

Interpreting the Early Cretaceous record of *Nothofagus* in Antarctica and Patagonia

Leppe, M.^{1,*}, Stinnesbeck, W.², Hinojosa, F.³, Nishida, H.⁴, Dutra, T.⁵, Wilberger, T.¹, Trevisan, C.⁵, Fernandez, R.⁶, Ortuya, M.J.⁶, Manriquez, L.¹, Mansilla, H.¹, Bastías, J.

1) Paleobiology Lab of Patagonia and Antarctica, Chilean Antarctic Institute, Punta Arenas, Chile, *E-mail: mleppe@inach.cl

2) Ruprecht-Karls-University Heidelberg, Heidelberg, Germany

3) Laboratorio de Sistemática y Ecología Vegetal, Chile

4) Department of Biological Sciences, Tokyo, Japan

5) Postgraduate Program in Geology, Brazil

6) Departamento Ciencias de La Tierra, Chile

The Genus *Nothofagus* Blume has been considered a key constituent of the Austral ecosystems, both for the aspects of its biology that make it important for biogeographic inferences, and for its extensive fossil record. Different authors have postulated their origin and diversification at the end of the Cretaceous, but in places as distant as New Caledonia and the Antarctic Peninsula. Recent paleontological exploration in the Magallanes Region, Southern Chile, and Antarctica, resulted in new fossil record and localities. In 2016, the study of new outcrops in a Campanian sequence at Rip Point, Stansbury Peninsula, Nelson Island, Antarctica, have ended with *Nothofagus* leaf imprint beds, associated with ferns and angiosperm remains, in rocks with an estimated age of ~81 Mya. Three different *Nothofagus* morphotypes dominated those Lower Campanian assemblages. One year before, our paleontological survey to Cerro Guido-Las Chinas Cretaceous complex, northern Magallanes Region, Chile, discovered close to an hadrosaur bonebed, the oldest South American record of *Nothofagus* imprints, in rocks assigned to the Lower Maastrichtian (~68 Mya). Four morphotypes, associated with a complex assemblage of angio and gymnosperms have dominated a continental forest in an alluvial fan, tidally controlled. We interpreted the asynchrony in the records of *Nothofagus* imprints in Antarctica and Patagonia as a consequence of the land discontinuity between the northern tip of the Antarctic Peninsula and the southern of South America during the Campanian–Maastrichtian interval. The apparition of a land bridge during the Early Maastrichtian due to the glacioeustatic fall in the sea level, probably permitted the dispersion and colonization, from Antarctica to South America. The event could be linked with the global record of cooling events. The biology of *Nothofagus* support the idea that land bridges are needed to disperse because its anemochory and anemophily dispersal syndromes. *Nothofagus* is an important element of the modern Sub-Antarctic forests of New Caledonia, Queensland, New Zealand, Chile and Argentina. Its current disjoint distribution, oldest record in Antarctica and the molecular phylogeny endorsed the hypothesis of the Antarctic center of diversification.