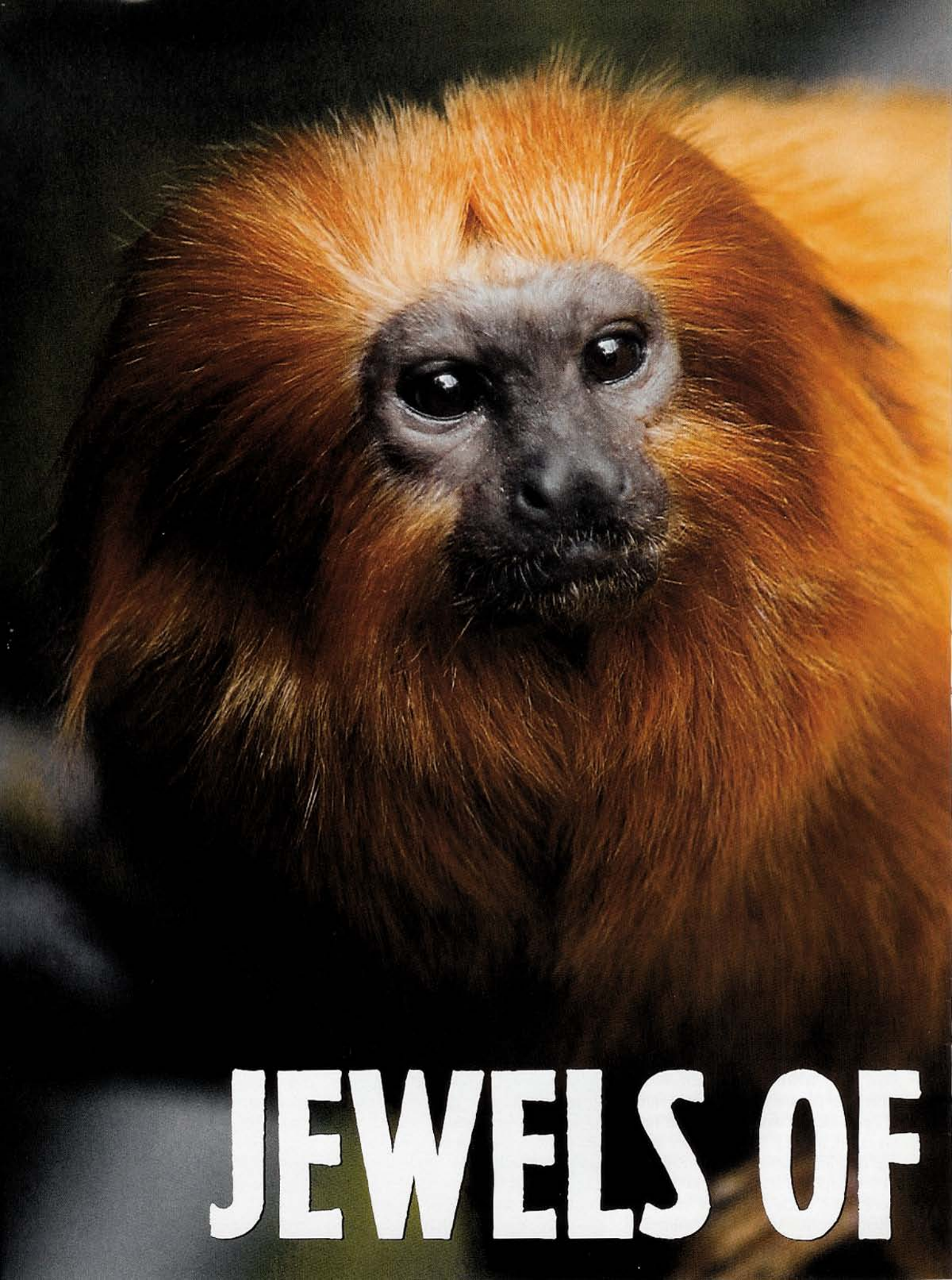

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FRANS LANTING/MINDEN PICTURES; DENNIS DEMELLO/WILDLIFE CONSERVATION SOCIETY (SPREAD)

Golden lion tamarins still light up Brazil's Atlantic forest, but they need more habitat to survive

BY CYNTHIA GRABER

ARLEIA MARTINS TREADS A narrow trail through the forest, her knife snug against her hip and her sleeves and pants worn long for protection against voracious, swarming mosquitoes. She whistles, long and high, and scans the trees. Another researcher, Paulo Santiago, follows closely. Martins whistles again, and the forest answers; high-pitched chirps cascade from the trees. She continues into the forest, whistling occasionally, until she comes to a platform about five feet off the ground, on which she piles bananas.

A number of petite primates appear overhead—golden lion tamarins, probably the best-known endangered species in Brazil's Atlantic coastal forest. Fiery orange, leonine manes frame their tiny faces, and black dye markings, put there by the scientists to distinguish one from another, run down their long, orange tails. They jump from limb to limb and peer hesitantly down at the proffered snack before descending to investigate.

Santiago points out a pint-size male. "That's Douradinho, the thousandth golden lion tamarin." Douradinho's status as the thousandth of his kind is significant because, at its low point, the wild golden lion tamarin population numbered a mere 200. His birth, in March 2001, represented the latest benchmark in a string of successes for the golden lion tamarin reintroduction project, one of the first and most successful efforts to release captive-born animals into the wild. The project has also used his birth to alert the public to the greater problem ahead: Without more habitat, golden lion tamarins will never be able to survive independently without human assistance.

When Devra Kleiman, as an assistant director for research at the Smithsonian's National Zoo in Washington, D.C., began working with golden lion tamarins in the 1970s, the zoo animals weren't breeding. "At the time," says Kleiman, now a Smithsonian Research Associate, "it wasn't clear that they are monogamous and live in family groups. Some zoos kept

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them in big gang enclosures, like rhesus monkeys or baboons. Breeding was dreadful under those conditions. So I said, well, they may be monogamous. Let's try it that way."

This approach worked. Then Kleiman did something unprecedented: She took the studbook, the list of animals that live in zoos around the world, and used it as a proactive conservation tool, transferring animals among zoos to enable viable individuals to get together to breed. By the early 1980s, the captive population had increased to 300.

As the number of captive-born tamarins swelled, survival prospects for their wild brethren were growing more precarious. In the early 1970s, Adelmar Coimbra-Filho, an eminent Brazilian primatologist, suggested that the lion-maned monkeys were well on the path to extinction. Urban and agricultural pressures had eaten away at their coastal forest habitat, eliminating whole populations, and individual animals were vanishing into the international pet trade. Through Coimbra-Filho's work, the Brazil government created the first tamarin reserve at Poço das Antas, 13,750 acres of land expropriated from 37 private landowners, about 90 minutes from Rio de Janeiro. Coimbra-Filho and Kleiman began discussing reintroducing zoo-born tamarins into the wild, and Kleiman went to visit the site.

"On my first view of the reserve I thought—this is hopeless," recalls Kleiman. Much of the forest had been cleared for agriculture or lost to natural fires, and there was no real management. In 1983, Kleiman sent James Dietz, then in a post-doctoral position at National Zoo and now a zoology professor at the University of Maryland, to Brazil to study the animals' behavior and the availability of habitat for reintroduction. Dietz's wife, Lou Ann, was hired to educate local communities, schools, and landowners about the tamarins' status and the economic value of the forest. Comparative psychologist Benjamin Beck, also at the National Zoo and an expert in primate cognition, became involved in the planning. Says Beck, "I looked at reintroduction as a primarily cognitive challenge to an animal raised in captivity. A zoo animal needs to adjust to a totally different set of environmental demands in the wild."

A year later, in 1984, the team released its first golden lion tamarins. "We really had no model to follow; we just winged it," says Beck, about those early years. Captive animals, raised on jungle-gyms, didn't know how to move and orient themselves in the wild, with new textures, weights, and surprises. Some animals died because the release was too abrupt, with minimum post-release care. Future releases included nest boxes, supplemental food, and intervention if an animal became lost or injured. With careful management of the Poço das Antas reserve, including controlled fires to eliminate secondary growth, the forest regenerated.

By the early 1990s groups of tamarins were living in both public and private patches of forest in and around the reserve. Offspring of the introduced tamarins mixed with wild populations. Internationally, many people have hailed this as a sign of success.

Back in the forest, Martins watches as the tamarins feast on the bananas and move on, springing out into the branches. She follows, slashing the dense undergrowth lit by thin rays of sun penetrating the canopy. She jots down in her notebook what

her subjects eat, how they interact, how they move. But after walking for only a few minutes, she comes to the end of the forest. Rolling green pasture spreads out beneath the trees—a common occurrence here. Hundreds of years of European logging, farming, and urbanization have reduced a tropical forest whose diversity once rivaled that of the Amazon to a mere 6 percent of its original size. Only 1 to 2 percent of the tamarins' original habitat remains, mostly as small, isolated islands.

This patch of forest is only 12 or 15 acres, a far cry from the 100 acres needed to support a golden lion tamarin family of four to eight—typically a mated pair, their offspring from several litters, and occasional unrelated adults. The pair shares responsibility for raising the young—usually a set of twins each year.

Because of the forest's condition, the 1,000 animals in Rio de Janeiro state need human intervention to survive. Food supplements augment the fruits and insects they forage. Individuals must be moved around to preserve genetic diversity. According to computer models, 2,000 individuals are needed to ensure genetic diversity, with 62,500 contiguous acres of habitat.

Beck hesitates over the words he chooses to describe the project's outcome. "I'm very cautious about using terms like success," he says. "Do we have real assurance that the whole population is self-sustaining? No. The computer models don't show that."

"The conservation project must be bigger than protecting golden lion tamarins," says Denise Marçal Rambaldi, director of the Golden Lion Tamarin Association (GLTA), based in the reserve. "Without the forest, there will be no animals."

To tackle this problem, the tamarin conservation project has moved into the next stage: habitat restoration. Worldwide, conservationists talk about ecosystems instead of individuals, wild places rather than wild animals. And the idea of building corridors between isolated habitats to allow species' movement and preserve genetic diversity has also gained importance. The first step in the current plan joins 14 forest islands by creating 13 corridors over numerous private lands, linking up Poço das Antas Reserve with the largest privately-held tamarin habitat 30 miles south. In 1996, botanists with the Rio de Janeiro Botanical Garden set up plots to test methods of replanting native forest species, some in circular stepping-stone patterns, others in strips, some with all the types of plants that would eventually colonize a forest, others with only the species that would grow first to create the shade necessary for the climax species to flourish. Today, the plants are sparse but growing. Birds and other animals come in to feed on the fruits and disperse the seeds of plants from deeper within the forest. The forest is slowly recapturing lost terrain. With these corridors in place, the tamarins will eventually have 50,000 acres to roam.

Decades of public support for the project have created a network of farmers proud to host the captivating tamarins on their land. At the same time, however, landowners will need to invest time and effort to ensure that their workers know they have to protect the corridors, repair fences when needed, and keep cattle out. GLTA representatives are planning workshops to teach grazing methods that would allow landowners to reduce the space needed for their cattle. However, even if all the corridor-building proves successful, it won't be enough. To get the last few thousand acres needed to reach the project's goal of 62,500 acres, even more landowners must become involved.

Rambaldi says that some new landowners will be recruited to dedicate existing forest habitat to the project. To create habitat, financial incentives such as tax breaks that already exist for forest creation will be exploited, and new financial incentives might be created. Coastal resort towns drain water resources and already face water shortages. Reforesting could cut down on erosion and protect water sources. Taxing water use could provide landowners with the financial incentives to replant. Finally, there is a law in Brazil that requires landowners to keep 20 percent of their land forested, but most still do not comply.

"If we have to resort to the law, we will," says Rambaldi. "We'd prefer not to. We don't want to break the support for the reintroduction effort."

Work with golden lion tamarins has shown that humans can right some past wrongs, manage zoo groups to create a genetically diverse population, then take zoo-bred animals and create a new population of animals in their native habitat. But without sufficient habitat, reintroduction can't save a species forever. So, perhaps the tamarins are claiming their next iconic place in the conservation movement as a symbol not of how far we have come, but rather of how far we still have to go.

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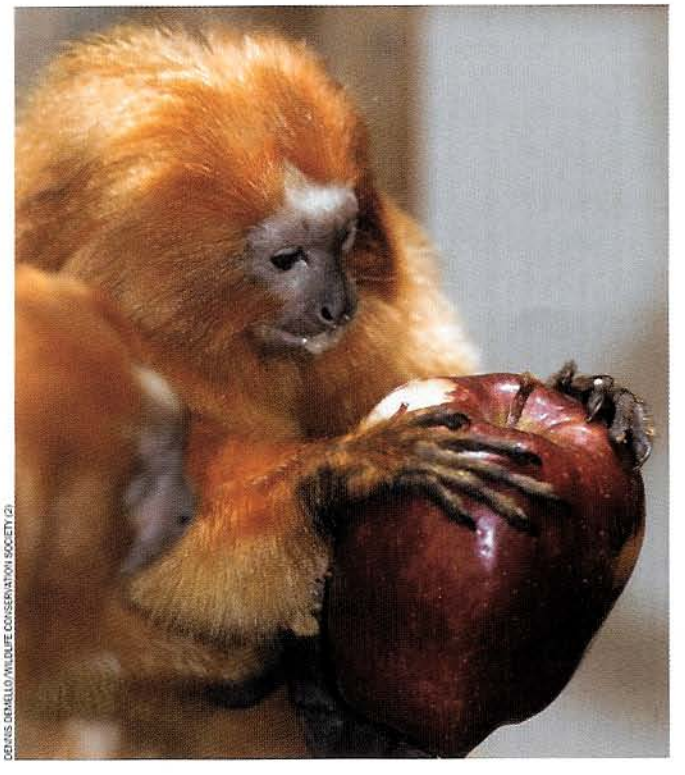

DENIS DEMELLO/WILDLIFE CONSERVATION SOCIETY (2)

Zoos have bred golden lion tamarins (pages 34-35, 36, and right) since the 1970s. Today, there are more than 450 in the captive population. Zoo-born animals were released into their native habitat in Brazil in 1984, but unless more of the Atlantic coastal rain forest is restored, the species cannot truly be saved in the wild.