis: *Andiceras* characterized by its strong evolution and flattened outline.

Description: Serpenticone discoidal shell, strongly evolute (mean U/D=0.47 mm). Largest specimen may reach more than 115 mm in diameter. Body chamber only partially preserved (1/4 whorl length or less) in four specimens (Fig. 4C and 5A2, B2, and D1). Almost parallel flat flanks becoming slightly more rounded with age (Fig. 7E). Venter gently convex. Whorl section compressed, higher than wide (mean H/W=1.28 mm), maximum whorl breadth attained around the umbilical border. Very shallow rounded umbilical wall, although slightly more pronounced on outer whorls. Ornamentation characterized by low-relief fine ribs, gently rursiradiate on umbilical wall, bent forward at the umbilical angle and rectiradiate to slightly prorsiradiate over the flanks. Most of primary ribs bifurcate near the middle of the flanks, some remain simple though in a few cases polygyrate branching does occur. No true constrictions are observed but some intercostal spaces may be reduced when a simple rib takes place. Ribs interrupted by a narrow and shallow ventral furrow up to a 20 mm diameter, on both sides of which, each rib swells slightly. After that, and when the complete thickness of the recrystallized shell material is preserved, ribs suffer a marked ventral depression but show no interruption until the shell reaches a diameter of 80 mm. Whenever the internal mould is preserved, a narrow ventral furrow accompanied by slightly swollen ribs at its sides is still visible. On outer whorls ribbing is continuous and passes straight over the venter with no depression. Portions of living chamber preserved show no change in ornamentation. Apertural modifications are unknown. Suture line well indented, characterized by narrow saddles and a deep trifid lateral lobe (Fig. 6).

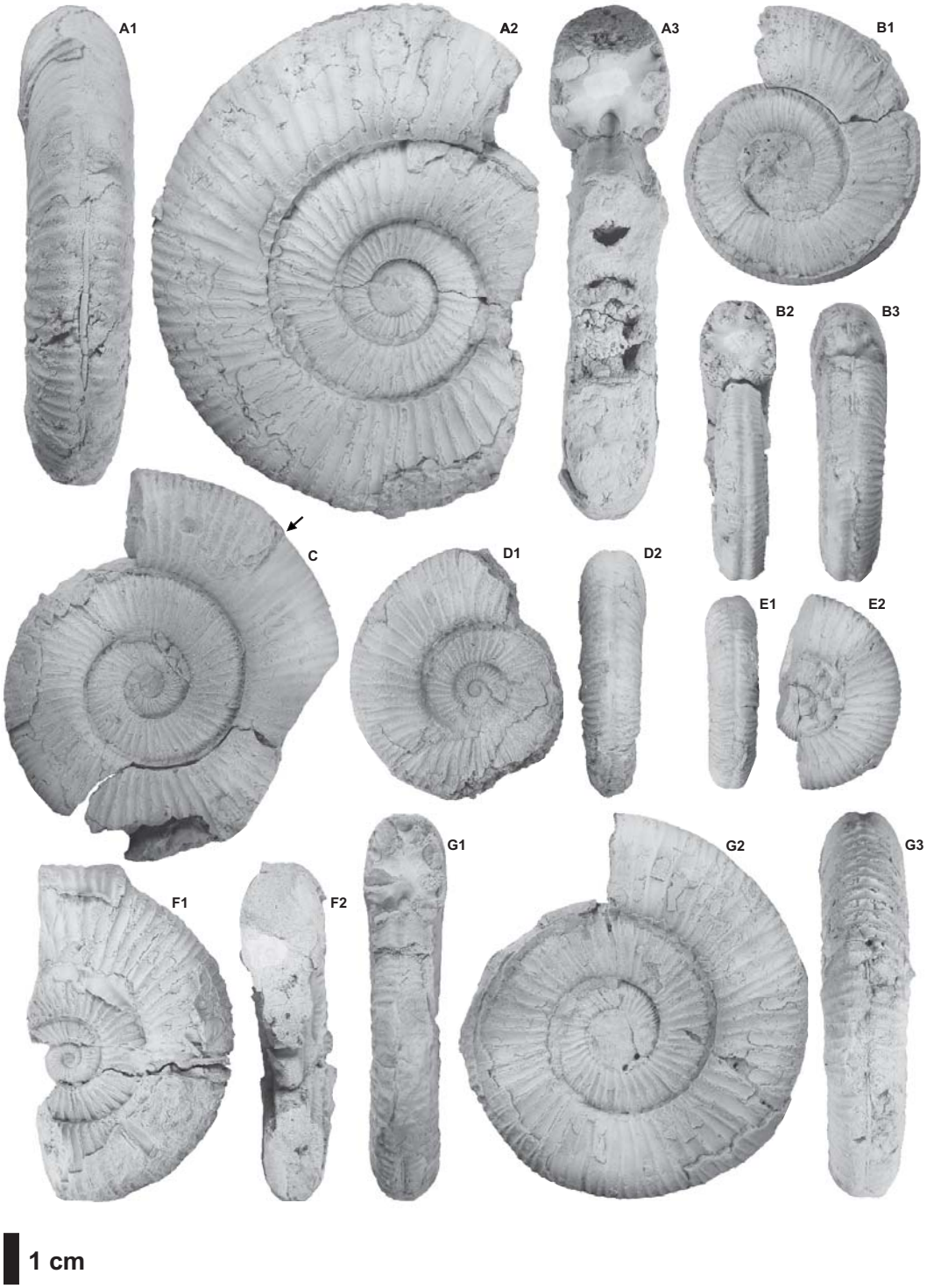

FIG. 4. *Andiceras planulatus* Vennari sp. nov. late Tithonian-early Berriasian of Real de las Coloradas section. **A1**, **A2**, **A3**, CPBA 20700.1 Holotype; **B1**, **B2**, **B3**, CPBA 20702.1 Paratype; **C**, CPBA 20702.3; **D1**, **D2**, CPBA 20700.2; **E1**, **E2**, CPBA 20702.9; **F1**, **F2**, CPBA 20702.7; **G1**, **G2**, **G3**, CPBA 20700.3 Paratype. The little arrow indicates the beginning of the living chamber. All figures X1.

FIG. 5. *Andiceras planulatus* Vennari sp. nov. late Tithonian-early Berriasian of Real de las Coloradas section. **A1**, **A2**, CPBA 20702.11; **B1**, **B2**, **B3**, CPBA 20700.5; **C1**, **C2**, CPBA 20702.10; **D1**, **D2**, CPBA 20701.2; **E1**, **E2**, CPBA 20702.6; **F1**, **F2**, CPBA 20701.1; **G1**, **G2**, **G3** CPBA 20702.2; **H**, CPBA 20701.3. The little arrow indicates the beginning of the living chamber. All figures X1.

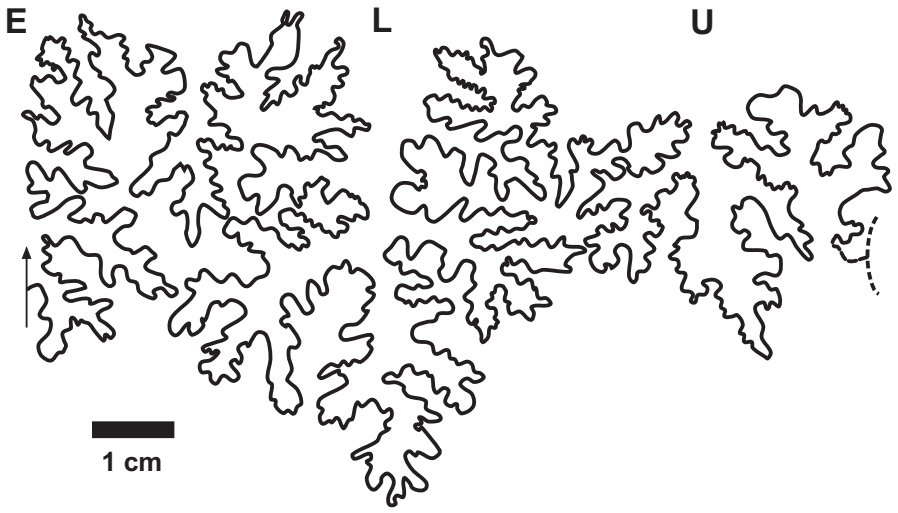

FIG. 6. *Andiceras planulatus* sp. nov. suture line. **E**: external lobe, **L**: lateral lobe, **U:** umbilical lobe. CPBA 20702.1 X10

Remarks: Inclusion of *Andiceras planulatus* in this genus is well supported by its general morphology, ribbing pattern and suture line. Nevertheless, its strong degree of evolution and markedly flat whorl section throughout ontogeny makes this species quite easily differentiable from others. From the group of species originally included by Krantz (1926) in his new genus *Andiceras,* (*A. trigonostomum* and *A. acuticostum* Krantz, *A. theodorii* Steuer non Oppel, *A*. cf. *theodorii* Burckhardt non Oppel and *A. fallax* Steuer), *A. acuticostum* and *A. theodorii* have the closest morphology to *Andiceras planulatus* (see schematic tranversal sections on Fig. 7A-7E), but both exhibit lesser degrees of evolution and more rounded outlines, and *A. Theodorii,* particularly, shows a notable persistence of the ventral groove on the outer whorls. *A. trigonostomum* differs from *A. planulatus* by its triangular whorl outline and the persistency of the ventral depression over the living chamber. Finally, *A. fallax* presents very rounded flanks, a markedly steep umbilical wall and a ventral depression that accompanies the entire phragmocone (diameter=130 mm), all characters clearly different from those typical of *A. planulatus*.

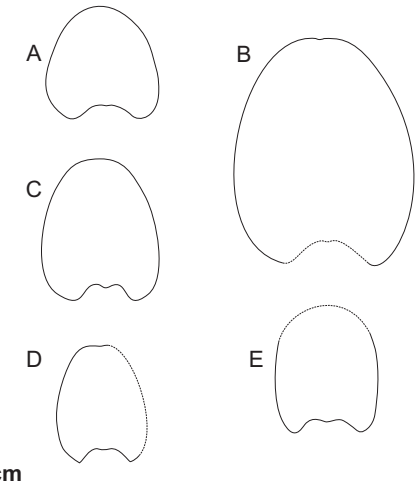

FIG. 7. *Andiceras* group whorl sections. **A**. *Andiceras trigonostomum* Krantz, *Andiceras* Type species, Holotype IPB 23 (Gerth Col. 1754); **B**. *Andiceras fallax* (Steuer), Holotype GZG 499-42 (Steuer Col.); **C**. *Andiceras acuticostum* Krantz, Holotype IPB 24; **D**. *Andiceras theodorii* (Steuer non Oppel) refigured from Steuer 1921; **E**. *Andiceras planulatus* Vennari sp. nov, CPBA 20700.1. All figures X1.

4. Stratigraphic distribution and discussion of age

Up to the present, *Andiceras planulatus* has only been proved to be represented in the western Neuquén Basin in a thin interval included in the upper portion of the Vaca Muerta Formation and the basal part of Chachao Formation. The first specimens have been found immediately above the last levels with *Parodontoceras calistoides* (Behrendsen), and below one containing *Himalayites andinus,* all placed in the *Substeueroceras koeneni* Zone (Table 2). *A. planulatus* increases in abundance upwards

TABLE 2. AMMONOID BIOSTRATIGRAPHY OF THE NEUQUÉN BASIN AND ITS CORRELATION WITH THE TETHYS/MEDITERRANEAN REGION.*

Stage		Tethys/Mediterranean		Neuquén Basin
		Zone	Subzone	Zone
BERRIASIAN	Upper	*Subthurmannia boissieri*	*Thurmanniceras otopeta*	*Spiticeras damesi*
			Tirnovella alpillensis	
			Berriasella picteti	
			Malbosiceras paramimounum	
	Middle	*Subthurmannia occitanica*	*Dalmasiceras dalmasi*	*Argentiniceras noduliferum*
			Berriasella privasensis	
			Subthurmannia subalpina	
	Lower	*Berriasella jacobi*		*Andiceras planulatus*
TITHONIAN *(pars)*	Upper	*Durangites*		*Substeueroceras koeneni*
		Micracanthoceras microcanthum	*Paraulacosphinctes transitorius*	*Corongoceras alternans*
			Simplisphinctes	*Windhauseniceras internispinosum*

* Neuquén Basin late Tithonian biozonation after Zeiss and Leanza, H. (2008), Berriasian after Aguirre-Urreta *et al.* (2007). Tethys/Mediterranean late Tithonian biozonation after Ogg *et al.* (2008) and Berriasian after Reboulet *et al.* (2011). *Andiceras planulatus* biostratigraphic situation in grey.

until the first occurrence of *Groebericeras bifrons* within the *Argentiniceras noduliferum* Zone. Some of the associated ammonoid fauna includes *Himalayites egregius* (Steuer), *Micracanthoceras lamberti* Leanza, A., *Substeueroceras subfasciatum* (Steuer) and *Berriasella* sp.

The position of the *S. koeneni* Zone around the Jurassic-Cretaceous boundary has undergone some changes in recent years. It was traditionally placed in the latest Tithonian-equivalent to the Tethyan *Durangites* Zone-(Leanza, A. 1945; Leanza, H. 1981a, b; Riccardi, 1988), but according to a new Andean ammonite zonation presented by Leanza, H. (1996), the *S. koeneni* Zone would not only embrace the J/K boundary, but it also would extend into the early mid Berriasian-including the late Tethyan *Durangites, Berriasella jacobi* and early *Tirnovella occitanica* Zones-(Riccardi *et al*., 2000; Riccardi, 2008). Although the reasons for these displacements are outside the scope of this paper, we should point out that *Schaireria longaeva* (Leanza, A.) is still considered a late Tithonian species as originally designated by its author (see correlation chart in Leanza, A. 1945) and not of early Berriasian age, as misinterpreted by Checa (1985) in correlating with Betic specimens -a situation already pointed out by Cantú-Chapa (2006). On the other hand, the proposal of '*Spiticeras*' *acutum* Gerth as a forerunner of *Groebericeras* of berriasian age (Leanza, H. 1996) is still not well supported, and currently its recombination as *Proniceras acutum* is under evaluation (Vennari, in preparation).

So far neither microfossils assemblages nor magnetostratigraphic data are available to improve the resolution of the Tithonian-Berriasian boundary beds in the Andean Region, and similarly to the situation of the Berrias Stratotype Section (Hoedemaeker and Reboulet, 2003) no lithological variations in the Upper Jurassic-Lower Cretaceous sedimentary column have been yet recognized (Harrington, 1962).

Thus, until new findings allow an accurate ammonite zonation for this interval, we still favour the traditional Andean scheme (Leanza, H. 1981a, b; Riccardi, 1988) in which a latest Tithonian-earliest Berriasian age is indicated for *Andiceras planulatus* bearing in mind its stratigraphic situation between

levels with representatives of the Family Himalayitidae, outstanding component of the Tethyan *Durangites* zone according to Tavera *et al*. (1986), and *Groebericeras bifrons*, which up to the present has never been recorded in the late Berriasian *Spiticeras damesi* Zone probably equivalent to the Tethyan *Berriasella boissieri* Zone of south-east France (Leanza, H. 1981a, b).

5. Conclusions

Andiceras planulatus, a new species of the Andean genus *Andiceras* Krantz is here presented and described. *A. planulatus* comes from upper Tithonian-lower Berriasian levels in Real de las Coloradas section. The stratigraphic position of this new species along with its particular morphological characters make it a potentially important biostratigraphic marker for the Jurassic-Cretaceous boundary in the Andean region.

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