Zoo Monkeys Rough It for Survival

National Zoo, office of graphics and exhibits

Logo for the Golden Lion Tamarine Reintroduction Program

The golden lion tamarines could soon face extinction, but zoo workers hope that releasing captive-bred monkeys will save the species

By JOAN CINDY AMATNIEK

Take a handful of well-fed city slickers, train them for the outdoors and leave them where failure could mean death.

It sounds like an Outward Bound program for humans, but it is a training program at the National Zoo in Washington, D.C., for a species of primate known as golden lion tamarines.

Releasing zoo-bred animals in the wild has been done with a curious menagerie of animals, including European bison, Hawaiian geese and peregrine falcons. But this is the first time for an endangered primate species. "It's the kind of thing we all dream about — the captive-born released," says Jim Douherty, a curator at the Bronx Zoo in New York City.

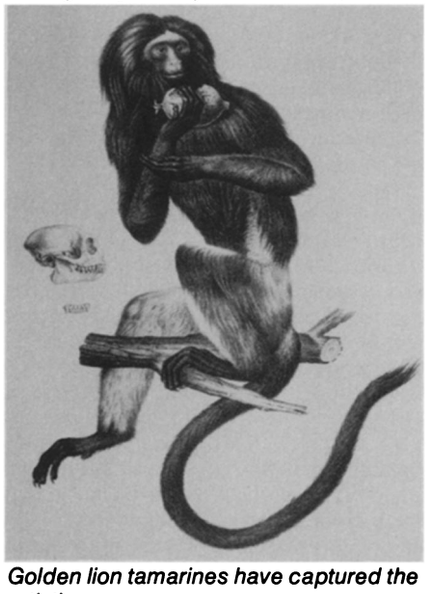
The successful captive breeding program for the golden lion tamarine *(Leopithecus rosalia rosalia)* makes the project possible, animal experts note (SN: 11/28/81, p. 347). The need arises from the precarious situation of the golden lion tamarine. Only an estimated 150 remain in the wild. A strong zoo population voids most usual concerns about whether repopulation helps the species.

Devra Kleiman, in charge of the golden lion tamarine project and acting assistant director of the National Zoo as well as studbook keeper for the species, says that the project team hopes to train captive-born monkeys to fend for themselves in the Poco d'Anta Biological Reserve near Rio de Janeiro, where some wild members of the species remain. Researchers are first determining if the preserve can sustain the extra tamarines, she says.

Foreigners since the conquistadors have been fascinated with Brazil's gold-colored, guinea-pig-bodied, dog-haunched, lion-faced, monkey-tailed animals. (Magellan's chronicler wrote about the golden lion tamarines.) But their odd beauty led to their downfall — poachers trapped them for the rich, who kept them as pets, and zoos put them on display.

Development took its toll on the golden lion tamarines as well. These members of the callitrichid family live only in one area — the coastal forest of southeastern Brazil. First the Portuguese cleared parts of the forest for the growing city of Rio de Janeiro. Later, 98 percent of the remaining forest was destroyed by logging and the petroleum industry.

Like many other primates, the golden lion tamarine's situation in the wild is critical. Over the past couple of million years, it is estimated that overall, the total number of primate species in existence has decreased from about 300 to approximately 120, with particularly drastic reductions during the past 20 years. Of these, half are endangered and half again may be extinct by the end of the century, says Stephen Suomi, chief of the Laboratory of Ethology at the National Institute of Child Health and Human Development, in Bethesda, Md.



Golden lion tamarines have captured the artist's eye.

But unlike the other threatened monkeys, the size of the golden lion tamarine's captive population has exploded. Until the early 1970s zoos found it difficult to get the species to breed in captivity. But the problem was solved by allowing the monkeys to live in more natural group situations. Now in 50 zoos there are nearly 400 golden lion tamarines; 200 have been bred at the National Zoo alone, says Kleiman, whose research on the animal's behavior and family structure is widely credited as the reason for the success.

The National Zoo sent 15 carefully chosen golden lion tamarines from U.S. zoos to the Primate Center of Rio de Janeiro in late fall, 1983. A family of nine and three young couples were picked for family structure and breeding lines, says Kleiman. If these die in the wild, their loss will not weaken the captive population base's genetic diversity. Nor are they from the strains that have developed a predisposition to hernias, she adds.

The researchers quarantined the monkeys upon arrival. Ron Evans, the species manager of the golden lion tamarines at the National Zoo, says, "They are like the first in space, who sat in a quarantine trailer in an aircraft carrier." He adds, "We don't know what they're carrying and not exhibiting. We must see if any diseases are demonstrated when in a different environment."

The monkeys' "rehabilitation program" will begin in earnest if a survey by National Zoo primatologist Benjamin Beck shows that the reserve can carry the additional monkeys without harming the wild popu-

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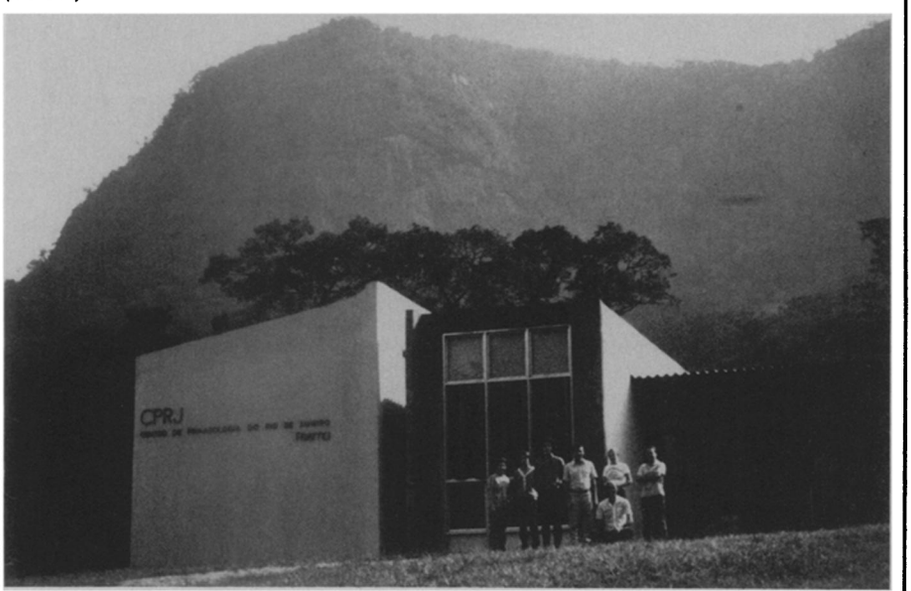
lation already there, says a National Zoo spokesperson. Little primary forest remains, and the reserve houses a railroad and a dam. The researchers might "create corridors between the patches of forest" to spruce up the area. But the lack of continuous woods helps the researchers too. It will isolate the wild from the captive-born and prevent interbreeding and disease spread.

Monkey in Poço d'Anta reserve (right).

The primate center and personnel at the base of Serra dos Orgãos, a mountain range in the state of Rio de Janeiro (below).



Photos: R. Mittermeier

To survive in the wild, the tamarines must become facile at "feeding and anti-predator responses," says Kleiman. They must master the ways to hunt for food, get in and out of the rain, and find nesting holes in trees — quite different circumstances from receiving two meals of canned marmoset food a day in the zoo and sleeping in a nest box.

Beck will teach the tamarines by taking them through a series of exercises. The schedule for the golden lion tamarines is graduated: Beck will slowly increase the cage size and hide their meals in more difficult places until the golden lion tamarines sleep outdoors and eat wild food. Beck and Aldemar Coimbra-Filho, director of the primate center, will also evaluate what the golden lion tamarines have retained through several generations of captivity and have learned from the exercises before deciding whether they can be released.

The program faces problems besides training the monkeys and reforesting the forest. The golden lion tamarines must be secured from human harm and competition. According to Russell Mittermeier, director of the World Wildlife Fund U.S. Primate Center (which partially funds the project) the Brazilian public is responding more warmly to the golden lion tamarine attempt than to other conservation projects because of the U.S. involvement. The Brazilian government has also acted in support of the effort to save the species. It banned the export of the golden lion tamarine. And it posted guards to prevent people from hunting and living in the 12,500 acre preserve.

The prospects for the golden lion tamarine look good. Although Evans expects mortality will be high, he feels the tamarine's curiosity and ability to learn quickly will help. "We're optimistic about the chances," he says. □

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ation in 1993. At best we could begin to build a research reactor at that time.

Ms assumption of a 20 percent long term increase in the cost of fission relative to fusion (due to the depletion of high grade uranium ore) is based on the cost increase for fission or fusion hybrid breeders.

With advanced fuels (e.g. DD), both inertial and magnetic fusion may in principle achieve higher efficiency by various direct conversion schemes. With DT fuel, inertial fusion may achieve higher efficiency by various schemes (e.g., absorbing the 14 MeV neutrons in a discus shaped mass of lithium which then jets into MHD power generators). The high temperature material problems which have so far impeded the development of fossil and fission MHD systems may possibly be solved by insulating the reactor walls with circulating lithium materials.

More work is needed before we can be confident that the cost of the fuel pellet factory is "well in hand" at $50 million to $100 million.

The cost of the pellet driver may possibly be reduced to roughly 10 percent of the power plant cost by a combination of three means: improve the pellet performance (e.g. by use of polarized fuel) to reduce the required driver energy, realize projected improvements in driver technology, and time-share the driver with two (or more) reactors.

Regarding sensitivity, if the fusion technology (driver and target factory) cost fraction were reduced to 10 to 20 percent, then the total cost would be most sensitive to the net electrical generating efficiency and to the cost of the fusion analogue of the fission nuclear steam supply system.

John H. Nuckolls
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Livermore, Calif.

Man and beast

Just a brief semantic quibble on your article, "The Living Link" (SN: 1/21/84, p. 41). *Orangutan* (pronounced O-rahng-oo-tahn; slight accent on the third syllable) is compounded of two Malay/Indonesian words: *Orang,* meaning human being, and *hutan,* meaning "jungle" or "forest;" hence it means "Man of the jungle." Thus "orang" won't work as an apocopation of "orangutan," since it carries semantic freight of its own, at least to those of us who know the language and, given what the "orang" are doing to the natural habitat of the orangutan, has a connotation which the orangutan themselves might find offensive.

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Green Meadows, Md.

Correction: A description of a study conducted by Selna Kaplan and colleagues at the University of California at San Francisco (SN: 2/11/84, p. 92) incorrectly reports that short normal children were treated with synthetic *human growth hormone. Rather, all the children in the study received growth hormone derived from human cadaver pituitaries.*

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