

HOW TO IMPROVE BIO-EDUCATION

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Uncontrolled human growth, together with wasteful exploitation of natural resources, has caused a situation in which the protection and sustainable development of the bio-environment has become one of the most burning problems which have to be solved. The damage is visible on an enormous scale. In many industrial regions, living conditions are not only burdensome, but threaten the health of the population. Today, nobody can doubt that the resources of our planet - animals, plants, water, soil, natural resources - should be protected, for our benefit and that of future generations. In the search for ways to solve the conflict between civilisation and the biosphere, the biological sciences seem to be particularly promising.

The evolution of the species *Homo sapiens* has been characterised by its ability to seize all physically accessible environments, which are then transformed as a result of being populated. Some researchers maintain that it is an "over-adjustment," which may lead humankind to degeneracy. Some symptoms, dangerous from a social point of view, have already been manifested, particularly in large cities.

Biological knowledge, in the first instance, as well as additional medical expertise, should protect humanity against the majority of the dangers of present civilisation, including contagious diseases, such as AIDS. Biological knowledge, acquired sufficiently early, is the best guideline on how to live a good, healthy life. These are the new values which are bringing contemporary biology into the area of education and upbringing, while not forgetting those older and unquestioned disciplines, such as knowledge of the structures and functions of organisms and species, and their current and historical mutual relations. Evolutionism, however, is a synthesis of biological sciences, through which the history of living nature, the mechanisms of development and our own origins may be comprehended. In this connection, the cognitive and didactic importance of biology, thus understood, has increased very considerably.

Today's "civilised" humankind cannot "return to nature" anymore. It is at least two centuries too late to do this. Biological knowledge equips us, however, with such intellectual potential that we are able to direct the future in a rational way, both for ourselves and the whole biosphere. None of the other branches of science can create such prospects for us and therefore they are not as positive.

The social recognition of the exceptional cognitive and educational role of biological knowledge, in the fields of philosophy of life, individual health and ecological safety, is a matter of particular importance. Still more important is basing the educational system on this new biological knowledge and making this knowledge the principal developmental element of the system. There is no doubt that a generation, the adult life of which will occur in the 21st century, will have to face problems of basic importance for the survival of the species.

The value and effectiveness of biology teaching, as well as that of other subjects, depends on many factors, among which the following are of particular importance:

- the professional and pedagogical preparedness of teachers:
- high quality and availability of text-books for pupils and hand-books for teachers
- adequate teaching equipment for school laboratories
- curricula which determine not only the aims and content of a subject studied, but also the teaching methods, leaving at the same time ample room for teachers' individual initiatives
- full correlation with other subjects, particularly chemistry, physics and mathematics
- an organisational system of education

What obstacles does the contemporary biological didactic face? In the second half of the 20th century, schools found themselves under extreme pressure from new biological facts and theories. As a result, the currently implemented programmes and textbooks, instead of radically changing their character, became a battle ground for pupils' brains in the fight between old and new disciplines. It is a critical situation. Today, the excessive overloading of pupils with purely descriptive teaching material, full of examples, definitions, hypotheses, is a general phenomenon and it must not be forgotten that the rate of scientific development is still increasing. It is practically impossible for an average teacher to implement the present programmes and for an average pupil to master them. Therefore the current education system in elementary and secondary schools of all types requires a thorough reconstruction.

Although the change of the educational system should involve all subjects, it should result in particular in increasing the importance of biology in the didactic and educational process. Increasing the importance of biology in elementary and secondary school curricula means treating it in

the same way as mother tongue language learning, or mathematics. In practice it should mean:

- a general improvement in the level of biology teaching
- saturation of the curricula of other subjects, from the first class of elementary school, with biological content and biological "culture"
- teaching biology in close connection with hygiene, environmental protection, and elements of preparation for family life

The main purpose of biological education should be to teach the minimum level of knowledge which will allow people to understand themselves, within the framework of evolution, and the present state of the world of living creatures. This should develop the ability to live longer, in health and harmony with other people, the environment and the whole biosphere.

Learning about the functions of your own organism is the most effective way to counteract civilisation's dangers of drug addiction, alcoholism, nicotinism or contagious diseases, i.e. AIDS. Without biological knowledge, humankind's emotional and sexual life cannot be understood and controlled. Modern biology is, therefore, also helpful in building family happiness and in bringing up future generations in physical and psychological health.

Biological knowledge aims at implanting a biological culture for the benefit of present and future generations. From the earliest age, biological culture should be associated with shaping positive attitudes towards the natural environment, and with practical knowledge regarding hygiene, nutrition, care of children and the infirm, the ability to breed animals and grow plants. This should go with the conviction that none of the activities in the sphere of production entitles anybody to devastate the environment. It should also encourage permanent biological self-training throughout the whole of life.

The steadily increasing flow of information is bringing into prominence the importance of self-education and the ability to regularly acquire information and process it effectively. At the same time, the detailed knowledge of numerous facts is becoming less vital. Contemporary schools pay too little attention to the development of the habit of self-education, and higher education institutions do not check this basic ability in competitive examinations. To solve this problem, a fundamental change in character and in the ways of preparing young people is necessary. Some young people, for example, come from intellectual families, living in university towns and can, therefore, benefit from different private lessons, however, working class young people, or those from the country or from small provincial towns, also need to have the opportunity to take part.

Preparation for higher studies should start, not earlier than, two years before the secondary school completing examination. The basic aid in the preparatory process should be extended facultative classes, so as to encourage a deeper understanding of and a greater ability in a given subject, in accordance with further educational plans. Specialisation too early is wrong, as it assumes that the humanistic, physical and biological abilities rule one another out, which is not necessarily so. The ability to use mathematics in many contemporary biological disciplines is no less important than in many other branches of technology.

The teacher is, and will remain, the central figure in the process of education. However, teachers have never needed such considerable help and regular support, as at present. This help should be based on a fundamental improvement in their financial situation and social status, as well as on creating the conditions for teachers' permanent education.

Professor **Leszek Kuznicki** is President of the Polish Academy of Sciences. His academic background specialised in microbiology and he became a full professor in 1988. His research area is protozoology, dealing with the theory of evolution and concentrating on protozoans motor reactions mechanisms. He has published extensively, and contributed actively to many international conferences and symposia, in particular the International Commission on Protozoology, with which he has been involved since 1975. He is currently Chairman of the Protozoological Section of the Polish Zoological Association.

