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IBP

monthly review of International Biological Programme

by ANGELA CROOME

THE PREPARATORY AND PLANNING STAGES of the International Biological Programme are now drawing to a close. The operational phase—designed to last for five years—of the study of the biological basis of productivity and human welfare will officially open on July 1, 1967. The entire programme, which is perhaps the most ambitious to be undertaken by man for peaceful purposes, will shift biology from the 19th century to the 21st. Classical biology, as Darwin knew it, has been largely untouched by the recent revelations of what goes on within the living cell. The IBP will take biologists back into the field again and concentrate on the work of anthropologists, botanists, ecologists, foresters, parasitologists and all those whose efforts are focused on practical applications and human welfare. This new SCIENCE JOURNAL feature will report regularly on their progress over the coming months.

IBP, with the entire biosphere as its stage, is geared to answer the increasingly pressing problems of how best to use the Earth's biological resources to support overpopulation by the dominant species—man. Man's intervention has already substantially altered the natural environment. Its original character is likely to be lost irreversibly in the next 20 years. Innumerable animal and plant species will disappear, as also may the conditions for maintaining a self-sustaining chain of food production.

Air and water pollution, and the "silent spring" caused by the indiscriminate use of pesticides, are obvious examples of how man has upset the balance of nature. There are others where the process is harder to unravel. Man has left his dirty footmarks everywhere and the time has now come to tidy up.

This requires a systematic study of what still exists. An accurate count of animal and plant species and their distribution; an examination of the interaction of communities upon each other, what sustains them and whether they have protective or adaptation mechanisms—all this and much else is relevant and requires detailed information in comparable terms. Much of this information is not yet available. IBP's aim is to make it available though not to implement the answers that the information should suggest.

The problem is global. It is therefore axiomatic to tackle it internationally. The undoubted success of the International Geophysical Year in 1957-8 prompted action and provided the model for this type of co-operated effort. Six months before the start of the programme, 38 nations are firmly committed to carrying out IBP studies, partly in their own territories and partly in regions of special significance for a particular branch of investigation. In addition, 20 other countries have correspondent status. So far, 22 national programmes have been formulated. In many respects, the programme has the greatest attraction for undeveloped or developing countries but these seldom have the resources, either of money or trained manpower, to participate. Many bilateral schemes are afoot, in which the scientific team is drawn from a rich country, and a unique environment for study is provided by a poor host.

The total cost of the programme is impossible to assess. It is not likely to be less than the International Geophysical Year—several hundreds of millions of dollars. For, though most of the projects will not require the expensive equipment—such as space vehicles—involved in IGY, the biology programme will last more than twice as long.

Uganda's fish pond

The productivity of Lake George in Uganda will be studied by a small team that has been training at the Windermere Laboratory of the Freshwater Biological Association in the English Lake District. The team, which has been under the supervision of Professor L. Beadle, lately of Makerere University College, Uganda, will also train Ugandan biologists in this type of work so that it can become nationally self sustaining. Lake George, which extends over an area of about 100 square miles, has been described as "a very rich fish pond". It is extremely shallow—averaging only six feet in depth—and supports a wealth of animal and plant life. Indeed, a species of *Tilapia*, a cichlid fish superficially resembling perch is estimated to be fished at a rate of 7000 tons per year.

It is intended to study the stages of the lake's productivity in detail, starting with the role of sunlight in phytoplankton production. From there the chain will be followed through the zooplankton and the shore and bottom faunas to the fish.

Unique desert laboratory

Plans for the setting up of a National Park centred on a permanent International Biological station at the Azraq oasis in Jordan were dicussed in London recently. Azraq situated in a typical Middle East desert region—should make an ideal desert 'laboratory', and the plan is to equip a laboratory in association with a former royal hunting lodge.

The prime object is to study productivity where, on the face of it, little enough occurs. However, three expeditions which have already been there—in 1963, 1965 and this year—suggest that the

PRODUCTIVITY of one of Africa's smaller Great Lakes—Lake George in Uganda—will be studied during the course of the IBP. The main commercial fish—a species of *Tilapia* seen here being caught by means of a gill net from a plank built canoe—is the edible end of a highly productive food chain that starts with sunlight and plankton

Production Process (PP)
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Czechoslovak Academy of Sciences, Institute of Microbiology, Prague, 4.

Conservation of Terrestrial Communities (CT)
Mr E. M. Nicholson,
The Nature Conservancy, London

Productivity of Freshwater Communities (PF)
Professor A. Hasler,
Laboratory of Limnology, University of Wisconsin, Madison.

Productivity of Marine Communities (PM)
Dr B. H. Ketchum,
Wood Hole Oceanographic Institute, Massachusetts.

Human Adaptability (HA)
Professor J. S. Weiner,
Royal Anthropological Institute, London, W.C.1.

Use and Management of Biological Resources (UM)
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desert is by no means unproductive. They have found that a species of moth appears at dusk in enormous numbers. Indeed, the local population of this small, sand coloured form is estimated in millions and it is thought that its concentration is possibly greater than that of any other moth species anywhere. Why it appears in such vast numbers is not known but it could be due to lack of predators. It appears to be associated with a plant, *Nitraria*, which grows in profusion among the salt flats and gives the moths daytime shelter.

For the hydrologist Azraq is interesting because its water supplies range from freshwater springs to concentrated salt pools; for the ornithologist it is of importance as it lies in the path of one of the main bird migration routes; and for the anthropologist it is a convenient centre from which to study the local Druses' and Bedouins' physiological and sociological adaptation to a desert environment. Countries interested in the project include Jordan, the United States and Britain.

Controlling pests with predators

The Biological Control Working Group's plans are now complete for the study of five pests that attack food bearing plants on a global scale. The programme was put into its final form in Tokyo recently, at the Group's second meeting. The target pests are: the aphid *Myzus persicae;* six species of rice stem borer; spider mites of the *Tetranychus telarius* complex; the codling moth and other pear and apple tortricides; and fruit flies other than *Drosophila* which attack healthy fruit. One of the principle aims of the study will be to elucidate the possibility of using predators to control the food pests.

Myzus persicae attacks an extremely wide range of plants throughout almost the whole of the tropics and temperate zones (see map). Victim species are thought to run into thousands, the crops most seriously affected being fruit, potatoes and sugar beet. As it transmits various viruses it is, additionally, extremely troublesome as a vector of plant diseases.

Rice is an important food for many undeveloped areas at different latitudes. The study of six species which attack rice stems will stimulate comparable work in a large number of widely dispersed countries.

Spider mites are a threat to fruit trees especially. Those of the *Tetranychus telarius* complex occur in many parts of the world but have many characteristics in common so that the study of one member bears on the others. They are important for specifying the effects of insecticides for they tend to be susceptible to different insecticides from those effective on their predators. Mite populations seem, on the whole, to be increasing faster than those of their predators.

Work on the codling and other fruit tree moths is tied up with the mite problem. They are extremely widespread in temperate regions and are considered central to the integrated control of fruit tree pests. They are already beginning to show considerable resistance to insecticides in several continents.

Together these studies will increase our knowledge of the mechanisms by which biological control works and suggest how they might be employed.

Premature ageing from too much starch

Work on human adaptability is prominent in the Japanese national programme. A survey is being made of 'hybrid' children of American-Japanese parents to compare their height and weight with those of 'pure-bred' American and Japanese children of corresponding ages.

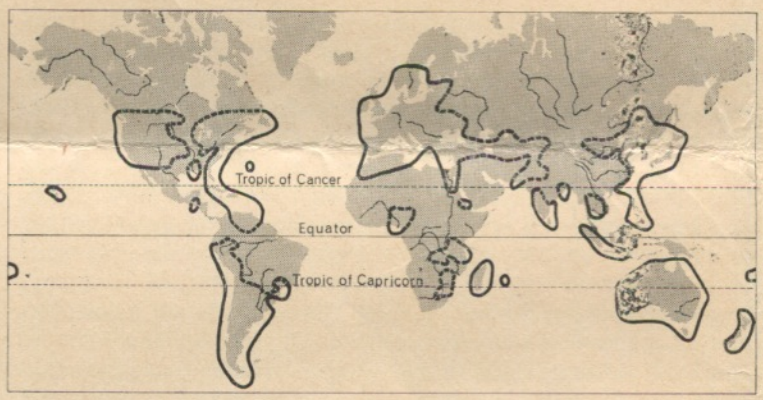
A long range investigation is being conducted—by the human genetics working group—of 10 isolated populations in different parts of Japan. In this particular programme, breeding patterns, fertility and infant mortality are being recorded.

A nutrition study of poor farmers in north east Japan concludes that excessive starch in the diet is the main cause of premature ageing; this diet may also cause the high incidence of fatal cerebral haemorrhages.

The process of high altitude adaptation has been studied, during a 14-man climbing expedition to Mt Aconcagua in Argentina, using a specially designed telemetry device to register the maximum data.

A pilot project, using rats and rabbits, on acclimatization to temperature extremes is being tested against measurements on the members of the Japanese Antarctic Expedition.

Tokyo Olympic athletes, who are in training for the 1968 Games which will take place at an altitude of 2240 metres in Mexico City, are co-operating in a phased study of physical fitness and the body's energy reserves.



DISTRIBUTION of aphid, *Myzus persicae*, is widespread throughout the tropic and temperate zones. It attacks a wide range of plants, especially fruit, potatoes and sugar beet, causing damage through its sap sucking. It is also a vector of plant diseases as it can transmit viruses from plant to plant. It is hoped that a parasite will be found which will reduce its numbers and avoid the use of insecticides

Proteins from unusual sources

The working group on Nove Protein Sources met in Warsaw recently to discuss the part which algae, amino-acid supplements, fish concentrates, leaf proteins, seeds, micro-organisms and molluscs might play in alleviating protein shortage in the future.

Yields on unicellular algae—in particular *Scenedesmus*—have reached 0·2 tons of dry matter per hectare per day, reported I. Sětlík of Czechoslovakia. The 900 square metre units have glass bottoms so that the space beneath can be used for vegetable production in the winter. An American delegate said that 'fish flour', containing 82 per cent protein, need only cost 50 cents per kilo. The Anglo-Indian collaboration on lucerne improvement promises yields of three tons of leaf protein per hectare under Indian conditions, said N. W. Pirie of the Rothamsted Experimental Station.

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