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A NEW EOCENE CONIFER FLORA FROM SEYMOUR ISLAND, ANTARCTICA

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Exceptionally well-preserved fossil plant material has been collected from the Eocene La Meseta Formation (approximately 53Ma) on Seymour Island, Antarctic Peninsula. This Antarctic flora is a source of valuable information about Gondwanan plant biogeography, palaeoclimate, and paleoecology. The plants grew in a lush cool rainforest on the Antarctic Peninsula under a greenhouse climate, and were subsequently carried into a shallow marine basin where they were preserved within carbonate concretions.

The La Meseta Formation is dominated by plant organs of members of the Araucariaceae (Conifers). Much of the material has been permineralised by calcite, coating the fossils and preserving fine leaf detail. The fossils include intact isolated leaves, cone scales, and woody fragments, but also include conifer branches preserved in three dimensions with their leaves still attached. The coniferous material has been identified as fossil relatives of the extant *Araucaria araucana*, the Monkey Puzzle tree, which is native to southern Argentina and Chile, and these fossils thus provide important links in the biogeographic and evolutionary history of this genus.

The recently developed Neutron Tomography technique has provided a unique opportunity to study these fossils in their original three-dimensional arrangement without destroying the specimens. This technique has never before been used on fossils of this type. Initial results from the facility at the Institute Laue Langevin (ILL, Universität Heidelberg) are very promising and, following refinement and advanced data analysis (currently being undertaken), it will be possible to produce three-dimensional reconstructions of the fantastically preserved Antarctic fossil branches, showing leaf

arrangement and branch structure. This scanning technique has the potential to revolutionise the way in which fossils are studied, since it is entirely non-destructive and could be applied to any fossil material that has been preserved in concretions or other 'hard' lithologies.

The fine detail that is visible in this exceptionally well-preserved conifer flora will provide new information and lead to a better understanding of the vegetation of Antarctica during the Eocene - the last global greenhouse period. Data collected from the fossil material can be used to infer palaeoclimate and palaeoenvironment in the Antarctic Peninsula region, and also has important implications for the evolution and biogeography of the ancient Araucariaceae conifer family, and for the palaeogeography of West Antarctica in the early Tertiary.