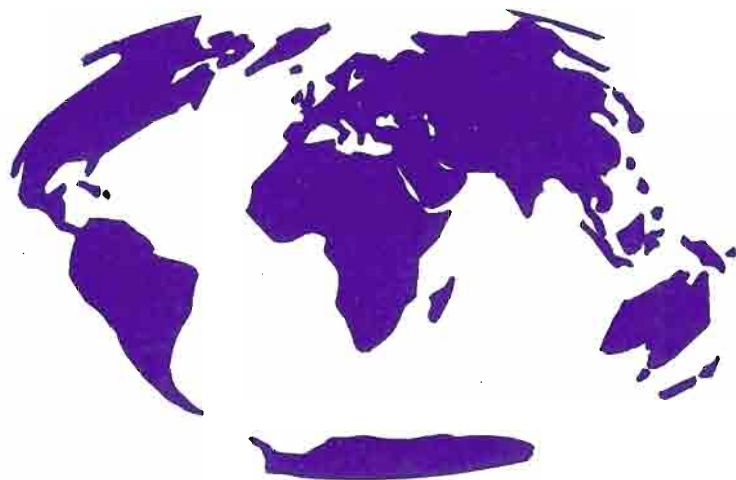


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Contents (N° 8, 1983)

1 Editor's Note.

FEATURE ARTICLES

- 2 **“Health Education and Biology Teaching”**
by P. Kelly
- 5 **“Sea Urchin Embryos as a Test-System to Detect**
Embryotoxicity of Chemical Compounds”
by G.A. Buznikov.
- 7 **“Biological Monitoring of the State of**
the Environment” by J. Salánki.

NEWS HIGHLIGHTS

- 10 **Proposal for SEPAB Symposium on
“Psychobiological Monitoring of the Environment”
by R.W. Russell.**
- 11 **Decade of the Tropics: 1983 Progress Report.**
- 13 **IUBS Medicinal Plants Working Group:
1983 Meeting.**
- 14 **ICSEB III.**
- 15 **The International Association of Human Biologists
by P.T. Baker.**
- 16 **The Vegetation Map of Africa.**
- 17 **“The International Organization of Plant
Biosystematics Conference”, 17-21 July, 1983,
Montreal, Canada.**
- 18 **“First International Congress of Comparative
Physiology and Biochemistry”, 27-31 August, 1984,
Liège, Belgium.**
- 19 **The “Second International Conference on Clinical
and Basic Factors Influencing Bone Growth”,
3-5 January, 1985, Los Angeles, U.S.A.**
- 20 **Field Research in Madagascar.**
- 21 **CHEMRAWN II: Chemistry and World Food
Supplies - the New Frontiers.**
- 23 **IAU Symposium on Search for Extraterrestrial Life.**

IUBS NEWS

- 23 IUBS Loans for 1984.
24 Publications Review.
26 Calendar of Meetings.

Editor's Note

The major concern of the IUBS current activities is twofold: to advance and expand our knowledge of biological systems and phenomena and to help developing scientific research oriented to the satisfaction of human needs in such areas as health, nutrition, food, resources management; as well as the resolution of environmental problems.

This concern appears very clearly throughout the various scientific programmes adopted at the 1982 General Assembly, and since their implementation, important activities have been undertaken during 1983. The present issue of *Biology International* is mainly devoted to provide information on a few of these programmes, i.e., "Health Education Through Biology", "Medicinal Plants", "The Decade of the Tropics", and on "Biological Monitoring of the State of the Environment" meetings. Special issues will be published in 1984 on the "Significance of Species Diversity" and the "Soil Biological Processes and Their Importance in Tropical Ecosystems" Symposia, and on the Seminar on the "State of Biology in the Arab Region".

Despite their interdisciplinary and intersectional character, the IUBS scientific projects for 1982-1985 show a predominant feature in belonging to organismic and ecosystem areas of biology, representing a greater involvement in the Union's activities of those National and Scientific Members concerned.

We are certain that in the near future, other Union Members involved with such specific topics as genetics, photobiology, cellular and molecular biology, etc., will develop scientific projects with similar boundaries and objectives of the ongoing IUBS scientific programmes.

Health Education and Biology Teaching

Report of a Seminar organized by
the IUBS Commission for Biological Education
Amman, Jordan, 7-9 September, 1983

The Seminar had four major aims :

- (I) To consider some of the major issues of health education, particularly as they relate to developing countries;
- (II) To review international developments in health education which are relevant to the teaching of biology in developing countries;
- (III) To review, for the purpose of comparison, developments in the health sector of industrialized countries in order to draw conclusions for an effective health education plan for developing countries;
- (IV) To draw conclusions from these reviews for further work by the IUBS-CBE project on health education.

SUMMARY OF PAPERS

The Changing Needs of Health Education

(Professor P. J. Kelly)

Professor Kelly outlined the changing health patterns which are associated with the social and environmental changes of developing societies. It was pointed out that there have been, and still are, non-industrialised communities which have evolved a relatively healthy, homeostatic relationship with their physical and social environment. This provides a balanced and effective existence, albeit at a low economic level. However, the balance is precarious and even slight economic, technological or environmental changes can lead to a state where disease control and malnutrition are foremost health problems.

With industrial development, which is frequently accompanied by population expansion, these problems can be worsened and added to by those of environmental pollution. This requires equal, if not greater, emphasis on preventative rather than clinical medicine. Health education is an important aspect of this but, frequently, the stronger influence of legislation and strict sanitary and environmental controls are needed to have real effect.

Health education becomes of greatest importance when self-induced ill-health is a major feature of a society. Accidents, excessive and inappropriate drug-taking, culturally-induced malnutrition and cardio-vascular disorders are examples of ailments which can reach epidemic proportions, paradoxically in both overpopulated, urban, under-developed countries and the more affluent developed societies. They put a great strain on medical resources and yet are largely preventable through individual and social action, which can be influenced by education.

Professor Kelly stressed the importance of relating strategies of health education to the particular contexts of the societies in which they are to be implemented. He argued that health education required a whole society approach involving contributions from, for example, the media, health services and

school which are directed at a variety of audiences, including, for example, the family, friendship and other social groups, the work place, shops and leisure activities, as well as those in educational institutions. It was further contended that different age and cultural groups within societies required different strategies of health education.

Biological education had a part to play in strategies of health education but it needed to be integrated with broader consideration of personal and social education and adaptable to changing circumstances.

Qualitative Concepts in Biology Teaching with Special Emphasis on Health (Professor G. Schaefer)

Professor Schaefer outlined the variety of types of concepts encountered in biology, pointing out that whilst many have objective and quantifiable characteristics a number are essentially qualitative in character. Concepts associated with health are mainly of this latter kind.

He also drew a distinction between the reductionist, exclusive thinking by which a concept is isolated for study, and inclusive thinking which is more subjective and aware of the relations of a phenomenon with other phenomena. The former is a particular feature of scientific thinking. Biological education tends to emphasise this matter rather than inclusive thinking. However, in many ways, the study of health requires inclusive thinking and, thus, if health is to be included as part of biological education, there has to be a change in our approach.

Professor Schaefer also outlined the results of a survey in which groups of children in six different countries (Barbados, Canada, Japan, Jordan, Philippines and West Germany) were given a word-association test. In essence they were asked to describe those phenomena which occurred to them when the word 'health' was mentioned. It is a way of finding out the meaning and beliefs held by people about different concepts.

The survey indicated interesting differences between countries. Thus in West Germany health was understood largely to be synonymous with disease and medicine whilst, for example, in the Philippines there was a much more positive view of health: it was linked to ideas of strength, energy, and an active mind and body. In countries such as the Philippines, Jordan and Barbados, psychological aspects of health were emphasised, unlike West Germany, where health was perceived as essentially a physical phenomenon. In the Philippines and Jordan, unlike other countries, health was strongly associated with religious beliefs.

A further study undertaken by Professor Schaefer and his associates involved analysis of the content of school biology text books in the six countries. Here again there were interesting variations, a number of which did not accord with the variation in conceptual understanding displayed by the children

who were studied. Thus, whilst all the books contained a high proportion of content relating health to the human body, in Canada more emphasis was placed on the influence of the natural environment on health, in Japan and the Philippines the influence of the social environment was seen as similarly important and only in West Germany were the mental aspects of health dealt with significantly.

In conclusion, Professor Schaefer stressed the importance of establishing clear and balanced interpretations of the concept of health and advocated international discussions on this. It was also important to adjust health education in biology to the perceptions of pupils in order to correct imbalances in understanding. He considered we should aim for positive views of health covering the body, the mind, transcendence, the social environment and the natural environment.

Country Case Studies of Health Education

Jordan (Dr. E. Baydoun)

Dr. Baydoun reported upon a survey of school Biology and Home Economics text books concerned with their coverage of health-related topics. There was a small number of health-related topics included in the Biology text books while, in comparison, Home Economics text books included many. He concluded that girls tend to receive a greater amount of health education through home economics while boys receive significantly less because they do not usually take the subject. He also described evidence indicating that social aspects of health education were regarded as a female concern. Dr. Baydoun spoke of the need to integrate more health education — particularly of the social kind — into science text books and to develop the notion of social health.

Egypt (Dr. M. S. Selim)

Dr. Selim stated that, in Egypt, health education was the formal responsibility of the Science Teacher but that teachers were not always good practitioners of what they taught.

He argued that educationists — particularly biologists — should regard health as an invaluable part of life; that facts alone will not ensure healthy life-styles, there is need to go beyond 'facts' in order to encourage choosing and decision-making; and that the total school environment, including the habits and behaviour of teachers, was an important factor in school health education. They also tend to teach *about* health rather than *for* health.

Dr. Selim stressed the need to include education as part of teacher training and reported that the Egyptian Ministry of Education was about to embark upon an ambitious programme of retraining in health education.

Central Africa (Dr. E. Rugumayo)

Dr. Rugumayo reported that his inquiry was not yet complete. He did, however, talk of the need for a better planned health education in both school and the community. He drew graphic pictures of the relative poverty of the health services in rural as compared with urban areas, and also of the differences in mortality and morbidity between them.

Japan (Professor K. Imahori)

Professor Imahori spoke first of the improved vital statistics of the Japanese population and showed

comparative figures for height and weight of Japanese children over the past ten years (1970-1980) which demonstrated considerable gains. It was thought that health education had contributed to this.

He gave an historical account of the development of health education in the school curricula since the 1920s. Today the major part of health education is taught in conjunction with, and through, Physical Education, although some is also taught within science and social studies. Health Education was also seen as an important element of out-of-school activities such as field studies and visits to National Children's Centres. The school meals service also provided a useful channel for health education. Health education strategies in Japan involved a variety of agencies.

Reports from International Bodies

UNESCO (Dr. S. Van der Vynckt)

Dr. Van der Vynckt described the Health Education activities of UNESCO which included an outline of the five major activities for the UNESCO Medium Term Plan 1984-1989 as follows:

- (I) **Promotion of health in the education process.** This involves activities intended to inform decision-makers in Ministries of Education and Health. These include the publication of a series of books on communication activities appropriate to health education and the production of multimedia materials aimed at policy-makers.
- (II) **School health education.** In collaboration with WHO, UNESCO is organising consultations with a view to preparing guidelines for primary and secondary school curriculum development. UNESCO is also working closely in the field of health education with IUBS-CBE in the preparation of the 'Health' booklet in the 'Biology and Human Welfare' series and for the 1985 ICSU-CTS conference on 'Science and Technology Education and Future Human Needs'.
- (III) **Out-of-school health education.** UNESCO intends to develop materials and training programmes for community education, especially in relation to the field of literary education.
- (IV) **Promotion of public understanding of health.** In collaboration with the UNESCO International Programme for Development of Communications and the International Centre for Children (ICC), a series of seminars is being planned, aimed at sensitizing media specialists on the needs of health education.
- (V) **Health education curricula for teacher training.** UNESCO will be preparing teacher resource guides emphasizing action-oriented teaching and learning both for in- and out-of-school settings for health education.

WHO European Office Copenhagen

(Mr. D. T. Williams)

Mr. Williams outlined the change in emphasis of strategies put forward by the European Office of WHO and drew attention to the paper 'Involvement in Health: a social concept of health education which had been written by Dr. Ilona Kickbusch, Regional Officer for Health Education.

In particular, he spoke of the change in style of health education which followed from an acceptance of the social concept of health education. He outlin-

ed the notion of the 'health career' as a possible model for consideration, in which the importance of social learning and social influences generally are demonstrated.

Mr. Williams mentioned the interlocking needs of school and community and produced a framework for action for curriculum development in school health education. He emphasised the importance of having a national or regional policy, without which innovation in school curricula would be difficult. Also emphasised was the need for the pre-service and in-service training of teachers and other professional groups. Experience had shown that even the most exciting curriculum materials prove to be ineffective unless teachers are well informed and able to adopt new teaching methods.

He concluded by underlining the importance of seeking a variety of avenues for health education in schools, pointing out the many advantages of including it within biological sciences but cautioning over the necessity for biologists to widen their perspectives to include the social context within which biology and health education existed.

European Communities Biologists Association
(Dr. L. Horst Grimme)

Dr. Grimme reported on the recent workshop organized by ECBA in Amsterdam and spoke of the support for health education which that Association offers. In particular, he outlined the Association's definition of health education as the full development of life in all its aspects and the goal of health education as helping individuals approach the desired equilibrium of all vital processes within themselves and between themselves and their social, man-made and natural environments.

The workshop had also clarified the biological principles which were particularly relevant to the development of health education.

Dr. Grimme concluded by speaking of the recommendations which had been formulated at the workshop for the development of health education within biological education.

DISCUSSION

Lively discussion followed after each presentation and a time was also reserved for plenary discussion on the last afternoon of the Seminar. For convenience, these discussions have been paraphrased and brought together to illustrate the main points which emerged.

There was some feeling that Biology should remain distinct from Health Education so as not to 'dilute' the scientific nature of biological study. It was generally agreed, however, that there might be some integration of Health Education with the Biological Sciences for the following reasons:

- (I) Research and experience has demonstrated that aspects of health education are already included within biology teaching in schools and colleges and often it is the only medium by which health education can be transmitted;
- (II) Biological Sciences provide a sound theoretical and practical knowledge of value for teaching about the human body and its health, and the environmental context of health. This can be linked to social and personal education through

which healthy life-styles can be promoted;

- (III) Far from diluting Biology, health education offers an opportunity to provide a new and distinctly human dimension to the subject.

It was pointed out that there are severe current limitations to biology teaching in terms of its effectiveness in health education because of its basically factual nature. Biology teachers rarely consider the social nature of consequences of health and disease. There was, it was argued, considerable room for in-service education in this respect. Aspects of mental as well as physical health should be covered.

One of the main deficiencies of biology teachers as health educators was thought to be their lack of appropriate teaching methods. Much of health education requires a non-didactic style of teaching which emphasises the involvement of pupils in the act of choosing between alternative behaviour or in making decisions of various kinds. In normal biology teaching this rarely happens. To remedy this deficiency in-service and pre-service training should be re-orientated to include relevant methods and subject matter.

Acknowledgements

The success of the seminar depended a great deal on the endeavours of Professor A. Badran, President of Yarmouk University and Dr. E. Baydoun. The Chairman was Professor G. Schaefer and it was supported financially by UNESCO. To all these the IUBS Commission for Biological Education is extremely grateful.

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Many of the issues discussed at the seminar will be included in a booklet 'Health' which is part of the 'Biology and Human Welfare' series prepared for UNESCO by IUBS-CBE and due to be published early in 1984.

The case studies of health education in Japan, Jordan and the Philippines are published in 'The Teaching of Health through Biology Education in Three Countries: a Comparative Study' obtainable from the Science Education Centre, University of the Philippines, Quezon City.

The analysis of biological principles relevant to health education referred to by Dr. Grimme is published as 'Health Education and School Biology: Report of a workshop organized by the European Communities Biologists' Association. It is available from the Executive Secretary of ECBA, c/o The Institute of Biology, 20 Queensberry Place, London, SW7 2DS.

Sea Urchin Embryos as a Test-System to Detect Embryotoxicity of Chemical Compounds

by G. A. Buznikov

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Gametes and embryos of marine invertebrates, primarily of sea urchins, have been long used as test-systems in the studies of cytotoxic, embryotoxic and teratogenic effects of various chemical compounds including drugs and pollutants. But unique as they are, these objects have not found due application as yet. As test-systems the embryos of sea urchins offer the following advantages: 1) simple production and incubation of unlimited numbers of synchronously developing embryos; 2) easy observation of normal and abnormal development *in vivo*; 3) high cell permeability to the majority of organic and inorganic compounds (high-molecular weight ones excluded); 4) possibility of using minimal quantities of the compounds under study; 5) possibility to produce various experimental models (hybrids, parthenogenetic embryos, androgenetic haploids, minicells, dwarf and giant embryos, etc.) for a thorough analysis of the effects under observation; 6) the fact that the object has been exhaustively studied makes it easier to understand developmental abnormalities produced by chemicals.

A standard procedure has been developed in our laboratory allowing the investigator working with sea urchin embryos to examine up to 20-30 chemical compounds a day. The gametes and embryos are obtained by a routine procedure, and the embryos are incubated in artificial sea water. Artificial water is also used to prepare the final solution (or fine suspensions). Incubation and examination of chemical compounds are carried out in the flat-bottomed glasses (diameter 10-12 mm) convenient for regular *in vivo* scanning of the material and for taking samples for histological fixation. The volume of the incubation mixture is 1 ml; concentration of embryos does not exceed 500 individuals per ml, so that the share of embryos makes up no more than 0.002% of this volume. The incubation mixtures are made using automatic dosing pipettes convenient for mixing living material in the initial suspension, that is for ensuring equal and standard numbers of embryos in the glasses. For the initial testing of chemical compounds a

series of diminishing concentrations is prepared, each being 10 times lower than the preceding one; the concentration range is usually 0.1-100 μM (except for those cases when it is known beforehand that it would be necessary to test higher or lower concentrations); the embryos are exposed to chemicals 3-5 minutes after fertilization (earlier transfer of embryos into the glasses could result in mechanical damage of living material, and fertilization could prove impossible in the presence of the substances under study). Based on the results of the first test, a second — verifying — series of tests is run, in which the concentration of substances and the times of their exposition may be changed and sometimes the concentration of embryos as well. It is desirable that at least several characteristics of the activity of the substances under test (see below) should be established for the embryos produced by the same female. Therefore only a part of the eggs produced by a given female are fertilized, and the remaining material is to be kept in refrigeration until the second experimental series.

The following characteristics are established for each of the compounds under study: 1) minimal concentration sufficient for complete block of cleavage divisions; 2) maximal concentration that does not affect the rate and character of the first cleavage divisions; 3) ability to inhibit or accelerate the first cleavage divisions by intermediate concentrations (cleavage abnormalities are noted); 4) minimal concentrations resulting in the arrest of development at the stage of middle blastula 2; 5) minimal concentrations affecting gastrulation (the observed abnormalities are noted); 6) minimal concentrations affecting the formation of skeleton; 7) maximal concentrations allowing normal development to proceed up to the stage of middle pluteus 2, that is to the beginning of active feeding. With the given experimental scheme it is no use to establish the characteristics 5-7 for other compounds than those stable enough in water solutions; regular change of solutions for the fresh ones is not always possible (some substances are

actively accumulated by the embryos of sea urchins so that such a change will lead to a marked and uncontrolled increase of the initial concentration).

The number of characteristics to be established can be decreased or increased according to the purpose of the study. In particular, the primary estimation of embryotoxicity of a substance does not require the characteristics other than those 1,4 and 6. If a substance in concentrations of ca 100 μ m does not affect cleavage divisions, produces no developmental arrest at the stage of middle blastula 2 and no defects in skeleton formation, it can be considered as more or less harmless (if it is not a drug, of course; in this case a more careful test with a number of systems is necessary). It should be noted that the above characteristics cannot be used to estimate mutagenic activity (the embryos of sea urchins are generally badly suited for the genetic research).

A large number of chemical compounds was tested in our laboratory; among them some 800 aromatic nitrogen-containing organic substances, several dozens of detergents and salts of heavy metals. In these tests sea urchin embryos proved to be a very convenient object to estimate the danger of chemical pollution. Similar conclusions were drawn by Swedish and Japanese investigators on the effect of petroleum products, detergents and some other substances.

Another important possibility of using sea urchin embryos to test various chemical compounds is connected with the ease of the analysis of causes of the produced developmental defects. Thus, if a substance under study applied in a wide concentration range produces the arrest of development at the 2-cell stage, it is likely to be a highly specific inhibitor of protein biosynthesis. If the arrest of development occurs at the stage of middle blastula 2, one can say almost for sure that the substance specifically blocks the nuclear functions, etc. This can be easily checked and the particular mechanisms can be easily established using standard isotope technique. Besides, the substance inhibiting the protein synthesis or, for example, mRNA synthesis in sea urchin embryos is most likely to produce the same effect on the embryos of the warm-blooded animals (extrapolation of the results). So, the described standard technique is also convenient for the mass preliminary testing of drugs. It is noteworthy that thalidomide which had safely passed the tests with standard pharmacological objects would not have passed the tests on sea urchin embryos and larvae, since it would have caused typical defects of skeleton formation (unfortunately, it was only after the thalidomide tragedy that data were obtained in the USSR and Sweden).

And finally, the described technique may

prove convenient for the preliminary screening for potential cancerolytics. At least in one group of compounds — aromatic alkylamines (neuropharmaca and their analogues) — a distinct coincidence is observed of the activities established for early embryos of sea urchins and the cells of experimental transplantable tumours (Ehrlich's ascite carcinoma, in particular).

The mentioned characteristics of chemical compounds which are established experimentally on some arbitrarily chosen species of sea urchins prove, as a rule, practically the same in other species. However, there are exceptions to the rule: embryos of some sea urchins (*genera* *Arbacia*, *Echinus*, and some others) are hypersensitive to certain compounds. Therefore it is desirable to use several species of sea urchins, one hypersensitive among them. An additional possibility is opened up with the use of the embryos of flat sea urchins, that of testing the substances for the ability to suppress the functional cellular interactions.

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Biological Monitoring of the State of the Environment

by Professor J. Salánki

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Introduction

As a result of population growth and technological development, human activities induce various changes in the state of the environment, causing damage to living organisms.

To avoid undesirable consequences, monitoring systems are required to recognise and predict hazardous effects in due time. Biological methods are of great importance in this respect, because

- a) microbes, plants and animals can indicate the presence of hazardous substances occurring in the environment in very low concentrations;
- b) life processes of various organisms can be used to evaluate the action of environmental pollution and that of single pollutants;
- c) changes in the population of species and in the structure of the ecosystem can be indicative of environmental deterioration.

Biological methods can be applied in predicting environmental changes that are likely to increase with higher technological development all over the world. Microbes, plants, animals, cell organelles, organs, individuals, populations and ecosystems show different sensitivities, and can be used as biological indicators (bioindicators) to assess and predict environmental changes in a timely manner.

Recognizing the importance of biological indicators in monitoring environmental conditions especially the effect of hazardous substances, IUBS decided to promote research and international cooperation in the field of bioindicators. For this reason a scientific programme was initiated by the XXIst General Assembly (Ottawa 1982). National Committees and adhering organizations were asked to support the programme.

Objectives

The general objectives are:

- a) to encourage scientific and national bodies to develop and improve methods indicative of hazardous substances occurring in the environment.

Studies of this kind can be especially useful because:

- i) they can be effective in relation to a range

of time courses of the chemical action which may extend from minutes to months;

- ii) they can give valuable information regarding sub-lethal concentrations;
- iii) they can be expressed quantitatively.

Although studies of this kind have been carried out in some organisms there is a great need for their extension and application in defining appropriate bioindicators. Although initial work may involve sophisticated equipment, very often this can be simplified when the nature and range of the parameters to be quantified has been resolved.

- b) to collect information about existing methods on bioindicators; to promote exchange of experiences between different laboratories, to help dissemination of recent knowledge among different countries;
- c) to provide literature about bioindicators including different reference lists, general description of methods and practical manuals suitable for distribution to interested bodies;
- d) to promote interdisciplinary and international cooperation in standardizing and extending the use of agreed methods;
- e) to stimulate scientific bodies to encourage the presentation of new results concerned with bioindicators at international meetings;
- f) to organize special regional or international symposia, workshops and seminars in cooperation with national bodies or other organizations on the methods, new results and their application.

Organization

The "Bioindicators" programme is coordinated by a Steering Committee at present composed of 8 persons working in different fields. Members of the Steering Committee deal with questions concerning the programme in their special fields, promote the realization of the above objectives, keep contact with relevant scientific bodies, laboratories and scientists. To help their work, 5-6 other scientists are being invited from each field, altogether composing the Advisory Board of the programme. The Steering Committee is nominated by the IUBS Executive Committee, the Advi-

sory Board by the Steering Committee.

It is desirable that the Steering Committee meets once a year. This committee is composed of: Professor R.R. Colwell

Dr. G.M. Hughes

Dr. D. Jeffrey

Dr. S. Kojucharov

Dr. D.A. Krivolutzky

Professor J. Salánki (chairman)

Professor A.K. Sharma

Dr. M. Yasuno.

Main fields of the scientific programme

Microbiology

Microbes are rapid detectors of environmental pollution both in water and in soil. There are microbes specifically sensitive to some substances, others take part in decomposition of pollutants. The elimination or abundance of species can be indicative of changing environments. Deterioration of the microbial communities, reduction of diversity of species can be the result of the presence of specific toxic agents.

Botany

Sensitive species may be employed to detect and monitor specific air pollutants. The taxa involved include a wide range of higher plants, non-vascular plants, lichens and fungi (leaf yeasts). Both long term and short term effects may be detected by appropriate choice of organisms. Synoptic records can be made more cheaply than by chemical methods.

Tolerant or indicator species are used to determine the incidence of particular soil conditions. Currently species indicative of soil pH, fertility and big metal concentrations, may be used in mapping.

Species which accumulate metals may amplify a weak geochemical signal and thus may be of value in mineral prospecting. Recent related possibilities include the geochemical study of pollen and recognition of widespread vegetation patterns by remote sensing.

Extension of paleoecological methods from peatlands to lake sediments enables worldwide application of this approach to monitoring long term changes in the environment. Herbarium material can also be used to detect long term geochemical changes.

Zoology

Study of both individual species and whole communities can provide valuable data regarding the accumulation of chemicals in animals. Accumulation occurs to different extents in

different organs and studies of this kind enable more effective choices to be made of suitable indicator species. However, a relative absence of accumulation does not necessarily exclude an organism from use as a bioindicator as examples are known in which marked changes are produced in the development and reproduction of particular species when subjected to environmental pollution. Accumulation of chemicals within food chains and consequently higher levels of toxicity in human foodstuffs can also be indicated by a suitable choice of species for routine study.

Within natural communities the variety and relative abundance of species can be greatly modified by changes in environmental conditions including the presence of pollutants.

Thus from many aspects the recognition of key indicator species can reduce the expense of monitoring activities and can be particularly useful in countries where financial resources are more limited.

Cell Biology and Genetics

The tolerance, susceptibility and adaptability of living organisms to physical and chemical states of the environment are controlled by their inherent genetic composition and physiological states. Throughout evolution, cellular systems have been subjected to a wide variety of endogenous and exogenous chemical, physical and microbial agents, which have affected the genetic architecture as well as the membrane systems. Biological systems have inherent enzymatic mechanisms, permitting them to repair or eliminate genetic damage to a certain extent.

An analysis of cellular and sub-cellular components of organisms, including chromosomes, adapted to specific environmental conditions, forms an excellent parameter for bioindicators. Numerous test systems have been established, both short and long term, "*in vivo*" and "*in vitro*", to monitor the genetic changes caused by different environmental agents. The occurrence of the chromosomal or genetical damage, if identified within a population, may be taken to indicate the level of certain elastogenic or mutagenic agents in the environment.

The plant species, which are genetically resistant to acute and chronic pollutant hazards, may also serve as excellent materials for analysing the factors contributing to such resistance. In resistant organisms, the genetical and cell biological systems involve a combination with the pollutant to render it ineffective, degradation of the pollutant, development of resistant enzymes and subcellular modifications and elimination of the pollutants through anatomical modifications. Such resistant genotypes, originating through natural selection, can serve as excellent indicators of environment – essential requisites for conservation and development strategy.

Comparative Physiology

Many animals show behavioural responses following the detection of environmental changes by their sense organs. Once a pollutant has reached an animal it comes into close contact with the surface of its skin and respiratory system where other rejection reflexes such as "coughing" may be elicited. Some pollutants so change these surfaces as to interfere with vital ionic and gaseous exchanges. Other pollutants are present in the food and may be rejected by the feeding mechanism or may enter through different regions of the digestive tract. Finally, after entering the animal such chemicals can influence the functioning of the endocrine, nervous, muscular, cardiovascular and excretory systems. Such changes in function may be investigated at the morphological, biochemical, or physiological level.

Thus the study of many branches of comparative physiology and biochemistry can indicate the influence of toxic materials. The particular organ system and species which can provide the most sensitive indicator varies according to the chemical and physical nature of the pollutant.

Hydrobiology

For many years the saprobic system has been applied to the running waters in various countries. The actual distribution range or spectrum of individual species of some macrobenthos in relation to the various data on the water quality has been collected. Such spectrum data may be compiled by the data base information services recently developed.

Biotic index has been used in a similar way. Both methods provide simple quantifying data but further simplified methods should be made available for non-specialists. Further development is required for application to estuarine and coastal situations.

Criticism of these methods has been presented. Namely, the distribution of organisms are regulated not only by a certain pollutant and it is risky to emphasize the absence of a certain species as an indication for the environmental condition. Therefore, it is necessary to find appropriate indicator species for particular toxicants, such as heavy metals, pesticides or other synthetic chemicals and acid environments.

Various diversity indexes can be applied to indicate the quality of environments. The indices usually decrease when the pollution is proceeding, but there are many exceptions. Indices are an important means of communicating to environmental managers.

Various organisms may be used as biometers. Practical methods including computer analysis and artificial substrates can be developed to solve sampling difficulties.

Many organisms have served for the residue analysis of chemicals and accumulation of toxic elements. Wide range surveys using standard organisms should be extended.

The occurrence of deformed organisms can be indicative of the degree of pollution.

Long term exposure to sublethal concentration of toxic chemicals has often resulted in the impairment of growth and reproduction. This aspect should be studied more in the future. Scope for growth is thought to be a more valuable indicator in estuaries than other parameters.

General Points

1. Once standardized, methods can be applied at low cost, using locally trained personnel and simple technology.
2. Research needs can be regionally or nationally defined by specifying problems. Solutions may be available from experience elsewhere in the world. Thus there is a need for a bioindicator specialist network.
3. There is a need for more widespread acceptance and application by national authorities of bioindicator systems in statutory monitoring of environmental conditions.

Planned scientific meetings

A Symposium on Bioindicators is planned for 1984 in Dew Delhi, in cooperation with the Indian National Science Academy. The aims of the symposium are:

- to present and discuss recent methods and results in various fields of biology connected with bioindicators;
- to promote such research and application of recent knowledge for developing countries in environmental protection.

Expected number of participants is about 60 (40 from India, 20 from other countries). In conjunction with the symposium, there will be a meeting of the Steering Committee. Steering Committee members will be invited speakers to the symposium. Other speakers will be invited by the local organizers, and free communications (posters) are also planned.

The next symposium on Bioindicators is planned to be held in 1985 during the General Assembly (IUBS) in Hungary. Details will be worked out together with the General Assembly's programme.

It is desirable to develop direct connections with UNESCO, ICSU, SCOPE, UNEP, and MARC. The Steering Committee will look for mutual interests with these organizations and will try to establish common projects in precisely defined topics.

1984 International Congress of Psychology Proposal for SEPAB Symposium on "Psychobiological Monitoring of the Environment"

During the years since its founding under the guidance of Professor Sir Frederic Bartlett (U.K.), Professor Leonard Carmichael (U.S.A.) and Professor Henri Pieron (France), the Section of Experimental Psychology and Animal Behavior (SEPAB) has been privileged to sponsor a symposium at International Congresses of Psychology. Several of the symposia have been published. All of them have been international in scope, both in speakers and in audiences. As President of SEPAB I wish to request approval for the Section to sponsor a symposium at the 1984 International Congress.

SEPAB is a Section of the International Union of Biological Sciences (IUBS). It was founded as a means of affiliating psychology with IUBS, the major international body in the biological sciences, and by so doing to indicate that modern psychology has always identified with the biological as well as with the social sciences. By playing this role maintained a presence in the sciences while efforts (successful last year) were being made to obtain Full Membership for IUPsyS in the International Council of Scientific Unions. SEPAB is presently examining the possible roles it may play in the future. It will be helpful to this process in the Section can continue its traditional relationship with the IUPsyS International Congresses.

The proposed topic for the symposium is: "Psychobiological Monitoring of the Environment". This topic arises from the widespread concern about the state of the environment being expressed by many groups and individuals around the world. IUBS has recently begun a project on "Biological Monitoring of the State of the Environment (Bio-Indicators)" with the statements:

"As a result of population growth and technological development, human activities induce various changes in the state of the environment. To avoid undesirable consequences, monitoring systems are required to recognize and predict hazardous effects in due time. Biological methods are of great importance in the respect. "

SEPAB has responded by recommending that measures of behavior should be included among the bio-indicators. We have argued that the behavior of living organisms is often, if not always, more sensitive to change in environmental conditions than other indicators. One of the main purposes of the proposed symposium is to bring together experts both in the measurement of adverse behavioral effects of environmental conditions (neurobehavioral toxicology) and in the regulation of hazardous conditions once they are recognized to discuss the contributions behavioral scientists can make to a bio-monitoring program. There is a real possibility that behavior may not be considered for a place in such a program unless attention is called forcefully to the significance of its role. It is believed that an international symposium in 1984 will be most helpful in this regard.

As the proposer of the symposium, I will welcome any suggestions the Program Committee may have about any of its aspects as set down tentatively on the attached sheet.

Submitted by :
Roger W. Russel
President
Section of Experimental
Psychology and Animal
Behavior

Proposal for SEPAB-Sponsored Symposium

Title: Psychobiological Monitoring of the Environment.

Time: 2 to 2 1/2 hours.

General Format: 5-6 15-minute presentations; 30-60 minute open discussion.

Topics:

1. The concept of psychobiological monitoring;
2. The need for monitoring;
3. Methods for monitoring I;
4. Methods for monitoring II;
5. Roles for governmental agencies in monitoring;
6. Roles for the International Union of Biological Sciences in monitoring.

Decade of the Tropics

1983 Progress Report

The present report describes the developments that have taken place so far in the organization of the **Decade of the Tropics** program.

According to the timetable drawn up at the IUBS General Assembly in Ottawa, the first year of the program was to be dedicated to organization.

The objective of the Decade of the Tropics is to foster the development of programs of biological research in the tropics, to help coordinate existing efforts, and to improve communication among researchers in different parts of the tropics. The program has two principal objectives: 1) to increase our understanding of the biology of the tropical species and ecosystems, including man and man-made ecosystems; and 2) to aid in the inventory of the tropical biota, and the preservation of tropical genetic diversity. Five major areas of tropical biology were singled out as deserving special attention:

- a) the problem of tropical diversity, and the ways that exceptional species richness is maintained and the capacity for simplification of species-rich systems without detriment to their sustainability;
- b) the problem of nutrients and tropical soils, and the means by which nutrients are trapped, transferred and stored within systems, which, despite their species richness and large biomass, exist in habitats poor in nutrients;
- c) the structure and function of selected ecosystems, including the relation of water, temperature, carbon dioxide, and various elements in tropical terrestrial ecosystems, especially in dry forest and tropical mountain regions;
- d) an understanding of the interactions of plants, animals, microorganisms and soils in agroecosystems to provide and increase sustained production;
- e) an understanding of human societies as intrinsic components of tropical systems, in the context of human ecology and in collaboration with the social sciences.

We now proceed to present state of each of these programs, starting with organization.

ORGANIZATION

The Steering Committee of the Decade of the Tropics has been integrated as follows:

Professor Edward S. Ayensu (Ghana/U.S.A.), Professor Frank B. Golley (U.S.A.) Vice-chairman, Dr. Malcolm Hadley (UNESCO, Paris), Dr. T.N. Khoshoo (India), Dr. Ernesto Medina (Venezuela), Dr. Jaime Palau (Spain), and Professor Otto T. Solbrig (U.S.A.), Chairman.

All members of the Steering Committee have accepted the assignment and there have been three informal meetings of members of the committee in Caracas, Venezuela, Paris, and Washington, D.C. In addition, there is a larger advisory committee whose members will be named by the Executive Committee of IUBS.

TROPICAL DIVERSITY

A conference-workshop to finalize a program of research on this topic has been held at IUBS headquarters in Paris, October 24-26th. Organizer of this meeting was Dr. Maury-Lechon of the Museum National d'Histoire Naturelle, section of Ecology, Paris, with participants from Sri Lanka, Malaysia, Venezuela, U.S.A., France, United Kingdom, and West Germany. The objective of the conference-workshop was to select a site or sites and appropriate methodology to study this problem. The report of this meeting will be published in 1984 by IUBS as a special issue of *Biology International*.

SOILS AND NUTRIENTS

A conference-workshop on this subject will be held in Marlewood, United Kingdom, January 9-13, 1984, under the leadership of Professor M. Swift of Zimbabwe. This workshop aims at providing an evaluation of decomposition research set within the context of other related ecosystems and soil fertility studies. Subjects which will be addressed by the participants are the following: tropical soil biology and chemistry, nutrient exchange between soils and plants, and traditional and intensive tropical agriculture. The objective is to prepare a technical report with a questionnaire for rapid publication and circulation, in order to prepare the following phase of this project which concerns the organization of a larger conference on this subject in 1985, tentatively scheduled for Zimbabwe.

ECOSYSTEM STUDIES

Two tropical ecosystems have been selected for special consideration: tropical mountains and tropical savannas and dry-forest ecosystems.

Tropical mountain ecosystems. This program, which is under the leadership of Professor Maximina Monasterio of the Universidad de los Andes in Merida, Venezuela, is directed at an integrative comparison of the physical and biological characteristics of five tropical and subtropical mountain systems. The areas selected are New Guinea, East Africa (Kenya, Ethiopia), the Himalayas (Nepal), the northern Andes (Ecuador, Colombia, Venezuela), and Hawaii. The objective is to hold annual workshops at the various localities starting with the northern Andes in 1984, attended by researchers from these five areas [meeting location revised to Barcelona, Spain - ed.] at which time local experiences can be compared and research programs developed. A symposium on the subject is also planned in conjunction with INTECOL's next congress.

Savannas and dry forest ecosystems. A great deal of interest exists in research on tropical savannas, and a number of international meetings have been organized for 1983 and 1984. It was felt that there was no need to

organize any new meetings, but rather that we would use those occasions to discuss the concerns of IUBS with the community of scientists working on savannas. Professor Guillermo Sarmiento of the Universidad de los Andes in Merida, Venezuela, will represent IUBS at these meetings and will help establish the nature and form of any subsequent program of research.

OTHER ACTIVITIES

We are very interested in developing two additional programs, one on Agroecosystems and one on Human Biology.

Discussions on both these subjects with interested parties are taking place and it is hoped that programs in these areas will be announced by the middle of 1984. IUBS is also proceeding with conversations with various funding agencies to secure additional funding for these various programs.

Interested parties in any aspect of the program are urged to contact the leaders of the various projects, the members of the Executive Committee, or Dr. Talal Younès, Executive Secretary of IUBS (51, boulevard de Montmoy, 75016 Paris, France).

SOIL BIOLOGICAL PROCESSES AND TROPICAL SOIL FERTILITY

Under the auspices of the IUBS "Decade of the Tropics", a programme of international collaborative research into the links between biological processes and tropical soil fertility has recently been launched. Its major objective is to determine the management options for improving tropical soil fertility through biological processes. The proposal was drawn up at a workshop/meeting of agriculturalists, biologists, ecologists, and soil scientists, and shall be published in a special issue of *Biology International*. The proposal document contains a brief statement evaluating the current understanding of the link between biological activities in soils and the productivity of natural or managed ecosystems. From this, two major programmes of research have been identified, with proposals being made as to how these may be pursued by scientists working within the tropics at a network of collaborating sites.

Copies may also be obtained from :

Professor M.J. Swift, Dept. of Biological Sciences, University of Zimbabwe, P.O. Box MP 167, Mount Pleasant, Harare, Zimbabwe; and
Dr. M. Hadley, SC/ECO, UNESCO, 7, place de Fontenoy, 75700 Paris, France.

IUBS Medicinal Plants Working Group Meeting Brussels, 6 Sept. 1983

1. Introduction

In order to provide a proper scientific basis for research on medicinal plants and to promote such research in developing countries, the IUBS Working Group on Medicinal Plants meeting held on 26 Sept. 1983 in Brussels considered:

1. a comprehensive list of medicinal plants: Taxonomic problems;
2. methodology;
3. identification of geographical areas;
4. safety and activity tests. Chemical analyses;
5. protection of medicinal plants;
6. education.

2. Taxonomy

For all work on medicinal plants the safe identification of the material used is of fundamental importance. It is also necessary to make sure that the correct scientific name is used, especially in view of the sometimes considerable number of synonyms.

The list of medicinal plants prepared by WHO, though extremely useful, has to be updated and corrected, i.e. since "the most commonly used scientific names" have been used. This sometimes means that the correct scientific name does not appear in the list.

This updating and correcting should be done under the auspices of WHO by competent taxonomists. Hence discussions with WHO on the financing should be undertaken as soon as possible. Contact between IUBS and WHO should be taken through E. Ayensu who also should provide a rough estimate of the costs.

3. Methodology

Because of the long history of the use of medicinal plants there are no uniform methods or instructions for the collecting and preservation of such plants. The scientific approach requests access to the material quoted in various contexts, which means that good voucher specimens should be available in reputable and publicly accessible herbaria. In order to secure good voucher specimens and information on the plants collected, a manual should be prepared on how to collect and preserve material, together, with a fill in form the most important information on the plants.

The preparation of the manual and the form should be done by I. Hedberg, based on the already existing material she has prepared, and published as a special issue of *Biology International*. CEC translation services might put the text into other languages (e.g. French).

4. Geographical Areas

Because of the competence of the two experts, the discussion on this point was mainly devoted to Africa.

A first attempt to deal with medicinal plants of North and West Africa has been made by L. Boulos (Egypt) and E. Ayensu who made publications on them. For obvious reasons their books do not cover all that is known on medicinal plants in those areas and more information should be gathered. This also refers to Southern Africa for which considerable information is available.

For some countries in Africa, scattered checklist and various short publications are sometimes available. Those countries should be encouraged to perform inventories, etc. of medicinal plants. Information to all countries concerned should be brought about by ABN (African Bioscience Network) through its Committee on Medicinal Plants, and information on what has so far been achieved, and on activities going on in this field should be sent to IUBS. Financial support should be requested from WHO and UNESCO.

The responsibility for organizing the work is with E. Ayensu as Chairman of ABN.

5. Safety and Activity Tests. Chemical Analyses

Safety and activity tests are very important parts in medicinal plant research. The identification of research organisations in developing and western countries carrying out such tests should be undertaken, and collaboration between institutes in those countries should be organized through joint contracts.

A number of simple and reliable tests should be devised and applied in those developing countries where work on medicinal plants has already been organized.

The task of identifying institutes in western countries working on plant toxicology was given to Miss Di Ferrante. For developing countries the ABN committee should be approached.

The chemical analyses should be a follow up of the previous steps. Plants not earlier investigated should be taken first into consideration.

6. Conservation of Medicinal Plants

Two main problems should be considered under this point:

- a) The world-wide pressure on the vegetation is a grave threat to all useful or potentially useful wild plants, not least to medicinal plants in developing countries. Intense educational activities are urgently needed. Such activities should be performed through IUCN (International Union for Conservation of Nature) - WWF and UNESCO.
- b) The discovery of active and sometimes powerful substances in certain species has sometimes led to excessive collecting of such plants. Following the identification and the synthesizing of the active substances, efforts have been made to destroy the

plants in its natural habitat in order to keep the monopoly of the drug.

In order to eliminate as far as possible the deliberate destruction of plant species, people should be instructed not to make bulk collection indiscriminately for various companies. Information on this matter should be spread through IBN (International Biological Network).

7. Education

This is a complex point since it comes into practically all other fields. Basic education on the importance of medicinal plants should be taken care of by UNESCO and IBN and canalised through the Ministries of Health, of Education, and of Social Welfare and Community Development in all developing countries. Education is also very important when it comes to aid agencies in developed countries as well as for administrators and people in general in such countries.

Information material prepared partly by IUBS should be spread through UNESCO and also by private institutions.

ICSEB - III

THIRD INTERNATIONAL CONGRESS OF SYSTEMATIC & EVOLUTIONARY BIOLOGY

The Congress will be held on July 4-10th 1985, at the University of Sussex, near Brighton, England.

The following Congress Symposia are being organized:

Symbiosis in Evolution; Conservation of Tropical Ecosystems; Biogeographic Evolution of the Malay Archipelago; Adaptational Aspects of Physiological Processes; Co-evolution in Ecosystems and the Red Queen Hypothesis; Angiosperm Origins and the Biological Consequences; The Measurement of Rates of Evolution; Molecular Biology and Evolutionary Theory; Co-Evolution and Systematics; Molecules vs. Morphology in Phylogeny: Conflict or Compromise ?; Random and Directed Events in Evolution; Biochemical Innovation in Microbial Communities.

There will also be Special Interest Symposia on other topics, as well as sessions for contributed papers, films and poster papers.

For further information, which will be mailed in early 1984, write to:

Professor Barry Cox, c/o ICSEB Congress Office, 130, Queen's Road, Brighton, Sussex, BN1 3WE, England.

International Association of Human Biologists

by Paul T. Baker, President

Department of Anthropology, Pennsylvania State Univ. PA, USA

The International Association of Human Biologists which was founded in 1967 has as its principal objective, service to scientists, in all countries, who have an interest in human population biology. Its current officers consist of an elected President, a Secretary-General (D. F. Roberts) and a Council of 19 members who are elected on a worldwide regional basis. The officers normally serve for a 5-year term. Affiliation occurs in two forms. First, scientific associations whose membership shows a strong interest in human population biology are urged to officially affiliate. Second, individual scientists who have appropriate qualifications may join as individual members, subject to official approval. Balloting for officers is currently restricted to individual members. The International Association of Human Biologists has at present 11 affiliated scientific associations with 5,000 members and an active individual membership of about 350. English and French are the official languages of the Association.

Human Population Biology and the Origins of the International Association of Human Biologists.

Scientific interest in the causes and consequences of biological variability in *Homo sapiens* has a long history. However, during the 19th and early 20th centuries when most basic scientific disciplines were established, interest in the subject failed to coalesce into a single discipline. Anthropology, with its origins in anatomy, served as the discipline which focused on human biological origins and to some extent the biological variability in recent human beings. However, the early studies in anthropology focused almost exclusively on morphology traits and taxonomy. Thus, effort was spent in attempting to classify human beings into "races" and to trace these races to their presumed geographical origins. The biological anthropologists of this era were also, unfortunately, influenced by the idea that racial types also had characteristic physiological and behavioral types. As a consequence of anthropological focus on taxonomy, many of the major findings on the nature of genetic, biochemical, physiological and behavioral variation in human beings developed in other disciplines with little cross-disciplinary integration.

The development of the general synthetic theory of evolution with its origins in population genetics began to alter traditional views. By the 1960's the geneticist's concept of a human population was an acceptable focal idea for scientists from several of the disciplines studying human biological

variability. The human adaptability project of the International Biological Programme provided a logical focus for these interests and through the indefatigable efforts of the project convenor, Professor Joseph S. Weiner, scientists from a broad array of disciplines were able to meet in small groups to plan the human adaptability project. Some of the subprojects were simple surveys of genetic, physiological and growth variation, but some were population specific and integrated results from a number of disciplines. In the integrated studies questions of how natural and social environments affected an array of biological characteristics in specific human populations were examined.

These integrated research efforts offered the opportunity to unite international scientists from all the disciplines interested in human population biology in a permanent association. With the help of the Wenner-Gren Foundation for Anthropological Research a small globally representative group met to found the International Association of Human Biologists. These individuals represented only anthropology, human genetics and human physiology, although in the human adaptability project, nutritionists, epidemiologists and social scientists were also involved. From these origins, the IAHB was born and became a member of the International Union of Biological Sciences.

Current Activities

The IABH currently publishes a semi-annual newsletter and is issuing a series of short monographs on the historical development of human biology on a country-by-country basis. It has sponsored a series of regional and tropical symposia and in conjunction with a business meeting supported a series of symposia at the August 1983 meetings of the International Congress of Anthropological and Ethnological Sciences. It directs an Advisory Commission on Human Biological Research. Association members are active in such international research activities as the Decade of the Tropics, ICSU research planning, the UNESCO Man and Biosphere Program and WHO activities.

The Association plans for the future a more active role in supporting small topic specific conferences and hopes to involve more national and regional organizations concerned with the diverse aspects of human variation. It will also continue to support all NGO and UN related activities devoted to understanding the past and present relationship between human population biology and the natural environment.

Vegetation Map of Africa

Just published in late 1983 by Unesco is the "Vegetation Map of Africa". The work comprises three map sheets and one sheet for general legend (composite English-French) plus a 350-page descriptive memoir by Dr. Frank White entitled « The Vegetation Map of Africa ». The map and companion text are designed to serve both as a lasting reference and as a research and teaching tool in biology, geography and related environmental fields.

"The Vegetation Map of Africa" has been compiled by the Association pour l'étude taxonomique de la flore de l'Afrique tropicale (AEFTAT), in collaboration with Unesco and the United Nations Sudano-Sahelian Office (UNCO). Made up of three sheets: North-eastern, North-western, and Southern Africa, the map scale is 1:5.000.000. An English-French legend to the 80 major vegetation types and mosaics depicted is included.

Dr. Frank White of the University of Oxford wrote the map's companion memoir, the "Vegetation of Africa". The volume's twenty-two chapters describe the vegetation of the main floristic regions of the African mainland, Madagascar, and other off-shore islands. Included are a bibliography of over 2400 items and an Index of nearly 3500 plant species. The preparation of the map with an accompanying memoir provides several valuable cross-reference advantages to the researcher, while preserving a unified, readable map presentation. The classification used for the vegetation map is based almost entirely on physiognomy and floristic composition of the vegetation, while the text provides climatic maps for each of the major phytogeographic regions. Vegetation and climate are dealt with separately. Only a few comparative climatic terms, such as moist and dry, are occasionally used in the designation of mapping units.

The two interconnecting and fully cross-referenced systems of classification can be used independently, or in tandem. In the legend the mapping units are grouped traditionally, according to physiognomy, while in the text they are

grouped by the floristic regions in which they occur. The legend permits easy comparison of African vegetation with that of other continents, while the text deals effectively with compiled spatial and dynamic relationships. Every effort has been made to keep the detail shown on the map as simple as possible. Some detail, which could have been shown on the map, though at the expense of the broad pattern of relationship, appears in the text.

The written account of African vegetation is introduced by brief chapters dealing with geology climate, soils, animals, fire, and use and conservation. The vegetation of the main floristic regions is described individually. For each region, the salient features of the flora, geology and climate are described, and a black and white map is provided. These ancillary maps illustrate topographic features mentioned in the text and summarize the regional climate by means of climatic diagrams. For each of the main vegetation types, references to source materials and other important publications, published photographs and profile diagrams (if available), as well as major synonymy, are given.

The bibliography includes all works consulted during compilation of the map and the writing of the descriptive memoir. The index gives names of the nearly 3500 plant species, together with their major synonyms. The index alone provides an introduction to ecological information on virtually all species playing an important in African vegetation.

"The Vegetation Map of Africa" has been published as Natural Resources Research Series No. XX. Other recent Unesco publications in this Series are "Case Studies on Desertification", "Vegetation Map of Latin America" and "Ecosystèmes Forestiers Tropicaux d'Afrique". The "Vegetation Map of Africa" and other numbers in the Natural Resources Research Series can be ordered from the national distributors of Unesco publications, or from the Unesco Press, 7, place de Fontenoy, 75700 Paris, France, from where further information can be obtained.

The International Organisation of Plant Biosystematics

1983 Conference held 17-21 July
in Montreal, Canada

More than 100 scientists from 17 countries met to hear and discuss 40 papers presented as part of the Symposium "Plant Biosystematics: 40 years later" sponsored by the International Organization of Plant Biosystematics. All aspects of modern biosystematics were covered with papers dealing with both historical perspectives and the most recent advances in techniques being presented. All the papers will be published by Academic Press, Toronto, in a book edited by the Chairman of the IOPB executive council Dr. William F. Grant, who expects the volume to be available by early 1984. The quality of the papers presented was high and the book will be a "must" for all plant biosystematists. Perhaps, most significant (to this cytotaxonomist at least) were the papers dealing with chromosome pairing and evolution of the karyotype. The data indicated that some review of well established ideas about homology must be undertaken. Overall, a combination of techniques and collaboration among several specialists were suggested as the coming necessity in order to solve difficult biosystematic problems. Traditional topics, such as the definition of the term "species", also were considered and these generated some lively debate.

The conference was held on the campus of McGill University and included a tour of the Jar-

din Botanique de Montréal. Both institutions did an excellent job in providing a suitable setting in which to discuss some very difficult questions.

During the meetings the IOPB council met and determined that it was necessary for the organization to function independently of its parent organization the International Association of Plant Taxonomists. IOPB will maintain its own membership list and will begin publishing a newsletter in the near future. Council member Dr. Krytyna Urbanska will edit the newsletter (Goebtanisches Institut, E.T.H., Zurichbergstrasse, CH-8044, Zurich, Switzerland). It was pointed out to all participants of the conference that technically no one was a member of IOPB and that everyone should request a registration form from Dr. Liv Borgen the secretary/treasurer of the IOPB council (Botanical Garden and Museum, University of Oslo, Trondheimsvn. 23B, Oslo 5, Norway). A membership fee of \$25 US was set to cover newsletter costs, which is a bargain since membership is for the five or more year period from one International Botanical Congress to the next. Dr. Urbanska has offered to host the next IOPB Conference to be held in Zurich in 1987 shortly before or after the International Botanical Congress meets in Berlin.

1st International Congress of Comparative Physiology and Biochemistry

August 27-31, 1984. Liège, Belgium

This large international congress is the first organized under the auspices of the Section of Comparative Physiology and Biochemistry of the International Union of Biological Sciences (CPB Section of IUBS).

The CPB Section of IUBS has been organized recently (1980) mainly thanks to the efforts of the CPB division of the American Society of Zoologists and of the European Society for Comparative Physiology and Biochemistry. The section, which is the expression of the steadily increasing interest of many biologists for the comparative approach, has been immediately very successful. It now gathers, aside of the "founding" Societies, the Canadian Society of Zoologists, the Japanese Society for General and Comparative Physiology and the Society for Experimental Biology (England); these 5 societies actually represent some 6.000 members.

The congress, organized in Liège (Belgium), will be the first manifestation of this international body truly representative of the rapidly growing field of Comparative Physiology and Biochemistry; it is thus of particular importance.

Liège has been spotted as a place of choice for this first international CPB congress for two main reasons. 1) The University of Liège has a well-known school of comparative physiology and biochemistry which will be celebrating in 1984 the 100th anniversary of its constitution. It is indeed in 1884 that Professor L. Fredericq, who showed a very strong appeal for the comparative approach, founded the physiology laboratory of the University. Later on, under the impulse of Professor M. Florkin who is internationally renowned for his most important contribution to comparative biochemistry, the laboratory developed into a large school of CPB actually known the world over. 2) The European Society for Comparative Physiology and Biochemistry, one of the founding societies of the CPB Section of IUBS, has been organized at the initiative of a 2 professors of Liège University (M. Florkin and one of his former students, R. Gilles).

Comparative Physiology and Biochemistry

developed early in the century from physiology and experimental zoology. Studies in the field were originated by scientists interested not only in the fundamental unity of life but also in the large diversity of physiological and biochemical processes shown by living organisms. This diversity being mostly an expression of adaptation of species to their environment, CPB soon incorporated the so-called environmental approaches to biology. The very large amount of information published in the area today has thus become relevant to all aspects of biology, not only physiology and biochemistry but also ecology, marine biology or veterinary sciences. Environmental and comparative research has also largely contributed to the development of new areas with more applied aims such as eco-physiology or eco-toxicology.

This first international CPB congress will be concerned with all the aspects of current research in the field. The most recent advances in a variety of the most important topics will be grouped in 5 fundamental themes: Metabolism, Respiration, Circulation — Transport, iono and osmoregulation — Adaptation to environmental factors — Hormones and behaviour — Neurobiology. 139 internationally renowned scientists will give plenary lectures during the 5 days of the meeting. Workshops and roundtables giving large opportunities for informal contacts and interactions will also be organized.

Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale (AETFAT).

From 19th to 23rd January 1982, the Xth AETFAT Conference was held at the CSIR Conference Centre in Pretoria. Although AETFAT is not affiliated to the IUBS, I am sure you are concerned about all biological fields. The Conference was very successful and the beautifully edited proceedings have just appeared as Vol. 14, Nos. 3 and 4 of *Bothalia* published by the Botanical Research Institute, Department of Agriculture, South Africa. The 1.023 pages paperback volume was edited by Dr D.J.B. Killick and costs R 30.00 in South Africa and R 31.00 overseas (post free).

Second International Conference “Clinical and Basic Factors Influencing Bone Growth”

University of California Los Angeles,
January 3-5, 1985

This interdisciplinary Conference will be a follow-up to the one* held in January, 1982 and will emphasize both clinical and basic science aspects of bone growth. A primary objective of the Conference again is to update and integrate our understanding of the growth of bone with new knowledge and to offer directions for future research. The content will cover factors and mechanisms which influence both normal and abnormal prenatal and postnatal bone growth, both general and craniofacial, from the subcellular to the gross level. Clinical experimental approaches to bone growth will be emphasized and attention also will be given to basic science aspects. Titles and 100-200 word abstracts in English are solicited from various clinical and other biological disciplines including but not limited to anthropology; computer science; genetics; metabolism; morphology;

oral, maxillofacial and plastic surgery; orthodontics; orthopedics; pediatrics and pedodontics. Abstracts should include purpose, method and material, results and conclusions. They should be submitted for consideration as soon as possible, but no later than June 30, 1984. Attendance will be limited. The proceedings of the Conference will be published.

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* Dixon, A.D. and Sarnat, B.G. (eds): Factors and Mechanisms Influencing Bone Growth. New York: Alan R. Liss, Inc. 1982.

“PREMIO BALZAN” 1983

The 1983 Balzan Prize for Zoology (with special reference to evolution) has been awarded to **Professor Ernst Mayr**, who *“has made fundamental contributions to the study of evolution by his research in the field of zoology. His critical analysis of the species concept, and of the processes of natural selection and formation of species, and his penetrating study of the impact of the Darwinian revolution on modern thought have made him one of the foremost contemporary investigators of biological evolution”*.

The International Balzan Foundation was established in 1956, with the aim of promoting the most deserving humanitarian and cultural work throughout the world, regardless of nationality, race and religion. To this end, prizes are awarded annually in subjects varying from literature, moral sciences and the arts, physical, mathematical and natural sciences and medicine, as well as a special prize for “humanity, peace and brotherhood among people”.

Field Research in Madagascar

On 1st and 2nd February, 1983, 26 biologists and conservationists from six different countries gathered in Jersey (British Isles) to discuss how foreign scientists could contribute to nature conservation in Madagascar. Also present was Mme. Berthe Rakotosamimanana, Director, Department of Scientific Research in the Ministry of Higher Education and Scientific Research of The Malagasy Republic.

The wishes of the Malagasy government are that the individual scientists should *not* make application to conduct research directly to the Department of Scientific Research, but rather that applications be made through an external advisory group and that, although proposal on a wide and varied range of topics are welcome, each should be partially oriented towards nature conservation in Madagascar.

On the advice of the Malagasy authorities, the participants to the meeting produced a formal document in conjunction with the Representative of World Wildlife Fund-International in Madagascar (whose on site conservation efforts are now official governmental policy), which describes how research by foreigners should aid nature conservation. The participants to the meeting compiled an international list of consultants with diverse fields of interest in Madagascar. From that list they elected seven biologists to form the International Advisory Group of Scientists (IAGS), whose duties (also described in the formal document) are to review and send on research proposals to Madagascar for final deliberation by the Department of Scientific Research.

The IAGS consists of established scientific investigators who are in a position to cooperate

effectively in identifying the urgent conservation needs of Madagascar. The Group is constituted for a period of three years from 1st March, 1983, the date that the Malagasy authorities signed this document. The IAGS does *not* provide financial assistance for research projects.

If you want more information about the constitution and duties of the IAGS or about how to apply to conduct research in Madagascar, please write to a member of the IAGS from your region:

Dr. Roland Albignac, Faculté des Sciences/
Laboratoire de Zoologie et Écologie Animale/
Université de Besançon/25000 Besançon/
France.

Dr. Lee Durrell, Jersey Wildlife Preservation
Trust/Les Augrès Manor/Trinity/Jersey/Chan-
nel Islands (via U.K.).

Dr. Alison Jolly, The Rockefeller University/
1230 York Avenue/New York, N.Y. 10021/
U.S.A.

Dr. Bernd-Ulrich Meyburg, ICBP Groupe
Spécialiste des Rapaces/Bockumer Strasse,
289, D-4000 Dusseldorf 34/West Germany.

Dr. Jean-Jacques Petter, Museum National
d'Histoire Naturelle/Écologie Générale/4 Ave du
Petit Château/91800 Brunoy (Essonne)/France.

Dr. Peter Raven, Director, Missouri Botani-
cal Garden/P.O. Box 299/St. Louis/Missouri
63166/U.S.A.

Dr. Alison Richard, Dept. of Anthropology/
2114 Yale Station/Yale University/New Haven/
Connecticut 06520/U.S.A.

CHEMRAWN II

International Conference on Chemistry & World Food Supplies — The New Frontiers

World food production must be increased at least twofold and preferably three- to fourfold during the next several decades in order to adequately feed the 8 billion people expected to be living by the year 2015.

This goal, which must be achieved without adding appreciably to the amount of land now under cultivation, will require agricultural practices that are more intensive, more selective, and more cost effective than those in use today. If this is to be accomplished, the chemical sciences and technologies must play a key and central role.

Greatly increasing world food production is a global problem, but the problem's nature, size, potential solutions, and prospects for resolution differ markedly from major region to major region, from country to country, and from area to area within countries.

These are among the conclusions of the Future Actions Committee of CHEMRAWN II, the International Conference on Chemistry and World Food Supplies — The New Frontiers. The Committee, comprised of five Nobel laureates and 19 other prominent scientists from around the world, based its conclusions and subsequent recommendations on papers presented at the Conference last December. It released its report* at a news conference today (26 July, 1983) in Washington, D.C.

Finding a large gap between actual and potential food production in developing countries, the Committee concluded that a combination of technology transfer and technology adaptation could provide much of the increased food production needed for the balance of this decade and into the early 1990's. However, it felt no assurance that these efforts would permit a 100 percent increase in world food production by 2015 or whenever the population does reach 8 billion, much less provide a three- to fourfold increase if rising dietary expectations also are to be met.

The Committee assigned high priority to several research projects that could produce findings within the next decade to generate these necessary increases in food production. It concluded that, while success cannot be promised, the world risks truly severe shortfalls in food production to meet both growing numbers and growing expectations unless such basic programs are supported adequately in the years ahead.

The Future Actions Committee developed 17 major recommendations encompassing both long- and short-range research goals. Detailed approaches to accomplishing these goals appear in the Conference publications, the *Perspectives and Recommendations* and the *Invited Papers*. It assigned high priority to:

- genetic engineering research and development programs, particularly those dealing with increased nitrogen fixation, improved stress resistance in plants, control of animal diseases, and enhanced efficiency in milk and meat production;
- plant physiology research, fundamental and interdisciplinary, with particular attention to understanding the molecular basis of reproductive, growth, stress, nutritional, and preservation processes;
- development of less expensive and more cost-effective nitrogen fertilizers, including investigation of processes for oxidative nitrogen fixation, for producing hydrogen from water using solar radiation as the energy source, and for improved controlled-released fertilizers.

The Committee's other recommendations included:

- work on programs designed to improve photosynthetic efficiency and — in the very long term — achieve artificial photosynthesis;

- research on plant and animal growth regulators;

- wide distribution and adaptation, as quickly as possible, of the presently available knowledge of pest-control systems;

- development of new chemical and biological methods to control pests in developed and developing countries;

- improvement in all aspects of animal, poultry, and fish production;

- establishment of internationally accepted standards of safety for people in different environments, and international agreements on registration, licensing, and patent procedures for pest control chemicals and methods;

- emphasis on programs to improve preservation methods, especially those that can be operated at home or at the small-community levels without large infusions of capital;

- formulation of programs to attract more qualified students and workers to agricultural- and food-related scientific disciplines.

CHEMRAWN II, held 6-10 December 1982 in Manila, Philippines, was the first major effort by the world's chemical and agricultural communities to evaluate the problem of meeting the world's increasing need for food, review the options, and recommend future courses of action. It was co-sponsored by the International Union of Pure and Applied Chemistry and the International Rice Research Institute, based in the Philippines. Some 600 leaders from government agencies, industrial companies, financial organizations, foundations, universities, and research institutions around the world participated in the five-day meeting.

* Reporters may obtain copies of the *CHEMRAWN II Perspectives and Recommendations* from Carol L. Rogers at the AAAS Communications Office, 1776 Massachusetts Avenue, N.W., Washington, D.C. 20036.

Science Software Newsletter

The Center for Environmental Studies at Arizona State University is interested in publishing a newsletter dedicated to computer (particularly microcomputer) software and applications for the natural sciences. The newsletter would be published quarterly and would contain 1) a listing and short review of recent scientific software, with availability and compatibility specifications; 2) one or more articles on microcomputer techniques — how to download software for different systems, how to choose between a minicomputer and a network of micros, etc.; 3) a forum for advertising "custom" software — a place where scientists who have written software for specialized modeling or applications

(for microcomputers, minis, or mainframe) can list and describe programmes for free use, exchange or sale. We are currently assessing the level of interest in such a publication among the scientific community, as an aid to obtaining necessary funding. If you are interested in seeing such a publication, would like further information regarding it, or would be willing to serve as a reviewer for new software and documentation, please call or write me at the address below.

— DIANA J. GABALDON, Ph. D., Center for Environmental Studies, Arizona State University, Tempe, AZ 85287 (602) 965-3051.

IAU SYMPOSIUM ON SEARCH FOR EXTRATERRESTRIAL LIFE

June 18-21, 1984, Boston University, Boston, MA, U.S.A.

The symposium on "Search for Extraterrestrial Life - Recent Developments" is being organized by the International Astronomical Union (IAU), and cosponsored by four major international scientific organizations: IUBS, COSPAR (ICSU Committee on Space Research), IAF/IAA (International Astronomical Federation/International Academy of Astronomics), and ISSOL (International Society for the Study of the Origin of Life). The symposium will be held on June 18th-21st, 1984, on the campus of Boston University in Boston, Massachusetts, U.S.A.

The major objective of the meeting is to gather together prominent international scientists working on the search for extraterrestrial life and other related fields to discuss recent progress made, as well as to outline plans for the future. It will also facilitate the exchange of information among disciplines, especially between astronomy and the life sciences.

The symposium will include seven sessions, each one being devoted to a particular topic,

and will consist of 1-3 invited papers which will give the state of the art in the particular subject, in addition to 4-8 contributed papers offering new results or new ideas. The sessions planned include :

- I. search for other planetary systems;
- II. interplanetary and interstellar organic matter;
- III. universal aspects of biological evolution;
- IV. radio searches - recent observations;
- V. technological progress in radio searches;
- VI. the Fermi paradox and alternative search strategies;
- VII. summary and conclusions.

Please address all your correspondence and inquiries regarding the symposium to:

Professor Michael D. Papagiannis
President, IAU Commission 51
Dept. of Astronomy, Boston University
Boston, MA 02215, U.S.A.

IUBS LOANS ALLOCATED IN 1984

At the Union's 1983 Executive Committee Meeting on October 28th and 29th, total loans of US\$15 750 were awarded to the following congresses and conferences:

The IIIrd International Congress on Cell Biology, 26-31 August, 1984, Tokyo, Japan, organized by the IUBS Section of Cell Biology (US\$3 500);

The VIIth International Congress of Protozoology, of the IUBS Commission on Protozoology, 26-30 August, 1985, Nairobi, Kenya (US\$3 500);

Vth International Conference on Culture Collections, 25 November - 1 December, 1984, Bangkok, Thailand, organized by the IUBS Commission on Culture Collections (US\$5 000);

IIIrd International Conference on Systematic & Evolutionary Biology (ICSEB/IUBS), 3-10 July, 1985, Brighton, U.K. (US\$3 750).

PUBLICATIONS REVIEW

CHEMISTRY AND WORLD FOOD SUPPLIES: The New Frontiers

Edited by L.W. Shemilt, published by Pergamon Press, 1983 (664 pages).

Under the continuing programme of the Chemical Research Applied to World Needs (CHEMRAWN).

This volume (CHEMRAWN II) presents an overview of the critical needs and solutions relating chemistry and agriculture to world food supplies. Major sections cover soil and crop management for efficient use of water and nutrients, chemical techniques for weed control, and the integration of chemical, biochemical, biological and agronomic techniques for pest control. Also included is how the role of chemistry and biochemistry is improving animal production systems, in developing new food sources, in the processing and storage of food, in addition to an analysis and assessment examination with emphasis on both current practice and future directions.

DETERMINATION LIST OF ENTOMOPHAGOUS INSECTS

West Palaearctic Regional Section Bulletin of the IUBS Section for Biological Control, 1983 (49 pages).

Edited by E. Haeselbarth, the 9th identification list of entomophagous insects includes 3 parts, dealing with parasite or predator, host or prey, and the host plants.

ECOLOGY IN PRACTICE

Edited by F. di Castri, F.W.G. Baker, M. Hadley (Man and the Biosphere Programme, UNESCO). Published by Tycooly International Publishing Ltd., Ireland, 1983 (2 part volume).

Based on the Paris conference of "Ecology in Practice: establishing a scientific basis for land management", these volumes identify the key scientific problems in the long-term management of ecological resources; describe the constraints and obstacles encountered in specific project; and give direction to future research and training activities. This important work will be essential reading for planners, local organizations and scientists in a wide range of disciplines who are seeking effective means of solving the ecological problems of the last two decades of this century.

ENVIRONMENTAL BIOGEOCHEMISTRY

Edited by R. Hallberg. Ecological Bulletins Publishing House/FRN. 1983 (567 pages).

This volume is based on papers presented at the "5th International Symposium on Environmental Biogeochemistry", held in Stockholm, Sweden, in July 1981. The presentation focused on biogeochemical cycles in natural reservoirs, in particular the pool-size variability, chemical transformation mechanisms and the impact of these factors on the interpretation of field data.

ENVIRONMENTAL SCIENCE EDUCATION AT UNIVERSITY LEVEL - III

Edited by M. Numata, Faculty of Science, Chiba University, Chiba 260, Japan, 1983 (57 pages).

This issue consists of selected papers dealing with environmental education at the university level, with the emphasis on science education in Japan.

INTEGRATED CONTROL IN GLASSHOUSES

West Palaearctic Regional Section Bulletin of the IUBS Section for Biological Control, 1983 (229 pages).

This volume contains 30 papers presented at the meeting of the working group "integrated control in glasshouses", held from 26-29 July, 1982, at Darmstadt (FRG). It includes national reports from China, Greece, Israel, Italy, Japan, the Netherlands, and Norway. Together with research papers on biological control of whitefly, leaf miners, aphids, and coccids on various crops in glasshouses.

INTERNATIONAL DIRECTORY OF BOTANICAL GARDENS-IV

Compiled by D.M. Henderson. Published by Koeltz Scientific Books, West Germany, 1983 (288 pages).

The new directory comprises the name and complete address of 798 botanical gardens. Additional information includes: ownership, chief objective of the institution, longitude, latitude, altitude, mean annual rainfall, annual temperature range, number of species and varieties grown, season of floral displays, collections of special interest, hours of operation, list of regular publications, size and type of library, herbarium and physical facilities, and the names and research speciality of staff members.

INVENTORY OF DATA SOURCES IN SCIENCE AND TECHNOLOGY: A Preliminary Survey

By the Committee on Data for Science and Technology (CODATA) of the International Council of Scientific Unions. Published by UNESCO, 1982 (229 pages).

This preliminary inventory consists mainly of chapters covering six specific topics, chosen by CODATA and UNESCO for their major interest to many developing countries: renewable energy sources, fertilizers, hydrological sciences and water resources, nutrition, pesticides, and soil science. A choice of more general data sources in science and technology, prepared by the CODATA Task Group on Accessibility and Dissemination of Data, is included as an Annex.

This inventory is intended to facilitate the access of scientists, engineers and information specialists to sources of numerical or factual data in science and technology.

SCOPE 20 - METHODS FOR ASSESSING THE EFFECTS OF CHEMICALS ON REPRODUCTIVE FUNCTIONS

Edited by V.B. Vouk and P.J. Sheehan. Published by John Wiley and Sons, 1983 (541 pages).

This book provides a review and assessment of methodology for evaluating the toxicological effects of chemicals on the reproduction of living organisms. The reproductive function of both female and male mammals is examined in detail, including laboratory testing and epidemiological studies. The book also reviews methods applicable to other vertebrates, non-vertebrates, higher plants and microorganisms. Where possible, a solid base is given for future methodological evaluations. Where suitable methods are not available, inadequacies are identified and suggestions made for the improvement and development of more appropriate procedures to fill them.

SCOPE 21 - THE MAJOR BIOGEOCHEMICAL CYCLES AND THEIR INTERACTIONS

Edited by B. Bolin and R.B. Cook. Published by John Wiley and Sons, 1983 (532 pages).

Resulting from a workshop held outside Stockholm in 1981, this book examines the interactions linking the biogeochemical cycles of carbon, nitrogen, sulphur and phosphorus in the major parts of the global system, i.e., the atmosphere, terrestrial biota, the soil, the fresh-water system, coastal zones, the open sea and marine sediments. An overview of the field as a whole is provided, together with a summary of the main features of the four cycles. This is supported by a more detailed assessment of the subject matter.

THE DEVELOPMENT OF MODELS FOR PRACTICAL USE IN CROP PROTECTION

West Palaearctic Regional Section Bulletin of the IUBS Section for Biological Control, 1983 (78 pages).

This issue, edited by M.J. Jeger, coordinator of the working group on "use of models in integrated crop protection", provides a comprehensive introduction to the range of models and techniques of modelling in crop protection, its implications and a guide to terminological differences in the literature.

TROPICAL FORESTS: Source of Energy through Optimization and Diversification

Published by Universiti Pertanian Malaysia, 1982 (397 pages).

This book represents the proceedings of the "International Forestry Seminar", 11-15 November, 1980, in Serdang, Selangor, Malaysia, which was attended by 200 participants from 13 countries. The objectives of the seminar were (1) to provide a common platform of discussion; (2) to review and assess the current problems in terms of optimum production and exploitation, reduction of wastage and diversification of the resource; and (3) to decide upon future strategies for sustained yield management and utilization.

WETLANDS: Ecology and Management

Edited by B. Gopal, R. Eugene Turner, R.G. Wetzel and D.F. Whigham. Published by the National Institute of Ecology and International Scientific Publications, India, 1982 (514 pages).

This volume constitutes the proceedings of the "First International Wetlands Conference", organized by INTECOL, in joint cooperation with the Institute of Ecology and the support of UNESCO, INSA, CFTC, and several other organizations. The papers contributed by ecologists from Asia, Africa, Europe and North America cover ecology, the use of conservation and managements aspects of a wide variety of wetlands such as mangroves, coastal wetlands and flood plains, shallow lakes, ponds, marshes, forested wetlands as well as cultivated wetlands.