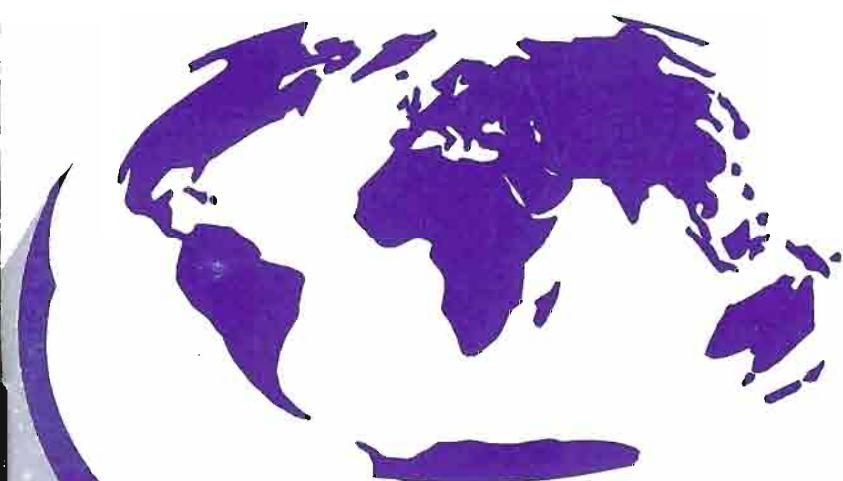


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Editor's Note

The basic feature of the IUBS Scientific Programme lies within its multidisciplinary character, which reflects the wide range of biological disciplines and in turn, the broad scope of biologists' concerns.

A prominent example to this is provided by the proposal for a collaborative programme of research on "Comparative Studies on Tropical Mountain Ecosystems", published as a "*Special Issue N° 8*" and the paper included in this issue of *Biology International* on "Agricultural Change and Genetic Erosion in the Andes", by S.B. Brush, which deals with one of the major problems to be faced in these areas.

Similarly, in order to cover the broad and diverse nature of the IUBS components, *Biology International* will continue to provide information on its constituent bodies. The present issue includes summary information on the Union's Section of Radiobiology and Commissions for Algology, Environmental Mutagens, Primatology, Reticuloendothelial Societies, Social Insects, and Systematic and Evolutionary Biology. We hope future issues will cover not only other international organizations affiliated to the Union, but also national institutions active and concerned with global co-operation in the field of biological sciences.

Agricultural Change and Genetic Erosion in the Andes

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Introduction

Just as climatic and biotic changes occur with regularity over altitudinal gradients in mountain environments, so also does human land-use change. Studies of agriculture in mountainous regions show regular variation in crop and animal distributions corresponding to environmental changes, and in social and economic features such as land tenure, agricultural management, and land-use intensity (Brush, et al., 1976; Rhoades and Thompson, 1975; Guillet, 1983). These socioeconomic changes result from biological factors relating to production and from social, cultural and economic factors such as population distribution, market development, and the presence of distinct ethnic groups. Mountainous areas are important to social scientists because of the pattern of distinct ethnic groups there and because of their important role in cultural evolution. These areas are associated with the invention of agriculture and with the rise of some early civilizations. Just as mountains are important for their biotic diversity, they are also important for their cultural diversity. This cultural diversity is manifested in many ways (Beaver and Purrington, 1984), but it is especially clear in traditional agricultural systems found in tropical mountains. This paper reports on a project underway in the Peruvian Andes to study changes in agriculture and how they affect the great diversity of crop germ plasm that is located there. The study takes advantage of the fact that the Andes are a region where agriculture was invented and evolved independently over several millennia. One result of this long evolution is a profusion of different crops and crop varieties. Another result is a system of land control and land-use that exploits the complex mountain environment in an efficient manner.

Andean Agriculture

Agriculture was independently invented in only a few regions around the world (Harlan, 1976). These were originally recognized by the existence of genetic diversity and subsequently better defined by archaeological and botanical research. Among tropical mountain regions, the

central Andes stand out as major center of agricultural invention and crop genetic diversity. Although numerous crops were domesticated and/or developed in the central Andes, tuber bearing *Solanum* (potatoes) are of particular importance. The potato is the major staple of the Andean population, and it is the one crop that has become a major worldwide crop. Andean farmers continue to produce a very wide variety of potatoes (Brush et al., 1981). Seven species are grown in the region, and many households maintain inventories of twenty or more distinct varieties. Within the Andean regions, some 5,000 individual varieties are recognized. Besides diversity in potatoes, the Andes is also a center of genetic diversity for maize (*Zea mays*) and for a number of more minor crops (Gade, 1975). Unlike potatoes, maize is not native to the Andes but arrived as a cultivar in prehistoric times and was independently developed into a great number of varieties. The diversity of potato and maize in the Andes is a product of both the physical diversity and isolating factors of the region and of the long development period of each crop there.

Although the potato is the major Andean staple, most farm populations in the region rely on a variety of crops and animal products. Villages and individual households traditionally lay claim to several production zones where different crops are grown and animals raised. Four production zones are generally recognized in the central Andes: 1) a tropical zone below 1 500 m altitude where coca (*Erythroxylon coca*), manioc (*Manihot utilissima*) and sweet potatoes (*Ipomoea batatas*) are important; 2) an inter-Andean valley zone between 1 500 and 3 000 m where maize (*Zea mays*), beans (*Phaseolus* spp.) and squashes (*Cucurbita maxima*) are found; 3) a high valley zone between 3 000 and 4 000 m where tubers, especially potatoes (*Solanum* spp.), oca (*Oxalis* *tuberosa*) and mashua (*Tropaeolum tuberosum*), and Andean chenopods (*quinoa* and *canihua*) and European barley (*Hordeum*, spp.) are cultivated; and 4) a high altitude pasture zone where native Andean camelids (*Llama glama*, etc.) are raised along with introduced stock. Apart from these major zones and crops, most farming systems recognize minor variations and grow a much wider variety of native and introduced species. The tuber

zone, for instance, is subdivided into two sections: a lower one where non-bitter varieties are cultivated and a higher one where frost-resistant, bitter varieties are grown. The bitter varieties must be processed into freeze-dried *chuno* before they can be eaten. This agriculture is complimented by extensive collecting of wild flora for food, medicine, construction and dyeing. These zones are not only recognizable by the crops and animals produced therein but also by different rules of land tenure and land-use, by different agronomic technologies (terracing, irrigation), and by the relative intensity of land-use. Some production zones are characterized by communal ownership and open access (e.g. pasture zones). In others (e.g. tuber zones), the community regulates land-use by setting the agricultural calendar and determining a complex sectoral fallow system. In others, individual ownership and management prevails, along with land-use intensity with such practices as irrigation systems and production for market.

Central Andean agriculture is thus characterized by genetic diversity in the major crops (potatoes and maize), by technological diversity and by agricultural management diversity. These three types of diversity are interrelated and may be understood as adaptive responses by the Andean population to its environment. Factors that contribute to agricultural diversity derive from the steep environmental gradient produced by altitude and its effects on rainfall, temperature, drainage, soils, and evapotranspiration ratios, from isolating mechanisms, and from the long period of agricultural evolution in the region. The amount of land available in any one production zone and for any one crop is limited, and crops are often grown close to their environmental limits, especially moisture and temperature. The long period of crop evolution has generated a large number of pests and pathogens in association with the major crops.

An agricultural response to these stresses has been to diversify the subsistence base, both in terms of numbers of cultivars and in terms of collecting wild plants. Crop diversity appear to be one strategy for successfully competing in this complex co-evolutionary system (Glass and Thurston, 1978). Other diversifying responses have been to promote genetic diversity within important crops (maize and potatoes) and to fragment land holdings into numerous, dispersed plots. Communal organization has facilitated this strategy of agricultural diversity through the control of Andean valley systems with different production zones and by regulating the production system so that numerous crops can be cultivated. Communities control the sectoral fallow system in tuber zones; they regulate the agricultural calendar; and they manage irrigation systems that increase arable

land in the dry, inter-Andean valleys. Potato agriculture depends on the regular exchange of seed tubers between altitudinal levels. Potato seed is moved from higher zones where aphid infestation and subsequent virus infection is lower. Apart from agricultural strategies that rely on diversity in crops, varieties, fields, and technology, communities and households depend on interzonal exchange. In some cases, this exchange appears to derive from limited production in any one zone (Thomas, 1976; Brush, 1977), while in others it may be explained as a more efficient use of available labor (Golte, 1980). In any case, exchange between agricultural zones depends on access to pastures where pack animals can be kept and to a system of roads, trails, and bridges. Community management is a vital part of the smooth functioning of these various exchanges between altitudinal zones.

Agricultural Change

Anthropologists and other social scientists have identified a number of factors and stresses that encourage change away from the diversity that is traditionally part of Andean agriculture. These factors include demographic changes, changing expectations, the growth of urban food demands and the penetration of roads and markets into isolated mountain areas. The main thrust of these changes is to move traditional Andean agriculture away from its diverse base toward one that is more productive and commercially viable. The most notable changes in the demise of traditional agriculture are: 1) a decrease in the number of different plant species cultivated, 2) a decrease in the number of cultivars of major crops, 3) a shortening of fallow, 4) replacing communal management by individual management, 5) the use of purchased subsidies (seeds, fertilizers, insecticides, herbicides, etc.), and 6) an increased reliance of off-farm income. The first two changes may be described as the process of *genetic erosion and the others as intensification*. All are related and occur in conjunction with each other.

The Andes provide an excellent and challenging place to study these two processes that affect both biological and human resources. The biological resource is crop germ plasm while the human resources are the knowledge and management skills that have been developed over several millenia of agricultural evolution in this difficult region. The study of genetic erosion and intensification demands that the researcher consider questions of the environment and questions relating to development and modernization. In order to study these processes, a three year project is now underway in the Peruvian Andes focusing on changing patterns of maize

and potato agriculture. This study is led by Drs. Stephen Brush and Enrique Mayer and is supported by the National Science Foundation of the United States. This project builds upon earlier research by the same investigators in the region (Brush, et al., 1981; Mayer and Fonseca, 1979). The objectives of this research are to 1) describe the distribution of traditional and improved crop varieties of maize and potatoes in the Andes, 2) describe the system of land management associated with each crop, and 3) analyze changes in land-use and the selection of crop varieties. The research aims at describing agricultural change by looking specifically at the diffusion of new types of maize and potatoes and at the maintenance of traditional varieties.

This research will take place along the eastern slopes of the Andes between 1984 and 1987. It will emphasize research among small farmers, the region's most typical type of farm. Three transects will be studied. These transects have been selected because of their ecological and agricultural similarities. The transects that will be studied run from the upper limit of potato cultivation, approximately 400 m, to the lower limit of maize cultivation, at approximately 1 500 m. The land along each transect is controlled by different communities and many households. These vary according to their reliance on traditional technology and by the degree to which they are integrated into the regional and nation-

al commodity market systems. Comparative analysis between households and communities will allow the researchers to establish the socio-economic context of the diffusion and adoption of new crop varieties.

The central Andes is typical of many regions of the world where traditional agriculture has been the object of development efforts for several decades. Crop improvement programs have bred and released new varieties of maize and potatoes into the region, and rural development programs have promoted the use of purchased inputs to increase production. Land reform, road and market development, growing urban demand, and increased off-farm employment have changed the context in which crop variety selection is made. In some parts of the Andes, and among some farm segments, the traditional farming system has given way to commercial agriculture based on purchased inputs. This change, however, is very uneven, and large sections of the Andes retain more traditional methods. The determinants of this uneven development are poorly understood, as is the extent of the change that has occurred. This current project on maize and potato agriculture should help resolve both of these problems in scientific knowledge concerning agricultural change. In accomplishing this, the case study in central Peru will permit better development planning to serve the interests of farmers and the conservation of important biological resources.

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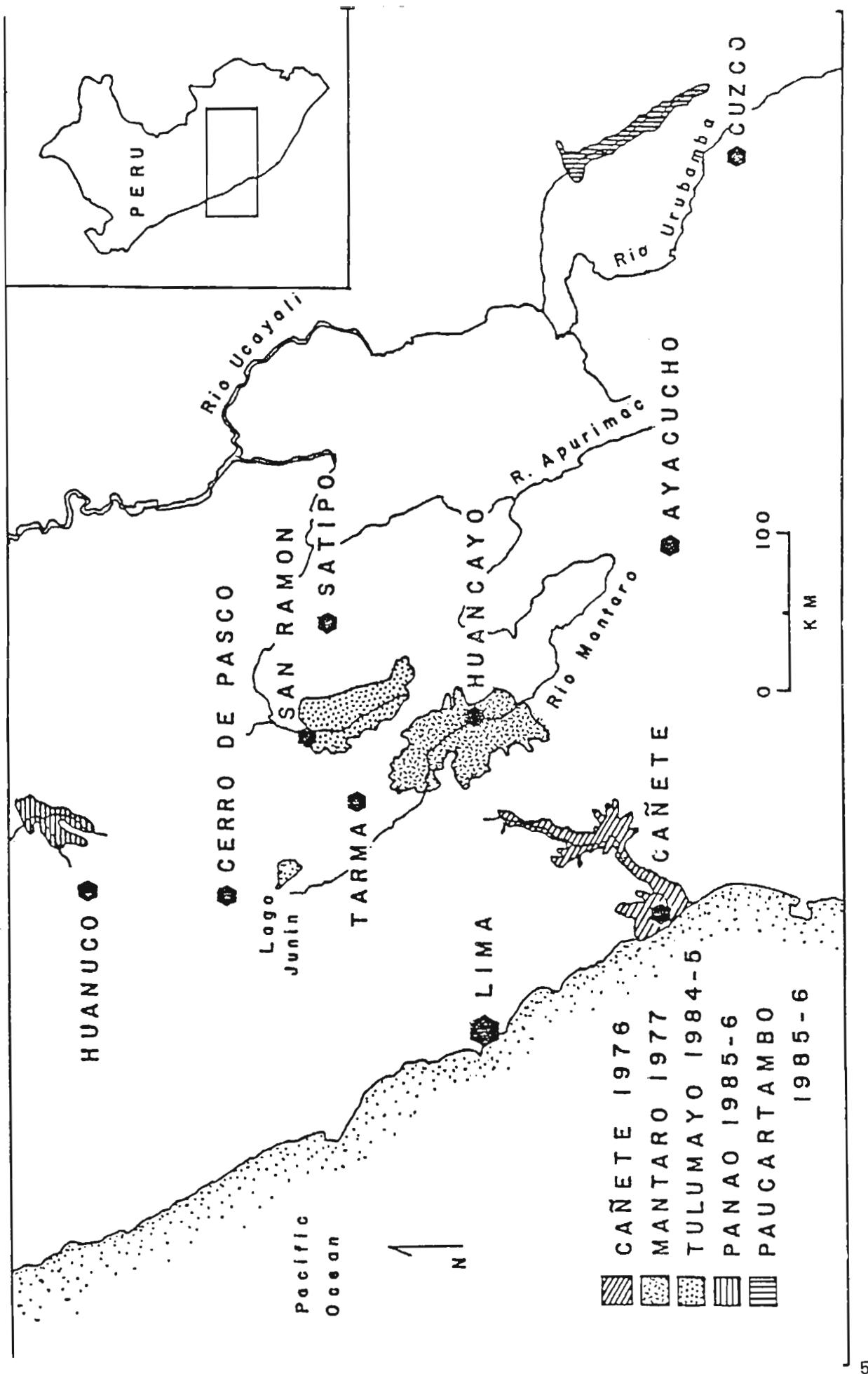
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Biological and Genetic Consequences of Nuclear Explosions

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The ionizing radiation resulting from nuclear explosions will cause a variety of somatic and genetic damage to the natural populations and communities. Somatic effects are usually manifested during the first generation while genetic effects may be observed in the course of many generations. The exposure to radiation will disturb the existing equilibrium in ecological systems: the heavy radiational damage to the microbial, animal and plant populations within a natural community will induce a process of extremely complex changes based on the opposite effects of the damage and repair processes.

Quantitatively, the genetic damage to populations (point mutations, changes in the structure or number of chromosomes, etc.) is a strict function of the radiation dose. It is generally believed that the magnitude of genetic effects increases linearly with increasing the dose (1). We have demonstrated that in cases when the absorbed dose is a function of dose rate (which is true for nuclear explosions), the dose-effect relationship for one-hit genetic changes can be represented by an exponential function equation (2).

Almost all of the induced mutations will be in some way harmful for the population, the degree of harm depending on how long a mutation is retained and how detrimental for viability it is. The genetic damage is an integral parameter including the products of all mutation types and their relative viabilities. The radiational genetic damage is the induced genetic burden in a population expressed in a series of consecutive generations under particular ecological conditions.

The whole picture of genetic and ecological changes irradiated communities for different dose rates may be presented in the form of a generalized scheme (Fig. 1). The range of dose rates for explosion-induced irradiation of natural communities is anticipated to cover 9 orders of magnitude. At relatively low dose rates (between 10^{-6} and 10^{-4} Gy/day) the genetic effects, depending on the organism, the test used and the environmental conditions, may be observed irregularly. At higher dose rates the effects become clearly manifest.

Chronic irradiation causes a gradual increase of mutability in the course of several generations

until a stationary (equilibrium) level is reached. As is estimated by the UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the equilibrium level of mutability in chronically irradiated human populations should be 7-10 times that observed in the first irradiated generation (1). Chronically irradiated natural populations of different species were also shown to display a growth of genetic effects with time, which may result in irreversible changes not at once but after a few generations (3,4).

Elimination of susceptible species may take place at dose rates as low as 10^{-2} Gy/day. At higher dose rates the degree of damage to the community will gradually increase (Fig. 1). These generalized data may be compared with the results obtained by American investigators (5,6). While our experiments were focused on genetic effects, the main emphasis in the above-cited studies was made on general radiosensitivity of species. The comparison suggests that genetic effects are manifest at dose rates a few orders of magnitude lower those causing lethality.

Chronic irradiation resulting from nuclear explosions will bring about gross changes in biocenosis structure, such as an overall biomass reduction and replacement of the leading species. The magnitude and scope of these rearrangements will depend on the dose rate and on how it changes with time. The rearrangements will be accompanied by induction of various mutations by the radiation, the majority of which will reduce the population's fitness. Some of these mutations will contribute to a better adaptation of the population to the new environmental conditions, and its radioresistance will increase. In chronically irradiated microbial and plant populations, for example, the radioresistance was shown to increase 2-3-fold after a number of generations (7,8). The selection for radioresistant varieties in populations irradiated in the course of several years is observed beginning with the dose rate of $5 \cdot 10^{-4}$ Gy/day and higher. The higher radioresistance of the varieties is associated with a more effective repair of the damage. Along with the direct selection for radioresistant mutants, the populations can adapt themselves to chronic irradiation by means of other mechanisms, by ecological radioadaptation, in particular (9).

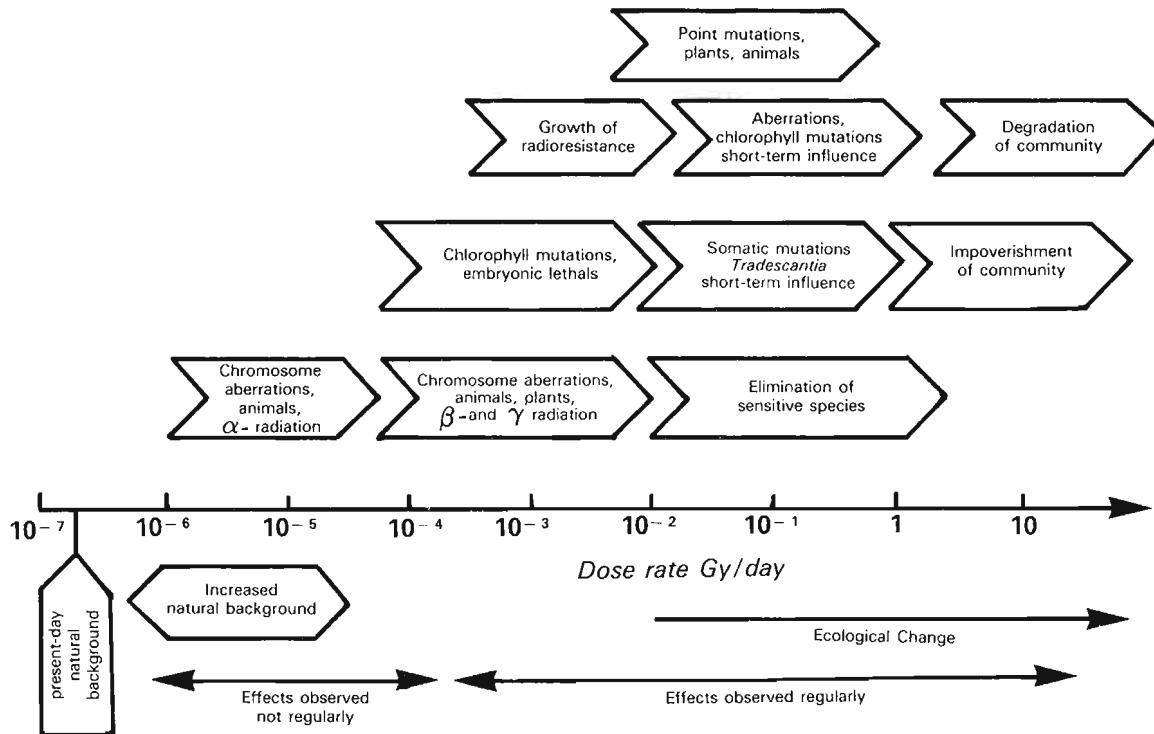
The long-term genetic rearrangement of populations under irradiation will create new forms of co-adaptation of genes, new polymorphism systems, etc. All this will take place against the background of a gradual increase of

the populations' radioresistance norms (3). The particular structure of the new biocenosis will depend on the evolutional homeostatic potential of the individual species in the community.

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Fig. 1. Genetical and ecological consequences of populational exposure to chronic irradiation as a function of dose rate (a scheme). The starting point of the arrow corresponds to the minimum dose rate at which the effect can be observed.



The International Congress of Systematic and Evolutionary Biology (ICSEB)

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At its twenty-first meeting held in August, 1982, the General Assembly of IUBS voted to adopt a new structure proposed by an *Ad Hoc* Committee for Review (*Biology International* 4 : 5-7). Under this new structure, intersectional groupings would replace the previous divisions. The criteria for a group are the presence of strong scientific interactions among its members, the holding of one or more international congresses or symposia, a compositional base of one or more international organizations, and a substantial membership. Because the *Ad Hoc* Committee suggested ICSEB as a possible nucleus for the formation of one of the new groupings, its history and activities are outlined below.

The concept of ICSEB was developed by Drs. Frans Stafleu (Tweede Transitorium, The Netherlands) and Richard Cowan (U.S. Museum of Natural History, U.S.A.) in order to promote the development of systematic and evolutionary biology, primarily by organizing meetings at which scientists from diverse disciplines could exchange ideas. Prior to ICSEB, most international meetings were restricted to particular sub-disciplines within biology (e.g., Botany, Genetics, Ecology). ICSEB was to provide a forum where geologists, paleobiologists, geneticists, botanists, zoologists, microbiologists, and ecologists could share approaches to the study of, and theories about, evolutionary processes and the classification of life on earth. With the help of a ten to fifteen person organizing committee composed of representatives from sponsoring organizations (e.g., IAPT, SSZ, SSE), Stafleu and Cowan organized ICSEB-I. The first Congress was held in Boulder, Colorado from Aug. 4-12, 1973. Over 1450 scientists registered for the Congress and an estimated 1800 actually attended the sessions. The excitement engendered by the exchanges of ideas between researchers who had rarely, if ever, had the opportunity to share their work was felt throughout the week. By the close of the meeting it was obvious that there was a strong need for ICSEB.

Since ICSEB-I was held in the United States, it was originally established as a corporation governed by U.S. corporate law. To continue as an international organization, it was necessary to provide ICSEB with a flexible system of governance that would reflect its international

scope and allow operation in any country. One of the first items of business of the officers of ICSEB-II (Frans Stafleu and Per Brink, Lunds University, Sweden, Co-Presidents, James Reveal, University of Maryland, U.S.A., Secretary) was therefore to appoint a committee to draw up a set of by-laws. In 1976, the By-laws written by this committee were accepted by the Board of Directors. These By-laws reaffirmed ICSEB's position as an International Commission within IUBS and provided for governance by a President (or Co-Presidents), a Secretary and Treasurer (or combined officer), and a Council of not more than 12 members including the current and past Presidents. As an advisory body to the Council, an International Committee of not fewer than 50 nor more than 100 individuals is elected by the Council. No country is allowed a representation on the Committee of more than 20 per cent of the membership at the time of election. The primary function of the International Committee is to help solicit invitations for Congresses and provide continuity. Between ICSEB-I and ICSEB-II, the Board of Directors became the Council, and this first Council nominated and elected a minimum International Committee. During the same period, an invitation from Canada to host ICSEB-II was received and accepted by the Council.

From 17-24 July 1980, ICSEB-II, attended by 953 members, was held at the University of British Columbia, Vancouver, Canada. The Congress adopted the By-laws and elected new officers (Beryl B. Simpson, University of Texas, U.S.A. and Geoffrey G. Scudder, University of British Columbia, Canada, Co-Presidents and James Reveal, Secretary-Treasurer). Additional members to the International Committee were nominated and elected. The offer of England to host ICSEB-III was accepted by the Council with Dr. Barry Cox (Kings College, London) agreeing to serve as Local Chairman. This third congress is to be held at Sussex University, Brighton, England, from 4-10 July 1985.

In addition to holding congresses, ICSEB, like many other international scientific bodies has used the force of its membership, in the form of resolutions, to attract attention to activities particularly counter or helpful to furthering free scientific inquiry. ICSEB's influence has also gone beyond the Congresses via publications of

symposia and contributed papers. Following ICSEB-I, two major books containing symposia papers, *Coevolution of Plants and Animals* (L.E. Gilbert and P.H. Raven, eds. 1975) and *Origin and Early Evolution of Angiosperms* (C.D. Beck, ed., 1976) were published. Several influential journals containing coordinated articles presented originally at ICSEB sessions were also published. On the basis of the success of publications resulting from ICSEB-I, the Officers of ICSEB-II decided to publish all of the major symposia of ICSEB-II in book form. The volume, *Evolution Today*, edited by G.G. Scudder and J. Reveal (1981) received excellent reviews and earned sufficient money to pay for itself and provide initial funds for the planning of ICSEB-III.

Since the purpose for which ICSEB was established was to provide an open, international forum, little effort has been made to provide it

with a rigid structure or accessory duties. Nevertheless, ICSEB is able to respond to the changing needs of its members. Indicative of this is ICSEB's offer to provide a meeting place during Congresses for the International Commission of Zoological Nomenclature.

Under the current structure of IUBS, groups are associations of Sections and Commissions working together on an equal basis because of mutual interests. Sections and Commissions can belong to more than one group at a time and groups will be formed and dissolved as the needs for them arise and decline. Since ICSEB is itself a Commission, it can serve only as a partner, joining with other Commissions and Sections interested in systematic and evolutionary problems. Such a group could carry out inter-sectional and intercommissional activities in which ICSEB will gladly take an active role.

The International Association of Environmental Mutagen Societies (IAEMS)

by Per Oftedal, Hon. Secretary and Past-President
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The IAEMS was founded at Asilomar, California, during the First International Conference on Environmental Mutagens in 1973, following the XIII International Congress of Genetics at Berkeley. Founding members were the four environmental mutagen societies then established, in North-America (1969), Europe (1970), Japan (1972) and India (formalized in 1975).

The formation of the IAEMS came as a natural conclusion to a period of rapidly increasing activity and insight into the possible effects of environmental chemicals on the genetic material. This development must be seen as one aspect of the general concern for environmental questions which gathered momentum during the sixties, spurred and aggravated by books like *Silent Spring* by Rachel Carson, and the thalidomide and Minamata poisonings. Concurrently, a rapid development took place in the scientific methods for quantification of damage to the genetic material.

This identification of mutagens became even more important when it was realized that most of the known carcinogens are also mutagens, and that the identification of unknown carcinogens by means of relatively cheap and quick tests for mutagenicity might be possible.

This change in attitude in the public and in the scientific community was very rapid. Dr. Alexander Hollaender, the first President of IAEMS, tells me that in the early sixties he obtained some money to try to get a society started on mutagens in the environment, but due to an almost complete lack of interest within the scientific community, the effort was fruitless and had to be abandoned, and the money returned to the Ford Foundation. A few years later, however, another attempt was made with help from the Anderson Foundation, and now with success in that the Environmental Mutagen Society was founded in 1969. In Europe, Japan and India similar societies were constituted in the following few years, and immediately became meeting grounds for geneticists, toxicologists and administrators. The European Society, EEMS, had an interesting organizational gestation period, during which relations between individuals, national groups, and international political-economic structures had to be worked out. It took some time and much discussion and

personal contacts before a pattern of cooperation with mutual trust and benefits was arrived at. The IAEMS has continued to grow, as new national or regional societies are being formed. New members are from Australia and New Zealand, and from Latin America. Recently the first steps in creating an African EMS were taken, and the foundations were laid also in China during a recent workshop in mutagenic test techniques.

The IAEMS sponsors through its local member society the organization of an international conference every four years. Following Asilomar in 1973, the second was held in Edinburgh 1977 and the third in Tokyo 1981. A fourth conference is being planned for Stockholm in 1985, and the 1989 one would be expected to be located in the U.S. Eastern states.

One of the important activities of the IAEMS and its member societies has been to introduce these new techniques in short term mutagenicity testing to scientists and regulatory authorities in all parts of the world. Usually, this has been done in the form of workshops and training courses. The primary organizer has again been Dr Hollaender, who has helped organizing a large number of these functions, in developing as well as industrialized countries. In 1983, workshops were organized in Nairobi (in collaboration with the International Cancer Research Centre, Lyon), in Shanghai, in Alexandria, and in New Dehli.

The IAEMS is an example of a relatively large scientific organization which has developed in response to a socio-scientific challenge. Concurrently with the realization of the "Limits to Growth" and "Biological Time Bomb" and vulnerability of the environment as a whole, attitudes in general toxicology shifted towards more subtle effects and more distant in time, i.e. cancer and genetic effects. Increasing synthesis and use of new biologically active molecules for industrial, medical and pesticidal purposes led to growing demands for both legislation and scientific documentation. This development of both national and supra-national standards and criteria has given the IAEMS an important role as a scientific focal ground for services of scientists to industry and government as well as in pure research. Indeed, this dichotomous

— sometimes schizoid — role is a recurrent discussion theme at all conferences: how to balance scientific objectivity with social responsibility. The scientific data and methods are now being compiled and utilized in many national and several international moves seeking further "chemical safety" and to register "potentially toxic substances", to borrow words from the titles of the programs sponsored by the United Nations.

There remained, however, a need for an international scientific consensus in the evaluation of many aspects of environmental mutagenesis and carcinogenesis. During a meeting at Bar Harbor in the summer of 1975 — again with Dr. Hollaender as a central figure — it was decided to set up an International Commission for the Protection against Environmental Mutagens (ICPEMC). The realization of the idea during a meeting in Research Triangle Park early in 1976 was made possible through the financial support of the Institut de la Vie represented by its founder and permanent secretary, Professor M. Marois. ICPEMC was formally established under IAEMS sponsorship as a 20-member international commission under the chairmanship of Professor F.H. Sobels, Leiden, then IAEMS Vice-President. ICPEMC has since — with the financial support of Institut de la Vie and the help of more than a hundred scientists, in the Commission and five committees — published working papers and summary reports on test methodologies, mutagenicity in relation to carcinogenicity, regulatory approaches, risk analyses, and epidemiological aspects of environmental mutagenesis. This organization form has proved effi-

cient and practical. Just as IAEMS has used the corresponding Association in the field of radiation research as its model, ICPEMC has opposite numbers in the International Commission on Radiological Protection (ICRP) and the International Commission on Radiation Units and Measurements (ICRU). However, in the radiation field, there is an international authoritative body under the United Nations, the UN Scientific Committee on the Effects of Atomic Radiations (UNSCEAR) which as yet has no counterpart in the area of chemical noxes.

The impact of a whole array of newly developed or refined tests for genetic variation has been dominant in the growth of the field of environmental mutagenesis. The techniques for identifying noxious agents by means of genetic end points opened new scientific doors and also set the scene for more refined risk-benefit evaluations. In the near future, new biological techniques will make the characterization of variation in the genetic material increasingly specific, and the borderline between natural variation and pathology will become even more difficult to define or draw. These difficulties will serve to emphasize the importance of maintaining and furthering the scientific attitude in controversial situations, thereby providing a firm common ground of recognized facts on the basis of which societal and political controversy may be approached and — hopefully — resolved. The IAEMS will continue to play a role as a meeting ground and base for the scientific efforts in the fields of environmental mutagenesis, in the interest of new knowledge and for the benefit of mankind.

The International Union of Reticuloendothelial Societies (IURES)

by P. Abramoff, Biology Dept., Marquette University, Milwaukee, WI 53233, U.S.A.

The three Reticuloendothelial Societies (RES) which comprise the International Union of the RES represent persons from such varied disciplines as anatomy, histology, physiology, pathology, immunology, pharmacology, toxicology, biochemistry, microbiology, hematology, oncology, as well as a number of clinical specialties. The bond uniting these investigators is interest in a group of cells which are found in the blood and other body tissues. Appropriate areas for consideration are cell structure, cell function, cell separation, cell cultivations, physical, chemical and pharmacological effects of cells, the environment of cells, technical methodology, and others.

The RES states as its goals the acquisition of new information about the reticuloendothelial system and the communication of such knowledge to others. To this end, the Society has adopted the following formal statement of purpose which summarizes the ideals and principles which guide its activities today.

1. The distinguishing feature of the RES is its overview concept of host defense. Accordingly, the Society places emphasis on human disease entities and promotes dialogue on the cooperation and function of the different cells that protect the host against such problems as malignancies, infections, and environmental pathogens. It is equally proper that we consider how the system goes awry and becomes the cause of disease.
2. The member Societies give priority to the promotion of dialogue on monocyte and macrophage function in order to understand better the functions of the mononuclear phagocyte system. Although heterogeneous and present in diverse locations the cells of this system help regulate homeostasis as well as contribute to immunity.
3. These societies promote scientific exchange on basic mechanisms a) by which granulocytes, macrophages, and lymphocytes and other cells of reticuloendothelial system recognize foreignness, b) how these cells process pathogens and altered endogenous materials, c) how host defense cells communicate between one another by either secreted molecules or cell to cell contact, and d) how macrophages participate and help regulate the induction and expression of an immune response.

4. The member Societies advance informational exchange on the inflammatory process and its control, including cell production and distribution, chemotaxis, mediators, and pharmacologic modulation. This area represents the major avenue by which the cells we study actually function in the body.

Thus, the scientific focus of these Societies is on two basic elements : monocyte and macrophage function and cellular cooperation in host defense.

The objectives of the International Union of the Reticuloendothelial Societies (IURES) are to advance research and understanding in the area of the reticuloendothelial system by:

1. Fostering and maintaining international scientific cooperation and communication between regional and national Societies, groups and individual scientists interested in the study of the RES and allied fields.
2. Promoting the organization of an International Congress in the field of the RES at intervals as determined by the Council of the IURES, preferably every three years. In recent years these Congresses have been held in Pamplona, Spain (1975), Jerusalem, Israel (1978), and Davos, Switzerland (1982). The 10th Congress will be held on August 21-27, 1985 in Japan. The first Congress was held on July 4-8, 1955 in Paris, France. The official proceedings of each congress are published as a text or monograph.
3. Promoting and facilitating international scientific conferences, workshops and training courses.
4. Establishing liaisons with the International Council of Scientific Unions (ICSU) and the International Union of Biological Sciences in order to facilitate appropriate representation of RES research within the member bodies.
5. Establishing liaison with the World Health Organization (WHO) and similar international organizations to promote and facilitate international collaboration in the field of the RES.
6. The present Union consists of three member Societies (the Reticuloendothelial Societies of the United States, Japan, and Europe) and one affiliate Society (The Kupffer Cell Foundation). The total membership of these four members is approximately 1 500.

The International Primatological Society (IPS)

by A.M. Schrier, Dept. of Psychology, Brown University, Providence, RIO 2912, U.S.A.

The aims of the International Primatological Society are to encourage all areas of primate research and to facilitate cooperation between workers of all nationalities who are engaged in such research. The Society is particularly concerned with fostering judicious use of primates in research, and with the conservation of primate populations in indigenous settings. A portion of the annual membership fee is set aside specifically for the furtherance of primate conservation. The Society has established a standing committee on habitat and species conservation which is chaired by a Vice President. In addition, many members of the Society are engaged in efforts in behalf of conservation, as individuals, and as members of international organizations.

The Society has approximately 900 members. Any individual may apply for membership. The Society holds scientific congresses biennially. Most recently, congresses have been held in the United Kingdom, India, Italy, and the United States. Future congresses are planned for Kenya, West Germany, and Brazil. The Society distributes a bulletin to its membership, and has an official scientific publication, *The International Journal of Primatology*, devoted to basic primatology.

The body responsible for administration of the Society affairs is the Executive Committee. It consists of the President, the Secretary General, a Vice President concerned with primate breeding and supply, a Vice President concerned with species and habitat conservation, the Treasurer, the Secretary for Membership Information, the Secretaries for Africa, the Americas, Asia, and Europe, and representatives of affiliated organizations.

The International Union for the Study of Social Insects (IUSSI)

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The aim of the International Union for the Study of Social Insects is to group together all researchers who are interested in social insects or social Arthropods (Hymenoptera, Isoptera, Orthoptera, or others, e.g. social spiders) in whatever way (Morphology, Anatomy, Ecology, Physiology, Biochemistry, Behaviour, etc.). It should facilitate the exchange of information and form contacts between workers in different countries, organize International Congresses and Symposia and organize the publication of a scientific journal, the official organ of the Union.

The International Committee of I.U.S.S.I. meets at each congress to conduct the business of the Union and shall constitute the Representative Body of the Union. It consists of delegates chosen by a national group or section of each country (two persons per country) together with the presidents of the two preceding congresses and the officers of the Union.

The officers are the President, the Secretary General, the Treasurer, and the Scientific Editor of the Union's publications. They are elected at each International Congress by the International Committee. The President and Treasurer belong to the Organizing Committee of the current Congress.

The International Association for Radiation Research (IARR)

by J.F. Duplan, INSERM, Unité de Recherche 117, 229, cours d'Argonne, 33076 Bordeaux, France

The International Association for Radiation Research (IARR) was established in August 1962 on the occasion of the Second International Congress of Radiation Research which was held in Harrogate (UK). The founding members of IARR were the British Association for Radiation Research, the Radiation Research Society of the USA, the Japan Radiation Research Society and the European Society for Radiation Biology. The membership of IARR increased to include eleven organizations in 1982 : the Netherlands Radiobiological Society and the Swedish Radiobiological Society joined in 1965, the Polish Association for Radiation Research was accepted in 1970, the Section on Radiation Biophysics of the Deutsche Gesellschaft für Biophysik and the Working Group for Radiation Biology of the Deutschen Ronggengesellschaft represents joint radiation research in Germany (Joint German Group) since 1974, the Radiation Research Society of Israel and the Société Belge de Radiobiologie became members in 1976. The original Constitution of the Association which had been approved in 1964 was completely revised to take into account the expansion of the membership. The new version of the Constitution was accepted in 1974 at the Seattle Congress. The aims of the Association are to advance radiation research by : 1) fostering and maintaining scientific cooperation and communication between societies, groups and individual scientists; 2) promoting the organization of

International Congresses of Radiation Research; 3) promoting and facilitating international scientific conferences and symposia; 4) establishing liaison with the International Council of Scientific Unions. Four different aspects of radiation research are represented in IARR namely, radiation physics, radiation chemistry, radiation biology and radiation medicine. Each of these fields of research is represented in the Council by an elected Councillor. The other Councillors of the Association are appointed by the member organizations. An important activity of the Council is to decide on the time and place of the Congress in the light of invitations received from member organizations or national scientific groups. These IARR Congresses are organized every 4 years. They took place successively in Harrogate (UK, 1962), Cortina d'Ampezzo (Italy, 1966), Evian (France, 1970), Seattle (USA, 1974), Tokyo (Japan, 1979), and Amsterdam (Holland, 1983). At its interim meeting (Brussels, 1981) the IARR Council accepted the invitation of the Association for Radiation Research (UK) to hold its 1987 Congress in the United Kingdom. The attendance to the Congresses varied in the past between 1 100 and 1 700 participants. A deep concern of the Council is to help young scientists to participate in international meetings, and a large fraction of the resources of the Association goes to a special fund which is used to support the travel expenses of young investigators on the occasion of the IARR Congresses.

The International Phycological Society

by R. Searles, Dept. of Botany, Duke University, Durham, NC 27706, U.S.A.

The International Phycological Society is dedicated to the promotion of phycology and to the encouragement of international cooperation among phycologists and phycological institutes. It was founded in 1960. It has a membership of approximately 900 individuals and institutions drawn from 55 different countries.

The two primary activities of the Society are the publication of its journal, *Phycologia*, and the planning and implementation of meeting and symposia. *Phycologia* has been published for 23 years and is published quarterly. Volume 20, the most recently completed volume, ran to 535 pages, contained 43 original research papers, one 102 page review paper and various book reviews, announcements, abstracts and historical papers.

The plants which the phycologists of the society study include freshwater, terrestrial, and marine macroalgae and microscopic algae. The

scope of investigations reported on in recent issues of *Phycologia* include ultrastructural studies, ecology, systematics, physiology, genetics, population studies, life histories and morphology.

Since its founding the Society has organized 12 meetings including the First International Phycological Congress in 1982 held at Memorial University in St. John's Newfoundland. Meetings in the past have often been held in conjunction with International Botanical Congress or the International Seaweed Symposia. At the International Seaweed Symposium in China in 1983 the Society has sponsored a symposium on the systematics of the genus *Gracilaria*, a red algal genus of economic importance with a large number of taxonomically difficult species. A second International Phycological Congress will be held in August of 1985 in Copenhagen.

ICSU Committee on Data for Science and Technology (CODATA) Activities in Biology

by Phyllis Glaeser
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For a long time, the role of data in biology was confined to compilations of morphological data. That was the period when the Natural Sciences were blooming, when the essential duty of the Zoologist and the Botanist was to establish an order among animals or plants, an order which was necessary if they were to propose a rational structure for the Animal and Plant Kingdoms.

It was the form of objects (animals - plants) or color, etc., that is to say, qualitative data which were the "data" collected by biologists at that time.

Only the newborn sciences of Physiology (18th-19th century) or Biochemistry (end of the 19th century) were involved in collecting quantitative data such as blood pressure, sugar content of serum, etc. These data looked very much like data in Physics or Chemistry; they were represented by numbers and comprised, what we currently consider, the "data" of the first half of this century. CODATA's main activity was concerned with this type of data.

However, in the 1950s and 1960s, with the revolution brought about by Molecular Biology, a new type of data came to light : sequence data. The sequence of amino acids in a protein is important because there is, roughly, a one to one correspondance between a primary sequence and a tertiary structure in proteins. Therefore, knowledge of a sequence of amino acids in a protein can lead to a prediction regarding its tertiary structure. Knowledge of this structure is directly related to the understanding of the function of the molecule and has played a key role in the fantastic development of molecular biology since 1960.

In this case, the data needed to understand the structure is a series of amino acids, chosen from a set of twenty, for the hundred residues of a given protein, for example. Thus, the data are not expressed by numbers but by a sequence. In a sense it is qualitative information, related, in a way, to the original situation found in the natural sciences.

Data banks on amino acid sequences in proteins very rapidly found themselves in competi-

tion with data banks on DNA nucleotides coding for these proteins. For technical reasons, it is much easier to establish the sequence for nucleotides, at least for the first 300-400, than for amino acids. Since reading the code does not imply ambiguity in the sense that "nucleotides translate to amino acids of proteins, thus, knowledge of a sequence of coding nucleotides provides unambiguous knowledge of the corresponding sequence of amino acids", it is understandable that nucleotide data banks are becoming so popular. Nonetheless, data banks on amino acid sequences of proteins remain, in certain cases, an irreplaceable tool.

Other data sets, "topological" in nature, are rapidly expanding in biology and even in human biology; these are the data concerning 2-dimensional electrophoresis of electrically charged biological molecules. One particularly striking example concerns 2-dimensional electrophoretical maps of proteins from human serum with which the biochemists hope to establish a catalog of all proteins (more than 2000) with identification of their place on the map and detection of "abnormal" proteins by their peculiar position.

Thus, we see that the movement of the pendulum in the history of science has made data collection and organization a topic of major importance to molecular biologists, with an order of precision, objectivity and significance which is completely new. In addition, the classification and the processing of these data require a type of logical analysis which can only be tackled with the aid of a computer.

CODATA, the Committee on Data for Science and Technology, has been concerned with these new developments in biology. In particular, in 1982 it established a Task Group on a **Hybridoma Data Bank**, under the leadership of Professor Alain Bussard, a molecular biologist and immunologist at the Institut Pasteur, France. The CODATA Hybridoma Data Bank on cloned cell lines and their immunoreactive products, financed by CODATA, ICSU, the International Union of Immunological Societies, the MIDIST in France, the Medical Research Councils of Canada and the U.K., RIKEN in Japan,

and the NIH in the U.S.A., presently contains information on over 2000 hybridomas. It was opened to the public on 1 October, 1984 and readers interested in contributing to and/or using the Data Bank should address their inquiries to :

Ms. Lois Blaine, Manager
CODATA/IUS Hybridoma Data Bank
12301 Parklawn Drive
Rockville, Maryland 20852-1776, U.S.A.

Cognizant that the exponential growth of protein data requires international collaboration among those individuals creating and distributing data collections and those investigators who wish to apply the data, CODATA established a Task Group on **Coordination of Protein Sequence Data Banks** in June 1984, under the chairmanship of Prof. B. Keil, also of the Institut Pasteur. The mission of this Task Group will be to gather information on existing data resources related to protein sequences — their contents, scope, software support, access procedures, future lines of development, etc. — and to prepare a useful catalogue and make it available; to encourage the development of a common format for information exchange in order to facilitate the transmission of data to and among data banks and users; to identify and to help solve problems of nomenclature since carefully designed and consistent nomenclature is essential, but lacking at present; to coordinate the development of useful software by the dissemination of specific programs, documentation and more general software tools; to analyze the coverage of the field in current collections, and to encourage the development of specialized data banks containing information not covered at present; and, lastly, to organize meetings and training courses that will help in the exchange of ideas and experience in the field of protein data collection and processing.

A third Working Group on a **Microbial Strain Data Network** was also established by CODATA, under the chairmanship of Dr. M. Krichevsky of the National Institutes of Health, U.S.A. This Group, jointly sponsored by the WFCC and the IUMS, arose from a Workshop sponsored by UNEP, the CEC and Belgian Fonds National de la Recherche Scientifique. The diverse science of microbiology which the

Workshop considered to include the study of bacteria, fungi, algae, protozoa, viruses, isolated cells from plants and animals, and hybrid fusion products of pro- and eukaryotic cells, is the cornerstone of biotechnology. In fact, basic research in microbiology has advanced so rapidly in the past decade, it has spawned biotechnology as an applied science and will continue to contribute to its growth. Paradoxically, the microbiology information base is not well organized and its resources, which include living libraries of cultures that contain the DNA of biotechnology interest, are incompletely accessible. In order to advance the state of the art, to avoid duplication of effort, and to promote technology transfer, it was proposed that an international microbial strain data network be established.

The relationship between traditional microbiology and cell culture of isolated cells of plants and animals is so close (through similar culture technology, such as sources of antigens or production of antibodies in immunology, overlapping collections, sources of genes for genetic engineering, production of products through fermentation technology, etc.) that the initial system should include both microbial and cell culture information. The Group will be working on the basis that communication standards be coordinated by a central organization but that it is impractical and impolitic to attempt centralization of the huge mass of data involved.

The 9th International CODATA Conference, held in June 1984 devoted a large part of its program to data in molecular biology and biotechnology. A subset of the presentations on this subject has been published as CODATA Bulletin No. 56 entitled "**Data in Modern Biology**". In particular, the following subjects are treated : the antibody synthesizing mechanism, a comparative structural and functional analysis of small ribosomal RNAs, computer-aided mapping of DNA-protein interaction sites, a human protein map, protein identification, the Protein Data Bank at Brookhaven National Laboratory, the sequence acquisition and analysis system of the Institut Pasteur, biotechnology data in the academic and research laboratory environment and data needs for biotechnology from the industry perspective.

The Bulletin is available from Pergamon Press, Oxford, for \$ 15.

IUBS LOANS AND SPONSORSHIPS TO SCIENTIFIC MEETINGS

At the IUBS Executive Committee Meeting on 19th-20th October, 1984, loans were awarded to the following congresses and conferences :

Therapeutic Photomedicine, Baden/Vienna, Austria, 10-12 February, 1985
IUBS Affiliation : Commission on Photobiology (US \$ 3 000);

Plant Growth, Drought & Salinity, Canberra, Australia, 13-16 May, 1985
IUBS Affiliation : International Association for Plant Physiology (US \$ 5 000);

IXth Int'l Colloquium on Soil Zoology, Moscow, U.S.S.R., 1985
IUBS Affiliation : Section on Soil Zoology (US \$ 3 000);

9th Int'l Malacological Congress, Edinburgh, U.K., 31 Aug.-6 Sept., 1986
IUBS Affiliation : Commission on Malacology (£ 2 000);

3rd Int'l Conference on Aerobiology, Basel, Switzerland, 6-9 Aug., 1986
IUBS Affiliation : Commission on Aerobiology (SFr 15 000);

Insect Diversity in the Tropics, Kuala Lumpur, Malaysia, July/Aug., 1986
IUBS Affiliation : Section on Entomology (US \$ 2 500);

VIIth Int'l Congress of Protozoology, Nairobi, Kenya, 24-30 Aug., 1985
IUBS Affiliation : Commission on Protozoology (US \$ 1 500);

10th Int'l Congress of the Int'l Union for the Study of Social Insects, München, FRG, 18-22 Aug., 1986
IUBS Affiliation : Commission on Social Insects (US \$ 4 000);

Comparison of Some Developmental Problems between Plants and Animals, Orléans, France, September 1985
IUBS Affiliation : Section for Developmental Biology (US \$ 3 000).

The following conferences and congresses were awarded IUBS sponsorship :

VIIth Ecdysone Workshop, (Univ. of Edinburgh) Edinburgh, U.K., 1985.

VIIth Int'l Symposium on the Biological Control of Weeds, (CSIR) South Africa, 1988.

GAP Workshop, (CSIR) Durban, South Africa, 1986.

Differentiation Patterns in Higher Plants, (IOBP) Zurich, Switzerland, 13-18 July, 1986.

PUBLICATIONS REVIEW

ACAROLOGY VI

Edited by D.A. Griffiths & C.E. Bowman.
Published by Ellis Horwood. (2 Volumes).

Acarology VI represents the proceedings of the VIth International Congress of Acarology held 5-11 September, 1982, in Edinburgh, U.K. Volumes 1 and 2 provide an extensive summary of current trends and directions in acrine research. Also included are the contents of the congress symposia together with the contributions made to all other sessions.

DIRECTORY OF IMPORTANT WORLD HONEY SOURCES

By E. Crane, P. Walker & R. Day.
Published by the International Bee Research Association, 1984 (384 pages).

This book identifies 467 plants that are reported to be the major sources of honey in the world. Also contained is a list of "candidate plants" on which more information is needed.

The "Directory" includes a bibliography of 820 references and three indexes to the main entries : "synonyms of plant names", "the names of insects producing honey dew", and "1 350 common names of plants".

ECOLOGY TEXTBOOK FOR THE SUDAN

By Meine von Noordwijk.
Distributed by Khartoum University Press, 1984 (264 pages).

This textbook gives an introduction to basic principles of ecology in a Sudanese context using examples locally. It deals with ecology as a biological science in addition to human ecology.

ENVIRONMENTAL CHEMICAL MUTAGENESIS

By A.K. Sharma.
Published by the Indian National Science Academy, 1984 (53 pages).

This paper deals with a relatively new field, environmental mutagenesis induced by chemicals. It concerns mutagens and carcinogens in the environment,

mechanisms of and factors affecting mutagenicity, and test systems for assessment and interpretation of data. Special emphasis was made on environmental chemical mutagenesis studies conducted in India.

A REALISTIC VIEW ON BIOTECHNOLOGY

By E.H. Houwink.
Published by the European Federation of Biotechnology, 1984 (134 pages).

Prepared on the occasion of the 3rd European Congress on Biotechnology in Munich (Sept. 1984), this volume was created in order to provide a professional and realistic view on the status of biotechnology. It deals with subjects such as — what is biotechnology ?, its history, the public's view, the present situation in Europe, Japan, U.S.A., U.S.S.R., and future prospects.

STRIGA : BIOLOGY AND CONTROL

Edited by E.S. Ayensu *et al.*
Published by ICSU Press and IDRC, Canada, 1984 (216 pages).

This publication contains papers presented at a workshop on "Biology and Control of Striga", held in Dakar, Senegal, 14-17 November, 1983. Among the topics dealt with are taxonomy and bio-systematics of Striga, patterns of Striga resistance in soybean and millets with special reference to Africa and Asia, chemical control and the natural enemies of Striga.

TEACHING SCIENCE OUT-OF-SCHOOL with Special Reference to Biology

Edited by G.R. Meyer & A.N. Rao.
Published by the IUBS Biological Education Commission and the Asian Biosciences Network.

This volume includes the contributions made by the IUBS/CBE members to the International Asian Symposium on Out-of-School Science Activities, held 3-7 June, 1981, in Singapore. The content is made up of 1) an introduction on the educational and social values of out-of-school science, 2) general issues, and 3) selected regional trends and case studies.