cluded in AIDS research work are the dental, child health, eye, and neurology institutes. In addition, $10 million has been assigned to the office of the NIH director to allow flexibility in meeting special research needs.

Other Items of Note. The House and Senate Appropriations Committees' budget actions are traditionally elaborated in committee reports that reveal items of special interest to members of the legislature. One, that the House suggests might be supported by AIDS money in the NIH director's office, is a "coordinated program in development of new antiviral agents based on a structural biological approach," which would include participation by physical chemists, molecular biologists, and biophysicists.

Also among items cited by Congress this year are provisions for establishing "centers of excellence" for the study of Alzheimer's disease; and funding through the National Institute of Diabetes, Digestive, and Kidney Diseases of six "kidney-urology" centers whose focus will include study of benign prostatic hyperplasia, which affects large numbers of men over 50. Congress instructs that the centers be named in honor of the late Representative George O'Brien of Illinois.

The new National Institute of Arthritis and Musculoskeletal and Skin Diseases will direct special attention to research in exercise physiology and low back pain, which the Senate report says "affects the majority of adults in the United States." "The Institute plans to bring together multidisciplinary research teams with expertise in bones, nerves, disks, and muscles to suggest research plans for studying low back pain," it says.

Micromanagement. The NIH is acutely sensitive to attempts at micromanagement by either the Administration or the Congress; this past year or so the OMB has been criticized as being most aggressive in this regard by spelling out how NIH is to spend its money by funding mechanism. That is, it has said that in a given quarter of the budget year, only so many grants could be awarded, at a specified dollar total, and only so much could be spent on research centers. Institute directors complain that this amounts to an intrusion by the Administration's budget office that merely reduces needed flexibility in distributing funds.

Congress took up the NIH cause through language in the appropriations reports that, while not binding, it hopes will influence OMB. In FY 1986, the Senate actually directed NIH to "disregard OMB substantive directives." Regarding FY 1987, the committee says it "expects OMB to refrain" from micromanagement.

During a period of budgetary restraint, when researchers quite reasonably feared that resources for biomedical research would be severely curtailed, the NIH has fared remarkably well at the hands of Congress, and a threatened presidential veto of the money bill never materialized. Whether the Administration will later seek rescissions in FY 1987 spending is anybody's guess. ■

BARBARA J. CULLITON

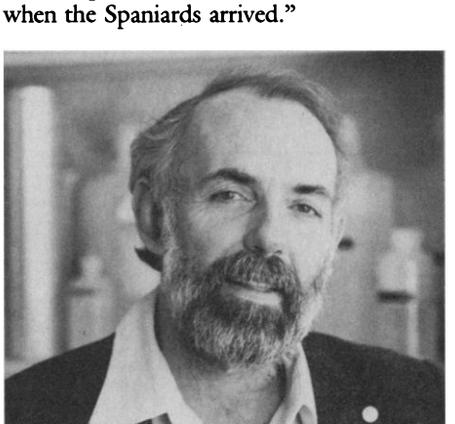
Regrowing a Dry Tropical Forest

Dry tropical forest has all but vanished; now a Pennsylvania biologist is raising money to restore one from forest remnants in a corner of Costa Rica

FIVE hundred years ago, when the Spanish came to Central America, dry tropical forest extended the length of the Pacific coast from northern Mexico to Panama. A few patches of this ancient forest still remain on the coast of Costa Rica. Now a biologist from the University of Pennsylvania, Daniel Janzen, is engaged in an unprecedented attempt to regrow a tropical forest in what he hopes will become a "case study in self-supporting perpetual ecological and biocultural restoration."

Janzen, who has been doing research on plant-animal relationships in Costa Rica for the past 20 years, is spearheading the effort, aided by foreign money and local talent. His goal is to incorporate the existing Santa Rosa National Park into a much larger 700-square-kilometer Guanacaste National Park by purchasing adjacent and connecting land.

With the simplest of technology—primarily fire prevention—he says that in 100 years or so the entire area can be restored, with "all the plants and animals that were here when the Spaniards arrived."



Daniel Janzen *hopes a "user friendly" park will help restore biology to the local cultural repertoire.*

Time is short. Janzen says the forested area of Costa Rica has shrunk from 20 to 2% in the past two decades. Janzen launched his dream a year ago; now he has collected $1 million for government purchase of the land—including $500,000 from the MacArthur Foundation—and needs $5 million more by next spring. The whole project cost is estimated at $11.8 million, including a $3-million endowment for operations.

Tropical dry forest, which once accounted for over half of all tropical forest, has received little attention internationally amid the alarm over the demise of rain forests. One reason is that there is so little of it left. "In any tropical country, look where its major crop and pasturelands are," says Janzen, "that's the former dry forest." Most of the rice paddies of India were once tropical dry forest. Dry forest really exists in two separate climates: no rain falls from December until spring, and for the rest of the year it rains all the time. Janzen says there are 20% to 40% fewer plant and bird species in this type of forest than in a rain forest; the variety of insects and mammals is about the same. Dry forest is in some ways more complex because of the extreme weather changes and the topical as well as seasonal variability in rainfall, which make for a great variety of small habitats.

The Guanacaste park (named after the national tree) contains farmlands, savannas, deforested areas, and two volcanoes as well as tiny areas of pristine forest. In the manner

of a skin graft, Janzen wants the remnant forests to form the seeds from which the larger forest will be regenerated.

Costa Rica in many respects provides a unique milieu for the regeneration plan: for 200 years until 1750 it was the "back forty" of the Spanish colonies, says Janzen, and remains relatively thinly populated to this day. In the 1800's, it was peopled by an influx of European immigrants, so it has an overlay of 19th century European culture. Indeed, says Janzen, in the upper elevations, with European-type climate, German is still spoken, and when he arrived in the 1960's children in lederhosen could be seen harvesting coffee beans.

The country, which abolished its army along with its military government in the 1950's, puts high priority on education, and the citizenry is virtually all literate. Although they average 2 to 5 years of grade school education, they provide a "very willing audience for an intellectual product," says Janzen, who regards the educational value of the park as its most significant aspect.

"I am definitely working in the easiest possible climate to set something up like this," says Janzen. Politically, he has the support of everyone from the president on down, including parks director Alvaro Ugaldi.

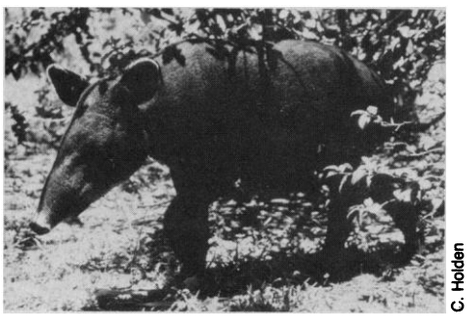
Economically, there is little reason for the few farmers and landholders in the area to resist selling since most of the farmland in the park is poor quality. Within the past year Janzen has persuaded the 15 farmers living within the boundaries of the park to sell their land, and has elicited promises from five large absentee landholders not to do anything until next spring when he hopes to have the resources amassed to buy them out.

With the exception of two graduate students engaged in "esoteric research," Janzen is using only local talent to further the plan. Several of the farm families are staying in the park and are being put on salaries to help with fire prevention, stop poaching, and plant seeds. He has an 18-year-old farmer collecting and preparing specimens who, he says, is as competent a worker as any graduate student. Janzen has a keen sense of the investment he is making when he sends two children out to collect guanacaste seeds in horse dung—in 20 years, he says, these will be responsible citizens whose knowledge of their natural environment may be affecting its future.

Janzen's research experience has given him an intimate knowledge of how the forest grows and interacts, but there is nothing new in the technology for regenerating the forest. The major impediment has been the fires set by farmers to clear pastureland, which regularly sweep uncontrolled over vast areas and stop new tree growth. Fires are now being curbed with fire lanes cut along the park's boundaries. Janzen also trains local citizens to speed up the regrowth process by collecting, preparing, and planting seeds. Cattle will be used as "management tools" to keep down tall grasses that inhibit new tree growth.

About 80% of the area is eventually to be allowed to return to its original form; the rest will serve as an experiment station for the production of timber, firewood, and fruit trees and trees for watershed protection. Janzen also says that populations of the local wild animals, such as deer, peccaries (boar), and agoutis (cat-sized rodents) might be jacked up to commercially exploitable levels.

One of the most challenging elements of the regeneration plan is what Janzen calls "biocultural restoration." The ancestors of the people residing in the area, he points out, "all had a very heavy-duty pragmatic understanding of nature." Now, their environment is dominated by rice, sorghum, cotton, and cows. His goal is to "put biology back into their cultural repertoire—back on the same status with music, art, and religion." He sees the regenerated forest as serving the function of a library or museum. It must be "user friendly." He is alive with plans for research projects and for educational activities ranging from field trips for local schoolchildren to international symposia. By building in local participation, he also sees a major function of the park as being "to short-circuit the long and tortured circuit of biological information flow from the tropics to the temperate zones and back to the tropics."



C. Holden

Peccary: *A wild boar, one of the larger mammalian denizens of Guanacaste National Park.*

When he first arrived in Costa Rica 20 years ago, Janzen, who spends 6 months a year there, says, "I never gave a second thought to conservation." It was not until a couple of years ago, when he was asked for advice on how to rid another park of the goldminers who were ruining its streams, that it occurred to him that his own research ground might be in jeopardy. Now he is a man with a mission. In 1984 he was awarded the Crafoord prize, a Swedish prize designed to fill gaps left by the Nobel, for his work on coevolution (how plants and animals evolve in relation to each other). He put $45,000 into electrification for the park; the remainder is for the government's purchase of parkland.

Among the small community of conservation-minded ecologists, the Guanacaste project is regarded as a rare bright spot in the generally ominous tropical forest picture. Thomas Eisner of Cornell University believes the project may act as a spur to similar ones elsewhere in the world. "Most tropical forest research and activism has been what to do to slow the hemorrhage," says E. O. Wilson of Harvard University. "This is one of the first efforts in restoration of an environment . . . and I believe restoration ecology is an idea whose time is about to come."

Janzen believes economic arguments for the preservation of tropical forests are insufficient and that both the value and the survival of this environment can be realized only if the soil and its denizens become embedded in the consciousness of the human inhabitants. "Let's not worry about how their economic development can be brought about—there are many minds already focused on that. Let's worry about the intellectual development of the people. . . ."

■ CONSTANCE HOLDEN