THE ADVANCEMENT OF BIOLOGY IN THE TROPICS

By Alexander F. Skutch

The foundations of the natural history of the tropics were laid chiefly by men of northern birth who were not afraid to risk their lives and their fortunes on perilous journeys to little-known lands. Lured by visions of the grandeur and profusion of tropical nature or spurred by thirst for adventure, they voluntarily exiled themselves from their homeland for years together, to face the hardships of travel in remote regions, long isolation from people of kindred interests, and the constant threat of death from fever or hostile savages. The records and collections gathered with so much toil and sacrifice were too often lost on the long journey home. These pioneer naturalists of the tropics were nearly always "on their own," with no government or institution to support them, although museums or private virtuosi might buy their collections. Some of these men, like Wallace and Spruce, were professionals who depended primarily on the sale of specimes for an income, others, like the mining engineer Thomas Belt, were amateur naturalists. In addition to earning a living by their work, these early explorers of tropical nature found time to make original observations on such fascinating subjects as mimicry in insects, the symbiosis between ants and plants, and the influence of climate on the flora and fauna; when confined to their hammocks by bouts of fever, they might speculate profitably on fundamental problems, such as the origin of species. Some of these intrepid naturalists of an earlier day died before they could make themselves known; others, with better luck or tougher constitutions, lived to return to Europe and write books that still inflame young naturalists with the desire to study tropical nature at first hand.

Support of biological investigation in the tropics by governments and scientific institutions came slowly. One of its earliest forms was the establishment of botanical gardens by colonial governments, as by the Dutch at Buitenzorg in Java, the English at Peradeniya in Ceylon and in other colonies. Early in the present century, William Beebe, under the aegis of the New York Zoological Society, established a succession of biological stations in British Guiana and then in Trinidad. A number of North American universities supported the station on Barro Colorado Island in the Panamá Canal Zone, which was later taken over by the Smithsonian Institution of Washington. The Rockefeller Foundation sent biologists to the tropics to investigate problems pertinent to its work in public health, such as the biology of mosquitoes. A few young scientists worked in the tropics on research fellowships from the National Research Council or their universities.

Since the last World War, we have witnessed a vast increase of interest in many aspects of tropical biology by governments, institutions, and private individuals with means to travel. The awakening of such interest by the governments of northern nations is, at least in part, an outcome of the global struggle for power between the Communistic and capitalistic

countries, with the consequent expediency of winning the friendship of the economically less advanced nations of the tropics by helping them to solve their problems, some of which, such as those in the fields of agriculture and medicine, have biological aspects. The accumulation of information which may be helpful in tropical military campaigns is another incentive for government-sponsored research. But in addition to these extraneous motives for promoting biological research in the tropics, there appears to be a genuine increase of interest in tropical nature for its own sake, and for the light which investigations in the headquarters of life on this planet can throw upon fundamental biological problems.

With the support now available from governments and institutions of learning, with modern means of travel to and within tropical countries and improvements in their living conditions and healthfulness, an increasing number of biologists can now study tropical nature with comfort, safety, economy of time, freedom from logistic and financial problems such as the pioneer naturalists of the tropics hardly imagined. But with more favorable opportunities there arises a new danger ,that the ease of obtaining support for tropical research will encourage people who are more interested in travelling or in escaping from annoying academic responsabilities than in probing the secrets of tropical nature; that in order to obtain grants, scientists with little knowledge of tropical biology will choose unprofitable problems. Profitably to use the facilities now available for research in the tropics, there is need for careful assessment of the needs and opportunities which each branch of biology presents.

As soon as our interest in any object or phenomenon is aroused, we wish to know its name, without which it is difficult to communicate our experience to others or even to hold it in memory. To satisfy this basic demand of a talking animal, the collection, naming, and classification of natural products rightly precedes the more detailed investigation of selected species or groups. In some divisions of the animal and vegetable kingdoms, especially the less conspicuous ones, the labor of collection and classification is far from complete; other groups, especially the warm-blooded vertebrates (with the possible exception of the smallest mammals), the butterflies, and (in some parts of the tropics) the flowering plants and ferns, are so well known taxomically that further general collecting seems superfluous. That many biologists still come to the tropics to collect birds or mammals in regions which were long ago adequately explored for these groups is a distressing fact, not only because of the needless destruction of life and the waste of golden opportunities for profitable research, but because such activity often encourages in the resident people among whom it is carried on harmful attitudes toward nature and wrong ideas about the work of biologists.

The greatest present need of tropical biology is detailed studies of selected species in all branches of the animal and vegetable kingdoms. We need to know their life cycles, how they grow and mate and reproduce, what they eat, their relations to their total environment, physical and biotic. Without this detailed knowledge of species, ecological studies of complex communities result chiefly in long lists of names of things which are largely unknown, laborious to read and enlightening to scarcely anybody. Some of the most valuable recent work in tropical zoology has been done in the field of life history and behavioral studies of selected animals: one thinks of

the observations of Evans on lizards, of Carpenter and Schaller and Miss Goodall on Primates, of Willis on ant-tanagers and Snow on manakins and other birds in Trinidad. Such studies are but the first steps in a vast field which may occupy many competent naturalists for generations.

Not only is the study of biology in the tropics essential to the understanding of life; without it, we may not even correctly interpret observations made in the temperate zones where by far the greater part of biological research is at present carried on. The early botanists of Europe might have concluded that recurrent intervals of dormancy, to be broken by exposure to frost ,are characteristic of all vegetation, if greenhouse and conservatory plants had not been available to prevent such a hasty generalization. In other fields, material for comparison is not so readily accessible. Some years ago, the British ornithologist David Lack, largely from the study of the number of eggs laid by European birds, concluded that birds produce broods as large as they can adequately nourish an inevitable consequence of the apparent fact that in any population of organisms the more fertile genotypes will gradually overwhelm the less fertile strains. This conclusion was not only explicity applied to birds everywhere; implicitly it had reference to animals of all sorts, and it was certainly not without relevance to mankind in a world menaced by a population explosion. The present writer promptly pointed out that productivity pushed to its maximum limit is probably a phenomenon of animals exposed to large periodic fluctuations in population density, as in the birds of high latitudes with their cold and often destructive winters, and that Lack's generalization hardly applied to birds of the humid tropics, where in a stable environment small broods are the rule. Snow's recent study of the population dynamics of the Black-and-White Manakin brings strong support to this view. Many tropical mammals, too, including some of the larger rodents of the New World, have slow rates of reproduction. There is at present no more promising field of biological investigation than the population dynamics of tropical animals.

The more fruitful undertakings in tropical biology cannot be completed in a few weeks, and some require years of steady application. The biologist who must limit his visit to the tropics to a month or six weeks can probably make no better use of his time than to advance his personal knowledge of the tropics in breadth and in depth, rather than to tackle some petty problem, or collect birds or butterflies in the hope of discovering a new subspecies.

It is one of the paradoxes of cultural history that the greatest and most enlightened interest in nature has been exhibited by northern peoples rather than by those native to tropical and subtropical lands where nature is far richer and more varied. Tropical peoples the world over have lagged behind northern ones in the classification and study of the natural productions which surround them. We wonder whether this difference is an expression of deep-rooted racial traits or is caused by the environment. Can it be that the very exuberance of tropical nature discourages the effort to know it thoroughly? When we study any subject, we like to master it; too great difficulty may breed discouragement and apathy. The young North American or British naturalist who sets out to know the trees or the birds of his native district can, if diligent, learn nearly all of them in a few years; a young Central American or Brazilian with a similar interest faces a far more arduous and frustrating undertaking.

The scarcity of books for the identification of the plants and animals of tropical countries, especially in the Americas —the almost total absence, in many countries, of those in the native language— is both a consequence of the prevailing slight interest in nature and a cause of this lamentable situation. If interest in nature had been stronger, doubtless adequate handbooks would have been produced by residents of the countries themselves; if it were easier to learn the names of animal and plants, more people would become interested in them. One who undertakes to teach some branch of natural history, at the college level, in a country without adequate nature guides, is dreadfully handicapped by their absence. I believe that no better or more productive use could be made of funds destined for the promotion of biology in the tropics than the preparation and publication of guides for the identification of their animals and plants, of the same quality as those available for North America and Europe, and in the local language. Because of the greater number of species to be treated in many classes of organisms, such guides will necessarily be larger and more expensive to publish, and sales will doubtless be smaller, than in the case of similar guides for northern countries. Hence first-class guides, which one can use without repeated frustration ,are not for a long while likely to appear in tropical countries unless they are subsidized by some government or institution.

To increase interest in tropical nature among the people of tropical countries, as by the provision of adequate nature guides and the more effective teaching they could promote, is an urgent need of our time. Such an increase of interest should result in more resident naturalists, who will enrich biology by prolonged observations of a sort that can hardly be made by transient visitors. An even more important consequence would be the growth of sentiment for the conservation of nature, which is now so tragically weak in many tropical countries. Unless such sentiment can be made widespread, strong, and articulate, and at the same time some check be placed upon the alarming increase in human population, there will before long be nothing left for the naturalist to study in tropical lands, except in habitats drastically altered by man and his domestic animals. The natural history of the stately tropical forests and their wonderful inhabitants, so well begun by the intrepid pioneer naturalists of past centuries, will no longer be an account of things that we may see for ourselves, but ancient history, the story of glories that have passed never to return, like those of classic Greece.