INSTITUTE OF CURRENT WORLD AFFAIRS

DRP-8

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The Canopy of Borneo

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Dear Peter,

In this report I would like to go into more detail about the present and future of canopy research. As you know I traveled to Borneo last fall with Wolfgang Bayer who was making a Nova television program about orangutans. This gave me an opportunity to examine canopy communities in two different areas of Borneo: swamp forest of Tanjan Putting Reserve in Kalimantan, Indonesia; and the very tall dipterocarp forest of Sepilok Reserve in Sabah, Malaysia.

Borneo's treetops lacked the diverse floral communities characteristic of Central and South America. Limbs were unencumbered by epiphytes, except for isolated patches of a conspicuous fern species. This was a depauperate display in comparison to the luxurious hanging gardens of La Selva, a research station in the lowland jungles of Costa Rica, where hundreds of epiphytes can form dense mats on large limbs.

Tree crowns at Tanjan Putting were relatively small. A hundred-foot tree was tall for this swamp forest. Such a tree might have a crown diameter of thirty feet and a height-to-crown ratio of about three to one. In the lowlands of Costa Rica, however, an individual might be one hundred and fifty feet tall with a crown diameter of ninety feet, a ratio of about two to one. Even at Sepilok, where the trees reached two hundred feet in height, it appeared that individual tree crowns were smaller, relative to tree height, than in the lowlands of Central America. If this is characteristic of Bornean trees (a number of localities needs to be measured) then certain biological ramifications might be expected.

Large tree crowns necessarily have large limbs, which in turn are better growth sites for epiphytes. Thus, smaller crowns, because of their smaller limbs, may be a contributing factor toward maintaining Borneo's less diverse canopy

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

communities. Smaller limbs drain more quickly and result in a relatively drier canopy habitat, an environmental condition that adversely affects epiphytes. Combine this with Borneo's longer dry season, and it is no wonder the country's canopy communities are so meager.

An intriguing aspect of smaller crown diameter is that tree trunks are closer together, thus in Tanjan Putting large trunks seem to "fill" the understory environment. Swamp forest is a prime habitat for orangutans. Contrary to popular belief, orangutans do not generally travel by brachiation, swinging from arm to arm along branches. They have a highly sophisticated locomotion appropriate for the largest and most intelligent arboreal mammal. They move through the forest by swaying back and forth on long narrow trunks until they can grab a nearby tree. Another method they use is to simply hang off-center -- they weigh up to two hundred pounds -- until one limber trunk approaches the next.

Watching orangutans break limbs while climbing, building nests, and stripping bark for food led me to think that these animals may have an influence on the structure of swamp forest. Foraging on the crowns of smaller trees could reduce the lateral reach of limbs and force the plant to grow taller. In effect the orangutans may help to maintain a crop of closely spaced, maturing trees. These may be more limber than they would be in the absence of orangutans because the trees have been "forced" to grow taller and thinner. This would leave mature trees more susceptible to damage by heavy winds that whip the crowns together, break limbs, and reduce crown diameters.

I came back from Borneo satisfied that La Selva had some of the best canopy communities in the world. This was supported further by discussions with friends who say that peninsular Malaysia and humid Africa are little different from Borneo. This does not mean that Bornean treetops are uninteresting. On the contrary, they make up for their meager epiphyte communities with a wealth of aerial canopy animals such as Draco (the "flying" lizard), huge gliding squirrels, "flying" lemurs, flying foxes, and a species of gliding snake.

The absence of a comparable community of gliders in Central and South America is a biological mystery without an explanation. It is possible the selective force behind the evolution of these gliders is forest structure. Aside from providing orangutans with an unusual means of locomotion, closely spaced trunks may well be the environmental condition that set the stage for leaping animals to be transformed into gliders.

I talked with a number of Indonesian and Malaysian biologists and learned that the region had no continuing canopy research programs. This is also evident in Central America where there are no research facilities devoted to canopy studies. I find this puzzling because of the great importance of canopy biology to understanding tropical rain forest ecosystems.

In 1974 when I first began developing techniques for access to the jungle's roof, I had thought that this neglected habitat would soon be invaded by a wave of researchers. But after a decade of writing scientific and popular articles about canopy biology, these techniques still have not been widely adopted. The most logical conclusion I have been able to draw from

discussions with biologists is that my rope-climbing techniques are too risky. Biologists are not high-wire acrobats.

An ecologist worth his salt knows that we will never understand tropical forests unless we can study the treetops. Terry Erwin, of the Smithsonian Institution, calls the jungle canopy "the last biotic frontier." The March 14, 1983 issue of NEWSWEEK carried an article about my research entitled "Tall tales from the jungle treetops." In it Michael Robinson, of the Smithsonian Tropical Research Institute (STRI), said, "We expect that [the canopy] abounds in all sorts of new and wonderful things." In the same article Peter Raven, President of the Organization for Tropical Studies, predicted that "The vast majority of organisms in the canopy are unknown and may well remain unknown." He was referring to the fact that tropical rain forests are quickly disappearing. As each year passes, it is becoming apparent that the canopy <u>will</u> remain unexplored. This is not only because forests are disappearing, but because research stations cannot find adequate support for canopy research. It would appear that the funding of canopy studies at most research stations, including La Selva, is being crippled by individuals who do not understand the importance of canopy research.

> "A park whose flora and fauna are unknown and uncataloged can be compared to an excellent library whose books have no titles, no authors, and no call numbers."
>
> Daniel Janzen, The Nature Conservancy News, January 1984

My trip to Leaky Station, in Tanjan Putting Reserve in Kalimantan, Borneo, uncovered another reason why the flora and fauna of tropical rain forests remain unstudied. Dr. Birute Galdikas operates this station and she also studies the canopy. Orangutans, her research subjects, spend much of their time living on high limbs. In order to study them, Dr. Galdikas must routinely employ natives, who climb bare-handed, to collect valuable botanical specimens and information. She was thrilled when I offered her the opportunity to see the canopy and soon began to master tree-climbing techniques using mountaineering gear. When I left Borneo, she purchased what little equipment I had brought with me. This showed me that a school is needed where biologists can learn to climb trees.

My plans for AWCE and the Heinz ground station include special tree-climbing courses. While AWCE eliminates strenuous work, it is not a replacement for tree-climbing; tree-climbing will remain the most mobile and inexpensive way to study the canopy.

I have received a letter that, among other things, reproves me for excluding Costa Ricans from my canopy research program. Costa Ricans are, and will continue to be, intimately associated with AWCE. A number of Costa Rican biologists have already expressed a desire to investigate the forest roof, and I expect more researchers will become familiar with AWCE once the system has been completed.

You may recall that in DRP-1, I had said it would have been

difficult to define a relationship between the Costa Rican government and AWCE. I have been asked to elaborate on this point. I had talked about AWCE with the national park service, which is a branch of the Costa Rican government. While they were interested in the project, they also said that building the Heinz ground station on park land would present some formidable, if not unmanageable problems. This is the reason why I have decided to build on private property.

One critic of my reports wrote that I made a grave error in DRP-3 when I said there would be political pressure to encroach on parkland in Central America. An interview in International Wildlife (January 1985) entitled "Coming Soon: Mass Extinction" has this to say:

> Magazine : What can we do? Intensify conservation efforts? Protect areas of the forest with parks?
>
> Peter Raven: Trying to save species by putting aside parks and reserves is worthwhile on the short-term, but on the long-term it simply won't work. With current populations and the very poor lot of most of the people, they will go right on using up whatever is available regardless of whether you call it a park or not.

I stand firmly behind Dr. Raven's claim. All over the world the needs of poor people are a serious political concern.

My use of rumors has unfortunately caused considerable misunderstanding. There are a variety of outrageous opinions concerning many topics in my field. Often it is not possible for me to know if these opinions are true or not, but since they do give some insight into social undercurrents, I like to include this stuff in my reports. In the future I will elaborate more fully about a rumor's merits.

Also it seems that poor spelling has irritated some readers. I am sorry for this and I am working diligently to correct the problem.

Some of these same people feel that I did not support the establishment of the Zona Protectura, a recent Costa Rican park extension that connects La Selva to Braulio Carillo Park. I would like them to know that one of my canopy research photographs was selected by NATURE CONSERVANCY for the cover of the Zona Protectura prospectus. Photographs are a powerful medium of communication, and I am glad that mine helped to raise the millions of dollars recently used to purchase the land.

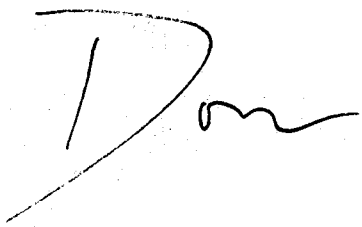
My photographic-adventure book, now published by Simon and Schuster of New York, has a new title. The old title was Life At The Top; the new title is Life Above The Jungle Floor. The book includes material about canopy biology, evolution, and the role played by ancient forests in driving dinosaurs to extinction. It is also an account of my experiences in the lowland jungles of Costa Rica.

La Zona Protectora

Cover of NATURE CONSERVANCY prospectus for the Zona.

To conclude, I extend my greatest respect to the Costa Rican government and its park service, universities, and people. They stand as an example to the world on how to begin to save tropical forests. I look forward to sharing AWCE with Costa Ricans and citizens of the world. I hope that funding institutions, who hold the success of canopy research in their hands, will realize the importance of assisting in the development of AWCE. If there is a funding agency or person interested in AWCE, I can be contacted through the Institute.

Sincerely,



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