

EXPERT COMMITTEE ON PROFESSIONAL AND TECHNICAL EDUCATION
OF MEDICAL AND AUXILIARY PERSONNEL

THE TEACHING OF SCIENCES IN PRE-MEDICAL COURSES OF STUDY

Geneva, 10-16 November 1964

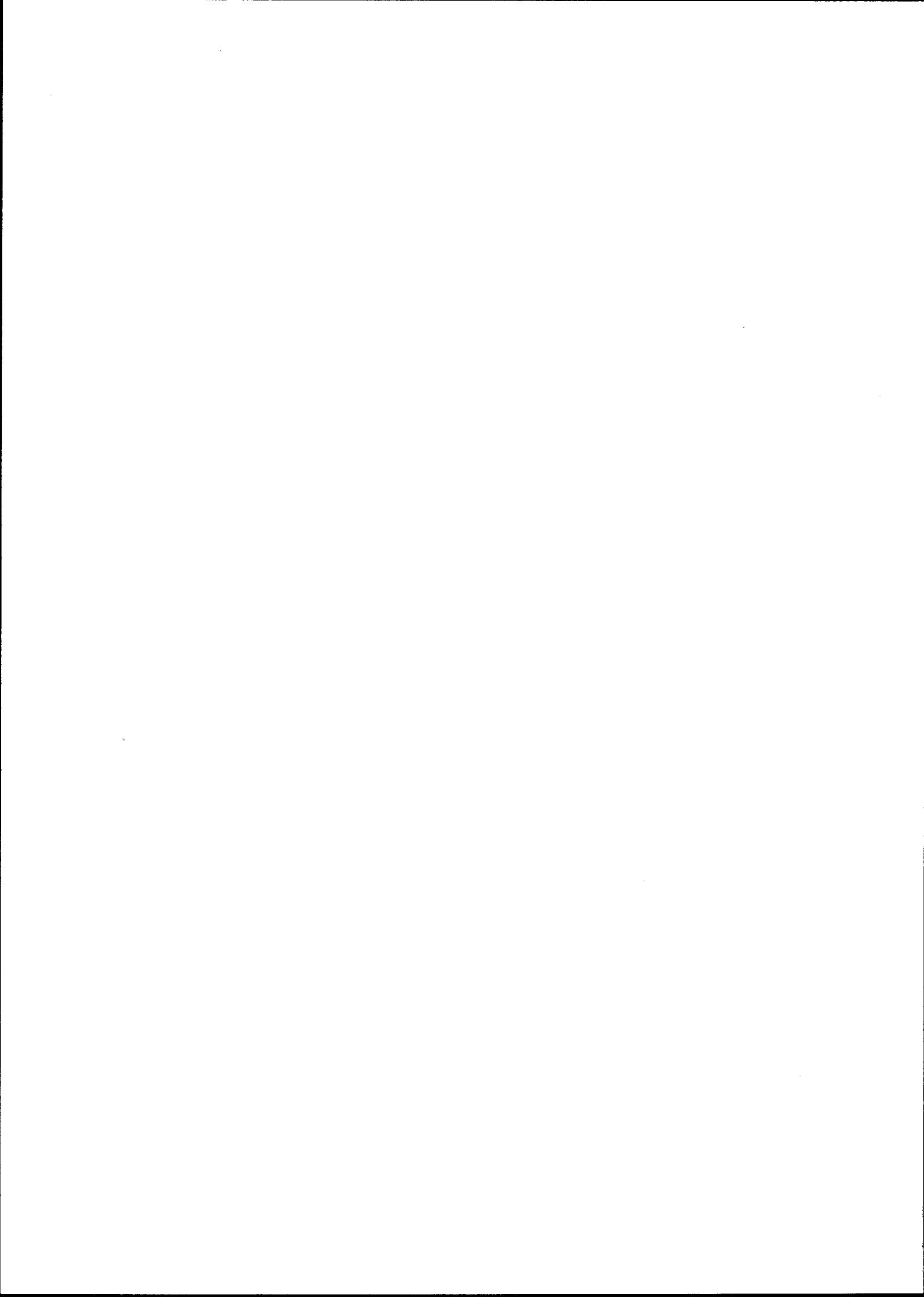
THIRTEENTH REPORT

CONTENTS



	<u>Page</u>
1. Introduction and general aspects	3
2. The content of teaching	7
2.1 Biology	7
2.2 Physics	8
2.3 Chemistry	10
2.4 Mathematics	12
3. Methods of teaching	12
3.1 New developments in methodology and organization	12
3.2 New developments in integration of the basic sciences into pre-clinical and clinical teaching	15
4. Preparation of teachers of basic sciences	16
Annex. Outlines of pre-medical courses in biology, physics and chemistry	19

This report contains the collective views of an international group of experts and does not necessarily represent the decisions or the stated policy of the World Health Organization.



Members

Dr A. L. Aboul-Nasr, Director of the Cancer Institute and Professor of Cancer Surgery, Faculty of Medicine, University of Cairo, United Arab Republic.

Professor P. de Goes, Director, Institute of Microbiology, University of Brazil, Rio de Janeiro, Brazil.

Professor A. L. Mjasnikov, Director, Institute of Therapy, Academy of Medical Sciences of the USSR, Moscow, USSR (Vice-Chairman)

Professor N. N. Pesonen, Director-General, National Board of Health, Helsinki, Finland

Dr A. Quenum, Professeur agrégé d'Histologie et d'Embryologie, Faculté mixte de Médecine et de Pharmacie, Université de Dakar, Senegal.

Dr V. Ramalingaswami, Professor of Pathology, All-India Institute of Medical Sciences, New Delhi, India (Rapporteur)

Professor R. W. Scarff, Director, Bland-Sutton Institute of Pathology, Middlesex Hospital, London, England.

Dr F. Verzar, Professor of Physiology, University of Basle, Switzerland (Chairman)

Representative of the United Nations Educational, Scientific and Cultural Organization

Mr R. E. Ganef, Division of Science Teaching, Department of Advancement of Science, UNESCO, Paris, France.

Secretariat

Professeur G. Amat, Laboratoire de Spectroscopie moléculaire, Faculté des Sciences de Paris, Paris, France (Consultant)

Dr M. Etemadian, Chief, Education in Medicine and Allied Subjects, WHO (Secretary)

Dr E. Grzegorzewski, Director, Division of Education and Training, WHO.

Dr G. E. Miller, Director, Office of Research in Medical Education, College of Medicine, University of Illinois, Chicago, Ill., United States of America (Consultant)

Dr A. Rabbi, Professor of Biochemistry, University of Parma, Italy (Consultant)

The WHO Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel met in Geneva from 10 to 16 November 1964.

Professor F. Verzar was elected Chairman; Professor A. L. Mjasnikov, Vice-Chairman; and Professor V. Ramalingaswami, Rapporteur.

Dr P. Dorolle, Deputy Director-General, opened the meeting on behalf of the Director-General, and welcomed the members. He said that the task before the Committee was to discuss the most appropriate manner in which a student might be trained in basic sciences as a preparation for a career in medicine and "to review the minimum level of knowledge in natural sciences in pre-medical courses of study necessary to prepare the students for the effective pursuance of medical studies proper".¹ This issue arose partly from the observation, in some countries, of a high proportion of failures during the initial stages of medical education which seemed to result from inadequate preparation in basic sciences. A similar problem was sometimes encountered in the WHO fellowships programme, particularly in the case of developing countries. The convening of an expert committee in order to render advice in this area was approved by the Sixteenth World Health Assembly.

1. INTRODUCTION AND GENERAL ASPECTS

For the purpose of this report, the term pre-medical sciences refers to chemistry, physics, biology and mathematics which are taught as preparation for the medical studies proper beginning with anatomy, physiology and biochemistry. It is used without regard to the kind of institution under whose auspices this phase of instruction is conducted since systems of pre-medical education in these subjects differ greatly in various parts of the world. For example, in some countries, instruction in these topics is provided within the medical school itself and is the direct responsibility of the medical faculty. In others, it is given either in the university science departments and colleges or in higher secondary schools at the pre-university level. The duration and content of such courses also varies widely. Thus, in some countries, the period of pre-medical

¹ Off. Rec. Wld Hlth Org., 1963, 125, 47.

study covers one or two years while in others, such as the United States of America, three or, more often, four years of college education is the general rule before beginning the study of medical sciences proper. Furthermore, the average age at which a student commences his regular medical studies also varies widely in different parts of the world. Each of these systems has a relevance to local conditions, traditions and resources. It is realized that the pattern that exists in each country has evolved in accordance with its educational framework and that the goals of pre-medical education may be achieved by different systems.

Divergent views are held by educators regarding the most desirable pattern with reference to the factors mentioned above. For example, the 1952 WHO Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel in expressing certain broad views about teaching basic sciences acknowledged that the student entering medicine should be well-grounded in these subjects. It further pointed out that "Study of the biological and physical sciences should provide basic understanding of the phenomena of living organisms and their adaptation to their environment". Later a WHO Study Group commented that "chemistry, physics and biology should be taught as general courses not specially designed for the future physician", and went on to say that "the applied aspects of these basic sciences would be instilled in the student later in his studies by his teachers in anatomy, physiology and clinical subjects".² The present Committee acknowledges that there is room for divergence of opinion on the extent of specific orientation towards medicine in pre-medical studies. It considers, however, that whatever system is selected it would be desirable for pre-medical studies to contribute to the development of student interest in living organisms and their environmental adaptation. Nonetheless, in view of the cultural and other reasons for variable approaches to pre-medical education it is necessary to recognize that in the present state of knowledge about the relative effectiveness of different patterns, it would be undesirable to recommend any rigid set of courses, with arbitrary stipulation of duration and orientation.

¹ Wld Hlth Org. techn. Rep. Ser., 1953, 69, 7.

² Wld Hlth Org. techn. Rep. Ser., 1962, 239, 26.

While the term basic sciences, as used in this report refers only to chemistry, physics, biology and mathematics, the Committee fully recognizes the importance of the behavioural sciences, including psychology and sociology, as well as the humanities - history, languages etc. - in pre-medical studies. However, in view of the extensive nature of these subjects and of the fact that some have received their due emphasis in earlier reports, they are not considered further in this report. It is the view of the Committee that pre-medical education should retain its liberal scientific character, but within this scheme the achievement of a minimum body of knowledge necessary for the more specific purposes of pre-clinical and clinical education in later years must be accomplished.

As a primary task this Committee was charged "to review that minimum level of knowledge in natural sciences in pre-medical courses of study necessary to prepare the students for the effective pursuance of medical studies proper".¹ The Committee recognized that the ultimate goal of pre-medical education should go beyond considerations of curricular outline and content and should encompass the specific behavioural objectives of teaching basic sciences in pre-medical courses of study. There has been an extensive discussion in the past about the number of hours to be spent in teaching specified areas of knowledge and a wide variety of courses have been designed, but the primary object of pre-medical education should be to create a programme that leads a student steadily toward the professional behaviour he must ultimately exhibit and not towards the acquisition of knowledge alone.

As they are organized to-day in many parts of the world, pre-medical courses of study seem largely directed to the memorization of a vast body of knowledge. Such courses are often regarded by students as a tiresome necessity, to be "cleared" before entering medical studies proper. This discontinuity between pre-medical and medical courses of study requires the most thoughtful attention.

There is obviously an urgent need to inject new ideas and adopt a fresh approach to the teaching of basic sciences during pre-medical studies. The Committee agrees that these courses must first introduce a prospective medical student to the processes

¹ Off. Rec. Wld Hlth Org., 1963, 125, 47.