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Tortoise genes and island beings: giant Galapagos reptiles on slow road to recovery

[Science News](#) , [Nov 10, 2007](#) by [Bryn Nelson](#)

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Not far from where the Galapagos Islands' most famous loner spends his days, tourists disembark by the inflatable boatload at a modern dock. A path takes them past marine iguanas sneezing brine from their salt-caked nostrils and striated herons roosting in the red mangroves to the Charles Darwin Research Station in Puerto Ayora on Santa Cruz Island. Within the station, another walkway leads to a natural enclosure sheltering a misanthropic Galapagos tortoise named Lonesome George.

[ILLUSTRATION OMITTED]

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The confirmed bachelor has been a potent icon of conservation ever since he was spotted on remote Pinta Island in 1971 and captured the next year by a group of goat hunters. Now in his 60s, 70s, or beyond--no one really knows--George may have lived more than half his life in exile. He is quite likely the world's last pure-bred Pinta tortoise, one of the dozen or so closely related species that still lumber around the Galapagos, an archipelago of 19 islands and dozens of islets about 600 miles west of mainland Ecuador.

Last April, however, the surprise discovery that Lonesome George has a genetic cousin on another island cast doubt, in a hopeful wax, on George's one-of-a-kind status. The revelation is just one illustration of how genetics and conservation biology are intermingling to rewrite

an oversize reptile's evolutionary past and to reshape plans to safeguard the remaining tortoise species well into the future.

REVIVAL SIGNS Estimates of how many giant tortoises remain in the Galapagos vary widely, from less than 10,000 to more than 30,000. Nearly everyone agrees that their prospects are improving, however. "If you look at tortoises today compared to 50 years ago, they are so far ahead of where they used to be," says Linda Cayot, Lonesome George's former keeper and a scientific adviser to the Falls Church, Va.-based Galapagos Conservancy.

But tortoise conservation may be a rare bright spot in the struggle to protect the fragile Galapagos ecosystem. The archipelago is so revered for its unique marine and terrestrial life that it was the first World Heritage Site chosen by the United Nations Educational, Scientific and Cultural Organization (UNESCO). In late June, the organization's World Heritage Committee added the caveat "in danger" to the designation to draw attention to mounting threats, including a surge in tourism and rising immigration from Ecuador's mainland. Increased flights and boat traffic have contributed to a 60 percent escalation in introduced species since 2001.

In April, before the UNESCO announcement, Ecuador's President Rafael Correa acknowledged these concerns by declaring the islands' ecosystem a national priority for conservation efforts. Amid the ensuing calls to scale back residency permits and overhaul a broken tourism model, the discovery of Lonesome George's kin sounded a rare hopeful note. Having compared highly variable regions of DNA from cell nuclei, Gisella Caccone and Jeffrey Powell of Yale University and their colleagues reported in the May 1 *Current Biology* that a tortoise on volcano-studded Isabela Island has about half its genes in common with George. The researchers even suggested that George may have full relatives on the same island.

The potential salvation of George's species, the Pinta tortoise, began in 1994. That year, the Yale team collected blood from 27 tortoises living on the slopes of mile-high Volcan Wolf, an active volcano on Isabela Island's northern end. Unlike single-species populations found elsewhere in the Galapagos Islands, the Volcan Wolf tortoises display an unusual combination of carapace shapes. Some are dome shaped, others have Lonesome George's distinctive saddle-back form, and some show characteristics of both types.

By 2002, the researchers had retrieved enough nuclear DNA and maternally inherited mitochondrial DNA from other Galapagos populations to tease out some unexpected links. The Volcan Wolf group seems to include a hodgepodge of lineages arising from multiple colonizations, while Lonesome George appears most evolutionarily related to saddle-backed tortoises on Espanola and San Cristobal Islands, more than 180 miles to the southeast. Caccone speculates that some tortoises on the southern islands may have floated on the strong ocean currents that flow northwest to Pinta.

In 2003, a joint expedition by the Galapagos National Park and the Oviedo, Fl.-based Chelonian Research Institute failed to find any signs of tortoise life on Pinta Island but did

uncover the skeletons of 15 former male residents. By extracting DNA from those remains and from others stashed away in museum collections, Caccone and her collaborators were able to compile a robust genetic profile of the Pinta species. Later, the researchers found a partial match in the nuclear DNA of a young male tortoise from the previously sampled Volcan Wolf population. The tortoise's mitochondrial DNA indicated that his mother had been born on Isabela. But it was clear that he had a Pinta male for a father, making him a hybrid of the two species.

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