



Research papers

Fossil woods from the Cross Valley Formation (Paleocene of Western Antarctica): Araucariaceae-dominated forests



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ABSTRACT

Fossil woods from Paleocene sediments of the Cross Valley Formation (Seymour Island, Antarctic Peninsula) are anatomically studied in detail. We collected 64 samples represented almost exclusively by conifers (95%). Only three samples of not determinable angiosperm fossil wood were found. Preservation of the samples is often poor and 52% of the samples were assigned to a fossil-species. The assemblage is dominated by *Agathoxylon* (Araucariaceae), particularly *Agathoxylon antarcticus*. Araucariaceae species are joined by *Protophyllocladoxylon*, *Phyllocladoxylon* and *Cupressinoxylon*. Forests dominated by Araucariaceae are unusual during the Cenozoic. The high dominance of Araucariaceae woods may be a reflection of soil conditions, weather and terrain elevation. Our study supports previous hypothesis that identified differences between the paleofloras in each side of the Antarctic Peninsula during the Paleocene.

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1. Introduction

Fossils from Barton Peninsula in King George (25 de Mayo) Island, Dufayel Island and Cross Valley in Seymour (Marambio) Island are the only three Paleocene macrofloras from Antarctica that have been described until now (Birkenmajer and Zastawniak, 1986, 1989; Case, 1988; Cantrill and Poole, 2012). Recently, fossil leaves from the Cross Valley Formation have been re-examined in detail (Cantrill et al., 2011; Tosolini et al., 2013). Particularly, Paleocene Antarctic fossil woods were only described by Zhang and Wang (1994), Poole and Gottwald (2001), Poole (2002) and Poole et al. (2000, 2003). In his pioneer article, Gothan (1908) described fossil woods from Seymour (Marambio) Island collected during the Nordenskjöld's expedition of 1901–1903, but the exact stratigraphic position of the samples is unclear.

West Antarctica was attached to South America until the end of Paleocene, connected by the Weddellian Isthmus which implicated a change of terrestrial biota (Reguero et al., 2014). Middle–late Paleocene climate was locally warm in the Antarctic Peninsula (Poole et al., 2005) in correspondence with globally warm climates (Zachos et al., 2011).

The floras of Barton Peninsula and Dufayel Island included warm temperate angiosperms (Cantrill and Poole, 2012). On the other hand, the recent revision of the Cross Valley flora questions the “mixed flora” proposed previously for it, because this flora lacks tropical elements (Tosolini et al., 2013).

A new collection of fossil woods from sediments of the Cross Valley Formation is anatomically described in detail for the first time. This research is a continuation of the previous article about the anatomy of fossil woods from the Seymour (Marambio) Island by Pujana et al. (2014).

2. Geological setting

The Cross Valley Formation is 195 m thick (Fig. 1) and fills in a narrow valley with volcanoclastic deposits representing an incised valley system, including estuarine, shallow marine and deltaic facies (Marensi et al., 2012). Recent field work allowed to subdivide this formation into three unconformity bounded subunits or allomembers named A to C from base to top (Marensi et al., 1999, 2012; Montes et al., 2007, 2013). Allomember Cross Valley A: The base of the unit corresponds to a 0.30–1 m thick medium-grained massive sandstone bed rich in glaucony. The bulk of the allomember is composed of coarse- to fine-grained cross-bedded sandstones with a high percentage of volcanic material arranged into three fining upward cycles 30–40 m thick. Charcoalified wood is frequently found in the sandstones. This allomember is interpreted as deposited in subtidal channels within

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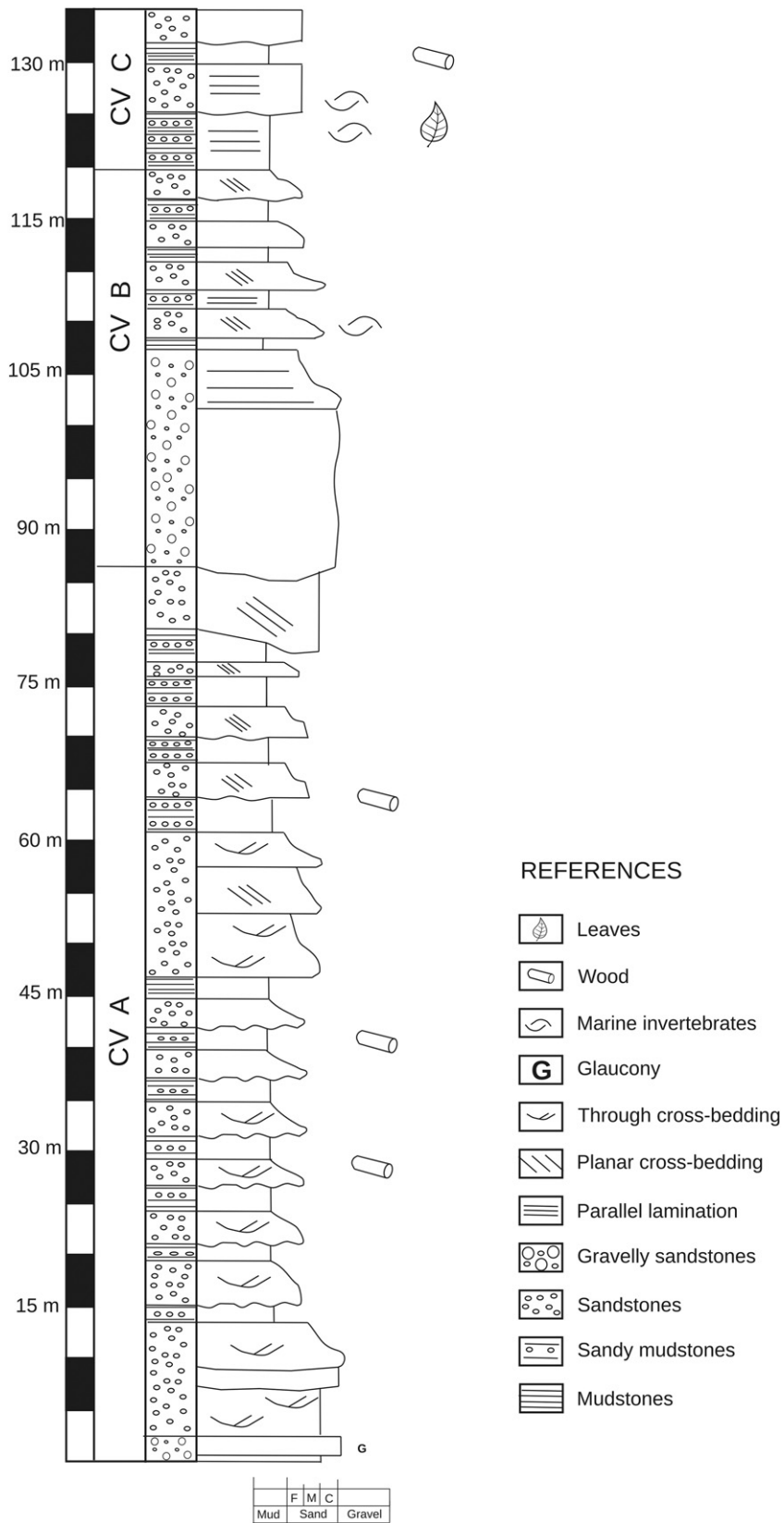


Fig. 1. Schematic log of the Cross Valley Formation.

an incised valley (Montes et al., 2007; Marensi et al., 2012). Allomember Cross Valley B: The base of this unit is a subtle erosive surface mantled by coarse-grained to gravelly sandstones. Three

main lithofacies compose this allomember. A lower interval made up of coarse-grained massive sandstones, a middle part composed of coarse- to medium-grained parallel-laminated sandstones and an

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