PREMEDICAL ZOOLOGY: A DIFFERENT VIEW-POINT

BY

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The problem of the early biological instruction of medical students has been the subject of a recent interesting and stimulating article by Drs. Abercrombie and Johnson.¹ With their ideas on how to train young students in scientific method no one will quarrel. Many of their ideas about the reform of the zoological syllabus of the first M.B. examination are, however, more controversial. Their central theme is that the proper study of the elementary medical (and zoological) student is man, and that zoological instruction given during the first year at university or hospital should be redesigned along these lines.

The need for the extension of biological teaching in schools is now generally accepted, and there can be little doubt that for those who do not intend to pursue biological studies further the biology of man must receive first consideration. For those who are going to dedicate many years to the subject the anthropocentric approach may not be the best starting-point. The medical student will devote two years to the unrestricted study of human anatomy and mammalian physiology and will subsequently study the human body in disease. Since all his later student years are to be dedicated to the study of biology from this limited view-point the need for giving him during his first year as broad a background as possible is imperative.

Man's Place in the Evolutionary Scheme

The zoological training of the first-year medical student has to be considered with two factors in mind:

(i) The course must lay a scientific foundation for a highly detailed study of human anatomy and physiology. It must therefore include a general outline of mammalian anatomy (including histology) and physiology, and also, since it is widely used for physiological experiments, the anatomy of the frog; the use of the microscope and of the scalpel must also be known.

(ii) The medical student will usually not have an opportunity for the further study of zoology. The course must therefore make it clear that one scientific approach to human anatomy and physiology lies in an understanding of man as the product of long evolution and as adapted to a particular habitat. At the same time the scientific principles underlying the study of the relationship of man to his civilized environment, to his parasites and his food supply, must be made plain.

These considerations closely define the nature of the course which is required. The central theme must be that of evolution rather than man. Nothing, in fact, could be more unfortunate scientifically than to inculcate in the mind of the young student the idea of man as the measure of all things. It is true that man may be better in this role than the traditional frog, but, as Prof. Cole's recent *History of Comparative Anatomy* shows clearly, this approach is scientifically barren, and biological thought without the guiding principle of evolution becomes pointless and undirected.

The existing syllabus was no doubt framed with the idea of illustrating evolution. The method used is to give a short description of the whole animal kingdom illustrated by a detailed study of a few animal types. Unfortunately the account of the anatomy of the types has tended to become an end in itself, and the underlying principles, hard enough to appreciate anyway in such a broad survey, have been lost. The method is a failure, and has led to the student cult of the reproductive organs of the earthworm, whose ending no one could lament.

Outline of Vertebrate Evolution

It is clearly necessary to reform the course. How, then, in greater detail should this be done? A start should be made with a survey of the animal kingdom in relation to habitat and structure. This must not, however, be allowed to descend to the level of a catalogue of aesthetically pleasing or economically important animals. It must show clearly how, say, arthropods differ from molluscs and echinoderms. The principle of increasing complexity of structure must be stressed, but no time should be spent on the detailed anatomy of

particular invertebrates. Then, by reference to the fossil record, the general outline of vertebrate evolution should be shown as demonstrating on the one hand the fact of evolution and on the other the biological position of man as a recent product of a long process. The course should then give a detailed account of the evolution of the vertebrates as a dynamic story showing the fish as the starting-point; how and why the vertebrates came on land; the new problems they had to solve; and how these were solved increasingly effectively by amphibia, reptiles, and mammals.

This treatment differs from that of Drs. Abercrombie and Johnson very radically. They believe that the principles of comparative morphology are the "least important branch of zoology when man is the centre of interest." Surely it is these principles which can help to lighten the long study of topographical anatomy. To omit these, the greatest unifying principles of biology, is to encourage an empirical and unscientific frame of mind. It is because these principles are so well illustrated in any account of the evolution of the terrestrial vertebrates that particular emphasis has here been laid on this question.

If the principles of comparative morphology are rejected a new unifying idea has to be sought. This is found by Drs. Abercrombie and Johnson in a "central theme, such as the maintenance of constancy of the internal medium in the land habitat." This theme is to serve as the leitmotiv to a study of the "physiological anatomy of man against a background of other animals."

It is submitted that this central theme is asking the student to run physiologically before he can walk. The maintenance of the constancy of the internal environment is effected by the integrated regulations of certain functions. Before these regulations can be understood the methods of working of the component parts must be thoroughly grasped, and in some cases a very detailed knowledge is required. The elementary student must be given elementary facts, and would surely be better served if he is shown the fundamentals of certain types of physiological mechanisms such as locomotion, digestion, respiration, and excretion, if he is shown the living organism as a physiological unity and as an attempted adaptation to a particular way of life. The essentials of the various mammalian physiological mechanisms and their anatomical basis can undoubtedly be better understood when they are seen in relation to the evolution of the terrestrial vertebrates, rather than when odd animals are occasionally introduced to clarify particular difficulties which may arise in human anatomy and physiology.

The treatment of vertebrate embryology should go hand in hand with that of anatomy and physiology, and the adaptations of the embryo to a terrestrial existence should be shown. At the same time the significance of recapitulation and its usefulness in understanding the morphological events of ontogeny should be explained.

The course of study should then proceed to consider the possible mechanisms of evolution; genetics should be shown in its relation to natural selection. The question of nature and nurture can be amply discussed in this connexion as well as the evolutionary consequences of tool-using and civilization. Here also logically belong a discussion of adaptation and oecology, including food-chains and the pyramid of numbers, together with a consideration of the effect of human interference on animal populations. The problems of the biology of parasitism should be presented against this background, emphasis being laid on how control measures are dependent on a knowledge of the biology of the parasites and their hosts rather than on over-detailed accounts of the morphology of different stages in the parasitic cycle. Finally a brief account of the historical development of biology should be given so that its relations with medicine and the other sciences may be seen. These latter details agree closely with the proposals of Drs. Abercrombie and Johnson in content except that the emphasis on evolution rather than on man is still stressed.

Social Aspects of Science

During recent years there has grown up an increasing body of opinion which believes that the interest of the student in science can be enhanced if the social applications and origins

¹ Abercrombie, M., and Johnson, M. L., *British Medical Journal*, 1945, 2, 262.

of the subject are emphasized. This view is doubtless quite correct, but is open to abuse and misinterpretation. For example, it is not necessary or desirable to teach only the latest discoveries in any field. Physics is not best approached through atomic bombs, or biology through D.D.T. In dealing with embryology Drs. Abercrombie and Johnson suggest that the course should consist of "development, omitting details of morphological embryology." This is a vague formula, but when taken together with their dictum that "comparative morphology is the least important branch of zoology," one wonders whether the morphological details are to be replaced by a discussion of the results of experimental embryology. Interesting and important as these are, they are certainly incomprehensible without a detailed morphological background. Students may perhaps learn the catchwords, but their knowledge will be shallow.

Again, the introduction of the social aspects of science cannot eliminate the necessity for application and learning on the part of the student. The multiplication tables still have to be learnt even if their historical background is explained; they are no easier to learn because of it, but the incentive to learn may be greater. Such an approach must not be allowed to become one in which learning the social background replaces learning the facts; mathematics, chemistry, and zoology must not be allowed to degenerate into history and sociology.

Finally, such an approach must not be used as an excuse for learning something different simply because it is easier. This appears to be the attitude of Drs. Abercrombie and Johnson. In defence of their anthropocentric orientation they stress the point that "the material [presented] will be more readily learnt and retained than will that of traditional zoology." Note that the contrast is between traditional zoology and human biology, not between the traditional presentation of zoology and a presentation with a more human appeal. Drs. Abercrombie and Johnson in fact favour human biology rather than zoology as a part of the early training of the medical student because, *inter alia*, they find that human biology is easier to learn than zoology. To learn Spanish is probably easier than to learn Greek; both may be necessary, but they are not the same thing. This appeal to ease of learning must be disallowed, though it is incidentally interesting to note in this connexion that the B.B.C.'s biological course for schools, prepared by Miss Honor Wyatt, has for several years now been based on the story of vertebrate and human evolution.

Another argument pressing the claims of human biology is that it will forge a real link between the first M.B. and the subsequent course, so that there will be "less danger that the biological principles which the course illustrates, and the scientific attitude it is supposed to inculcate, will be jettisoned." It is not clear why Drs. Abercrombie and Johnson consider that the inculcation of the scientific attitude ends with the first M.B. That, however, is beside the more important point that this link depends in reality on the fact that the biological principles which Drs. Abercrombie and Johnson would introduce into the first M.B. are those which the students will have with them always. I suggest that the link should in fact be forged from the other side and that more material from comparative anatomy and physiology could advantageously be incorporated in the second M.B. courses.

Conclusion

In the final analysis, however, we return to the problem of whether there is a need for a zoological course for first-year medical students or whether they should rather be given an outline of human biology, including instruction in human anatomy and physiology, presumably by competent human anatomists and physiologists and not by zoologists, whose knowledge and experience on these matters are generally limited to their reading of textbooks. It has been urged above that the contribution of zoology to the intellectual armament of the medical student is the evolutionary outlook towards biology. This, zoology alone can give, and if this, the most embracing of all biological generalizations, is worth fully understanding, the medical student must have a zoological course. To sum up:

(i) The main contribution of zoology to the intellectual training of the medical student is the idea of evolution.

(ii) The zoological course of the first M.B. should be designed to show man's place in the evolutionary scheme.

(iii) This can most easily be done by laying the main emphasis on the evolution of the vertebrates.

(iv) A course in human biology is not a substitute for a course in zoology, nor is ease of learning a criterion by which the desirability of teaching a subject can be judged.

ORGANIZATION FOR TREATMENT OF CANCER

Some three years ago, as a sequel to the passing of the Cancer Act, the National Radium Commission issued a pamphlet *Organization for the Treatment of Cancer*. The Commission did not attempt to frame an exact constitution, nor did it lay down any specific pattern for future organization. It confined itself to an examination of the defects of existing facilities for dealing with the disease, and put forward suggestions for the improvement of these, dealing, however, with general principles only; for example, the importance of early diagnosis, the need for consultation between a team of experts before treatment is planned, the desirability of pooling resources, and the cardinal position occupied by research. The Royal Cancer Hospital (Free) found itself in general agreement with the Commission, having already been working for some years on the lines recommended. It was thus encouraged to develop its plan. Some two years later a second pamphlet, known as *The A B C Scheme*, was published. This went into greater detail, and suggested a specific allocation of responsibility for the diagnosis and treatment of cancer in a region comprising London and the Home Counties.

A Co-operative Plan

In the absence of any indication as to the official attitude towards these proposals, and as to the probable future national organization under the Cancer Act, the Governors of the Royal Cancer Hospital, acting on the advice of their medical committee, decided to expand the internal organization of the hospital, and to proceed with its plans for collaborating with a number of other special hospitals in cancer diagnosis and treatment.

This decision was prompted partly by a desire to place the exceptional resources of the hospital for diagnosis, treatment, teaching, and research at the disposal of the patients and staffs of other hospitals, and partly by a desire to obtain a larger number of cases of the less common forms of cancer both for purposes of research and in order that current methods of treatment might be tested, developed, and improved. Negotiations were therefore opened with the following hospitals, most of which had been co-operating with the Royal Cancer Hospital in an unofficial manner for a number of years: the Brompton, the Chelsea, the Gordon, the Princess Beatrice, the Royal Free, the Royal London Ophthalmic, the Royal National Nose, Throat, and Ear, and the West End Hospital. A general procedure agreeable to all was evolved.

Outline of General Procedure

The patients referred by the co-ordinated hospitals are examined at a consultation clinic at the co-operating hospital by a team comprising a physician and/or a surgeon and a radiotherapist, often with a clinical research assistant in attendance. The main lines of treatment to be adopted are laid down, and the full resources of the whole group of hospitals are available for the patients. Surgical treatment is usually carried out at the co-operating hospital, but patients may be transferred freely from one hospital to another for surgery, radiotherapy, or chemotherapy, according to the location of the equipment indicated or to the facilities most suited for the purpose.

In order still further to promote harmony and good will certain subsidiary arrangements have been made as follows. All beds in the Royal Cancer Hospital have been pooled, and all members of the cancer team—physicians, surgeons, and radiotherapists—have equal privileges in the admission of patients. Members of the staffs of some of the special hospitals co-operating have been appointed to the staff and medical committee of the Royal Cancer Hospital. This arrangement is reciprocal. A Co-operating Hospitals Committee has been set