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# Education Committee of the International Union of Biochemistry and Molecular Biology

## Introduction

The technological evolution of mankind accelerated enormously in this century. In parallel with the vast number of beneficial effects derived from the scientific revolution, the explosion of new knowledge and its concentration in only a few countries has generated a number of complex situations that present major challenges for modern science education. These include the asymmetrical distribution on the planet between young people and the production of new knowledge, the super specialization arising from the information overload, and the difficulties in teaching the vast amount of new knowledge generated each year by science.

## Asymmetrical Distribution of Young People and Science on the Planet

The explosive production of new knowledge

that has occurred since the 19th century has not been distributed equally around the world. The increase in new knowledge was, and continues to be, centralized in a few countries in the Northern Hemisphere: the USA, Canada, Japan, and Europe. These countries are primarily responsible for the discoveries that have led to the greatest changes in the world during the last two centuries and continue to be those where the majority of new discoveries are made each year. Thus, > 70% of the scientific reports published each year originate in these countries. This can be estimated from the number of scientific publications in journals catalogued by the Institute for Scientific Information (ISI) database. The population of these countries represents 14% of the world's total. The rest of the countries, with 86% of the world population, produce altogether only 25% to 29% of new knowledge each year.

Thus there is a pronounced dichotomy: on the

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one hand, a small group of countries producing a large amount of new knowledge and, on the other hand, a much larger group of countries that consume it. Countries that have achieved a more advanced scientific development have also reached a major economical development and have learned to control their population. Thus the challenge that confronts modern education is the following: Countries with the least scientific and economic development are responsible for educating the majority of the world's young people.

### **Information Overload**

In biochemistry, 151 journals indexed by ISI publish about 60,000 articles per year. The Journal of Biological Chemistry alone published 35,440 pages in 1998. If a university professor who wishes to update his or her knowledge of biochemistry reads one article per hour, 10 h a day, every day of the year, including Saturday and Sunday, he or she will read only 6% of all the articles published in biochemistry in that year. This professor will not have time to teach or to carry out any other academic activity. Worse yet, if the professor persists in trying to keep up with the literature in biochemistry, he or she will somehow have to assimilate the remaining 94% of the articles for that year and an equal number in new articles in the following year. This example reveals the necessity for super specialization. That is, to remain productive, the professor in this instance will have to be content in keeping up with new developments in only one particular area of biochemistry.

### **Science Education**

Among the different fields of knowledge, education is one that has advanced at a relatively slow rate during the last century. The great discrepancy between the search for new knowledge and the way in which it is taught is exemplified by the relatively small number of scientific journals and articles devoted to education. During 1981-1993, a total of 7,756,888 scientific articles were published in the journals covered by ISI, but only 36,212 (0.5%) were related to education. Science today is taught by the same approach used more than two centuries ago, using lectures and laboratory classes and, in the best institutions, tutorial instruction. The primary goal is still that of transmitting the largest number of facts to the students. In this context, the expectation is that the students who graduate will be familiar with the current concepts in their chosen field. However, the explosion of knowledge in

recent years has made this task impossible and, in fact, we do not yet know how to prepare the students to deal efficiently with the large amount of new information that is produced every year, a capability that seems to be essential for a professional at the cutting edge of science. In this regard, the IUBMB recently published a booklet with recommendations about the standards for the PhD Degree in the Molecular Biosciences. This effort was coordinated by Frank Vela, Alan H. Mehler, Wilfried Rombauts, Harold B. White, and Edward I. Wood. (See the IUBMB home page at [www.iubmb.unibe.ch](http://www.iubmb.unibe.ch).)

### **Activities supported by the IUBMB Education Committee**

The two major activities supported are workshops/courses and the free distribution of text books, journals, and other educational material. The aim of these activities is to foster the teaching of biochemistry and molecular biology with special emphasis in developing countries.

#### **Workshops and Courses**

The main format of the courses supported by the Committee is as follows:

1) Updating courses of biochemistry. Broad theoretical courses encompassing general biochemistry with little or no bench work, these will be mostly given in countries where science and technology are still behind, teachers at universities have no access to modern bibliography, and little or no laboratorial facilities are available.

2) Workshops with emphasis on practical work. These workshops are not research activities but focus on a specific field, such as molecular biology, protein structure and function, and so forth. These courses are much in demand in developing countries where there is already some research, the staff of the universities have access to journals, and efforts are being made to develop postgraduate education. These workshops are designed to be given to teachers in developing countries with some experience in research who want to learn in more detail about subjects to teach in graduate courses and to postgraduate students.

3) Research in education. These courses can be workshops and meetings at congresses. They should not be limited to techniques to be used in classes but should focus on new approaches to education.

4) Advanced courses in biochemistry. An overwhelming number of scientific papers are pub-

lished every year in biochemistry and molecular biology. There is a long delay between production of new knowledge and its transfer to the general educational system. The aim of the advanced courses is to accelerate this transfer.

#### **Applications for Workshops and Courses.**

All countries that are affiliated to the IUBMB can apply for IUBMB support. While the Committee will provide assistance on a worldwide basis, it gives special attention to those geographic areas where science and technology are still at an early stage of development and where teachers at universities have no access to modern bibliography.

Applications should be addressed to Leopoldo de Meis, Chairman of the Committee on Education. Deadlines for both workshops and courses are April 1st and September 1st. During 1992 through 1999 the number of workshops sponsored by the IUBMB Education Committee has varied between 8 and 13 per year.

Because of the limited amount of funds available, it is never possible for IUBMB to finance fully any particular workshop or symposium. It is hoped that co-sponsorship by IUBMB and the provision of "seed" money will provide regional recognition, which will help the organizers to raise additional funds from other sources. The Committee also cooperates with various regional organizations, especially the Pan American Association for Biochemistry and Molecular Biology (PABMB), the Federation of Asian and Oceanian Biochemists and Molecular Biologists (FAOBMB), and the Federation of African Societies of Biochemistry and Molecular Biology (FASBMB).

Attendance at the workshop must be available to scientists of all nationalities, although the total number may be limited by the organizing committee. An essential condition of IUBMB sponsorship is that the organizers of a workshop observe the ICSU resolutions on "The Free Circulation of Scientists." A copy of this document may be obtained from the ICSU Secretariat (51 Bd. de Montmorency, 75016 Paris, France).

Selection of the workshops proposed to be supported will be made by the Chairman in collaboration with two to three members of the Education Committee who are familiar with the region where the workshop will be conducted.

Financial support provided by IUBMB can be used in the following ways:

1. A contribution to travel costs of lecturers. The IUBMB contribution will not exceed the listed

economy-class round-trip fare. If an Apex fare can be obtained, this will be the maximum payment.

2. Contributions may also be made to help young biochemists to attend the symposium who are from countries where biochemistry is less well developed.

3. Contribution for payment of living expenditures of the invited lecturers and students can also be considered.

4. IUBMB will not provide any funds for administrative expenditures.

Payments are made by the Treasurer of the IUBMB to the organizers of the workshops and courses and are normally made about 3 months before the date of the event.

At the end of the activity, a report describing the workshop and expenditures should be sent to the Education Committee Chairman and the IUBMB Treasurer. The report should include a brief account of the scientific proceedings, a list of the speakers, and the number of attendees. Accounting of the expenditure of IUBMB money should also be provided. The Committee Chairman should be kept informed of any publication that emanates from the symposium and should be provided with a copy of the book.

#### **Textbook and Journal Program**

The aim of this part of the program is to distribute textbooks and free subscriptions of journals to biochemists and libraries that have difficulties purchasing them. The journal most distributed is *Biochemical Education*. This is an IUBMB journal published for us by Elsevier (see home page). Requests for a free subscription should be sent directly to the editor of the journal. Textbook requests should be addressed to the Chairman of the Education Committee. In addition, textbooks are sent to representatives of biochemical societies affiliated to the IUBMB in developing countries to be distributed in their region to universities and libraries that they deem to need assistance. During 1992 through 1999, about 1,000 textbooks were distributed this way.

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## PABMB news and views

Peter J. Dolphin  
Secretary General,  
PABMB

As you may know our society, in addition to being a member of the International Union of Biochemistry and Molecular Biology, is also a constituent society of the Pan-American Association for Biochemistry and Molecular Biology (PABMB). The current chairman of PABMB is Dr. Jack Preiss of the Department of Biochemistry at Michigan State University. The association includes constituent biochemical societies from all of the larger South American countries together with Mexico, Panama, the American Chemical Society, ASBMB and the CSBMCB. The Spanish and Portuguese Societies are adherent members of PABMB, which, as an association, is a member of the IUBMB.

The role of the PABMB is similar to but rather less extensive than that of the IUBMB in that it promotes and fosters biochemistry and molecular biology research and education throughout its mandated area of the Americas by the organization and support of regional scientific meetings and a larger triennial meeting at which the general assembly of the PABMB meets. The most recent of these meetings was held in conjunction with the ASBMB, the ACS and the CSBMCB in San Francisco last year. Although I was unable to attend for medical reasons I am informed that this was a most successful meeting for all concerned. Forthcoming PABMB meetings include participation in the IUBMB meeting in Birmingham 16-20<sup>th</sup> July and a joint FEBS/PABMB meeting June 30<sup>th</sup> to July 6<sup>th</sup>, 2001 in Lis-

bon. There will be 7 symposia at this meeting which will include the areas of Bioinformatics; Functional Genomics and Proteomics; Cell Dynamics, Signal Transduction Pathways; Ageing and Stress; Developmental Biology; Molecular Basis of Disease and Structural Biology. In addition there are 14 workshops planned that will cover areas of current biochemical interest. Details of the meeting can be obtained either from myself or Professor Claudina Rodrigues-Pousada, Instituto Gulbenkian de Ciência, Ap. 14.2781 Oeiras, Portugal.

2003 will be a significant year for Canadian Biochemistry, Molecular and Cellular Biology as Toronto will be hosting the 19<sup>th</sup> International Congress of Biochemistry and Molecular Biology, jointly sponsored by the CSBMCB, NRC, the IUBMB and also the PABMB. The organization for this meeting is well in hand and I look forward to the active participation of our colleagues from South America particularly as these countries have a warm feeling for Canada and Canadians. These feelings were significantly strengthened by Harry Duckworth's most able organization of the PABMB meeting in Winnipeg in the mid-eighties and Gordon Dixon's chairmanship of PABMB. During the course of my tenure with PABMB it will be one of my goals to foster collaborations between Canadian and South American laboratories, particularly those in countries with which Canada has significant trade agreements.