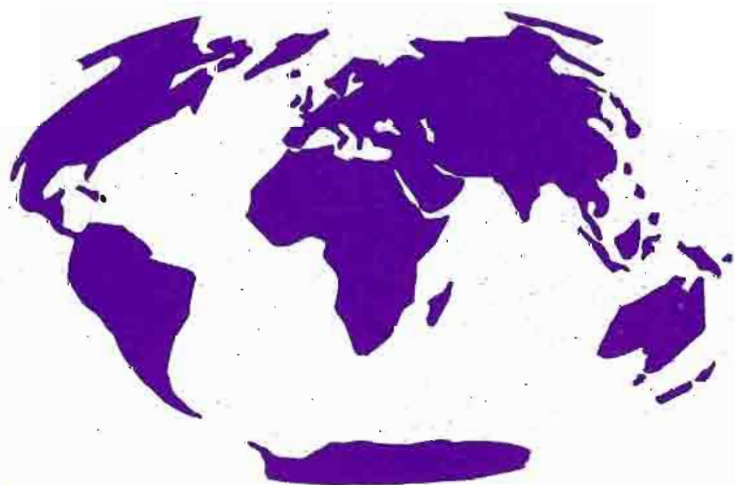


Biology International

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Union of Biological Sciences (IUBS)



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Contents (No. 1, 1980)

1 Editor's Note

FEATURE ARTICLES

- 2 Ecology in Practice : Plans for an International Scientific Conference
by F. Di Castri, Director, Division of Ecological Sciences UNESCO**
- 6 The Role of Agricultural Research in Dealing with New Problems Facing Agriculture
by J. Poly, Director General, INRA, France**
- 12 International Biological Science Community within the framework of the IUBS
by T. Younes, Executive secretary, IUBS**

NEWS HIGHLIGHTS

- 18 Professional Herbal Medicine**
- 19 Models for Behaviour of Nitrogen in Soil and Uptake by Plants**
- 20 UNESCO Support of Biology in Latinoamerica**
- 20 Space Biology at the XXII Meeting of Cospar**
- 21 Biosciences at the 7th International CODATA Conference**
- 21 CODATA Directory - Bioscience chapters**

IUBS NEWS

- 22 Financial Statements of IUBS for the year 1979**
- 24 Publications Review**
- 27 Calendar of Meetings**

Editor's Note

In order to broaden the regular channel of communication between its members and to serve as a meaningful vehicle for the dissemination of information and the exchange of ideas and experiences, the IUBS newsletter has been improved and expanded to create *Biology International*.

Biology International will reflect the current trends of biological research and show how the knowledge in biological sciences can help provide human needs, especially in such areas as Education, Health, Nutrition, Food, Land Management and the resolution of Environmental problems.

In this regard, *Biology International* will be an important link between the Union and the specialized agencies of the United Nations system, particularly with UNESCO, with which IUBS intends to maintain a close cooperation, mainly in the fields of the Man and the Biosphere Programme, the development of the International Biological Network and of the Science and Technology Education Division.

We invite all Union members to contribute to *Biology International* with short and informative feature articles and points of view, on such topics as Recombinant DNA, Biotechnology, appropriate biological science programs for developing countries as well as indications and advice which could help the Union interact with governmental and non-governmental organizations to promote IUBS stated objectives.

Ecology in Practice : Plans for an International Scientific Conference

by Prof. Francesco DI CASTRI,
Director, Division of Ecological Sciences - UNESCO

For a number of years, biologists and specialists from other environmental sciences have been searching for new ways of harnessing their skills to the needs of economic development. In considering the links between scientific endeavour and natural resources development, there has been consensus about the need to pass beyond sterile abstractions and to test out new approaches within concrete field situations. The Man and Biosphere (MAB) Programme of Unesco represents one framework for such testing.

The MAB Programme was launched by Unesco in 1971. It grew out of the experience of the International Biological Programme, and as such has its roots in the biological and environmental sciences. The main aim of the Programme is to provide the scientific knowledge and trained personnel needed to manage natural resources in a rational and sustained manner. Thus, MAB is studying not only the impact of man on the environment, but also the repercussions of environmental modifications on man.

It is based on 14 international themes of research. It stresses the need for problem-oriented research to meet the need of planners and managers and for interdisciplinary approaches to address complex problems of resource management.

The MAB Programme is built on national priorities and initiatives, within broad international frameworks for scientific cooperation. MAB operates through National Committees which, in mid-1980, have been established in 95 countries. Over 900 field projects are underway in 74 countries, with some 10.000 participa-

ting scientists. These projects focus on concrete problems of resource management and involve both the natural and social sciences. They vary in complexity and duration. Among them are a number of "pilot projects" which have regional and international significance. Examples of the types of problems being studied within MAB pilot projects are :

- migration of people from the highlands for the settlement and use of lowlands in the tropics.
- confrontation of pastoral and agricultural practices in the arid zones.
- conflicting interests of tourism, industry and traditional agriculture and forestry in mountain or coastal areas.
- interaction between cities, considered as ecological systems, and their surrounding environments.

The MAB Programme has passed through a number of phases since its launching in 1971, evolving from the initial phases of definition of objectives, scope and general content, through planning at national and regional levels to the firm implantation of field activities in countries. Attempts have been made to build in evaluation as an integral part of MAB activities, at all levels of the Programme. As part of this continuous process of evaluation, an International Scientific Conference and Exhibition is being organized under the general theme "Ecology in practice : establishing a scientific basis for land management". The Conference-Exhibition will take place at Unesco Headquarters, Paris, from 27 October to 3 November 1981, under the joint sponsorship of Unesco and the International Council of Scientific Unions (ICSU). A three-day session of the International Coordinating Council of MAB will follow from 4 to 6 November 1981. These three events will mark ten years of the MAB Programme.

The combined Conference, Exhibition and Council session have three main objectives. First, to provide an in-depth review and evaluation of some critical land management problems, and to assess the contribution of MAB in providing a scientific basis for tackling such problems. Second, to identify the principal problems concerning man-environment relations for the 1980's and examine how the MAB Programme can best address these problems. Third, to consider possible modifications within MAB in light of past experience and future needs.

In so doing, more far-reaching questions will also be examined, such as : Has ecological research during the last ten years been sufficiently problem-oriented ? Have research results been presented in a form which can be understood and used by decision-makers ? Have ecologists fulfilled their responsibility to help the general public to better understand environmental problems ? What are the most effective means to bring about international cooperation in the ecological sciences ?

The Conference will focus on concrete field activities where an attempt has been made to conduct ecological research which responds to development needs. The Conference will avoid generalized discussion of theory or strategies which have not been backed by practical experience. Examples will be drawn mainly from MAB, but other case studies or projects not formally part of the Programme may also be included.

The Conference will be based on invited papers which will analyze some of the technical outputs of specific projects or groups of projects. Shortcomings as well as accomplishments will be highlighted. There will also be an opportunity for contributed papers.

The Conference will be organized in plenary sessions on a number of main themes and subthemes. There will be ample time for discussions and questions. Also envisaged are concurrent sessions on particular MAB project areas (arid lands, tropical forests and savanna, aquatic and coastal systems, etc.), open forums or panel discussions on such topics as "Criteria for the evaluation of research", poster lectures, and briefing sessions for journalists. A provisional programme for the Conference is attached. Volumes of proceedings are planned.

An Exhibition on MAB field activities will complement the discussions of the Conference in a visually stimulating, experimental way. It will consist mainly of information materials prepared by MAB groups at the national level with emphasis on specific field projects. The

kinds of materials envisaged for the Exhibition include not only technical reports, maps and other graphics, but also audio-visual programmes and other information materials which summarize MAB results in a form which can be understood and used by planners, teachers and other non-specialist groups. Other exhibits will focus on particular methods, approaches and techniques. Some will illustrate ways and means for the handling and communication of information, and will include a demonstration of the MAB Information System, with a small computer enabling individuals to search for particular categories of information. Others will focus on methods for land assessment. Once the Conference-Exhibition is over, a roving exhibit will be prepared.

As mentioned above, the Conference is being organized jointly by Unesco and ICSU, with the International Union of Biological Sciences (IUBS) playing a key role in the planning of the Conference and in mobilizing the participation of the international biological community. The Steering Committee for the Conference comprises the Chairman and the Secretary of the MAB Council and the Executive Secretary of ICSU. In addition, an International Organizing Committee is being set up. This will include the three members of the Steering Committee, plus about seven other persons broadly representative of the professional and regional groups which, it is hoped, will take part in the Conference.

Participants in the Conference will be specialists from a variety of disciplines of both the natural and social sciences, ecologists, biologists, foresters, agronomists, geographers, economists, etc. It is expected that policy-makers and decision-makers, as well as scientific journalists, will also be present. Those attending the Conference need not necessarily have been previously involved in the MAB Programme.

The Conference is designated to provide a forum for scientists and planners to discuss the contribution of ecological approaches to a selection of critical land use problems focusing on concrete examples. It will provide for an evaluation of past and ongoing activities within MAB, of shortcomings as well as successes. The Conference will also identify priority problems for the 1980's. One of the anticipated outputs of the Conference will be recommendations for shaping the future direction of MAB. As such, the Conference is an opportunity for the international scientific community to influence the evolution of MAB, so that the Programme may respond to the changing organization of science in different countries and to new priorities for research and international cooperation.

ECOLOGY IN PRACTICE :

Establishing a scientific basis for land management
Paris, 27 October - 3 November 1981

TENTATIVE PROGRAMME

TUESDAY 27 OCTOBER

- Opening session** Welcoming addresses.
- Theme 1** **The search for sustained production systems in the humid tropics.**
- Review and evaluation paper Land management strategies in the humid tropics, and the role of MAB therein.
- Case studies Large-scale land development and conservation in the Tai forest region of the Ivory Coast.
The East Kalimantan project, Indonesia : the effects of logging, transmigration and other human activities on tropical forest ecosystems.
Nutrient retention mechanisms, tropical forests and the San Carlos pilot project, Venezuela.
- Selected problems Priorities in tropical biology.
Ecologically-sound development in the tropical regions.
- Poster session

WEDNESDAY 28 OCTOBER

- Theme 2** **Scientific basis for the management of grazing lands.**
- Review and evaluation paper Management strategies in grazing lands and the role of MAB therein.
- Case studies Diversifying production systems in semi-arid and arid lands of northern Kenya.
Problems of land use and resource management in mountain regions of Chile.
Modern techniques for determination of carrying capacity on reindeer range : practical example from the Spitzberger tundra.
The Parcours du Sud project in Tunisia : combining subsistence and market economics in an arid land region.
- Selected problem Understanding traditional land use systems as a basis for introducing change.
- Open forum - general discussion Interdisciplinary approaches to integrated rural development in the humid tropics and on grazing lands - practicable concept or utopian dream ?
- Poster session

THURSDAY 29 OCTOBER

- Theme 3** **Can ecological approaches contribute to improved urban planning ?**
- Review and evaluation paper Integrated studies of cities considered as ecological system and the role of MAB therein.
- Case studies Energy conservation and diversification of energy sources in and around the city of Lae (Papua New Guinea).
Managing urban space for children - the Toronto experience.
Ecological studies for regional planning in the Valley of Mexico.
Sensitivity models for urban and regional planning : the example of Lower Main-Frankfurt.
- Selected problems Biotic indicators of environmental quality within an urban context.
Integrating natural and social sciences for urban planning purposes.
- Open forum - panel discussion on Theme 3
- Poster session

FRIDAY 30 OCTOBER

Theme 4

Providing a basis for ecosystem conservation.

Review and
evaluation paper

The biosphere reserve concept and its implementation.

Case studies

Linking conservation with development and local participation - the example of biosphere reserves in Durango, Mexico.

Organizing long-term ecosystem research in biosphere reserves : the example of China.

Planning networks of reserves in large ecological regions : based on the experience of several countries.

Selected problems

Application of ecological theory to conservation planning.

Genetic diversity, ecosystem conservation, evolutionary responsibility.

Open forum -
general discussion
on Theme 4

Poster session

SATURDAY 31 OCTOBER

(morning only)

Concurrent sessions

- Tropical ecosystems, including forests and savannas.
- Arid zones.
- Mediterranean climate ecosystems.
- Temperate ecosystems, including alpine, tundra and taiga ecosystems.
- Aquatic and coastal ecosystems.
- Urban systems.

MONDAY 2 NOVEMBER

Theme 5

The role of the scientist in applying the results of ecological research.

Theme 5 A

Heightening the applicability of the results of research.

Organizing policy-oriented research on population-environment-development interactions - the Fiji and Barbados experience.

Research linked to conflict resolution in the European Alps.

Infusion of a "perception approach" within a research undertaking.

Systems approaches to research design and the communication of results.

Theme 5 B

Preparing the ground for the application of results.

Mobilizing the scientist, planner and local community in an urban situation - the Rome case study.

Use of scientific data for environmental education purposes : the Indonesian experience.

Integrating research within large scale engineering schemes - the Salto Grande project (Argentina - Uruguay).

Mobilizing the local community in a rural situation - the Waitaki River Basin, New Zealand.

Open forum -
panel discussion

Poster session

TUESDAY 3 NOVEMBER

Theme 6

Emerging issues and priorities problems for the 1980's.

New trends in international scientific cooperation for natural resources development.

Problems in the funding of interdisciplinary research

- a scientist's view.
- a policy-maker's view.

Are present scientific structures able to produce the people required for solving land management problems ?

Combining the strengths of governmental and non-governmental approaches.

Suggestions for future directions of the MAB Programme : content, functioning, structure.

General summary of the Conference.

The role of agricultural research in dealing with new problems facing agriculture

by Prof. Jacques POLY, Director General
Institut National de Recherches Agronomiques (INRA) - France

This article is extracted from the inaugural speech given by the author at the XXth Conference of International Organizations for the Joint Study of Programmes and Activities in the Field of Agriculture in Europe, FAO, Paris.

No doubt that agriculture will be one of man's essential activities from now until the end of the 20th century if we judge by the demographic forecasts which have been made of the world population in 2000.

These demographic forecasts can undoubtedly be criticised but they point to an increase in the population of the order of 2 % per annum from now until the year 2000. This means that the world population will be about 6 billion people by this time — making vitally necessary a rapid increase in food available to feed men, all men. Even more important, these increases in population will vary from one place to another. The population of Western Europe, Australia, Japan, New Zealand, USA and Canada will fall, as a percentage of the world population, by 20 %. Also, by the year 2000 70 % of the population, in what we can call the Third World, will be concentrated in eight countries : China, India, Bangladesh, Pakistan, Nigeria, Brasil and Mexico. Yet at present, 60 % of the world food production, expressed in wheat equivalent, is produced in developed countries which consume 80 % of the capital necessary for the development of agricultural activities. The studies and forecasts of the FAO indicate that in the year 2000, two-thirds of the population will live in countries described as developing, which will represent at that time 96 % of the world's active agricultural population. There is, thus, in sum, a food challenge whatever constraints of the contemporary political world may be, constraints which are linked to the economic and social problems at national, multinational or international level.

Hence the basic question : how can agronomy respond to this very worrying demographic

challenge ? Agronomy, which is the mother of all agricultural techniques, has its roots above all in what is now called living sciences and covers numerous and very varied applied biological disciplines.

It should be recognized that at present in the International or National Scientific Community, it can be seen that biology is acquiring its maturity step by step. Some years ago it was the physicists who gave the lead as to the development of the economic activity of man. Now it is biology which is gaining "position" and it is apparent that we will call upon it more and more in numerous sectors to meet the needs of tomorrow's society.

Agriculture is undoubtedly more and more productive; it uses what is known as intermediate consumption in an intensive way : energy, fertilizer, machines, investment, crop protection, compound food for animals, medicines necessary to keep livestock healthy. Since 1973, the price of these intermediary goods has risen more and more. It is becoming clear for example that the use of fertilizer, especially nitrogenous fertilizer, is expensive in terms of energy. It is generally agreed that about two tons of oil are necessary to obtain one ton of nitrogen. This represents an important energy cost to meet the needs in nitrogenous minerals of plants cultivated relatively intensively. In addition, numerous techniques have been developed such as irrigation which consume energy. In certain regions grains high in humidity about 30 to 33 % are harvested and must then be stored at a degree of dryness of between 15 to 16 %; there are thus significant energy costs to ensure the drying and/or stocking of the harvest. In this respect, intermediate consumption is becoming more and more expensive.

Tomorrow's Agriculture

The development of value-added in agriculture — with the increased importance of intermediate consumption and the relative stagnation in farm prices — is falling. In certain countries a fall in the effectiveness of intermediate consumption can be seen. These are the problems which must be the subject of future research. One can define the agriculture of tomorrow by some general qualifications : agriculture should be at least as productive as at present, even if the nature of this productivity must be different. But it may also be more economical, and more moderate.

In the first place, tomorrow's agriculture must use factors of production of an industrial origin more rationally and more reasonably. All wastage must be avoided. When fertilizers were relatively cheap there was a tendency towards production of fodder based on grasses, with intensive treatments of nitrogenous fertilizers sometimes even exceeding the needs of industrial crops. These practices must henceforth be rigorously adjusted to the needs of agricultural production which are to be developed. The second point is as in the past to make an effort to reduce production loss to a minimum, particularly that resulting from climatic uncertainties and disease. This means producing in a satisfactory way and we should know if there is research which can be carried out so that it can be done in a better way to protect the capital necessary for the production of crops and livestock.

The third point is the perhaps more systematic use of what could be called the by-products of agricultural and agri-food activities and the waste and residues resulting from these activities, to produce energy from proteins or molecules. One could also well imagine that it would be possible to find useful molecules for the chemistry industry. We know that at present the chemical industry is based essentially on oil. But there is also a chemical industry able to be developed on the basis of for example ethyl alcohol. And we are very well aware of sources of ethyl alcohol which could be derived from agricultural products. Some of these waste products or side-products could be cultivated specifically by means of various micro-organisms to produce for example protein. These proteins, in certain cases, could be used directly in human food, or hypothetically in feed for animals.

The fourth element, the more systematic exploitation of all natural resources in our countries, is particularly important.

Should one, in a period in which all natural resources should be used as much as possible, allow monotonous models to perpetuate themselves and not be sufficiently imaginative or creative enough to find differentiated agricultural models, adapted to the variety of regional conditions ? Tomorrow's agriculture must not only be more productive, economical and moderate but also more concerned about its continuation in the future. It is not the intensive model which we know so well, a type of farming which merely extracts. Does not the intensive use of a certain type of soil in monoculture eventually reduce the content of organic material in the soil, the latent potential of the soil on which agricultural

activity is based ? It is an important problem. Do we not change the micro-climate in certain regions when we carry out indiscriminate land re-allocation without studying the effects in a sufficiently rational way ? Are we not allowing mountain pastures to return to a wilderness ? This is thus reducing so many possibilities of extensive production of which we will speak perhaps, models a bit different from the monotonous plan which I have mentioned previously. In certain cases for example the intensive and indiscriminate use of the nitrogenous fertilizers directly on the soil means that the ground water or the hydric reserves, which we and our children will require in the years ahead might not have the same characteristics and potential as those we use today. Today's generation must foresee with courage the capital which it will hand down to future generations. I think this must be taken into consideration by researchers in agronomy - preparation for the future under the best conditions for future generations.

Another point is that the natural fauna and flora is a vast genetic reservoir from which we have created the industrial crops which we use at present or the breeds of farm animals dear to us. In the name of economic liberalism, certain very productive breeds are to be found in all regions. This being so, we risk losing a part of our genetic assets which could be a driving force for future progress; this I call the maintenance of capital for tomorrow's agricultural production.

A final point which concerns agriculture : there should be more concern about the demands of the whole of society than has been the case in the past. In fact, for a long time agriculture has been considered as an intrinsic economic activity. However, it should not be forgotten that it covers 90 % of rural areas and that it poses problems for everyone. I see two important forces : the liaison between agriculture and the world of consumers through agricultural products either consumed directly or after processing. The demands of consumers, whatever the country, in the United States or Europe, is becoming more and more important with regards to the quality of food products provided. These problems are linked to the problem of human nutrition and are thus becoming very important for the future. The contemporary world suffers from a rapid increase in social and medical costs. In all countries health costs develop every year at a much faster rate than a country's resources. To this extent therefore it is perhaps necessary not only to study to ultimate pathological effects of a bad diet but also the primary effects of a well-balanced diet for the society of tomorrow.

The facts that 15 % of the population in the United States is obese, that vascular disease is linked to a hyperlipidic diet, that cancer is related to an excessive consumption of protein and insufficient milk, mean that we must try to define a well-balanced diet. These diets are essentially made up of agricultural products consumed either in their natural state or after processing. In addition, I believe that in the quality of food we should maintain what I would describe as the price/service relationship.

The organoleptic qualities of food, which for example, make it desirable to eat, should be

conserved, while maintaining the essential quality of food provided for human consumption. But there are in addition what I would call consumers of rural areas. With urbanisation, which sometimes becomes excessive the spread of secondary homes sometimes poses problems between agriculture and the users of rural areas. Excessive use of fertilizers in certain cases uncontrolled discharge of certain waste, or pollution in other cases - will no longer be tolerated.

In sum, if we had to define agriculture at the end of the twentieth century in the developed countries of Europe or of OECD, I would say that apart from particular cases, it should be essentially an agriculture which provides "*an optimum biological and social value-added*".

I also think that the idea that biology can help towards the development of agriculture is important.

Biological Sciences and Agriculture

How can science try to reconcile the likely contradictory requirements which I have just outlined ?

I will merely cite a number of examples because I do not claim to be exhaustive. In my view the following points must be the subject of our work : a better knowledge and control of the physical milieu in which we carry out agricultural activities are the first lines of research ; the second is a better use of the natural or induced genetic variability of types of plants or animals. In the third place, it is necessary to make even more effort in the sphere of crop protection through the development of certain techniques, or biological or integrated control.

The fourth line of research is the more intensive and unquestionably promising use of micro-organic potential. Another line of research is the use of biomass through the phenomenon known as bio-conversion. Other points also seem to me essential for the future of agriculture. It is the more general study of what I would call systems : Biological systems, farming systems.

Finally, a last point : we rarely think that the imparting of information, the science of information is likely to revolutionise the practice of agriculture.

First the physical milieu. A better use of climatic elements is fundamental for agriculture, even initially simply for a more rational use of fertilizers. When one has a thorough knowledge of the soil and one knows the type of crop to be introduced, and this is presently the case in many countries, data processing can help adapt a fertilizer plan to a specific type of production according to the climatic elements of a region. The definition of the water balance for the essential problems of cultivation or improvement require, of course, a better knowledge of the climatic elements in the agricultural area. The same is true of studies of the potential of agricultural zones which show what one might describe as the crop vocation of regions.

Improvements in order to try to eliminate excess water or to give additional water (permanent or

occasional irrigation) can only be accomplished if more and more precise knowledge is gained on the substrata where the agricultural activity is to be found. In this respect extremely modern techniques can play an important role in helping farmers or those responsible for making improvements. Remote sensing for example will certainly in time permit better weather forecasting. We foresee a European meteorology programme, for everyone knows the importance of accurate weather forecasts, 5 or 6 days ahead. It is clear that the farmer of tomorrow who will have to sow, plough, spread fertilizer, or apply plant protection treatments will work better with a better knowledge of the climatic conditions forecasted for the medium term, and of the physiological functions of crops as well. Under certain conditions one will know when an optimal water-economising irrigation could be started to meet the physiological needs of the crops. Climatic accidents will be better foreseen, thus better controlled as well as yield forecasts through remote sensing. These are some examples concerning the physical milieu.

The second point, which in my view is fundamental, is *genetic variability*, natural or induced. This implies first of all a thorough *knowledge of the physiological functioning of plants and animals*, and biology has made considerable progress in these spheres. One of the first subjects to be examined is what I call the *management of natural genetic resources*. Many opinions have been expressed on this matter. Much is often spoken of gene banks, and of resource banks. It is clear that we have to be able to protect these natural genetic resources but this area of stocks of genetic capital seems in my view to be a little static. It is therefore necessary to adapt programmes of selection to these natural resources, permanently improving them. We have to know how to manage these natural resources. I would suggest the term *dynamic management* to describe what the geneticists call the *source population*, in other words the evolutive populations where they will look for the genes which will be necessary to develop the biological material of such and such a crop.

The second element, sophisticated *genetic techniques, molecular biology*, has advanced considerably these last few years and, in many countries, completely new techniques are being developed which no longer correspond to the schemes of selection, and classic improvement of cultivated varieties, which have been used to great profit. Well, I think all this will continue to develop.

The use of *anther plant called Haploides* will, after a certain diploidation, enable the acceleration of the process of genetic improvement. The physiologists and the geneticists also use more and more *protoplast cultivation* in their work. These protoplasts, as you know, are somatic plant cells which have been taken out of their cellulose envelope and are subjected to genetic manipulation. They are likely to have a considerable impact in the genetic field of tomorrow, in the creation of new varieties, new hybrids for example. At present, molecular biology has provided an explanation in certain spheres of the phenomena concerning what I would call *cytoplasmic heredity*. It is clear for example that the characteristic "*male sterility*" which is used in plant production to make hybrids, has a cytoplasmic

composition. These results are fundamental for the future. We can think of more developed use of cross-breeding between species. Thus work was carried out in certain countries on rye and wheat hybrids with high yields - one can in this case try to blend the yield level of wheat with the resistance and hardness characteristic of rye which thus results in a completely new variety which can be used in more marginal areas, less fertile than those in which wheat is presently cultivated.

In future, the work of geneticists will undoubtedly permit a background of genetic resistance to biological material which can be made available to farmers. A new type of wheat which has a substantial resistance to the main diseases has been created by taking the genes of the same family from Asia Minor, of a wild grass called "*Aegilops ventricosus*" which is extremely hardy in dealing with numerous fungae-type diseases. I think this return in genetics in force will result in forms of general resistance to a certain number of diseases which affect certain crops. This is true for certain animal breeds which are disappearing. Although I am not in favour of the folklorical continuation of all breeds existing on the planet, only those which have practically no potential use in the future should be allowed to disappear. Animal breeds which are particularly resistant for example to parasites and are necessary for genetic improvement programmes should not be allowed to disappear. I also think regarding the exploitation of genetic variability more notice should be given to the problems of consumption brought up earlier; more emphasis should be placed on objectives of selection concerning quality. We are now able, through the *techniques of electrophoresis* to identify food quality varieties and the physico-medical components of quality. Hence the possibility of making cereals rich in such and such a type of protein example. At present, we are capable of producing varieties of maize which have 20 g more protein per kg. The fact that maize is the cereal which is most used for farm animals demonstrates that savings in complementary proteins which can be made with these varieties. Some researchers have found varieties with a high lysin content, the amino acid essential for animal feed. Nor have we exploited all the resources of plants rich in protein : there are varieties of beans and varieties of field beans, which can provide when manipulated correctly considerable opportunity for development and perfection. In short, more precise knowledge about the biological material and its more and more reasoned use to meet the needs in agriculture in future certainly opens up considerable possibilities. We already know of a microbe which causes disease — a sort of plant cancer — which is capable of genetically transforming plant cells, in other words of transmitting to them definitively new genetic information. Many geneticists work in this sphere. There will probably be a Nobel prize for the laboratory which is the first to discover, by controlled genetic manipulation, the possibility of fixing atmospheric nitrogen by cereals. This is unlikely to happen before the year 2000 but I am sure that genius of men is such that we will finally resolve this problem.

In the livestock sector, we have known for several years how to control **animal reproduction** and obtain, as often as we want, the time of coming on heat of females; the use of frozen sperm has enabled

geneticists to create *real genetic prototypes* with a considerable economic impact in zones where artificial insemination is used. Only recently a new possibility has been opened up through the use of egg transplant. We first thought that thanks to super ovulation we could considerably increase the number of calves by cow and by year presently only one a year. However, this technique appears inapplicable because of the considerable variation in the response of the female. Excellent females for example, which can provide many fertile eggs are used together with sperm from the best bulls for example, which give very high quality embryo. We now know how to obtain them and we are beginning to try to keep them at a low temperature. This, by the way, should make it possible to resolve the problem of gene banks and of the conservation of animal breeds for which we are less well armed than for plants. Techniques are beginning to appear by which we might perhaps be able to choose the sex of the calves. This should help to solve one of the most worrying economic problems : that as suckling cows, whose productivity is greatly inferior to that of milk cows.

Milk productivity has been considerably increased but I am convinced we can make even greater progress. I would go as far as to say that from the genetic point of view the increase in yield per cow will be even more sensational than that obtained from cereals. To pass, however, from a cow which gives one calf per year to a *receiver cow conditioned to carry two embryos of the same sex and preferably male* (when for beef, since the male grows faster) - these are techniques which are likely to completely upset the present figures on suckling flocks.

In the sphere of plants one thing which is well known is the **multiplication of plants in tubes**. You can either take a fragment of leaf tissue or a terminal bud of a plant or a cultivar and one is thus able to reconstitute a whole plant. The ability to multiply plants in tubes increases by at least 1000 the possibilities of reproduction for certain plants, by producing healthy material free from all disease and completely identical. We also know how to regenerate strawberries, raspberries, roses, carnations, root-stocks of fruit trees, etc. free of all disease. A carnation cutting put in a culture tube on the 1st of January in a laboratory is capable within a year to give two million individuals identical to the initial model. In traditional zones of cultivation, the carnation is grown in a uniform way. This results in problems of soil fatigue or the accumulation of fungus in the soil which means that the production something which is likely to have considerable repercussions from now until the end of the century.

As far as **plant protection** is concerned, I think it useful to say that we should study more deeply the problem of *host parasite*. To know when a disease starts, know how the plant can defend itself, is one of the bases which has led to the principles of the biological control. Epidemiological forecasts based on a better meteorological knowledge are an essential tool for the protection of plants. As an example, last year in June the climate was hot and humid and colza suffered a very rapid attack from fungal parasites. It could have been possible to foresee this

three or four days in advance, which would have enabled farmers to treat it effectively while in fact as a result of the massive invasion most of them lost up to 60 % of their yield 15 days before the harvest. This is an example which shows that in future we could arm ourselves in advance against such accidents. I will not therefore dwell on the protection of plants.

Let us pass to micro-organisms. This is, in my view, an important subject. I think, in fact, agriculture will have to draw on all fundamental and applied knowledge discovered during the last few years in the sphere of molecular biology and the biology of microbes or micro-organisms. Much progress has been made in the sphere of molecular biology based on *Escherichia Coli* which was the model for all studies of molecular biologists.

However, it is to be regretted that the transfer of knowledge to other types of bacteria has been insufficient, particularly with regards to soil bacteria. Agriculture knows quite well what goes on above the soil but very little of what goes on underneath. Soil biology is something which seems to me fundamental at the level of nitrogen fixative microbes for example : many teams in the world want to perfect these small genetic tools - *rhizobiums* and other microbes capable of having the same properties. It is clear that, in this sphere, genetic studies are of fundamental interest because we can introduce a specific gene into a microbe which enables it to create a given protein. This is what was done for example by introducing a gene responsible for the synthesis of insulin in certain microbes or what could be done with the micro-organisms capable of fixing nitrogen. But of course it is not only the genetics of these micro-organisms which must be studied but also the minute process of nitrogen fixation at plant level and the ecology of these micro-organisms : indeed when these marvellous genetic prototypes which will fix nitrogen have been obtained it is still necessary to introduce them into the soil where they will be in competition with the wild natural populations. Will they triumph, survive ? Here are two fields of research of fundamental study for the future. Microbes will certainly be of much use in agri-food development. A microbe is capable of producing an enzyme, which can make a converted product from an agricultural product by modifying the structure of certain basic molecules. This is what enables technologists to speak sometimes of the use of biological reactors, in other words so called fixed microbes, particularly membranes. Here are still more examples : it can be envisaged that by genetic manipulation of microbes we can make certain factors called "releasing factors" capable of setting off production of the hormones important for the physiology of our farm animals. Another example of a veterinary type : nothing stops us from imagining that we could introduce a gene responsible for making a viral anti-gene in a microbe and could make "synthetic" vaccines. This would be a new possibility of making vaccines against virus diseases. These microbes can also serve to transform by-products to digest cellulose, to make methane from cellulose waste, to make proteins from micro-organisms which are themselves growing on different supports. This type of mushroom is capable of growing on glucid substrates and to make dry matter containing 50 % proteins. Certain fibrous mushrooms are also capable of mixing with the roots of plants and playing a role in

the mineral nutrition of these plants by rendering certain mineral elements assimilable in difficult soil.

The annual world production of biomass corresponds to the energetic value of about 10/15 thermal units resulting from the phenomenon of photosynthesis on the surface of the globe. It is also estimated that the use of fossil energy represents only 10 % of this annual production. It is estimated that if 1 % of this annual production was used for food, one could feed about 8 billion people. In view of this I think that the study of the photosynthetic yield of plants should be allotted an important role. Under the best conditions a plant only uses 1 % of solar energy and even then only extremely active plants. Thus, one can imagine, with geneticists and the scientific support of the physiologists that the photosynthetic yield of plant populations could be increased. Some have spoken of *composite plant identikits*, and of plant biotypes which could absorb the maximum of solar energy to make all the plants more productive. Here, once again are openings which in the future would enable us to increase the biomass produced from our plants. Furthermore it should be recognized that for twenty years the geneticists have worked hard on cereals. It is estimated that the photosynthetic yield accumulated in the form of potential energy in the grains have been doubled in twenty years and that the part of straw in relation to grain has declined considerably and has now stabilised at around 50 % grain, 50 % straw.

Plant material can thus vary from the point of view of its *energy capacity*. Here again it is necessary to study their *bio-energy yields*.

Comparisons between plants enables one to make some strategic reflections. Maize, for example, is it not a plant which is too expensive from an energy point of view in certain countries and under certain conditions of Western Europe ? It often requires considerable quantities of nitrogenous fertilizer, some additional irrigation and drying of grains after harvesting.

In terms of global energy maize is likely to be less profitable unless other genetic paths are found to produce an earlier variety with an extended distribution, sown earlier and harvested earlier, with lower water needs; at the moment straw cereals, whose yields we wish to increase for use as forage, could compete with maize.

As far as *energy type plants* are concerned, I think we must avoid being too romantic. It is clear that the biomass will play an important role, but the biomass can only be used if concentrated geographically, yet it is spread over large surfaces : if the harvest of the biomass in energy terms costs more than its use, the quantity of biomass in fact used is practically much lower than the theoretical figures. We can, I think, imagine the existence of energy type plants but substantial efforts must be made in this sphere. There is talk of *short rotation coppices* : cane from Provence for example is capable of producing 20 to 30 tons of dry matter/hectare. There is talk of the use of the *water hyacinth* which gives 100 to 120 tons of dry matter in quite hot water in Florida. Studies have been made on euphorbias rich in cyclic hydrocarbon. All those are subjects which must be studied. I also

think that in the sphere of biomass and bioconversion attempts should be made to find possibilities of using high production of transformable starch, perhaps in alcohol, which would give interesting possibilities as far as energy is concerned. For starch the race for maximum tonnage per hectare is very important. We are seeing the resurgence of new ideas like the Jerusalem artichoke. I fear that in these spheres, there will be much sparkling initiative but little steady follow-up of the work or good research, examining in detail the economic and practical consequences.

I would like to add one or two words about the **systems of production**. I am one of those who think that the systems of production are too uniform as is the case for example of milk cows. If we continue in the same way the *milk cow* will become *monogasttric*. In other words it will never eat grass in its life but manioc imported from SE Asia and soya cake or imported concentrates from other countries. This is a kind of industrialisation which goes against the rational exploitation of natural resources. Let us leave our cows the fresh grass of our pastures apart from giving them the minimum of concentrates necessary. Most of these concentrates can be produced on the farm itself through the cultivation of proteins or leguminous-grasses. We have forgotten the virtues of the leguminosae which fix nitrogen from the air. Yet, up to now the ideal has been to plant temporary meadows based on forage grasses which require for example 500 units of nitrogen/hectare, in other words a ton of oil per hectare. Under present conditions, these procedures must be abandoned and must be replaced in the more general context of which I dealt earlier. In contrast, *to use natural resources implies reasoning and more creative intelligence in the conception of more difficult agricultural systems*.

Unfortunately little research has been carried out on **alternative agricultural systems** which have been developed in European countries. Imagine an agriculture with a relatively low gross income/hectare but a net income close to the gross income, in other words one which *uses few inputs*. This seems to me an intelligent path for the future, for the use of all our natural resources. Much progress must be made in this domain but we have not imagined them, for these systems are more difficult to control because of the greater risks involved, often situated in the most unproductive physical milieux. In order to

succeed, the young must also be particularly well trained for this type of farming and must have sufficient land at their disposal. Some fifteen or twenty years ago the European Federation of Animal Production studied the problems of *transhumance*: this means the possibility of having winter forage in a favoured zone and of exploiting at a high altitude natural resources which would otherwise be wasted. I think that the *spatio-temporal complementarity of our land* will necessitate more reflection on the technical, economic and social future of our agricultural world.

A final word on what I would like to call the science of information. I am certain that *communication and micro-processing* will play an important and predominant role if only because of the isolated farmer will in the future have at his disposal more detailed information to enable him to make better decisions. I imagine him rising in the morning pressing the television button to have the weather information for the week to come. This will enable him to direct the work of cultivation. I also well imagine him having acquired a mini-computer costing about 10 000 FF — farmers generally are used to paying 100 000 for their tractors — and, with this tool, managing his land, his herd and his budgetary and financial resources and his development plan. He must have maximum access to figures, to the data bank and I think that all this will be possible with the transmission of information, with the science of information which is being created; this latter will definitely provide an important tool for the farmer of tomorrow.

To conclude, do not imagine that following this speech, in which I tried to present a number of salient points, all agriculture's problems will be resolved. The forecasts I have made, even if they appear exaggerated, correspond I am sure to serious scientific examination of the potentiality of all laboratories. I see a considerable advantage in the massive introduction of biology into farming systems. This will enable agricultural development models to be suggested to developing countries, for their agriculture. If we provide them with biological techniques perhaps we will be able, in this way, to change for the better, even so the so-called developed countries should not be miserly with their technological knowledge and that they prove their immense and indispensable generosity by sharing their discoveries with the developing countries and training the people of these nations.

International Biological Science Community within the framework of the I.U.B.S

by Dr. Talal YOUNES, Executive Secretary - I.U.B.S.

The International Union of Biological Sciences (IUBS), founded in 1919, received the general enthusiasm that accompanied all international activities at the end of the first world war. It assembled most of the European scientists active in the field of a new and appealing discipline dealing with "the search of the conditions and causes of the major manifestations of the life on the cell, individual and species levels", according to the definition given to Biology by Y. Deleages, first elected President of IUBS (1919-1922).

Through IUBS, biologists were aiming at initiating and organizing the cooperation of different countries in the field of scientific research — establishment of research laboratories accessible to students of all nationalities, publication of the results of the research, elaboration of new topics of discussion, etc. Sixty years later, biological research has developed tremendously, growing into diversified major disciplines : Botany, Zoology, Microbiology, Cellular Biology, Ecology, Biochemistry and Biophysics and the applied disciplines connected to Biology; Agricultural and Medical Sciences did the same. Consequently, most biologists are inclined to identify themselves as botanists, zoologists, microbiologists, ecologists, biochemists, biophysicists, rather than as mere biologists.

However, recent advances in Biological Sciences have underlined and confirmed the unity of Biology and of biological processes. Since 1919, and despite the existence on the international scene of many international bio-unions, members of ICSU family, IUBS, the mother-organization is playing a decisive part in initiating, facilitating and coordinating biological sciences and scientific activities at an international level, promoting the organization of international conferences and assisting in the publication of their results.

In order to fulfill these aims, the Union must have close and strong links with the world's biological science community which constitutes the IUBS potential if it wants to play a leading role in the field of international Biology, in both developed and developing countries.

The charts on page 14-17 show the structure of the international biological science community within the framework of IUBS, forming a comprehensive international biological network.

It is mainly based on the answers to a questionnaire sent by the IUBS secretariat prior to a meeting of the Ad Hoc Committee of Review, on the 5th of December 1979. A decision was taken at the XXth IUBS General assembly, at Helsinki in 1979, to set up this Committee to examine the functions, responsibilities and activities of the Union, its relations with international and national organizations affiliated to it, and to recommend changes in its structures and activities.

The Secretariat received a very good response from the IUBS Commissions, Sections and Divisions; by their prompt answers they indicated that the scientific members are fully aware of the necessity and urgency for IUBS to fulfill its stated goals and objectives, and manifested their willingness to help the Union by becoming still more involved in its activities.

International Biological Science Community

The IUBS is operating within and acting on behalf of a very large and diversified worldwide scientific community. The minimum estimate of the number of biologists involved in the Union's activities is about 170,000. They work in the varied fields of Microbiology, Environmental Biology, Systematic and Evolutionary Biology, Molecular and Cellular Biology, and in inter-and-multidisciplinary fields such as Biometry, Biological Education, History of Science and Culture Collections.

The international biological science community is one of the largest scientific communities in the world. Therefore, it constitutes a very high potential to the Union enabling it to play a leading role in the development of biological sciences so as to help improve the conditions of life for human beings all over the world.

The IUBS represents, through its scientific members gathered in international scientific associations, the real and deep concerns of the world's biological scientists. The governing bodies of these associations are for the most part elected by their members on a periodical basis. The periodicity of elections, which is 2 to 3 years for the majority of the IUBS scientific members, ensures that the Union always reflects the actual and essential interests and trends in the world of biology.

The IUBS Support to scientific meetings

A brief list of the scientific meetings supported by the IUBS since 1978 indicates the wide range of subjects treated :

- Annual European Photomorphogenesis Symposium.

1978

- International Congress on Science and Cultivation of Edible Fungi.
- Symposium on Molecular and Cellular Models of Aging.
- Symposium on Cell Motility.
- Annual Symposium on Photomorphogenesis.
- 1st International Conference on Aerobiology.
- Meeting of the Committee for Taxonomy of Viruses.
- Meeting of the Committee for Enteric Phage Typing.
- 4th European Meeting for Bacteria Transformation and Transfection.
- 2nd International Congress of Ecology.
- 12th International Congress of Microbiology (Mycology Section).
- 4th International Congress of Myriapodology.

1979

- Symposium on Reproduction in Flowering Plants.
- 3rd International Conference on Ephemeroptera.
- Chemosystematics, principle and practice.
- Symposium on genome organization and expression in plants.
- 8th International Congress on Photobiology.

- Meeting of the Ad Hoc Committee on Approved List of Bacterial Names.
- EIS 4th International Coelenterate Conference.
- 2nd International Symposium on Microbial Ecology.
- 21st Congress of International Association of Limnology.

1980

- 11th International Symposium on Food Microbiology and Hygiene.
- 5th International Symposium on yeasts.
- 2nd International Symposium on Avian Endocrinology.
- 8th International Congress of Arachnology.
- 7th International Malacological Congress.
- 5th Palynological Conference.
- International Meeting of the federation of European Societies of Plant Physiology.
- 5th Congress of Parasitology.

These meetings constitute an effective means of publicizing the latest research studies in biological sciences. They show evidence of the increasing scientific activities of the Union which is corroborated by the notable increase in IUBS subventions to its scientific activities and meetings.

— US \$ 23,650	in	1977
— US \$ 28,000	in	1978
— US \$ 40,300	in	1979
— US \$ 68,475	in	1980 Budget

International Biological Science Activities

The most general and common activity of the international biological associations is to promote biological studies and research through the exchange of ideas and the discussion of scientific findings and results at international, regional and national meetings. Most of them organize conferences, congresses, symposia and workshops.

Another important activity, although not so widespread, is cooperative research through common projects and working groups, the organization of training courses and provision of international consultancy.

The Union plays a very important role in providing financial assistance to scientific activities orga-

nized by the scientific members who rely totally or partially on IUBS support for their functioning.

The following charts should be considered as a short and brief survey of the very diversified and widely spread international biological science community, within the framework of IUBS. It is only meant to give highlights of the different components of the Union from the point of view of the international scientific members, i.e. international scientific associations affiliated to the IUBS. The questionnaire has been sent only to them and not to the national members of the Union. This preliminary survey should be completed by more accurate information on the perspectives, new trends and fields of activities of the different scientific members of the Union at both national and international level.

International Union of Biological Sciences

Inter/Multi-disciplinary Commissions

N.B. * Data non available

Replies from 3/7

Name of Sections and Commissions (1)	Number of Affiliated Societies (2)	Total Membership (3)	Governing Body (4)	Periodicity of Meetings (5)	Activities (6)	Source of Finance (7)	Communication Channels (8)
Biological Education	1	25	Elected	Once a year	Publications-Research, Training courses	IUBS-UNESCO	Newsletter and Individuals
Culture Collections	10	250	Elected	Every 4 years	Meetings, training courses, publications	Fees, grants and contracts	Newsletter
Microbial Ecology	*	*	Elected	Every 2-3 years	International Symposia cosponsor publication	IUBS	Meetings

Division of Botany and Mycology

N.B. * Data non available

Replies from 16/18

Name of Sections and Commissions (1)	Number of Affiliated Societies (2)	Total Membership (3)	Governing Body (4)	Periodicity of Meetings (5)	Activities (6)	Source of Finance (7)	Communication Channels (8)
Algology	1	900	Elected	Every 3 years	Publications, symposia	Dues, sale of publications	Journals Correspondence
Bee Botany	*	134	Elected	Once a year	Symposia, publications	Fees, IUBS	*
Botanical Gardens	0	*	Nominated and elected	Every 6 years	Congress, symposia, Direction of Botanical Gardens	IUBS grants	Very little Communication
General Botany	*	*	*	*	*	*	*
General Mycology	21	15000	Elected	Every 6 years	Congresses, Nomenclature Workshops	Fees	Circulars, Meetings
Horticultural Sciences	0	17000	Nominated by Countries	Every 2 years	Congresses, Symposia, Publications	Fees and sales of publications	Meetings
Nomenclature of Plants	0	19	Elected	Every 6 years	Coordination of Nomenclature activities	No independent finances	*
Paleobotany	2	1150	Elected	Every 2 or 3 years	Congresses, publications	Fees, IUBS	Newsletter
Palynology	20	2287	Elected	Every 6 months Congress every 4 to 5 years	Conference, symposia Publications	Fees, IUBS and parent institutions	Meetings and newsletter
Plant Growth Substances	*	340	Elected	Every 3 years	Congress	Fees	None
Plant Pathology	38	11500	Nominated Societies/ Elected	Every 5 years	Congresses, symposia, publications, problem-oriented research	Fees, IUBS Sale of Newsletter	Meetings Newsletter
Plant Physiology	27	5000	Elected	Once a year	Congress, symposia, Workshop	Fees	Newsletter
Plant Protection Congresses	21	21 representing (2)	Elected	Every 4 years	Coordination of plant protection congresses	No financing	Individual
Plant taxonomy	3	2500	Elected	Every 6 years	Publications, symposia Nomenclature organisation	Dues	Individual
Seed Technology	200	*	Elected	Twice every 3 years	Congresses, symposia, publications, training courses	Fees, sale of Publications	Correspondence newsletter
Succulent Plants	0	140	Election Nomination	Every year	Congress, symposia, publications	Fees and IUBS	Individual

Division of Cell and Developmental Sciences

N.B. * Data non available

Replies from 7/8

Name of Sections and Commissions (1)	Number of Affiliated Societies (2)	Total Membership (3)	Governing Body (4)	Periodicity of Meetings (5)	Activities (6)	Source of Finance (7)	Communication Channels (8)
Cell Biology	12	8000	Nominated by Societies	Every 4 years	International Coordination, congresses and publications	Subscriptions	Newsletter Correspondence
Developmental Biology	0	800	Elected	Every 4 years	Congress and workshops	Grants and fees	Circulars
Genetics	35	22500	Elected	Every 5 years	Congresses, symposia, workshops	Grants and fees	Circulars
Histo and Cyto-chemistry	17	3400	Elected	Every 1-2 years	Congresses, workshops publications	Annual dues	Meetings and Correspondence
Photobiology	10	2500	Elected	Once a year	Congress and workshop	Fees and IUBS contributions	Correspondence and personal visits
Radiobiology	13	3250	Elected	Every 2 years	Congresses	Fees	Meetings
Senescence Research	3	2500	Elected	Twice a year	Congresses, workshops research training	Grants (private and governmental)	Meetings and journals
Skin biology	*	*	*	*	*	*	*

Division of Environmental Biology

N.B. * Data non available

Replies from 8/8

Name of Sections and Commissions (1)	Number of Affiliated Societies (2)	Total Membership (3)	Governing Body (4)	Periodicity of Meetings (5)	Activities (6)	Source of Finance (7)	Communication Channels (8)
Aerobiology	6	300	Elected	Once a year	Congresses, working group, publication of a newsletter	Fees	Newsletter, Correspondence, Individual working group
Biological Control	4	335	Elected	Every 4 years	Publications, symposia workshops	Annual contribution	Network of Research Inst.
Ecology	20	10000	Elected	Every 4 years	Congress		Newsletter, meetings
Human Biology	6	304	Elected	Once a year	Congress, publications	Fees, IUBS	Meetings and Individuals
Limnology	1	3100	Elected	Every 3 years	Congress, workshops publications	Fees	Annual Circular National meetings
Oceanography	1	77	Elected	Every 5-6 years	Publications, symposia, workshops	IUBS	Correspondence newsletter meetings
Vegetation Science	*	500	Elected	Every year	Meetings, excursions	Fees	*
Small scale vegetation mapping	no formal	* no formal	Elected	Personnel relations	*	None	Individual

Division of Microbiology

N.B. * Data non available

Replies from 10/13

Name of Sections and Commissions (1)	Number of Affiliated Societies (2)	Total Membership (3)	Governing Body (4)	Periodicity of Meetings (5)	Activities (6)	Source of Finances (7)	Communication Channels (8)
Bacteriology	68	50000	Elected	Every 4 years	Congresses, publications	IUBS/IAMS	Newsletters Correspondence
Biological Standardisation	0	500	Elected	Every 4 years	Congress, symposia	Fees	Casual
Econ. and Applied Microbiology	26	27 represent. (2)	Elected	Once every 1-2 years	Symposia, training course, publications	Grants, IAMS	Meetings Correspondence
Food Microbiology and Hygiene	25	*	Elected	Every 2-3 years	Symposia, workshops, publications	Fees, IUBS	Meetings
Microbiol. Genetics	*	22	Election and Nomination	Every 4 years	Stimulating activities	IUBS, IAMS	Casual
Microbiol and Immunol. doc.	54	*	Elected	Irregularly	Publications, workshops	IAMS	Newsletter
Microbiological specif. for foods	3	23	Elected	Once a year	Workshops, publications	IUBS, WHO, Governments	Reports individuals
Systematic Bacteriology	32	306	Elected	Every 4 years	Congresses, judicial and taxonomic subcommittees Nomenclature and publications	Grants IUBS/IAMS	*
Taxonomy of viruses	*	120	Elected	Every 3-4 years	Nomenclature, publications	IUBS, IAMS, WHO	*
Yeast and Yeast-like microorg.	*	44	Elected	Once a year	Congress and symposia	*	No contact

Division of Zoology

N.B. * Data non available

Replies from 16/20

Name of Sections and Commissions (1)	Number of Affiliated Societies (2)	Total Membership (3)	Governing Body (4)	Periodicity of Meetings (5)	Activities (6)	Source of Finances (7)	Communication Channels (8)
Arachnology	5	750	Elected	Every 3 years	Congresses, publications documentation, coordination of research	Fees	Correspondence
Bryozoology	*	250	Elected	Every 3 years	Conference, publications	IUBS fees	Circulars
Comparative Endocrinology	0	700	Elected	Every 2 years	Conference	Subscriptions	No formal contact
Dev. and Comp. Immunology	5	800	*	*	Meetings	Dues	Journal
Entomology	15	*	Elected/ nominated	Twice every 4 years	Congresses, clearing house proceedings	Sales of proceedings, fees	Correspondence
Invertebrate Pathology	0	700	Elected	Once a year	Meetings, publications	Dues, IUBS Governments	Meetings, Newsletters
Invertebrate survey	0	40	Elected	Every 2 years	Symposia, workshop, publications	IUBS national members	Individual
Malacology	*	206	Elected	Every 3 years	Congresses, publications	Fees, government	Meetings
Mammology	26	3185	Elected	*	Congresses, publications workshops	Grants, government	Meetings, journal

Division of Zoology (Cont')

N.B. * Data non available

Replies from 16/20

Name of Sections and Commissions (1)	Number of Affiliated Societies (2)	Total Membership (3)	Governing Body (4)	Periodicity of Meetings (5)	Activities (6)	Source of Finances (7)	Communication Channels (8)
Ornithology	48	121	Elected/ Nominated	Every 4 years	Congresses, publications	Governments IUBS, fees	Correspondence
Palaeozoology	20	8000	Elected	Every 4 years	Symposia, publications	Fees, IUBS, IUGS	Meetings, Publications
Primatology	3	750	Elected	Every 2 years	Congresses, publications	Dues	Meetings, newsletters.
Protozoology	6	2000	Elected/ Nominated	Every 2 years	Congresses, symposia, workshops, publications	Fees	Correspondence
Social Insects	0	400	Elected	Every 1-2 years	Congresses, symposia, publications	Grants subscriptions	Journals circulars meetings
General Zoology	0	400	Elected	Every 3 years	Meetings, publications	Fees, subscription	Individuals
Zoological Nomenclature	0	*	Elected	Every 3 years	Nomenclature	IUBS	*

The IUBS Ad-Hoc Committee of Review

The XXth General Assembly of IUBS, Helsinki 1979, decided to appoint an Ad Hoc Committee of Review to examine and report upon the functions, responsibilities and activities of the Union, its relations with international and national organizations affiliated with IUBS and, in consultation and with the assistance of ICSU, on possible functional links with other biological unions with a view toward considering and recommending appropriate changes in the structure and the activities of IUBS which may seem opportune.

The following persons have been selected to

serve the Ad Hoc Committee of Review.

Sir Otto Frankel (Chairman), Professor Nils Oker-Blom, Professor Otto Solbrig, Dr. Satya N. Kakar, Dr. S.G. Vassetsky, Professor J. Guern, Dr. M.G.P. Stoker (Members) and Professor E. Ayensu, Secretary General IUBS (Ex-officio).

The first Meeting of the Ad Hoc Committee took place on March 10-11, 1980 at the Royal Society in London (UK).

The final interim report will be submitted to the IUBS Executive Committee Meeting in October 1980.

Professional Herbal Medicine

by Prof. E.S. AYENSU, Secretary General - IUBS

Since many public health administrators are beginning to concede the fact that traditional medicine has a role to play in formal health delivery systems, particularly in countries in Asia, Africa and Latin America, attempts have been made by individuals and organizations to compile lists of plants reported in various pharmacopoeias.

An initial review of published and unpublished documents on this subject by the IUBS Committee on Medicinal Plants has revealed that there is often very little assurance that the plants named in the pharmacopoeia are indeed those which were intended to be recorded. Instances have occurred where the taxonomy and nomenclature is so loose that phytochemists are led to collect the wrong plants for investigation. Problems such as these have led to discrepancies in the reported constituents of plants believed to contain various alkaloids and glucosides, which could be connected if the correct names are firmly fixed with labels to the plants being studied.

The Committee on Medicinal Plants of the IUBS which met early in May of this year, has recommended a series of points which, when followed, will upgrade our current knowledge of plants of traditional medicine, their uses and chemical constituents.

Among the major recommendations of the Committee were the need to obtain (a) Correct documentation of species names in publications on medicinal plants and products since such information is fundamental, and requires the participation of competent taxonomic botanists in formulating lists of medicinal plants. All collections of plant material for pharmacological studies should include adequately labelled voucher specimens to be deposited in reputable public and private herbaria. (b) Information on medicinal plants from all available literature such as pharmacopoeias, books and plant lists. An indication of the wealth of data available from labels on herbarium specimens alone has been given by Siri von Reis Altschul, in "Exploring the Herbarium",

Scientific American 236(5) : 96-104 (1977). (c) Coordinate medicinal plant research among the various botanical and agricultural and chemical organizations currently engaged in such work, and to compile a list of such organizations and their fields of interest. (d) Screening and testing methods employed by various pharmaceutical organizations, and the information made available to a wider audience through liaison with the WHO. (e) Clinical data on the effects of many plant medicines on man before the old generation of traditional practitioners are lost to mankind.

The IUBS intends to organize a network of suitably located herbaria and specialists from plant taxonomic research institutes that are interested in studies of medicinal plants, and to secure adequate deposition of voucher specimens having full botanical and ecological documentation. A comprehensive bibliography of literature containing data on medicinal plants is also being organized. The cooperation of all interested botanists will be most welcome to these programmes.

The Traditional Medicine Programme of the WHO has under production a publication on the uses of traditional medicine in the overall health services of its Member states, in which the current depletion of medicinal and potential medicinal plants, some particularly vulnerable to extinction in nature, as well as folk knowledge about them, will be among the topics addressed.

The recent involvement of the WHO in helping to elevate the standards of traditional medicine as an augmentation of modern medicine, as part of the Organization's attempt to improve the world's health delivery system by the turn of the century, makes it clearly timely for the projected re-evaluation of basic information already accumulated on medicinal plants to begin in earnest, and to pave the way for much more precision to be accorded to interviews with herbal practitioners, phytochemical analyses, and data bases for medicinal plants.

Models for Behaviour of Nitrogen in Soil and Uptake by Plants

Crop yields throughout the world are often severely restricted by lack of nitrogen. This results partly from the high cost of increasing nitrogen levels in soil and partly from the difficulty in forecasting how to adjust rates of nitrogen fertilizer to differences in crops and soils. A hundred years of field experiments have resulted in considerable progress but serious difficulties remain. They stem from the critical dependence of the results of such experiments on the weather and on the impracticality of trials on more than a few of the possible combinations of crops, soil and weather. It is therefore necessary to extrapolate from the results to a wider range of conditions which inevitably lead to much error and inadequate advice on the choice of practice.

Development of mathematical simulation models was the answer of scientist to requests of modern society for reliable extrapolations of fertilizer requirements, food production and ecological consequences. Progress in model development is undoubtedly hindered by difficulties in communication. Models span many disciplines, are often complex, inherently difficult to understand and are seldom described in the scientific literature in sufficient detail to be helpful to other workers. The net result is that there is a range of apparently different nitrogen models purporting to do the same thing : some of them have reached the state of experimental testing.

Some of the differences may result from different

concepts for particular processes, e.g. immobilization and mineralization of nitrogen may be described with the emphasis on the role of the biomass or on using C/N quotients, and partly from environmental differences which allow different approximations. Uptake by plants may be considered mainly as a physical-chemical process or as a biologically controlled process, some programmes are focused on the effects of a single event (denitrification after heavy rainfall), and others may describe the decay of soil organic matter which involves periods of 10 or more years.

The Institute for Atomic Sciences in Agriculture (ITAL) at Wageningen (Netherlands) organized an International meeting of scientists who have modelled different aspects of the nitrogen cycle. It was held from 28 January to 1 February 1980 and was supported by IUBS-UNESCO, SCOPE and the Dutch Ministry of Agriculture.

A book — *Simulation of Nitrogen Behaviour in Soil-Plant Systems* edited by M.J. Frissel and J.A. Veen — will bring together the results of this work. It will contain a chapter describing the reports of the four panels, another summarizing the features of the models and another describing each of the models in greater detail. It will be published by Pudoc POB 4 Wageningen, The Netherlands.

UNESCO Support of Biology in Latinoamerica

Between March 17-20, 1980 a group of Latinoamerican biologists met at the Instituto Venezolano de Investigaciones Cientificas (IVIC) in Caracas, Venezuela. Such a meeting was sponsored by the Regional Office of Science and Technology for Latinoamerica (ROSTLAC) and the Latinoamerican Center for Biological Sciences (CLAB) both depending from UNESCO. During this meeting some of the activities of UNESCO for the promotion of Biological Sciences in this subcontinent were reviewed.

Dr. Guillermo Whitembury, director of CLAB, mentioned that since 1972 two meetings and eight international postgraduate courses were given at IVIC. Such courses trained some 150 young investigators from South America and the Caribbean region.

Dr. Jorge Allende, coordinator of the Regional program of postgraduate training in biological sciences (PNUD/UNESCO/RLA 79/204) reported that during 1979, 34 binational or trinational projects of scientific research were sponsored by PNUD/UNESCO. A total of 180,000 dollars were used for

equipment and travel by 70 laboratories of 8 countries in South America.

Future activities include : a) travel aids for scientific interchange within the region, b) organization of Colloquia under the name of Dr. Bernardo Houssay to discuss definite themes in Biology, c) organization of Scientific Symposia.

During the meeting Dr. E. De Robertis, president of IUBS described the aims and activities of this Union and expressed the hope that more Latinoamerican countries would affiliate to IUBS.

The main result of this meeting at IVIC was a proposition about Orientation, Content and Methodology in the Teaching of Biology at the pregraduate level in Latinoamerica. This program comprises an initiation cycle, one of formation in Biology and a third cycle with different orientations.

This plan of study that has many interesting new features may be obtained from D. Gustavo Malek, Director of ROSTLAC (Casilla de Correo 859, Montevideo, Uruguay).

Space Biology : Report of the Working Group V XXII Meeting of the ICSU Committee on Space Research (COSPAR)

by Prof. E.B. SHULZHENKO - IUBS Representative to COSPAR

Gravitational biology constituting a part of space biology and medicine comprises systematic studies in ground-based experiments, aboard biosatellites, and in real manned missions. The studies assure continuous accumulation of the data concerning physiological, biochemical, structural and morphological responses of living beings that may help advance a general theory of the biological role of gravity. The results obtained contribute to further development of countermeasures against adverse effects of gravity exposures.

Panel sessions of Working Group V were devoted to gravitational biology and planetary biology (organic molecules in outer space, early biological evolution, etc.). The distribution of papers was as follows : 10 papers discussing problems of gravitational biology (USSR - 4, USA - 1, France - 3, Poland - 1, Rumania - 1) and 19 papers concerning problems of planetary biology (USSR - 1, USA - 16, India - 2).

In regard to gravitational biology, the Soviet specialists presented a paper on biological studies aboard the Salyut-6-Soyuz station (E.N. Vaulina et al. "Development of higher fungi in weightlessness"; V.A. Kordyum et al. "*Clorella* growth under the influence of space flight factors", "Cell growth and structure of *Proteus vulgaris* in weightlessness"). The 8-day fungal experiment gave evidence that under the conditions of weightlessness and artificial illumination 35 fruit bodies that were at different developmental stages and were light oriented were formed; in the absence of illumination no fruit bodies developed; on return of the mycelium to 1 g normal, fruit bodies were formed.

The Soviet-Czechoslovakian experiment *Chlorella-1* (strain LARG-1) demonstrated that during the 5-day flight algal cultures developed in the same manner as on the Earth. Weightlessness exposure

did not lead to significant changes in the cell genetic structure. The experiment showed a flight-induced decrease in metabolic activity of growing cells. Upon return to the Earth, these cells exhibited an increased sensitivity to environmental changes. Therefore, readaptation to 1 g should proceed under most favourable conditions.

In the 4-day space flight the growth and morphological characteristics of *Proteus vulgaris* remained essentially unchanged. At the same time the electron microscopy study of the cell ultrastructure showed an increase in the number of outgrowths of the cell membrane and spiral formations of the lysosome type in the cytoplasm.

The French papers by M. Berbaer et al. "Somatogenic effects in *Nicotiana tabacum* found post-flight" and by J. Proust et al. "recombination changes in *Drosophila melanogaster* induced by balloon flights" presented the experimental data from a 22-day flight of the biosatellite Cosmos-936 (Experiment Bioblock-2) and from 8- and 22-hour balloon flights. The space flight effects were shown to induce changes in the development of *Nicotiana Tabacum* seedlings and, what is more important, in the genetic structure controlling chlorophyll synthesis. Balloon flights produced similar effects that were, however, less pronounced.

The American scientists showed particular interest toward closed ecological systems. The US pertinent investigations are concentrated on the physico-chemical methods of ethanol production and subsequent microbial transformation of methanol into protein.

There was a number of papers discussing organic molecules in the interstellar space, comets, meteorites and planetary atmospheres. A hypothesis of the formation of the primary Earth atmosphere from carbon and other constituents of comets was put

forth. The modern methods of studying outer space with the aid of space vehicles and high precision devices made it possible to investigate the space structure in detail and to detect there many inorganic and organic compounds. The total number of the compounds identified by the present time is 53; they are atoms, molecules, free radicals, etc. They are characterized by discrete distribution. However, the zones of discrete distribution occupy large areas with masses exceeding the solar mass by several orders of magnitude.

Codata Directory - Bioscience Chapters

The Committee on Data for Science and Technology (CODATA) of the International Council of Scientific Unions (ICSU) is currently preparing its international *Directory of Data Sources for Science and Technology*, for a large number of disciplines in the physical bio and geo-sciences. The CODATA Directory is presently published in the CODATA Bulletin as separate chapters devoted to a given scientific field.

At present, three chapters of the CODATA Directory have already been published : Crystallography, Hydrology and Astronomy. Others are currently in preparation in various fields of the physical sciences (Atomic and Molecular Spectroscopy, Thermodynamics, Chemical kinetics...) of the geosciences (Geodesy, Seismology,...) and of the biosciences (Zoology, Botany, Nutrition, etc.).

The goal of the Codata Directory is to provide precise information on data activities and related projects in all fields of science. It is a world-wide project which is currently being prepared by experts concerned with data collection, compilation, evaluation and dissemination for their specific field of interest.

Each chapter is prepared under the scientific editorship of an expert in the field who acts as chapter

editor and collects information on existing data projects — international, national and local — and on specialized publications, drawing upon the expertise of scientists from the same discipline and the assistance of scientific organisations and data centers.

During this task, the chapter editor works closely with members of CODATA, members of the concerned Scientific Union, and he receives permanent assistance from the CODATA Secretariat.

A first survey of data activities in *Biosciences* was made recently by Dr. Philip L. Altman, from the Federation of American Societies for Experimental Biology. Dr. Altman has collected an important amount of informative material which is already edited.

A Chapter devoted to Zoology will be published shortly but other fields need to be completed : Botany, and other sections relevant to IUBS. Dr. Altman has kindly offered to provide collected material to any specialist willing to act as chapter editor for these sections.

Any interested person should contact the IUBS Secretariat which is supporting this project and is working closely with the CODATA Secretariat on this matter.

Biosciences at the Seventh International Codata Conference

The Seventh International CODATA Conference is scheduled for October 8-11, 1980 at the Kyoto International Conference Hall, Kyoto, Japan, at the invitation of the Science Council of Japan, the Chemical Society of Japan and the Japan Society for CODATA.

The scope of the Conference under the general title "Role of Data in a Dynamic World" will range from the role of data in basic scientific research to applications focusing on major problems facing society. Some of the aspects which will receive special emphasis are : Formation of new scientific concepts and solution of problems using existing data; needs for new, evaluated data to test new working hypotheses; critical evaluation of data; and promotion of data reliability in scientific applications.

The accent of the Conference this year will be on biological data, and an entire day has been organized on the theme "data collection which has contributed to the formation of new ideas" by Professor Gutfreund of the University of Bristol, Medical School, who is also Chairman of the CODATA advisory panel on the biosciences.

Fifteen papers on the subject will be presented and

eleven biological poster presentations will be discussed.

Among the subjects dealt with, we note the following :

- Data of Evolutionary Heritage, M. Kimura, Japan.
- Data Analysis from Cell Separation, T. Jovin, FRG.
- Higher Order Activities of Biological Systems, K. Sato, Japan.
- Development of Conservational and Direct Programming in Ergodata, Biometric Data Bank, A. Coblentz, France.
- The Automation of Human Fertility Analysis, G. Bar Or and I. Paz, Israel.
- Construction of Numerical Description of Groups of Microbes from Binary Data, C.A. Walczak, U.S.A.

Registration forms for the Conference are available from :

Dr. Y. Mashiko
c/o Japan Society for
CODATA
Dai-ichi Kanamori Building
1-5-31 Yushima
Bunkyo-ku, Tokyo, 113 Japan

Financial Statements of IUBS for the year 1979

Statement I. Balance sheet on December 31, 1979 (in US Dollars).

ASSETS

Cash and Banks

Petty Cash in Fr. Fr	47
The Chase Manhattan Bank-Frankfurt/Main in US \$	113 296
The Chase Manhattan Bank-Paris in US \$	8 959
The Chase Manhattan Bank-Paris in Fr. Fr.	6 093
Amro Bank Utrecht in Dutch Guilders	4 677

Other Assets

Marketable Securities	17 884
Other receivables	1 850
Loans	8 000

\$ 160 806

Less : Liabilities

Sundry Creditors	10 568	10 568
		\$ 150 238

Statement II. Income and expenditure accounts for the year ended December 31, 1979 (in US Dollars).

1. Income

ICSU Subvention	16 000
UNESCO grants for Scientific Meetings	11 750
Contribution from National Members	158 870
Interests and Dividends	8 267
Gain on Exchange	1 714
Other income	1 044

\$ 197 645

2. Expenditure

A. Scientific Activities

General Assembly and Executive Committee Meeting	28 344
Officer's Meeting	7 875
Representation at Meetings	4 176
Grants to Scientific Meetings	23 002
Grants to Scientific Members	14 400
Contribution to other Scientific Organizations	3 992
Publications	3 054

\$ 84 843

B. Administrative Expenses

Offices of the President and Secretary-General	1 000
Salaries	56 831
Related Charges	28 612
General Office expenses	9 015

95 458

C. Other

Bank charges	481
Audit fees	2 641
Other expenses	534

3 656

183 957

Excess of income over expenditure	13 688
Accumulated Balance brought forward	136 550
Accumulated Balance carried forward	

150 238

Executive Committee Meeting 1980

The 1980 Executive Committee meeting of IUBS will take place in Paris from 28 to 29 October 1980 to conduct the affairs of the Union as provide in Article 10 b of the Statutes.

In order to inform the Executive Committee of the recent work of the Union, the Secretaries of all Divisions, Sections and Commissions are kindly requested to prepare a brief *summary of the activities* of their Divisions, Sections or Commissions since their 1979 report to the XX General Assembly, and to send it to the IUBS Secretariat at the latest by 1 September 1980. These report summaries will serve to prepare the annual Report of the Secretary General to the Executive Committee.

At its meeting the Executive Committee will examine Subvention requests for 1981. It is recalled that all subventions should be formally requested whether for Congresses or Symposia on special forms available from the Secretariat or for the scientific activities of Divisions,

Sections and Commissions by letter, giving all details on their financial situation and their action programme.

All requests should be sent to the Secretariat as soon as possible and at the latest by 1 August 1980. These requests have to be forwarded to the members of the Subventions Committee in advance of the Executive Committee meeting. Therefore any requests which do not reach the Secretariat by the deadline of 1 August 1980 will not be taken into consideration.

Attention is drawn to the recommendation of the last IUBS General Assembly to give priority to subvention requests for interdisciplinary projects and programmes of value to developing countries.

Under the provisions of Articles 8 and 9 of the Union's By-Laws, National Committees and Scientific member bodies may send a representative as an observer *at their own expense*. Such representatives have no voting rights, but they are welcome to participate in discussions.

International Organization for Succulent Plant Study

The XVIth Congress of IOS was held in Mexico, March 23-30 and at that Congress the following members were elected as Officers and members of the Board of Directors :

President : Mr. John DONALD

41 Mill Road, North Lancing.
West Sussex, BN15 0PZ, England.

Vice-President : Prof. Dr. Werner RAUH

Institut für Systematische Botanik und Pflanzengeographie der Universität
Im Neuenheimer Feld 280, 6900 Heidelberg
GERMANY

Secretary : Mr. Lloyd BRINSON

127 Brook Street
San Carlos
California 94070 USA

Assistant Secretary : Dr. Heimo FRIEDRICH

Osteracker 38, A-6162 Natters, Austria

Members of the Board of Directors :

Dr. Heidrun HARTMAN *

Institut für Allgemeine Botanik, Jungiustr. 6-8
D-2000 Hamburg, GERMANY (BRD)

Mr. David R. HUNT

Royal Botanic Gardens - Kew
Richmond, Surrey TW9 3AB England

Mr. Marcel KROENLEIN

Jardin Exotique, P.O. Box 105.
Monte-Carlo - Monaco

Mr. Hernando SANCHEZ-MEJORADE
Alpes 1174, Mexico 10, D.F. Mexico

* Liaison Officier to IUBS.

Renewal of the administration and part of the council of the International Association of Human Biologists (IAHB)

President : P.T. BAKER

Present Position and address : Professor, Department of Anthropology, The Pennsylvania State University, University Park, Pennsylvania 16802, USA.

Secretary General : Derek F. ROBERTS

Present position and address : Head, Department of Human Genetics, University of Newcastle Upon Tyne, 19 Claremont Place, Newcastle Upon Tyne NE2 4AA, England.

Representatives

Africa : R. CABANNES (Abidjan, Ivory Coast)

Southern India :

M.R. CHAKRAVARTTI (Ranchi, India)

Eastern Asia :

N. FUJIKI (Kasugai, Japan)

Eastern and Central Europe :

P. RUDAN (Zagreb, Yugoslavia)

Western and Southern Europe :

C.F.J. SUZANNE (Brussels, Belgium)

North America :

F.E. JOHNSTON (Philadelphia, Pennsylvania)

Latin America and the Caribbean :

R. LISKE (Mexico City, Mexico)

Union of Soviet Socialist Republics :

A.A. ABASKULIEV (Baku, USSR)

PUBLICATIONS REVIEW

PROCEEDINGS OF THE IUBS XX GENERAL ASSEMBLY

Helsinki (Finland) 20-25 August 1979 Serie A No 20
Published by the IUBS, 1980.

This volume is based on the reports of the General Assembly, the National Members and the Union's Divisions, Sections and Commissions.

It contains 17 resolutions covering the different fields of interest of the biological sciences community, mainly the conservation of natural resources, endangered species, genetic resources, increasing productivity, medicinal plants, taxonomic, nomenclatorial systems, international biological network.

BIOLOGICAL EDUCATION NEWSLETTER Nos 3 and 4

Two new issues of the Biological Education Newsletter have been published by the IUBS Commission for Biological Education.

Edited by Professor A. Badran, Yarmouk University, Irbid (Jordan). The number 3 covers the biological education news of publications, seminars, meetings and reports in various areas of biological education. The number 4 is directed mainly to report on the second meeting on Biological Education for Community Development held at the University of Kiel, Federal Republic of Germany, during the period of 2-6 November 1979.

ENVIRONMENTAL EDUCATION IN THE LIGHT OF THE TBILISSI CONFERENCE

Published by UNESCO, 1980.

This 108 page paper-bound book includes the declaration and recommendation of the Intergovernmental Conference on Environmental Education held in Tbilissi, USSR, October 1977, as well as chapters on Education and the challenge of environmental problems, and on goals and characteristics of environmental education. It shows the strategies and modalities for its incorporation into the educational process and international cooperation.

For more information, write Environmental Education Programme, UNESCO, 7 place de Fontenoy, 75007 Paris, France.

WORLD CONSERVATION STRATEGY

Published in 1980.

Prepared by the IUCN, with the advice, cooperation and financial support of UNEP and WWF, in collaboration with UNESCO and FAO. It is assembled as a kit, containing the following brochures: Preamble and guide, Executive summary world conservation strategy and map section.

For more information, write IUCN, 1196 Gland, Switzerland.

ARCTIC AND TROPICAL ARBOVIRUSES

The Proceedings of the Second International Sym-

posium on Arctic Arboviruses, held at Mont Gabriel (Canada) on 26-28 May 1977, were edited by E. Kurstack and published by the Academy Press, New York 1979. (327 p.).

The title was chosen to designate the geographical scope of the epidemiological problem of arbovirus infections in man and animals. Several chapters are devoted to the recent investigations on arboviruses in the northern regions and their vectors, mosquitoes and ticks, as well as the detection in the North of arboviruses originally isolated in South. Included is an analysis of the etiological agent of a possible arbovirus, the rapid diagnosis of arboviruses, and the description of in vitro culture methods for arboviruses using arthropod cells.

This volume will be a useful tool for all concerned with viral diseases, virologists, ecologists and epidemiologists.

GENOME ORGANIZATION AND EXPRESSION IN PLANTS

This volume is based on the contributions given by the speakers invited to the NATO Advanced Study Institute Course held in Edinburgh, Scotland (UK), 11-21 July 1979.

Edited by C.J. Leaver, vol. 29 (618 pp.) 1980 Plenum Press New York (price US \$ 59.50 - US \$ 71.50 outside U.S.A.).

Subjects covered include most areas of plant molecular biology, especially the organization and transcription of the nuclear genome, cloning and analysis of plant DNA, hormonal and environmental regulations of genome expression, organization and expression of chloroplasts and mitochondrial genome, nitrogen fixation, Ti plasmid of *Agrobacterium tumefaciens*, structure and expression of viral genomes and viroids and practical techniques for plant molecular biologists.

This book will be of interest to researchers from a wide variety of biological disciplines, including molecular biology, biochemistry, genetics, plant physiology, plant virology, plant breeding and cell biology.

PROCEEDINGS OF THE FIRST INTERNATIONAL CONFERENCE ON AEROBIOLOGY

Munich (FRG) 13-15 August, 1978.

Edited by the Federal Environmental Agency and the International Association for Aerobiology Published by Erich Schmidt Verlag, Berlin (471 pp.).

Beginning with an overview of the aerobiology, its status and prospects and the importance of aerobiological findings for the diagnostic in clinical allergy, this volume contains the papers presented at the four symposia organized at this conference. It deals with pollen and seeds, spores, insects and mites.

☐ **Genome Organization and Expression in Plants**

edited by **C.J. Leaver**

This volume addresses genome organization and expression in plants, as elucidated by the latest techniques available in molecular biology and genetic engineering. *NATO Advanced Study Institutes Series, Series A: Life Sciences, Volume 29*. 618 pp., 1980, \$59.50 (\$71.40/£37.49 outside US)

☐ **Handbook of Legumes of World Economic Importance**

by **James A. Duke**

This timely volume fills the need for a concise source of detailed information on nearly 150 economically important species of legumes. approx. 350 pp., illus., 1980, \$45.00 (\$54.00/£28.35 outside US)

☐ **The Biosaline Concept**

An Approach to the Utilization of Underexploited Resources

edited by **Alexander Hollaender, James C. Aller, Emanuel Epstein, Anthony San Pietro, and Oskar R. Zaborsky**

This volume explores the food and fuel production potential of various high-salinity environments, including arid and semiarid land areas, open oceans and bodies of brackish water, and land exposed to irrigation for prolonged periods of time. *Environmental Science Research, Volume 14*. 400 pp., 1979, \$39.50 (\$47.40/£24.89 outside US)

☐ **Introduction to Ethology**

by **Klaus Immelmann**

translated by **Erich Klinghammer**

This textbook offers both the specialist and layman an incisive and systematic survey of the theoretical basis of comparative ethology. Taking a "biological" approach, the author looks at animal behavior patterns as adaptations to specific ecological conditions. approx. 300 pp., illus., 1980, \$22.50 (\$27.00/£14.18 outside US)

Text adoption price for orders of 6 or more copies: \$13.95

☐ **Comparative Biology and Evolutionary Relationships of Tree Shrews**

edited by **W. Patrick Luckett**

This new work evaluates the possible evolutionary relationships of tree shrews to primates and other eutherian mammals, and considers the use of tree shrews as models for the study of various primate organ systems. A volume in *Advances in Primatology*. approx. 325 pp., 1980, \$39.50 (\$47.40/£24.89 outside US)

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MYRIAPOD BIOLOGY

Edited by Marina Camatini, Institute of Zoology, Univ. of Milan (Italy)
448 pp. \$ 66.50.

This book presents the findings of the Fourth International Congress of Myriapodology, held at Gargnano, Italy in September 1978. With a multi-disciplinary approach, this book not only describes the current state of knowledge on Myriapoda, but also brings together the findings of researchers long devoted to evolutionary and cytogenetic problems of Arthropoda as they relate to the myriapods. As such it will be especially informative for anyone involved in this particular branch of zoology.

INTEGRATED CONTROL IN CEREALS "APHID ECOLOGY"

West Palearctic Regional Section Bulletin of the IUBS Section of Biological Control 1980. (110 pp.).

This Bulletin reports on the activities of the working group on integrated control in cereals, dealing with ecology of cereal aphids and the use of *Entomophora* species in controlling its populations.

MATURITY STANDARDS FOR FRUITS

WPRS Bulletin of the IUBS section on Biological Control, 1980
(99 pp.).

The issue presents the results of the meeting of the Commission of the Valorisation of Integrated Production 23-24 August, 1979 (Aix-en-Provence, France). It deals with fruit testing, sampling and labelling methods and with pesticides in the oriented-integrated control.

INTEGRATED CONTROL IN BRASSICA CROP

WPRS Bulletin, published by the Section of Biological control-IUBS, 1980.
(145 pp.).

This Bulletin reports on the activities of the working group on integrated control in Brassica crop since 1972, its past assessments, new trapping methods, host-parasite relationship, and economic threshold of *Hylemia brassicae*.

ATLAS PROVISOIRE DES INSECTES DE BELGIQUE

Notes Fauniques de Gembloux no. 4 1980, Gembloux (Belgium)
(144 pp.).

Edited by the "Equipe Faunique de Gembloux" of the IUBS Commission on Invertebrate Survey.

This issue contains the complet analysis, in 1600 maps, of the Insect Atlas in Belgium, and the first established list of endangered insect species of the Belgian fauna.

European Life Science Editors Association (Else)

The European Life Science Editors Association (ELSE), admitted as a Commission to IUBS at the General Assembly in Helsinki last year, was founded in 1967 with the object of improving the effectiveness and efficiency of communication in the biological sciences. Its members are editors of serial and other publications in the biological sciences and individuals responsible for editing or managing such publications. The Association is European-based but about one-fifth of its membership comes from Australia, the Americas, South Africa and Japan. About one-third of the members are editors of medically-oriented journals.

Between the triennial General Assemblies the Association organizes Workshops, usually with other bodies (British Medical Journal, Ciba Foundation, Editerra) on special topics, e.g. typesetting and printing techniques,

standards and style, editing conference proceedings, the treatment of references, and relations between primary and secondary journals.

A Newsletter entitled *Earth & Life Science Editing* is published twice a year jointly with Editerra, ELSE's sister association in the geological sciences. The Newsletter reports on meetings, publishes book reviews, announces new developments and forthcoming events, calls attention to books and articles of interest to members, and in general aims to keep readers abreast of activities in the world of scientific editing and publishing, and assist editors with the intellectual and practical problems of producing journals, conference proceedings and other books.

The annual subscription to ELSE is 40 Swiss Francs. Membership enquiries to the Secretary, Miss Nancy Morris, PO Box 33, Farnham, Surrey GU10 3JX, UK.