Letters

Animals from the Amazon Basin

History shows that precisely the resources and species thought to be inexhaustible are those in greatest danger of misuse and extinction. Laymen and scientists alike generally consider the flow of products from the "green sea" of the Amazon Basin to be limitless. It is not.

From 19 Sept.–12 Oct. 1966, I explored the forests near the Peruvian towns of Pebas, Santa Clara, Iquitos, and Pucallpa in order to survey the area for the study of primates. I flew over or boated through the intervening miles. Wherever I inquired, army officers, missionaries, and natives insisted that animals and good forest could be found "*en el centro*" (meaning directly away from the major waterway in the area). However, after half-day treks into forests of a type in which experience led me to expect many animals, I found none, even though I had been previously assured that I was in a "good" area. The sounds of the forests where I walked were chiefly those of insects. Visible were small birds, small lizards, and colorful tree frogs, joined only occasionally by a bird of medium size. Not once did I see any mammals or any large birds or reptiles. The usually common armadillo trails were extremely rare; feces or signs of feeding or resting were extremely scattered, and no nests were spotted. A colleague who has worked the Amazon from the Colombian border into Brazil and another who has worked the headwaters of the Pachitea River confirm these observations.

Wherever land is high enough to permit farming, slash-and-burn agriculture degrades the soil, completing the depredation of the forests which was begun by lumbering. In places the destructive trend has progressed to an "anticlimax" of pastureland. The second-growth forests, soon to be recut in their turn, are of poor quality and produce mainly wind-dispersed seeds. These are probably poor or inefficient food sources and can support little animal life in comparison with the original forests, though it is true that in slashed areas the collapse of the vertical stratification contributes to the abundance of a few species. Losses of forests to lumbering and farming, and animals to hunting practices are inevitable corollaries of the burgeoning populations along the river. (Not only dried monkeys but also fresh rat-sized rodents are for sale in the open meat market in Iquitos.) Road building will soon send colonizers into frontier areas which are now inaccessible.

However, the fur and live animal export markets threaten wildlife over a wider range. Demand always exceeds the fur traders' supply, though tens of thousands of skins are shipped from Iquitos every year. Select species such as tapir, peccary, ocelot, and jaguar are being severely depleted over truly vast regions because of the desirability of their hides. All animals must be sought further and further into the forests each year. The trends set in motion by agriculture and the fur trade are compounded by exportation. Many animal exporters are unable to fill their huge orders—mostly from the U.S.—and mainly for experimental animals. The methods of hunting and capture are those most devastating to the breeding populations. My experiences lead me to conclude that through human intervention many species' ranges are being truncated, perhaps irreversibly, over large areas.

Demographic and economic problems and the fur trade aside, the situation demands investigation of the extent of experimental animal resources currently available in the Amazon Basin. Most ecological parameters of our experimental animals are only vaguely known, if at all. My preliminary observations suggest that suitable habitats for ceboids may be much more restricted than is generally thought, and that seemingly insignificant modifications of the forests may make large areas uninhabitable. Committees of the International Biological Program should be encouraged to plunge into the vast and exciting problems of the Amazon Basin. Through their organizations scientists must urge and support the conservation and management of animal resources and the control of exports at the source of supply. We may also demand more care in the keeping and shipping of animals to eliminate death between forest and laboratory.

Conservation by scientists is most vital and practicable. Quite often an experimenter uses only a brain or some other organ and then disposes of the remainder of the animal. Cooperative and conservative use of experimental animals can and must eliminate this inexcusable waste in the laboratory. I suggest that the demand for experimental animals could finally drive some Amazonian species to extinction. It is time scientists acknowledge that the South American source of supply is exhaustible.

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Basic Research and Public Support

Greenberg's article ("Money for research: LBJ's advisers urge scientists to seek public support," 19 May, p. 920) reminds me of a conversation I had recently with three engineers over a game of bridge. One was describing his work with satellites, and the discussion got into navigational problems. I found myself explaining some of the recent work on honeybee navigation, and speculations concerning honeybee brain function. Ultimately one of them asked if this work had some special significance or was being conducted merely on an academic basis. I was sufficiently so taken aback for the moment that my answer was lame. Subsequently discussion resumed on satellites, and glowing descriptions were given of the variety and complexity of gadgetry on some of them. When I innocently inserted the question whether information being received from these gadgets had any practical application or just represented somebody's whim, I received three amazed stares. One engineer said in polite exasperation: "Hell, man! We're exploring the universe!" I replied, "So are those fellows interested in honeybee brains." George Gaylord Simpson has said that Darwin's book was the most important one of the last few centuries