

INSTITUTE OF CURRENT WORLD AFFAIRS

DRP-3

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March 31, 1986

The Feet of Birds

Peter Martin
INSTITUTE OF CURRENT WORLD AFFAIRS
4 West Wheelock Street
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Dear Peter:

I have returned to New York from a very successful trip to Costa Rica.

I spent part of February in Costa Rica searching for a site for AWCE, the Automated Web for Canopy Exploration. The property is called Rara Avis and is owned owned by Amos Bien. It is located in Caribbean slope foothills about forty miles north of San Jose, the capital of Costa Rica. I found two areas that would be suitable for AWCE while scanning Rara Avis from an airplane. Both are in steep terrain that would be difficult, if not impossible, to study without a radio-controlled, chairlift system. The sites include some of the nicest forest on the property and I am looking forward to exploring that canopy.

Braulio Carillo, a national park adjacent to Rara Avis, will soon be transected by a highway. After Amos Bien has finished constructing a dirt road, Rara Avis will be only a two hour drive from San Jose. It will then have vehicular access, except after heavy rains when two river crossings become impassable. Fortunately, suspension bridges make it possible to traverse these rivers on foot in case of an emergency.

Amos cut trails to the AWCE research area this March, and selected the location for the Heinz ground station (Heinz has donated funds for the development of a canopy research station.) Both AWCE and the station are situated across a gorge from El Plastico, a nearby farm where we can live until our buildings are completed. A suspension bridge will be built to span the gorge. One can anticipate approximately a thirty minute walk from El Plastico to the Heinz House, once the bridge is in place. The construction of the buildings will be directed by Amos, who is

Donald Perry is an Institute Fellow who is developing a new system of access for conducting research in the tops of jungle trees.

now in contact with carpenters and sawyers.

Near the end of April I will return to Costa Rica to inspect the progress on the house and determine the exact dimensions of the suspension bridge and AWCE. During the summer John Williams, my engineering collaborator, and I will install the chairlift. It is scheduled to be field-tested in September and in full operation by fall.

Both Amos and I are excited about the suspension bridge. It will add an adventurous flavor to Rara Avis as visitors will be able to simply and safely view treetop communities. The suspension bridge should satisfy the acrophilic needs of most adventurers while allowing research on AWCE to remain undisturbed. A less direct trail through the ravine will be maintained for those who prefer to keep their feet on the ground.

Amos and I will be working independently; he with tourists and I with canopy researchers. Already several tour group operators have asked if AWCE will be open to the public, but I have decided to allow only sponsors of canopy research and investigators to use the "web." This will avoid any potential the system might have for becoming a tropical canopy tourist trap.

During its first two years AWCE will need approximately \$20,000 per year for operations, which includes employment of two "web" operators. The primary duties of the operators will be to train long term investigators in the safe use of AWCE and to lead visiting investigators to study sites in the canopy.

Rentals will not provide enough operating capital until funds become available through independently written grants. Since this is a slow process, funds will initially be sought from private sponsors. Donations to canopy research will be tax deductible through the Foundation of the University of California at Los Angeles. Sponsors will be taken on an aerial excursion to see the luxurious and extremely complex communities of life in the tops of immense rain forest trees. Many would find this an exhilarating natural history adventure.

Deforestation threatens all Central American forests. As human populations grow and wood resources dwindle, there will be increasing political pressure to encroach on park lands. Even in the United States, where large groups of people are interested in conservation, it is difficult to protect wilderness areas from detrimental human activities. Thus the long term success of Rara Avis is linked in part to the fate of Braulio Carillo park. There are several reasons why Braulio may be the most environmentally secure location in Costa Rica: 1) The close proximity of San Jose makes the park a favored half-day trip for the country's urban nature lovers. This group is growing in number and consequently, political influence. 2) Several years ago the Organization for Tropical Studies, a consortium of U.S. and Latin American universities, embarked on a conservation

campaign to enlarge the park. OTS wanted to prevent Finca La Selva, its lowland rain forest research preserve, from becoming an island of forest in a sea of cattle pasture. This effort culminated in a fund raising drive spear-headed by Nature Conservancy. The money was successfully raised for the purchase of the Zona Protectora, a long piece of forest land connecting Braulio with Finca La Selva. On March 15 the president of Costa Rica traveled to La Selva for a party that officially incorporated the Zona into Braulio Carillo park. 3) The establishment of Rara Avis as a premontane research site (the elevation is about 600 meters) would add to the existing forces that are poised to guard the park against exploitation.

Perhaps the most prominent piece of this conservation puzzle is Finca La Selva. Over the past two or three years La Selva has undergone a metamorphosis. Under the direction of David and Debbie Clark and with funding from the National Science Foundation, La Selva has changed from a relatively small facility to a sprawling complex of buildings. The Clark's success is most evident in the new mess hall. Its capacity has quadrupled and it can now serve two hundred people. New individual bedrooms give researchers privacy during their stay. The plan, besides improving comfort, was to increase La Selva's ability to handle large groups of people.

Having reached a final plateau in growth, La Selva now finds itself in a potentially precarious financial situation. The finca lacks an endowment like that of the Smithsonian Tropical Research Center (STRI.) STRI has operated a station similar to the new La Selva in the Panama Canal Zone on Barro Colorado Island for many years. Presently, NSF provides a major share of support to La Selva, but considering the nation's budget crisis, one is left wondering how La Selva will offset a decrease in NSF support. Rentals to scientists with long term grants would provide some operating capital, but the large numbers of guests and researchers necessary to sustain the facility have yet to arrive. (Rumor has it that because La Selva is strategically placed in the lowlands relatively near to the Nicaraguan border it will continue to receive NSF support for political reasons. The idea seems absurd, but that describes many U.S. Government decisions concerning Nicaragua.) Perhaps rental to bird-watching groups will help fill the gap. Becoming a tourist hotel might also save La Selva, but that would not enhance tropical research.

Some people think that STRI is sufficient and that another tropical research station is not necessary. These are people do not realize that there is a vast difference between the forest in the Canal Zone and La Selva's forest, the latter being richer in species and more humid. La Selva has one of the most interesting forests in the world and if it is to be saved for posterity, it seems that a major drive to obtain an endowment must soon begin.

The financial health of La Selva may have a tremendous impact on the survival of the Zona, which in a few years may be the last remaining latitudinal transect of tropical rain forest

in Central America. Because Rara Avis is adjacent to Braulio and the Zona, La Selva's long term success may dictate the future of AWCE.

The material I had planned on including here about the extinction of the dinosaurs has been bumped to a later report by an exciting discovery I made while working with the GEO film crew at La Selva. (GEO video taped me in the treetops for a commercial television program scheduled to be broadcast near the end of March or early April.) The discovery was a new class of flower that depends on birds' feet for cross-pollination. All writings that I am familiar with are silent on the subject. The flower structure is so unique it may well rank as a new chapter for books on pollination ecology.

I first suspected the existence of this pollination system in 1981 after I had climbed a 160 foot tall Ceiba at La Selva to take photographs for "Life At The Top," my photographic adventure book that is being published by Simon and Schuster late this summer. Yet, it was not until this last trip that I was able to make critical observations in support of the discovery. The plant is a tenacious vine, Norantea sessilis of the family Marcgraviaceae, and is most readily visible in February. At that time the Ceiba's crown is leafless, which accents the tree's dozens of epiphytes by silhouetting them against the sky. N. sessilis is the most extensive plant in the crown. Its importance to canopy birds is apparent when looking up from the ground. Throughout the day birds of all sizes -- from large, gaudy oropendolas to tiny, emerald honey creepers and migrant warblers -- can be seen flying about the crown with most of their activity restricted to the vine. When viewing the birds from the ground, however, they appear so small that one is unable to correctly determine their species.

The main feature that makes the vine so attractive to birds is its copious nectar production. Groups of very unique ladle-shaped nectaries on each stem (rachis) of flowers produce several cubic centimeters of sweet nectar each day. Much nectar is produced during the early morning hours and it literally rains from the nectaries at the slightest disturbance. The birds repeatedly landed on inflorescences causing dozens of drops to fall to the forest floor. I have spent ten years working with flowers and never have I seen so much wasted nectar.

For the vine, attracting birds is only one of the problems of pollination. Ideally pollen must then be carried between plants. Most biologists would not think that the smooth scales on birds' feet could effectively carry pollen. N. sessilis is very different from most plants in that its pollen is embedded in a thick, transparent glue. The substance sticks to any smooth surface and easily attaches to birds' feet.

Probably the greatest physical problem the plant must overcome is the mechanical abuse its flowers must endure. Not surprisingly N. sessilis's female flower parts are small

flattened "buttons", and unlike most flowers they can withstand incredible shearing and compressive forces while remaining viable.

In addition to having a reproductive strategy new to science, the natural history of N. sessilis is intimately linked to annual events in North America. I took Gary Stiles, a tropical ornithologist and professor at the University of Costa Rica, to see the vine and he immediately discovered information that had eluded him during years of observation. Norantea attracted many species of North America's migratory birds: Tennessee, Chestnut Sided, Bay Breasted, Yellow, and Prothonotary Warblers, and Northern (Baltimore) Orioles. A rich flock of exotic and colorful tropical birds also visited the vine. He was very excited and more certain than ever that Central American forest canopies are primary habitats for North America's migratory species (although he sees those birds as fully tropical species that fly North.) I could not help but wonder if a summer will come when our beautiful tropical birds fail to return because their canopy homes have been virtually destroyed.

Sincerely,

A handwritten signature in cursive script, appearing to read "Don".

Received in Hanover 4/7/86