Letters

A Biologist Visits Cuba

For the past 4 years I have been studying island evolution in lizards of the genus *Anolis*. I had worked on every major island in the Caribbean except Cuba where I wanted to continue my collections. Some details of my recent 7-week trip to that island may be of interest to the American scientific community because of the general lack of information about research and travel in Cuba.

Travel arrangements. Within several weeks of my writing to the passport office, outlining my proposal and including letters of reference in support of my research plans, my passport was returned, validated for a 2-month trip to Cuba. The State Department told me that I could get a visa for Cuba from the Embassy of Czechoslovakia in Washington; this was immediately obtained. I was also told that if I planned to go through Mexico (Cuba may be entered by air from four cities only—Mexico City, Madrid, Prague, and Moscow), I would need a permit to enter, leave, and reenter Mexico issued by the Mexican immigration authorities. This was the only "red tape" I encountered. Months of correspondence proved useless. However, on arrival in Mexico City, the problem was solved immediately.

When I began correspondence with biologists in Cuba, I discovered one needs the patience of Job. A letter sent airmail from the United States to Havana takes, on the average, 5 weeks for delivery. However, a letter mailed from Cuba to the United States will be received in about 10 days. Telegrams can be sent in both directions, but telephone calls can be made only *to* Cuba.

Orlando Garrido, of the Institute of Biology, Academy of Sciences, Havana, and Miguel Jaume, director of the Museo "Felipe Poey" El Capitolio, Havana, were my correspondents. Garrido is studying Cuban ornithology and herpetology; Jaume is primarily a malacologist but is extremely well versed in all aspects of field natural history in his homeland. Both promised all cooperation in arranging field trips, and space and equipment for my cytological preparations.

I flew from Mexico City on Cubana Airlines, which provided excellent service. Customs inspection was routine and rapid. U.S. dollars can be exchanged for Cuban pesos (1 for 1). There may be some difficulty in exchanging traveler's checks—cash is better.

Costs and facilities. Cuba is expensive for a traveler; restaurant prices are very high. Hotel accommodations are quite reasonable, but there is little variation in price. A first-class, air-conditioned room in the Hotel Nacional in Havana is $7 per day for a single; while a fourth-class hotel in Manzanillo (a large city in the eastern province of Oriente) lacking running water (but having an interesting fauna of roaches and mosquitoes) was $4.50 per day. A reasonable estimate for anyone planning fieldwork is $20 per day. This would cover meals and hotel room and leave a small sum for incidentals. In the large cities other than Havana it was very difficult to obtain hotel rooms without advance reservations. Transportation can be a serious problem. There are several flights daily to major cities, but within the cities it is impossible to rent an automobile as these are scarce and run-down (primarily old American cars). For the zoologist or botanist who wants to go into the field for collecting, it is absolutely necessary to work through the Academy of Sciences which has a large fleet of jeeps, and Cuban biologists seem particularly interested in reestablishing scientific relations with their North American colleagues. It was my privilege to be accompanied by Jaume and Garrido on all my trips. They were literally at my service, arranging to go exactly wherever I wished. Cuban zoology seems stronger than botany, so that there are trained experts in virtually all groups of animals, but few systematic botanists. There were no restrictions, both on travel and taking photographs. Also there are no armed checkpoints along highways, such as I have found in several Latin American countries. I never carried identification in the field—all documents were in Havana.

Research in Cuba. Before the revolution, the Academy of Sciences had a monthly budget of 450 pesos. Since then, the Academy has become a very complex organism with several thousand full-time employees and a budget in excess of 600,000 pesos per month. It includes autonomous institutes of soils, meteorology, oceanology, and biology, and also the social sciences such as history and economics. Although much of the research is directly applied, as would be expected in a developing nation, there was a surprising amount of pure research receiving government support, such as Garrido's studies on the taxonomy of reptiles and the distribution of Cuban birds. As one of the vice presidents of the Academy said to me, "We have an academy but we do not yet have academicians." There is an obvious desire to have research done in Cuba on Cuban material which probably accounts for the extraordinarily warm reception I received. Harvard, in particular, had been deeply involved with Cuban natural history; in botany, through the Atkins garden and research center; and in zoology, through the work of Barbour, Clench, Darlington, and others in the Museum of Comparative Zoology. Cuban naturalists particularly miss such expertise. The visitors from Czechoslovakia, Hungary, and other Soviet-bloc countries come to learn about tropical biology, whereas American zoologists and botanists formerly came and taught much to the Cubans.

I was given space in the genetics unit of the Institute of Biology. All standard laboratory reagents were available there, and the various fixatives and stains that I had brought with me merely added to my overweight baggage. Most equipment, from reagents to microscopes, appear to be Czech, although there was French electrical equipment in the Institute of Neurophysiology.

Despite the government's willingness to spend pesos, there is an unwillingness to spend dollars; hence, biologists are not keeping up to date in all major journals. It is impossible for a Cuban scientist to convert his pesos into dollars, so that literature and some equip-

ment cannot be privately obtained even if he is willing to spend his own salary.

There is no reason why any American biologist should hesitate to go to Cuba. The situation appears quite stable; there is an active interest in science, and particularly a desire to reestablish information flow with American scientists. As a postscript, there were several Cuban biologists who were hurt because they no longer received mail from friends and colleagues in the United States. Undoubtedly these Americans hesitated to write for fear of endangering or embarrassing their Cuban friends, but this fear is groundless.

My trip was sponsored by a grant from Sigma Xi and a supplementary grant from the graduate department of biochemistry, Brandeis University. To these organizations I am indebted.

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Geographical Distribution of NSF Grants

Granted that Lee A. DuBridge is a distinguished academic and science administrator, I question whether his letter (24 Mar.) reflects a completely unbiased point of view insofar as California and the California Institute of Technology are concerned. His concern about "quality standards for research," about low quality choices forced on science-supporting agencies of the government by political pressures for geographical distribution of grants, and about "the spread of already scarce funds to less meritorious areas" reflects the position of the "haves" rather than of the "have-nots."

The report of the National Science Foundation on its appropriation requests for fiscal 1968 shows the major categories of grants made by NSF in fiscal 1966. To cite a single comparison, California agencies and institutions received grants and contracts in fiscal 1966 totaling $52.5 million, while Ohio institutions received $10.3 million. Ohio has 5.3 percent of the population of the United States and contributes 6 percent of all revenues collected by the federal government. California has 9.5 percent of the population and contributes 9.4 percent of federal revenue collections. Yet, California received 12.2 percent of all NSF grants, and 21 percent of all fellowships. Ohio received 2.4 percent of all NSF grants in fiscal 1966, and 1.7 percent of all fellowships.

Table 1. National Science Foundation grants and contracts awarded for fiscal year 1966; percentage analysis for all states.*

State	Population† (%)	Grants and contracts: Total (%)	Grants and contracts: Fellowships (%)
Alabama	1.78	0.34	0.21
Alaska	.13	.41	
Arizona	.82	3.53	.44
Arkansas	1.01	.18	.16
California	9.45	12.22	21.05
Colorado	1.03	3.92	1.10
Connecticut	1.45	1.79	3.99
Delaware	.26	.17	0.05
District of Columbia	.42	3.08	.52
Florida	2.98	3.17	.89
Georgia	2.24	.90	.65
Hawaii	.37	.64	.14
Idaho	.36	.16	.04
Illinois	5.48	5.07	6.77
Indiana	2.52	3.26	2.14
Iowa	1.44	.95	1.44
Kansas	1.16	1.00	0.62
Kentucky	1.65	.34	.09
Louisiana	1.81	2.53	.64
Maine	.52	.18	.02
Maryland	1.79	1.24	1.15
Massachusetts	2.79	6.62	18.62
Michigan	4.23	3.08	4.04
Minnesota	1.84	1.35	1.14
Mississippi	1.21	.26	0.12
Missouri	2.30	1.50	1.03
Montana	.37	.18	0.10
Nebraska	.77	.25	.25
Nevada	.21	.17	
New Hampshire	.34	.52	.25
New Jersey	3.49	3.25	4.91
New Mexico	.53	.68	.33
New York	9.36	9.38	8.49
North Carolina	2.54	3.12	1.50
North Dakota	.34	.21	.03
Ohio	5.28	2.41	1.68
Oklahoma	1.29	.63	1.16
Oregon	.98	1.48	.90
Pennsylvania	5.99	4.04	3.42
Rhode Island	.48	1.15	.47
South Carolina	1.34	.27	.11
South Dakota	.37	.31	.02
Tennesse	1.99	.89	.94
Texas	5.43	6.30	2.08
Utah	.52	.64	.35
Vermont	.21	.21	.02
Virginia	2.29	.75	.52
Washington	1.56	1.93	1.22
West Virginia	.94	1.36	.08
Wisconsin	2.15	1.79	4.02
Wyoming	.18	.19	.09
Total	100.00	100.00	100.00

* Compiled by the Ohio Board of Regents from National Science Foundation data entitled *Appendix A, Justification of Estimates of Appropriations, Fiscal Year, 1968.* † Percentage of the national population.

Unless DuBridge wishes to maintain that NSF grants are intended to redistribute state wealth in the United States, which would be a "political" objective, I assume that the California Institute of Technology is as much committed to the economic and intellectual advancement of Ohio as it is to that of California. I only hope this is evident in practice.

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Abuses of Citation Indexing

Much of Margolis' enthusiasm for citation indexing ("Citation indexing and evaluation of scientific papers," 10 Mar., p. 1213) is based on the assumption that citations give a fair picture of the intellectual links between publications. It would be more accurate to say that they give the picture that authors record. The deviation results from memory failures, lack of self-awareness, carelessness, plagiarism of other people's citations without having actually used them, the widespread custom of not citing "obvious" sources, and many other causes—all consequences of the simple fact that the author selects citations to serve his scientific, political, and personal goals and not to describe his intellectual ancestry.

The enthusiasts refer to all this as "semantic noise" without adequately considering the possibility that the noise dominates the message. My examination of mathematical literature suggests that ancestors of major importance may have a lower probability of being cited than those of minor importance. A network (or matrix) showing all citations in mathematics during the last 100 years would yield interesting information about citation habits (in spite of being largely empty), but it would not give "a reasonably faithful map" of the history of the subject. The widespread use of citation indexing for information retrieval and evaluation will certainly modify citation practice, but not, I suspect, in the direction assumed. Authors will choose their citations so as to make the citation indexes serve their purposes. They will cite their own and their friends' papers more (a friend is someone who cites in return), cite a wider variety of papers than before so as to attract people who might (and perhaps should) miss the paper, and cite "obvious" sources. The idea that journals and referees will prevent such abuses is no more realistic than the notion that they do so now.

The basic motivation underlying the citation index and its use for historical purposes is the desire to find methods of information retrieval and historical analysis that reduce the need for scholarly work. In the long run, however, there can be no substitute for good indexing, abstracting and analysis, based on knowledge of the subject matter. Why not begin by requiring each author to accompany his article by an