Biodiversity and glacial history of Chiloé Archipelago

Biodiversity

The Chiloé Archipelago possesses one of the most diverse and singular floras of Chile. Despite a lack of precise estimates for the total number of terrestrial plants in the Archipelago, it is probably over 1200 species, especially when the approximately 750 known species of vascular plants are considered (Ruthsatz & Villagrán 1991; Villagrán *et al.* 1986; Villagrán 2002) along with at least 360 known species of Bryophytes (Villagrán *et al.* 2003, 2005).

'Ulmo' (*Eucryphia cordifolia*) forests, one of the most important and diverse components of the Valdivian rainforest, reach their southern limits along the northern and central part of the Isla Grande (Schmithüsen 1956). North Patagonian rainforest communities are present along the Piuchén Cordillera, and along the southern portion of the Isla grande and adjacent islets. These forests are dominated by 'canelo' (*Drimys winteri*), 'tepa' (*Lauleliopsis philippiana*), myrtles such as 'luma' and 'petagüa' (*Amomyrtus luma* and *Myrceugenia ovata*) and by *Nothofagus nitida* and the conifers *Saxe-gothaea conspicua* and *Podocarpus nubigena* ('mañíos') at higher elevations. A more complex vegetational mosaic covers the broad summits of the Piuchén cordillera and low-elevation wetlands. This mosaic comprises small stands of Magellan 'coigue' (*Nothofagus betuloides*) and 'ñirre' (*Nothofagus antarctica*); magellanic moorlands (*Astelia pumila, Donatia fascicularis* and *Gaimardia australis*); 'alerce' (*Fitzroya cupressoides*); Guaitecas' cypress (*Pilgerodendron uviferum*); and 'tepú' (*Tepualia stipularis*).

Many of these species, a true vanguard of the subantarctic floras, meet their northern limits here. Along the Pacific coast, diverse marsh, beach and intertidal rock communities are found adjacent to pristine forests of 'arrayan' (*Luma apiculata*) and 'olivillo' (*Aextoxicon punctatum*), one of the most unusual of Valdivian rainforest associations, with northern limits along the semi-arid coast of northern Chile (30°30'S) and southern limits at the Guapiquilán, Esmeralda and Guafo islets at the SW end of the main island.

The olivillo forests of Chiloé house numerous species of vines, epiphytes and rare cryptogams that are endemic to Chilean forests, many of which have disappeared from most of their original ranges and today exhibit pronounced disjunct distributions in remote areas (Villagrán & Armesto 2003; Villagrán *et al.* 2003, 2004 and 2005).

Glacial history

Considering the dramatic extent of past glaciations during the Pleistocene, how did Chiloé come to have such levels of biodiversity? Glacial geological records from the last glaciation, show that most of the southern and eastern portions of the main island, as well as continental Chiloé and the islets, were heavily covered by ice during the last ice age, the late Llanquihue Glaciation (LLG), dated between c. 37 000 and 17 500 yr bp, with temperatures estimated to have been 6-8°C lower than today (C. J. Heusser et al. 1999). Periglacial processes such as solifluction, exerted considerable impact on the montane forests of the Piuchén Cordillera right down to the foothills (Veit & Garleff 1996). The figure on the next page indicates the location of the pollen sites where these dramatic vegetation changes have been documented. Past changes in mean summer temperature during the LLG have been obtained from the pollen record at Taiquemó, the oldest such record in Chiloé (Heusser 1990a; Denton et al. 1999).

For more detailed information about the Chilotan Piedmont Glacier in the southern Andes during the last glacial maximum by Calvin J. Heusser, click <u>here</u>

Reference

Moreno, T. & Gibbons, W. (eds) 2007. The Geology of Chile. The Geological Society, London.

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FIG. 2. Extent of Llanquihue Glaciation on Isla Grande de Chiloé, Chiloé Continental, and part of the lake district with dated sites and radiocarbon age determinations relevant to the glacial chronology. Major existing glacier areas in the Cordillera de los Andes are outlined by stippling. Sources are Heusser (1981; unpubl. data), Heusser and Flint (1977), Mercer (1967, 1976, 1984; personal commun., 1982, 1984), Porter (1981), and Villagrán (1985, 1988a, b).