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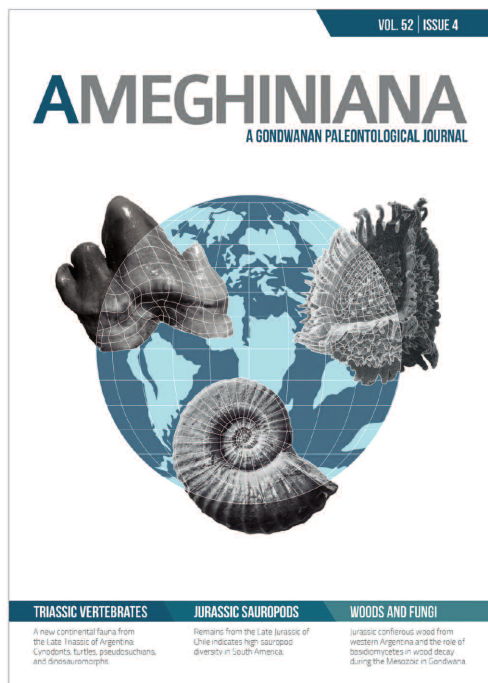


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Submitted: November 19th, 2014 - Accepted: June 23rd, 2015

To cite this article: Ezequiel I. Vera and Silvia N. Césari (2015). New species of conifer wood from the Baqueró Group (Early Cretaceous) of Patagonia. *Ameghiniana* 52: 468–471.

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NEW SPECIES OF CONIFER WOOD FROM THE BAQUERÓ GROUP (EARLY CRETACEOUS) OF PATAGONIA

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Key words. *Brachyoxylon*. Fossil woods. Baqueró Group. Patagonia. Cretaceous.

THE Baqueró Group is a continental sequence deposited during the late Aptian in Patagonia (Césari *et al.*, 2011; Limarino *et al.*, 2012; Perez Loinaze *et al.*, 2013). During more than fifty years the Baqueró deposits have been yielding an exceptionally rich and diverse paleoflora including shoots and leaves preserved as impression/compressions, charcoalfied and silicified stems and woods, and isolated palynomorphs, representing diverse plant groups, such as ferns, cycads, bennettites, conifers, and early angiosperms (Archangelsky, 2003; Del Fueyo *et al.*, 2007; Limarino *et al.*, 2012; and cites therein). A few years ago, Vera and Césari (2012) described the first permineralized woods recovered from the Baqueró strata. They identified two taxa they referred to *Agathoxylon* sp. and *Brachyoxylon* sp. cf. *B. boureaui* Serra, 1966.

Recently, Philippe *et al.* (2014) referred *Brachyoxylon boureaui* Serra, 1966 to *Shimakuroxylon japonicum* (Shimakura) Philippe, Boura, Oh and Pons, 2014, excluding Vera and Césari's (2012) specimens. As a result, the taxonomic placement of the Patagonian woods remained uncertain. In this work, we propose a new species of *Brachyoxylon* to include these specimens.

MATERIALS AND METHODS

Studied specimens come from rocks of the Baqueró Group and were collected at the fossil localities Punta del Barco Sur (48° 39' 30" S; 69° 7' 18" W) and Anfiteatro de Ticó (48° 30' 34.27" S; 69° 14' 13.44" W). Stratigraphic

levels (*sensu* Limarino *et al.*, 2012) are given for each specimen. The studied specimens are deposited in the Museo Regional Provincial Padre Manuel Jesús Molina, Santa Cruz Province, Argentina, under **MPM PB** catalog numbers.

Specimens consist of silicifications and charcoalfications. Silicifications were thin-sectioned in transverse (**TS**), longitudinal tangential (**LTS**) and longitudinal radial (**LRS**) sections. Silicified specimens were studied under Light Microscopy (Olympus BX51) and Scanning Electronic Microscopy (SEM, Philips XL30 TMP). Charcoalfications were observed exclusively under SEM. Measures are given as the mean, followed by the range in parentheses.

Generic classification follows Philippe and Bamford (2008) and Philippe *et al.* (2014).

SYSTEMATIC PALEONTOLOGY

Order CONIFERALES

Genus *Brachyoxylon* Hollick *et* Jeffrey, 1909

Type species. *Brachyoxylon notabile* Hollick *et* Jeffrey, 1909

Brachyoxylon baqueroensis Vera *et* Césari sp. nov.

Figure 1.1–12

2012 *Brachyoxylon* sp. cf. *B. boureaui* Serra – Vera and Césari, Anais da Academia Brasileira de Ciências, p. 84, fig 3.

Derivation of name. The specific epithet refers to the Meseta Baqueró in Patagonia.

Diagnosis. Secondary wood with defined growth rings. Mixed wood with tracheids pitting in radial walls predominantly uniseriate (more than 90%), circular to flattened, contiguous (44%), separate (41%) and with a mixture of both types (15%). Rarely biseriate opposite and alternate, and very rarely triseriate alternate radial pitting. Cross fields characterized by 8–26 pits, arranged in 2–4 series. Rays homogeneous, uniseriate, 1–9 (median 4, mean 4) cells tall.

Holotype. MPM PB 3181.

Geographic occurrence. Anfiteatro de Ticó, Santa Cruz Province, Argentina.

Stratigraphic occurrence. Anfiteatro de Ticó Formation, Baqueró Group, stratigraphic level 5 (*sensu* Limarino *et al.*, 2012).

Supplementary material and occurrence. MPM PB 3182, MPM PM 3183, MPM PB 3184 and MPM PB 3185 (south flank of Meseta Baqueró, Santa Cruz Province, Argentina; Punta del Barco Formation, Stratigraphic Level 12 (*sensu* Limarino *et al.*, 2012).

Age. Late Aptian.

Description

This description is based on five specimens composed exclusively of secondary xylem. Specimen MPMPB 3182 is badly preserved, and was observed only under SEM and was not included in percentage calculations.

Transverse section. Growth rings are distinct, sometimes with a narrow zone (1–3 cells wide of late wood (Fig. 1.1, 2)). Early wood tracheids are 33 (17–64) μm in diameter, with thick [4.7 (2.8–6.6) μm] walls. Approximately 6 (2–12) series of tracheids are present between the parenchymatic rays.

Radial section. Tracheids show circular to flattened bordered pits arranged predominantly in uniseriate rows (100% in MPMPB 3183, 3184, 3185; 92% in MPMPB 3181) (Fig. 1.3–5, 9). The biseriate alternate and opposite, and triseriate pitting pattern is also present (Fig. 1.9), but is less common, observed only in MPM PB 3181 (4% biseriate opposite, 4% biseriate alternate, less than 1% triseriate alternate). The pitting pattern of the radial walls of the tracheids is typical of a mixed type, with 41% of abietinoid-type, 44% of araucarioid-type, and 15% of mixed series. Pits

measure 24 (16–32) μm in diameter, with circular apertures (10 (7–15) μm in diameter), and may appear flattened in regions where they are almost adjacent. Cross-field regions are square or rectangular ("tall") (Fig. 1.3, 6, 7, 10, 11), and characterized by the presence of 8–26 circular pits, 5.7 (4.7–6.7) μm in diameter, arranged in 2–4 rows. Pit apertures are obliquely-oriented, slit like, measuring 3.1 (1.8–4.5) μm in its greater axis (Fig. 1.6, 7, 10, 11).

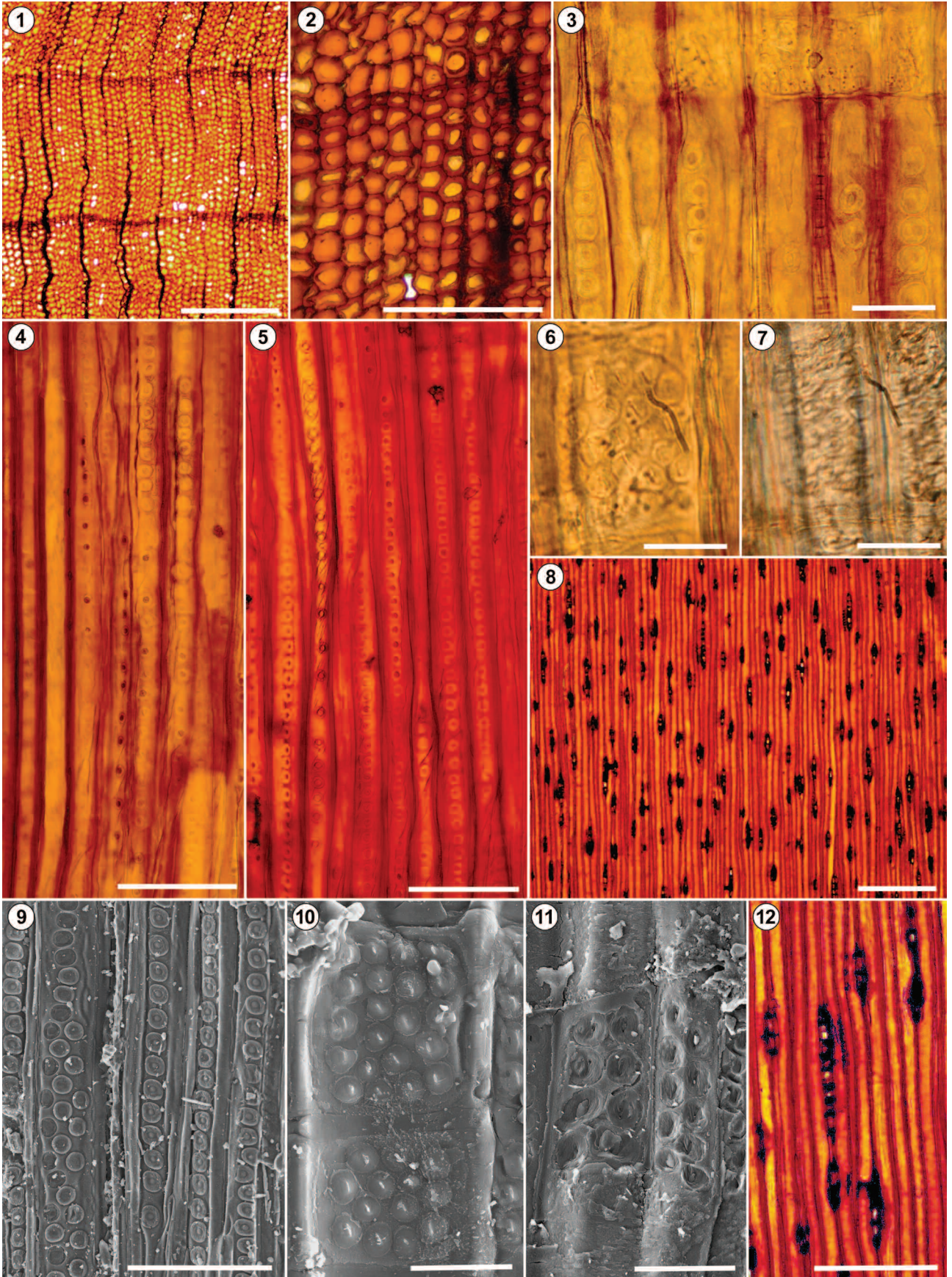
Tangential section. Rays are homocellular, exclusively uniseriate, 1–9 (median 4, mean 4) cells tall (Fig. 1.8, 12). Ray cells are parenchymatic, thin walled, rectangular in shape, and measure 73 (44–102) μm high and 35 (13–57) μm wide (Fig. 1.12). Transverse walls were not identified in the studied samples. Generally 20 (10–30) rays per mm^2 are observed. Ray tracheids and axial parenchyma were not identified in the studied samples.

Affinities. The finding of *Brachyoxylon* type of woods in association with conifer leaves and *Classopollis*-bearing cones (Zhou, 1983) suggests that at least some *Brachyoxylon* woods may be representatives of the Cheirolepidiaceae, a group of plants present in the Baqueró Group (*e.g.*, Archangelsky, 2003; Del Fueyo *et al.*, 2007; Limarino *et al.*, 2012).

DISCUSSION AND CONCLUSIONS

In the original description, Vera and Césari (2012) referred these specimens to the species *Brachyoxylon boureaui* Serra, 1966 (from Late Jurassic units in Cambodia and Thailand), due to the high number of pits per cross-field, mostly uniseriate radial pitting of the tracheids, and essentially low rays (Serra, 1966; Philippe *et al.*, 2004). However, no conclusive referral to this species was made, due to the spatial and temporal differences between these two taxa (Vera and Césari, 2012).

Recently, Philippe *et al.* (2014) proposed the new fossil-genus and combination *Shimakuroxylon japonicum* (Shimakura) Philippe, Boura, Oh and Pons, 2014 to encompass fossil woods anatomically similar to *Brachyoxylon* but presenting 10% of its radial pits arranged in the *japonicum*-type (opposite to slightly sub-opposite and mutually flattened, which gives them a square outline, type BOS (biseriate opposite square) in figs. 1 and 2 in Philippe *et al.*, 2014). Given the presence of the *japonicum*-type of radial pitting, the type and other previously published specimens of *Brachyoxylon boureaui* Serra were referred to this taxon



(Philippe *et al.*, 2014). Our specimens cannot be placed in *Shimakuroxylon* due to the lack of *japonicum*-type of radial pitting, and are retained in the genus *Brachyoxylon*. Since there is no previously published species of this genus comparable with the Baqueró specimens (in particular due to its high number of pits per cross-field, table 2 of Bodnar *et al.*, 2013), and taking into account that enough anatomical features are recognized to justify the erection of a new taxon, we propose *Brachyoxylon baqueroensis* sp. nov. as a new species to include the studied specimens. The new taxon differs from other *Brachyoxylon* remains from Patagonia by having mostly uniseriate pits on the radial walls of the tracheids, and generally high number of pits in the cross fields (Gnaedinger *et al.*, 2009; Bodnar *et al.*, 2013).

ACKNOWLEDGMENTS

Thanks are due to D. Pons for giving advice in reference to the new genus *Shimakuroxylon* and the resulting taxonomic placement of our specimens. The comments of L.C.A. Martinez and two anonymous reviewers were also critical to enhance the final version of the manuscript. This work is a contribution to the CONICET-PIP 0286 granted to SNC.

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doi: 10.5710/AMGH.23.06.2015.2853

Submitted: November 19th, 2014

Accepted: June 23rd, 2015

Figure 1. *Brachyoxylon baqueroensis* sp. nov. 1–7. MPM PB 3181, all photographs under transmitted light microscope, unless otherwise stated; 1, general view of the transverse section (TS) (Scale bar= 1 mm); 2, detail of a TS showing the limit of a growth ring (Scale bar= 500 µm); 3, longitudinal radial section (LRS) showing cross-fields and uniseriate pitting (Scale bar= 40 µm); 4–5, LRS showing continuous to spaced pitting of tracheids (Scale bar= 200 µm); 6, detail of a square cross-field, showing pitting in a LRS (Scale bar= 20 µm); 7, detail of a “tall” cross-field (LRS), showing pitting (Scale bar= 20 µm); 8, general view of LTS, showing uniseriate rays (Scale bar= 400 µm); 9, LRS under SEM, showing mostly uniseriate, and bi to triseriate pitting of tracheids (Scale bar= 200µm); 10, LRS under SEM, showing two square cross-fields (Scale bar= 20 µm); 11, LRS under SEM, showing two “tall” cross-fields (Scale bar= 20 µm); 12, LTS showing a detail of the uniseriate rays (Scale bar= 200 µm).