equipment utilization in research and development laboratories. I have no doubt that these meters would serve a useful purpose in the production plant where the criteria for utilization of equipment are quite different. Before I would recommend the use of these meters universally in a research and development setting, a more complete study would need to be conducted to establish the validity of the results obtained from their use and to allow the users and the managers to arrive at a realistic and responsible procedure for incorporating their use in an equipment management system for a research and development laboratory."

During the pilot program, Natick researchers initially viewed the meters as a game, Levine noted. Because the meters, which were installed externally on the equipment, record only the time the instruments are turned on and not the actual utilization time, uncooperative scientists were able to affect the statistics by merely flipping the "on" switch. However, Levine claimed that, once the initial antagonism had worn off, fairly accurate records were obtained.

At the subcommittee's request, Natick will undertake a new study with the meters again being placed on 100 pieces of equipment.

Each of the meters in Natick's program costs $10. The labor cost of installation is calculated at $2.50 per meter. Levine indicated that quantity purchases of a new type of meter could lower unit costs to $4.55 in lots of 5000 and $3.90 in quantities of 10,000.

Prior to the introduction of running-time meters at Natick, the laboratory used a "walk-through" system of locating unused or little-used equipment. This was said to be similar to the system used at the Goddard Space Flight Center.

Testimony indicated that the Goddard "walk-throughs" essentially consist of teams of management and senior scientific personnel walking through laboratories and inspecting equipment to see if it is needed or being used. Between 1 December 1966 and 1 June, the program was reported to have located $1.9 million of unneeded capital equipment and an additional $598,000 in noncapital equipment. Most of the equipment has been redistributed to other Goddard programs. The remainder is being processes as "excess."

—KATHLEEN SPERRY

Aldabra: Biology May Lose A Unique Island Ecosystem

London. The future of Aldabra Island, an inhospitable atoll about 260 miles (or, about 400 kilometers) northwest of Madagascar, is currently an issue between defense authorities in Great Britain and the United States and scientists in the two countries. Use of Aldabra as an airfield and staging post in the Indian Ocean to meet strategic requirements in the 1970's is under consideration. Biologists strenuously oppose such a move because irreparable damage would be done to the ecosystem of an island which offers literally unique opportunities for research, particularly in evolutionary theory.

An agreement between the United Kingdom and the United States has made available for joint defense purposes islands in the British Indian Ocean Territory, a remnant of empire which includes Aldabra. Because of this American treaty interest, officials of the National Academy of Sciences have discussed the scientific implications with representatives of the British Royal Society and have expressed concern to American defense officials.

The Royal Society has taken strong and unusually public exception to Ministry of Defense proposals for an airfield and supporting facilities. A proposal for erection of a BBC transmitter on the already settled West Island of Aldabra does not seem to elicit such powerful feelings. The case for preserving Aldabra from the Ministry of Defense appears to be an all-or-nothing one. A Royal Society memorandum on Aldabra includes a section on vulnerability of oceanic islands which notes that:

> It follows that drastic ecological changes would occur if the isolation were to end and [continental] dominants were able to invade and compete on equal terms with the insular biota. Man, by developing shipping and aircraft capable of frequent and rapid voyages even to the most isolated parts of the world, and by his habit of carrying with him domestic animals, crops and garden plants, and soils, seeds and insects, has effectively reduced the isolation of remote islands and the predictable consequences are in fact ensuing.

Oceanic islands like Aldabra are volcanic in origin and have not been linked to continental masses. Colonization by flora and fauna, except where man has intervened, therefore, has been by immigration across the sea. The Royal Society memo points out that most land animals and plants are poorly adapted for dispersal across ocean distances and that oceanic islands have "impoverished biotas." The variety of plant and animal life generally corresponds to the distance from a continental source and the age of the island.

Dominant species on oceanic islands are determined to a great extent by their long-range dispersal mechanisms. This is not usually true on the mainland. On an oceanic island, therefore, the ecosystem may be simplified and lend itself readily to study.

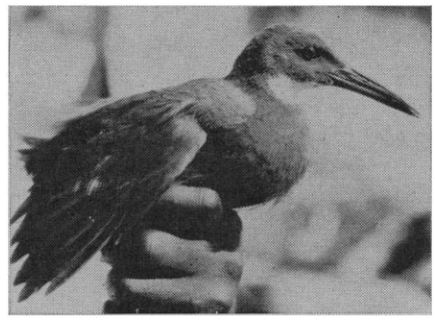
As Darwin showed when he made his clinching observations on natural selection on the Galapagos, oceanic islands lend themselves well to the study of evolution. An island may provide a haven for a species which has declined on the mainland because of the emergence of competitors or predators. Endemic plants or animals may evolve. There may be selection for flightless birds and insects on a small island if flying out to sea proves dangerous.

Aldabra is interesting to biologists because it is both fairly close to a continental mass—Aldabra is 400 miles from the coast of Africa and consequently rich in flora and fauna—and relatively untouched by man. It is a high limestone island and is slightly elevated compared with ordinary, sea-level coral atolls. This makes Aldabra particularly attractive to defense surveyors searching for a site for a land-

ing strip. Aldabra is an elongated coral ring 21 miles long and 60 square miles in area around a central lagoon. The ring is separated into four islands by narrow channels. On the small west island there is a settlement for migrants from the Seychelles, who live by turtling and fishing. Aldabra has escaped the exploitation that befell other Indian Ocean islands because it lacks guano and phosphate rock. It has no fresh water supplies and has never been considered suitable for cultivation. It is so uncongenial a place for humans that few scientists have worked there.

The most important of the resident land fauna on Aldabra is the Giant Land Tortoise (*Testudo Gigantea*). Only on Aldabra and on the Galapagos are there surviving natural populations of giant tortoises. There are a number of endemic species of land birds on Aldabra as well as another last-of-the-line survivor, the flightless rail (*Dryolimnas cuvieri*). Aldabra is also one of the last remaining havens for the sacred ibis and the home of a possibly distinct flamingo. Seabirds, particularly frigates and the pink footed booby, nest on Aldabra in sizable numbers.

Plans for development of the island appear to hold particular perils for its rarest inhabitants. The Ministry of Defense would build its airfield on South Island at the broadest and highest part of the island ring. This "platin" area is the breeding and browsing ground of the giant tortoises, and the landing strip and its related facilities would inevitably lead to a reduction in their numbers from the present population of about 10,000.



SURVIVAL THREATENED: *Dryolimnas cuvieri* whose sanctuary is on Aldabra Island.

A linking road would be built along the north side of the atoll to South Island, and channel-spanning causeways would permit the spread of introduced species such as cats and dogs to all parts of the atoll. This would spell extinction for the flightless rails on Middle Island. There are feral cats on South Island, which have already killed off the rails.

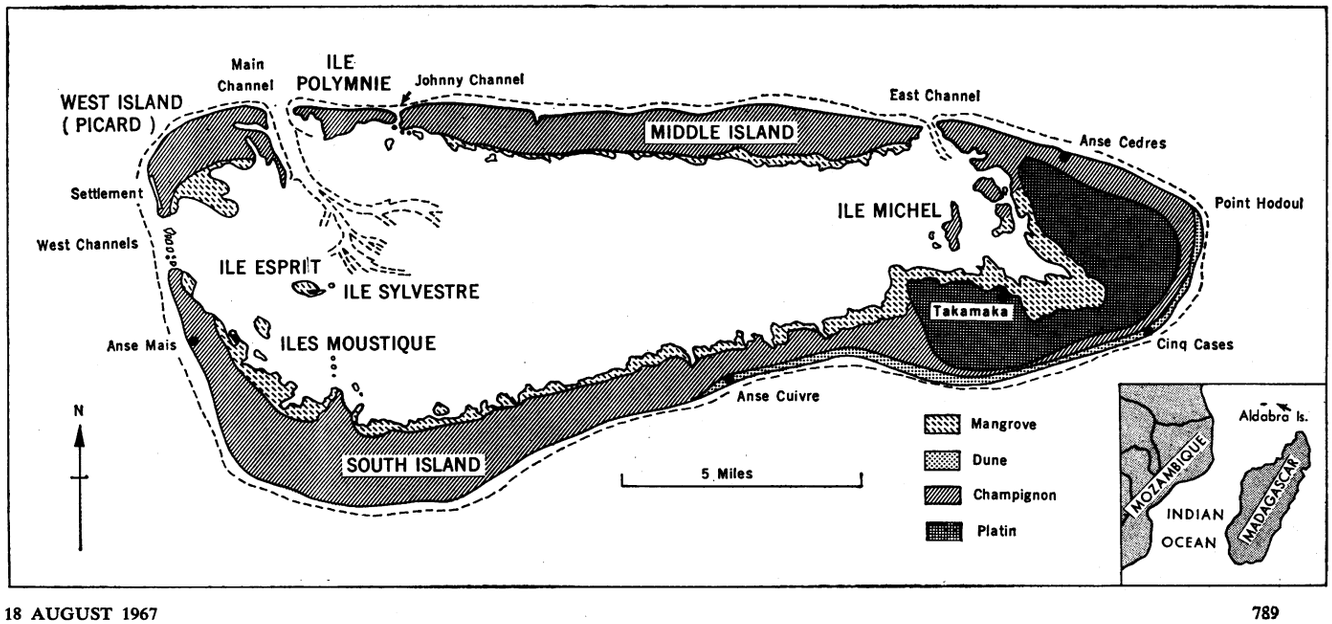
A more widespread but less predictable effect would result from a plan to build a harbor involving a dam in the lagoon at the Main Channel entrance. The alteration of tidal behavior is certain to affect seriously the ecology of the lagoon. Damming of lagoons elsewhere has caused catastrophic effects on marine life.

The frigate bird could be expected to pose the same problem to aircraft on Aldabra that the albatross does on Midway. The frigates' habit of hovering between 50 and 3000 feet in the air would put them in the flight path of planes, and a campaign against the birds would no doubt come to be regarded as necessary. Side effects of the presence of man, such as sewage disposal, use of insecticides, and aircraft noise, would have a grave effect on a delicately balanced ecosystem.

The argument for total preservation of Aldabra is a persuasive one scientifically. And the Royal Society and the National Academy are formidable advocates. But the scientific future of the island is far from assured.

Ministry of Defense officials have been polite, and even helpful. D. R. Stoddardt, of the geography department at Cambridge, the man who alerted the Royal Society to Defense Ministry designs on Aldabra, was invited with another scientist to accompany a BBC survey party to Aldabra last September. His preliminary survey provided the basis for the Royal Society Council action in the matter. Stoddardt is returning, this summer as head of a Royal Society expedition, again with Defense Ministry help, for a longer stay on Aldabra. The expedition will be on the atoll in both dry and rainy seasons, and, if worse comes to worse on the Aldabra decision, will conduct a kind of scientific salvage operation to find out as much as possible about the ecosystem of the island and the rare biota there before the bulldozers begin. If Aldabra is spared there is hope that a research station on the model of one on the Galapagos may be set up on the West Island where the present settlement is.

The latest official statement on the



question, however, was hardly encouraging for the preservationists. On 22 May, Royal Society President P. M. S. Blackett led a delegation to meet with British Defense Minister Denis Healy and discuss the case. Healy, who had considered the Royal Society memorandum on Aldabra, provided a formal reply that he authorized be made public.

He declared that no decision had yet been made by the government on whether the defense facilities would be established at Aldabra, but that a decision would be taken within a year.

He acknowledged the "importance of the scientific issues at stake," and pledged that these would be given careful consideration. He added, however, that "this does not mean that, when all other relevant factors are brought into the balance, the scientific considerations will necessarily be held to be decisive."

In the event that an airfield and harbor are built on the island, he said that scientific bodies concerned would be continuously consulted, that defense authorities would seek to insure that changes in the ecosystem of the island were minimized, and that assistance would be given to those carrying out programs of research.

After giving this cold comfort he concluded the report by noting that use of other islands in the Indian Ocean had been considered "but it had proved necessary for compelling reasons to rule them out."

This is where the matter stands. What happens in the next year will depend in large measure on decisions made on Britain's role East of Suez, a subject of intense political interest in Britain at the moment. As of now, Britain is planning a series of island staging areas in the Indian Ocean as way stations between Europe and the Far East. With British withdrawal from Aden scheduled for next year, the Indian Ocean stations, and particularly Aldabra, look increasingly attractive.

East of Suez strategy is, however, far from settled. The recent cancellation of the Anglo-French Variable Geometry (AFVG) project after French withdrawal will deprive Britain of an aircraft which was expected to use Aldabra in the mid 1970's. The British plan to buy a number of the versatile American swing-wing F-111's, but economic and political considerations make it highly unlikely that the RAF-anticipated requirements East of Suez can be fully met with the American planes.

Considerable pressure on the Labour government is being exerted from within the Labour party to scale down its commitments East of Suez in the coming decade, and the outcome of this debate will no doubt affect the decision on Aldabra.

As for the United States, an airfield and supporting facilities on a strategically useful island with no political problems is presumably desirable from the standpoint of those responsible for U.S. global planning. Facilities on the island would be shared by the United States and United Kingdom. The United States would share in the cost of establishing the station, and opponents of the development of the island speculate the United States has been applying dollar pressure in favor of the establishment of the defense facilities.

In the United States, both the National Academy of Sciences and the Smithsonian Institution have indicated deep concern over the future of Aldabra. A statement issued by the office of the president of the National Academy, 10 August, said, "The Academy and the Royal Society have urged their governments to exert every effort to eliminate this threat of incalculable damage to one of the world's unique resources for scientific investigations." Two Smithsonian staff members are now on Aldabra with a Royal Society Expedition. They joined the party by invitation of the Royal Society. The U.S. Department of Defense (DOD) told *Science* in a telephone interview 11 August that the final decision on the placement of an air base on the island will rest with the British. No date has been set for the decision. The DOD said wildlife on Aldabra will be taken into consideration. If Aldabra is not selected as the site of the joint U.S.-U.K. defense base, at least three other sites have been listed by the DOD as possible alternates. Under a joint agreement signed by the two countries 30 December 1966, the Chagos Archipelago, Farquhar Island, and Ile des Roches were named as sites that would be available for use by either party. All are located in the Indian Ocean.

The Aldabra issue has aroused scientists in Britain more than any recent attempt to preserve an ecosystem. The preservationists now are trying not only to save Aldabra, as the Galapagos were spared, but to drive home the point that there is no established mechanism by which the scientific community is consulted when such government decisions affecting science are made. So, as important as an Aldabra preserved is to science, even more is at stake than whether the atoll in the 1970's is to be the home of the flightless rail or the F-111.—JOHN WALSH

APPOINTMENTS

Emanuel R. Piore

Emanuel R. Piore, vice president and chief scientist of International Business Machines Corporation, to treasurer of the National Academy of Sciences. He succeeds the late **Lloyd Berkner**. . . .

Hàig H. Najarian, associate professor of biology, University of Maine, to chairman of the newly organized Division of Science and Mathematics at the University. . . . **Clarence Allen**, director of the Seismological Laboratory, California Institute of Technology, to acting chairman of the Institute's Division of Geological Sciences, and **Don L. Anderson**, associate professor of geophysics, to director of the Seismological Laboratory at the institute. . . . **James G. Sites**, associate professor of obstetrics and gynecology, George Washington University, to chairman of the department of obstetrics and gynecology at the university. . . . **Paul H. Thomas**, associate professor of physiology, Philadelphia College of Osteopathic Medicine, to associate dean of the college. . . . **Robert G. Langdon**, professor of physiological chemistry, Johns Hopkins School of Medicine, to chairman of the department of biochemistry, University of Florida College of Medicine. . . . **J. Ward Greenwood**, head of the International Affairs, Atomic Energy of Canada Limited, to Washington representative of the National Research Council. . . . **Nunzio Tralli**, chairman of the department of physics, C. W. Post College of Long Island University, to director of the Division of Science at the college. . . . **Robert M. Gordon**, assistant director of computer facilities and information services, University of California, Irvine, to director of computer facilities and information services at the uni-