



# Cloud Ridge Naturalists 2011 Field Notes



by Sarah Drummond

Winter's greetings! As the days slowly start to lengthen here in the northern hemisphere, we reflect on some of our southern travels during the previous year. Our final trip of 2011, "In Darwin's Footsteps, Part II," once again took up the trail of naturalist Charles Darwin and his famous voyage in the survey ship *Beagle* around South America between 1831 and 1834. In November 2010, Cloud Ridge visited several points on Darwin's route in Argentine Patagonia, culminating with a cruise through Tierra del Fuego and ending in Punta Arenas, Chile. This year, we returned to Punta Arenas in early December, and from there we traveled north up Chile's convoluted and mountainous coast. We went first to Puerto Hambre and the Cemeterio Ingles, where Fitzroy's predecessor as captain of the *Beagle*, Pringle Stokes, is buried. Next, we journeyed into Torres del Paine National Park to enjoy the spectacular alpine bloom and abundant wildlife as well as the park's dramatic scenery. Further north in Chile's lake district, we spent several days exploring the lush rainforest on Chiloe Island's west coast. Finally, we returned to Santiago and drove across the Andes via the Portillo Pass to end our journey in the wine country of Mendoza, Argentina. Like our previous sojourn "in Darwin's footsteps," this one took us through a wide range of landscapes and habitats, and illustrated both the incredible diversity and vulnerability of Patagonia. Abundant evidence of the geologic forces that amazed Darwin, however, served as a reminder that despite our power and numbers, humanity is never in control.



Porcelain orchid, *Chloraea patagonica*



*Calceolaria uniflora*



Dog orchid, *Codonorchis lessonii*

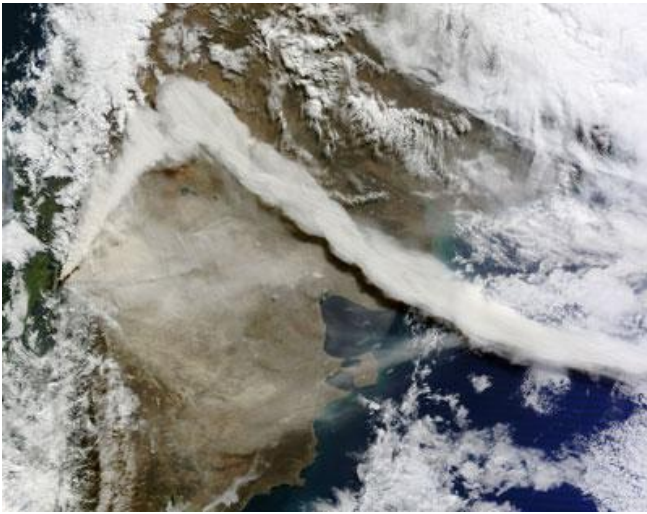
## Flora of Torres del Paine

The world remembers Charles Darwin for his theory of evolution by natural selection, and as a naturalist concerned with the life histories of living animals. However, he was also an ardent student of geology and a disciple of Charles Lyell, one of the first scholars to suggest that landforms of the modern world might be the result of gradual processes (like erosion and sedimentation) instead of sudden, catastrophe events (like the Biblical flood). Reading Lyell's *Principles of Geology*, excavating fossils, and measuring geological strata around South America all contributed to Darwin's growing conviction that the natural world was constantly undergoing gradual change, and had to be much older than the three thousand years generally allotted by Christian theologians. During his tenure in Chile, he witnessed two major geologic events that demonstrated exactly how gradual movement of the earth's crust could have created the landscapes through which he'd been traveling: "On the night of [January] 19th [1835] the volcano of Osorno was in action. At midnight the sentry

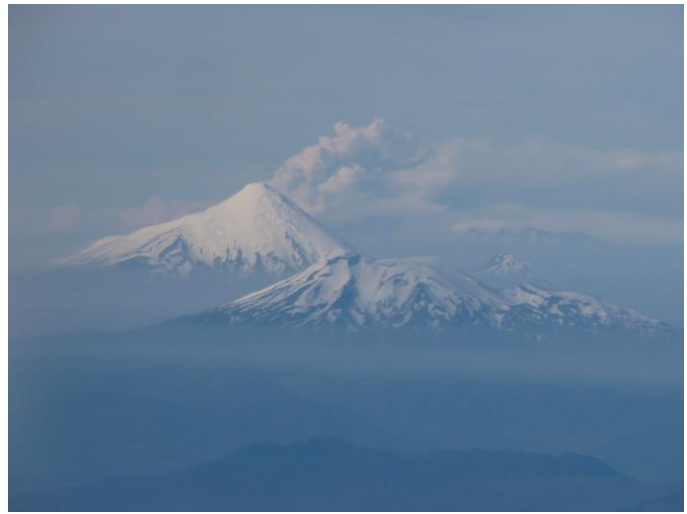
observed something like a large star, which gradually increased in size till about three o'clock, when it presented a very magnificent spectacle... I was surprised at hearing afterwards that Aconcagua in Chile, 280 miles northwards, was in action on this same night; and still more surprised to hear, that the great eruption of Coseguina (2700 miles north of Aconcagua), accompanied by an earthquake felt over 1000 miles, also occurred within six hours of this same time... It is difficult even to conjecture, whether this coincidence was accidental, or shows some subterranean connection." The concept of a "subterranean connection" was highly radical in the mid-1800s, but ultimately Darwin's astute insight was vindicated by the recognition of plate tectonics in the late 1950s.

A month after watching Osorno in action from a safe harbor at Chiloe Island, Darwin experienced a major earthquake near the Chilean town of Concepción. "I happened to be on shore, and was lying down in the wood to rest myself. It came on suddenly, and lasted two minutes, but the time appeared much longer... There was no difficulty in standing upright, but the motion made me almost giddy." Upon entering the town, he found a scene of colossal damage and marveled at how few lives had been lost. He was deeply shaken by the event but fascinated by its ecological implications, especially the sudden elevation of many parts of the coastline: "Captain Fitzroy found beds of putrid mussel-shells *still adhering to the rocks*, ten feet above high-water mark: the inhabitants had formerly dived at low-water spring-tides for these shells." The presence of marine shell beds at several hundred feet of elevation had intrigued and puzzled Darwin on his previous Andean excursions, and the Concepción earthquake gave him a plausible explanation for their existence. "At Valparaiso, as I have remarked, similar shells are found at the height of 1300 feet: it is hardly possible to doubt that this great elevation has been effected by successive small uprisings, such as that which accompanied or caused the earthquake of this year, and likewise by an insensibly slow rise, which is certainly in progress on some parts of this coast." While not all of the uplift from the 1835 earthquake was permanent, as Darwin believed, he was correct in assuming that the same forces that raised the shell beds were responsible for the uplift of the Andes.

We were fortunate enough to have unusually clear weather and a spectacular view of Volcan Osorno during our stay in the Puerto Montt area. The lava that Darwin watched flowing down the mountainside a hundred and seventy-seven years ago is now a black pumice formation on the volcano's eastern slope, but Osorno retains its iconic, perfectly conical shape. This particular volcano has been dormant since the eruption witnessed by Darwin, but the Chilean plate has been anything but. Movement of the earth and seismic rumblings in the mountains are a normal part of life in a country located directly over the subduction zone between the Pacific and South American plates. Chile has two to three thousand volcanoes (depending on who is counting) and at any one time, in the words of one of our guides, at least two of them are going off. Currently, the epicenter of Patagonia's seismic activity is the Puyehue-Cordón-Caulle volcano, located about five hundred miles south of the Chilean capital, Santiago. The Cordón Caulle opening adjacent to Volcan Puyehue began throwing out clouds of ash in early June 2011 and continued intermittently throughout the rest of the year, affecting air traffic from New Zealand to South Africa and causing ecological and economic devastation across much of Patagonia. Because the prevailing winds blow west to east over the Andes, vast quantities of ash darkened the atmosphere all over Argentina. Bariloche, an Argentine resort town famed for its chocolate factories and ski areas, suffered the brunt of the impact about one hundred kilometers due east of Puyehue. Residents continually shoveled heavy ash and sand off their roofs and roads while the town's airport (and most of its vital tourism) shut down completely.



Ash plume from Puyehue-Cordón-Caulle Volcano, 6/6/2011. (Image credit: NASA/GSFC/Jeff Schmaltz/MODIS Land Rapid Response Team)



Volcanoes Osorno (left) and Tronador (foreground), with Puyehue's ash cloud visible behind Osorno. 12/8/2011.

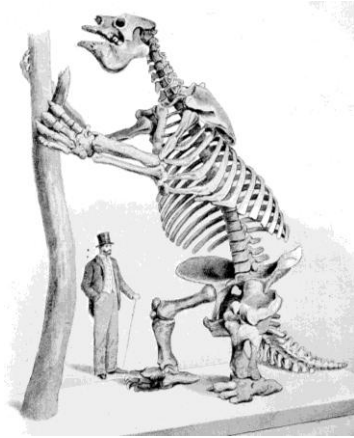
For the Argentine provinces of Chubut, Rio Negro, and Neuquen, Puyehue's deluge of ash arrived on top of a five year drought. Across the arid steppe, dry conditions had already taken a toll on wildlife and livestock. On Peninsula Valdes, Estancia La Ernestina lost five thousand of its original seven thousand sheep over five years and approximately fifteen hundred lambs annually. There, as in the rest of Patagonia, falling ash decimated most of the little remaining forage, and caused further mortality by ingestion and inhalation. At La Ernestina, the drought finally broke with a rain in October, and the land is now covered with a delicate new green growth of needle-and-thread and other grasses. It will take many years and many more rains, however, for the populations of native grazers like guanacos and maras to recover. Puffs of ash still floated up from underfoot as we walked the cobble beaches of the Peninsula, over nine hundred kilometers from Puyehue on Argentina's Atlantic shore. Scientists estimate that after the ash fall ceases, it will be at least six years before the landscapes of central Patagonia begin to resemble their pre-eruption conditions. Carol Mackie de Passera, Cloud Ridge's Argentine liaison and travel coordinator, expects to have to contend with ash-related airline delays and cancellations (such as Cloud Ridge encountered on the previous trip, "Weaving Andean Stories") for a minimum of three years after the volcano quiets down. As of this publication, however, Puyehue continues to spout more ash into the atmosphere.

Volcanic eruptions and earthquakes are natural phenomena that have affected (and, as Darwin realized, actively created) Patagonia for millions of years. "Daily it is forced home on the mind of the geologist," he wrote, "that nothing, not even the wind that blows, is so unstable as the level of the crust of this earth." The concept of a dynamic earth was revolutionary in Darwin's era, and today, our concept of climate is undergoing a similar paradigm shift. The earth is currently in a warming trend exacerbated by human-induced release of greenhouse gases, the long term ramifications of which are unknown. Drought cycles are part of a long-established pattern in Patagonia, but climatologists fear that they may become more extreme in the future. If so, the region's flora, fauna, and human populations will have to contend with less reliable resources and a greater frequency of fire. A recent wildfire broke out in Torres del Paine in late December (shortly after Cloud Ridge's visit to the park), exacerbated by the area's chronically high winds and the dry summer vegetation. Over 21,000 acres burned, but the park reopened in mid-January and reforestation efforts are scheduled to begin in spring. Fires are not unusual in southern Chile, but this one serves as a reminder that as Patagonia adjusts to changing conditions, humanity will have to reassess its priorities and allow it the room and the resources to do so.

We are learning that conservation does not mean simply preserving a place in perpetuity, but accepting natural cycles even when they go against our own advantage and trusting that favorable conditions will eventually return. It means both taking responsibility for our impact, and having the humility to recognize that we are only a small part of a vast and complex system, whose inner workings are beyond our control but not our respect and understanding.

Below are a few vignettes of Darwin's experience paired with my own impressions of places we visited.

### CUEVA DEL MILODON



*The Voyage of the Beagle*, p. 84-85. “The great size of the bones of the Megatheroid animals... is truly wonderful... The teeth indicate, by their simple structure, that these Megatheroid animals lived on vegetable food, and probably on the leaves and small twigs of trees... With their great tails and their huge heels firmly fixed like a tripod on the ground, they could freely exert the full force of their most powerful arms and great claws. Strongly rooted, indeed, must that tree have been, which could have resisted such force! The Mylodon, moreover, was furnished with a long extensile tongue like that of the giraffe, which by one of those beautiful provisions of nature, thus reaches with the aid of its long neck its leafy food.”

In 1895, German explorer Captain Hermann Eberhard wandered into one of several large caves along the Cerro Benitez mountain range, about 15 miles northwest of present-day Puerto Natales. Inside, he found a strip of hide belonging to an unrecognizable animal. It proved to be the remains of a *Mylodon darwini*, an extinct giant ground sloth named for Charles Darwin, who first described its bones from specimens he unearthed in eastern Patagonia. This enormous herbivore inhabited the Pleistocene world of Patagonia up until around 5,000 years ago. The cool, dry conditions within the cave effectively preserved portions of Mylodon bone, hide, hair, and even scat: small fibrous pellets about the size of a cherry still litter the cave’s sandy floor. The “Mylodon Cave” is now part of a Chilean Natural Monument, and a life-sized fiberglass statue near the entrance shows how the animal might have looked in life. The close relationship between the Mylodon and the small arboreal sloths he’d encountered in tropical Brazil, and between the extinct glyptodonts and modern armadillos, later provided Darwin with evidence for his theory on “the transmutation of species.”

## ISLA CHILOE



*The Voyage of the Beagle*, p. 280: “I one day noticed, growing on the sandstone cliffs, some very fine plants of the panke (*Gunnera scabra*), which somewhat resembles the rhubarb on a gigantic scale. The inhabitants eat the stalks, which are subacid, and tan leather with the roots, and prepare a black dye from them. The leaf is nearly circular, but deeply indented on its margin. I measured one which was nearly eight feet in diameter, and therefore no less than twenty-four in circumference! The stalk is rather more than a yard high, and each plant sends out four or five of these enormous leaves, presenting together a very noble appearance.”

Chiloe Island is only 1.3 kilometers from the mainland, but its Mapuche inhabitants developed a unique culture and a rich mythology all their own. Like Darwin, we enjoyed the island's old Spanish churches and elaborately shingled houses and were astonished by the massive *Gunnera* leaves growing in exposed, sunny areas. Once the stalk's thorny outer covering is peeled away, *Gunnera* leaves can be eaten raw like fresh celery (and with a similar but more tangy taste) or added to cooked dishes like domestic rhubarb. Much of Chiloe's temperate rainforest has been cleared, but swathes of old growth still exist on the island's western side. We felt privileged to be able to explore this area, in a private reserve called Tepuhueico adjacent to the southern end of Parque Nacional de Chiloe. Walking through the forest revealed a magical world overflowing with life. A stunning array of red tubular flowers attracted scores of green-backed firecrown hummingbirds, while flocks of slender-billed parakeets clattered through the forest canopy and chucao tapaculos chattered coyly from the sides of the trail. Darwin's frogs sounded a staccato chorus at dusk, and tiny pudu deer walked daintily beneath the giant *Gunnera* leaves to graze. Tepuhueico is an extraordinary pocket of diversity and beauty, and we all hope the Reserve's conservation efforts continue successfully.



Puente del Inca, 12/15/2011.

“When one hears of a natural bridge, one pictures to oneself some deep and narrow ravine, across which a bold mass of rock has fallen; or a great arch hollowed out like the vault of a cavern. Instead of this, the Incas Bridge consists of a crust of stratified shingle, cemented together by the deposits of the neighbouring hot springs.” pp. 335-336.



Cerro Aconcagua, 12/15/2011

“The day was truly Chilean: glaringly bright, and the atmosphere quite clear. The thick and uniform covering of newly-fallen snow rendered the view of the volcano of Aconcagua and the main chain quite glorious.” p. 263.



White-crested elaenia, 12/7/2011  
Torres del Paine

“The gloomy woods are inhabited by few birds: occasionally the plaintive note of a white-tufted tyrant flycatcher... may be heard, concealed near the summit of the most lofty trees.” p.238



Flightless steamer duck, 12/10/2011. Isla Chiloe

“Their wings are too small and weak to allow of flight, but by their aid, partly by swimming and partly flapping the surface of the water, they move very quickly... These clumsy, loggerheaded ducks make such a noise and splashing, that the effect is exceedingly curious.” p. 200.