

Teacher's study guide
on the
BIOLOGY
of human populations

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Preface

The main objective of Unesco's pre-university science and technology education programme is to organize and promote all activities leading to the improvement of the teaching of science disciplines at pre-university level. The Organization's aim in this field, particularly in developing countries, has been to introduce improved teaching programmes for each particular discipline on a regional basis.

As regards biology, the African continent was chosen for the implementation, between 1967 and 1972, of a pilot project for the improvement of education in this discipline. Important results have been obtained thanks to the co-operation of the national study groups set up in African countries, training courses and seminars lasting from a few weeks to several months and, finally, the co-operation of experienced African and foreign specialists and educators. Among these results should be mentioned: publication of several teacher's guides with colour slides adapted to African needs; advice on methods of improving biology curricula; provision of plans for inexpensive laboratory experiments; encouragement to countries to adapt the pilot project materials and methodology more closely to their national requirements (several countries have already commenced such work).

Moreover, the dissemination of documents on biology teaching by Unesco with the help of regional and governmental organizations, has certainly led to greater awareness of national efforts in the field of educational activities. This has also been of benefit to Asia and Latin America, whose countries can profit from the experience acquired and the methods employed.

In order to support this national effort in educational renewal, which covers not only the improvement of the content and methods of teaching programmes, but also of teacher training, and above all the adaptation of education to its social and cultural context, Unesco undertook in 1971-72 to prepare a teacher's study guide on several aspects of the biology of human populations.

Human biology forms a part of the biology curriculum in secondary schools at all levels. It is a complex subject and sometimes presents difficulties for the teacher who often has little documentation available related to local conditions, while at the

same time it raises a number of crucial questions on the behaviour of individuals and the evolution of society. One of the courses organized within the framework of the Pilot Project for Biology Teaching in Africa was devoted to the preparation of teaching material on some aspects of human biology (nutrition, reproduction and diseases), intended for hygiene and nutrition education, emphasis being placed on the physiological aspects. It seemed important to extend this initial undertaking to other continents, at the same time giving it a more ecological dimension; that is to say, dealing with the biology of human populations rather than of man alone. This initiative, moreover, came at a time of world-wide concern with the problems of environment and of relations between man and his milieu which were being stated everywhere in critical and sometimes dramatic terms. It was therefore natural to try to introduce this concern in secondary education programmes, by means of clear and objective information centred upon the larger theme of human ecology. It fell within Unesco's field of competence to undertake this initiative, in close co-operation with the United Nations Fund for Population Activities (UNFPA). Demographic growth and its consequences and human reproduction must, in fact, be seen in their biological and ecological context in order to be better understood at the sociological level. The assistance given by the UNFPA has been valuable and, indeed, vital in the completion of the present work.

The preparation of this book comprised three main stages. In 1972, three professors from American universities drafted the basic text containing the fundamental data on human genetics and the evolution of Man, the physical and biological environment of human populations, human reproduction and sexuality, as well as population dynamics, the relationships between populations and their environment (housing, degradation of the environment, pollution, etc.). At the end of 1972 and the beginning of 1973, three regional seminars were held in Montevideo, Nairobi and Bangkok, where, in the presence of the authors of the basic text and in collaboration with regional specialists and educators, the form and content of a guide more suited to the region concerned were decided. Finally, in 1973, the writing of the African, Asian and Latin American versions of the book was completed under the guidance of a regional co-ordinator in each case and, in the first half of 1974, the English version of these three texts was finalized at Unesco Headquarters. French and Spanish translations were completed during the second half of 1974 and in 1975.

It should be stressed that in these three versions—African, Asian and Latin American—this Teacher's Study Guide on the Biology of Human Populations satisfies a definite need, expressed during the three regional seminars, and appears at an opportune moment. It is the result of collective work, and therefore necessarily reflects, with undoubted objectivity, the nuances of different modes of thought. For this reason, it is designed for use only by an experienced teacher, who will make best use of it by adapting the information he obtains from it to the needs of his country, society and students. The directions which he will find in the Introduction immediately following this preface will help him in this respect. The Guide, moreover, makes no claims to be an exhaustive work, nor is the effort of adaptation complete. It would not be possible to cover all aspects of this vast subject and to take into account all the particular

situations encountered throughout a continent. For this reason, selected bibliographical references have been placed at the end of each Part of the book, in order to guide further investigation on the part of the teacher. The latter should, moreover, consult local documentation sources (universities, ministries of technology, research centres) and regional and international organizations (publications issued by Unesco, FAO, WHO, UNFPA and their regional offices; publications issued by the United Nations, the Population Council, etc.). The numerous illustrations in this Guide should also prove very useful, especially in those countries where educational resources are still limited at secondary level; their origin is indicated in each case, which means they are an important source guide for documentation.

The effort to adapt the Guide has received particular attention and, given the enormity of the task, may be considered satisfactory. It is the sincere hope of Unesco and UNFPA that this effort will be continued in each country concerned, with a view to producing similar guides at national and sub-regional level. This, moreover, constitutes the second stage of the project: the organization of regional seminars during which the work will be still better adapted with the collaboration of the experts in the region or sub-region. Assistance—although it may be modest—will continue to be provided to those national study groups or commissions for teaching reform who wish to undertake such a task.

The designations employed and the presentation of the material in this work do not imply the expression of any opinion whatsoever on the part of the Unesco Secretariat concerning the legal status of any country or territory, or of its authorities, or concerning the delimitation of its frontiers.

The opinions expressed in the following pages, moreover, are those of the authors and do not necessarily reflect those of Unesco.



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Table of contents

Introduction

The use of this book	13
Ecology: concepts and principles	16
Biosphere	20

Part I Evolution of human populations

1 The evolution of man	39
2 Genetics background	53
3 Mechanisms of evolution	67
Further reading	78

Part II Environment of human populations

4 Energy	81
5 Atmosphere	117
6 Water	139
7 Soils	173
8 The biotic environment: flora and fauna	213
9 The oceans	231
10 Food and nutrition	245
11 Diseases and environment	271
12 Mineral resources	285
Further reading	302

Part III Dynamics of human populations

Preamble	307
13 Demographic parameters	309
14 Population dynamics: growth and density trends	327
15 Environment and population patterns	341
Further reading	352

8163204

Part IV Reproduction in human populations

Preamble 355

16 Human reproduction 357

17 Sexual behaviour 381

Further reading 390

Part V Present and future evolution or Design for survival

18 Ecosystem management and control of environmental
quality 393

19 Regulation of fertility 413

20 Does man have a future? 433

Further reading 437



The use of this book

This book has been written to help teachers to cope with all the new aspects related to man and to his action on the environment. It is a source of information on biological subjects not usually treated in student texts because, only in the last years, have they become related to important issues of our times. A minimum of materials already in conventional use in secondary teaching had to be included, in order to give unity to the presentation.

This is not a student text. It is a teacher's study guide. Thus, its direct consultation by secondary students is clearly *not* recommended. In order to make it more relevant to teachers, the authors have adhered to the following guide-lines: to treat every subject freely and impartially, as fits a scientific discussion; to offer factual and conceptual information without indulging in propagating unsubstantiated opinion.

Good techniques for teaching sciences are today well divulged. They certainly differ greatly from the traditional teaching to which many of us have been exposed: namely, lecturing by the teacher and note-taking by the student. We emphatically advise teachers not to make the substance of this book the object of lecturing, under the excuse, for instance, that its contents are important and have not been included in a student's book. The following suggestions for its proper use are therefore made.

The use of the teacher's study guide

First, we hope that the guide will help teachers to widen their own attitudes and academic experience so that they can conduct their courses more fruitfully by modern methods. Furthermore, they will be free to make written summaries based on it, adapted to the level of their classes, and mimeograph or otherwise reproduce them for the direct use of the students. In doing this, it is important that the material be presented in a more stimulating style than the one used here, so that giving information becomes an aim subordinated to creating interest, raising problems and giving hints for their discussion. Guide-questions for the student to answer in writing will help focusing his attention to

the crucial aspects of the subject and will make both his work and the discussion which must follow more productive.

The way for a meaningful teaching of biology at the secondary level is to place under the student's scrutiny: questions about himself, as a living being; biological problems of practical importance for his country or community, and issues of great interest for mankind in general. The subjects presented here relate mainly to such categories. It is not sufficient, however, to choose pertinent materials; it is essential that they be thoroughly relevant to the surroundings of the student and to his past experience. The best way to do this is to adopt the problem method in either of its variants, i.e. the discussion and the project techniques.

The problem method

Here are some of the abilities the problem method helps students to develop:

1. Drawing information from books, encyclopaedias and other sources, when needed, for the development of the subject he is studying.
2. Making summaries and drawing conclusions from readings and discussions, discarding trivial material and concentrating on parts which are important for his purposes.
3. Making use of basic equipment such as microscopes, centrifuges and glassware and manipulating chemicals safely and competently.
4. Making use of basic mathematical techniques when necessary.
5. Planning to conduct interviews and inquiries to obtain information.
6. Making a critical judgement of statements and reasonings from books and people.
7. Explaining ideas clearly, in writing or orally.
8. Planning and performing observations and experiments.

Among the mental attitudes which the problem method develops are the following:

1. To look for factors influencing a situation as a means of understanding it, for cause and effect relationships through valid criteria.
2. To avoid hasty judgement and unwarranted generalizations, and to base opinions on proved facts as far as possible.
3. To look for biases in one's own opinions and reasonings and examine other people's ideas openmindedly;

therefore to be ready to revise opinions as soon as new evidence is presented.

4. To judge the efficiency and precision of the methods and techniques used by oneself and others in collecting evidence.
5. To preserve his curiosity and interest with respect to all important aspects of science and its application.
6. To use scientific knowledge and the scientific way of thinking in current personal, communal and professional life.

These attitudes and principles show that the important thing is that the student improves the efficiency of his thinking during his training. The task of the teacher is mainly to excite the minds of the students through worth-while demonstrations, laboratory work, excursions, readings and discussions.

The whole process becomes more natural and efficient when students work in groups. Preparatory work, such as reading and summarizing, collecting information in books and interviewing people will be better done by small teams of students; the discussion of data gathered, answers to guide-questions, and reasonings and conclusions produced is more profitable if all in the class participate.

Some subjects, like reproduction in humans, are appropriate to be worked on through the discussion technique, variant of the problem method, while others, like pollution, will merit the use of the project technique.

The discussion technique

The efficiency of this teaching procedure depends specially on the adequacy of the written sources made available to the student and the skill of the teacher in conducting discussions. Basically, the ensuing steps may be followed:

1. The teacher presents to the student, in no more than ten minutes, the nature of the problems to be studied, being careful to emphasize the important points, without stating their solutions. This raises interest and helps the student perceive the aims of his work.

2. During one or more sessions the student reads and discusses in small groups some appropriate material and answers the guiding questions. This phase can be also worked out individually, in class or at home. The teacher makes sure that each team (or each student) writes down its (or his) answers to each guiding question.

3. To start the general discussion the teacher asks a student his answer to the first guiding question and the other students are encouraged to comment on it. Question after question is thus discussed until there is agreement in the class about the answer to each. The teacher should not lose the opportunity for extending the discussion to cover subjects not included in the guiding questions.

The project technique

Typical of this technique are the following aspects:

1. The activity must be directed toward a well-defined goal, and the scope of the problem must be wide; for example, 'to what extent is BCG vaccination efficient in the prevention of tuberculosis?' It must be divisible into significant subproblems ('what are the causes of tuberculosis?') and tasks ('find out how often BCG vaccination is used in our community').
2. The aim of the project should not vary, but the means may change as the actual planning is frequently revised.
3. The fundamental part of the project is the practical work (observations, experiments, interviews, data-gathering) and this must culminate in some concrete manner such as a final report, an exhibit, a demonstration or a seminar.
4. The richness of a project is measured by its interaction not only amongst the students but also with the community.

Ecology: concepts and principles

Ecology

Today, the word 'ecology' is much used in many situations and on many occasions. However, the term is often applied rather indiscriminately and sometimes even considered synonymous with 'environmental science'. But there is a difference. Ecology, as originally defined by the German biologist Ernst Haeckel, is concerned not only with the environment, but also with the organisms in that environment and 'all the complex interrelations' referred to by Darwin as 'the conditions involved in the struggle for existence'.

The subject-matter currently embodied in the discipline of ecology is not new. Its viewpoint, in so far as its implications in the understanding of global problems together with its conception of the earth as a set of interlocking and interdependent systems; and its emphasis on man as an integral part of these systems, is now accepted and of great significance.

Consequently, ecology is no longer merely a subsection of biology but also an extension of social sciences and the humanities. Man's relationships with both animate and inanimate nature reflect on and interact with his socio-economic structures. Crucial questions of economic development, industrialization and population control, etc., are all bound up with the ecological problem. In brief, the 'holistic concept' is gaining foothold, developing integrative approaches to human problems and creating inter-