outdoes even the salmon, which otherwise leads the field—from, inter alia, horses, jet-airliners, motor cars, pigeons, dogs, humming birds, and bees in that order.

For me on my bicycle this figure converts to 19 300 calories per mile, or, in nutritional parlance, 19.3 calories (0.0504 MJ/km), for it has to be remembered that the "calories" of the dietitian are the kilocalories of the scientist. This means that a glass of milk—130 kilocalories (0.54 MJ)—will take me on my bicycle for over six miles (9.7 km), a large slice of bread for five miles, and a fair-sized apple or boiled egg for four. A lump of refined sugar will carry me less than one. A 2-oz (56-g) bar of milk chocolate, by contrast, contains 300 kilocalories (1.24 MJ), and so do 1½ pints (1.05 l) of draught bitter; but try giving that to a Rolls Royce and see how far you get. Even if it were able to make use of energy in such a wholesome and unexplosive form that magnificent machine would be lucky to lurch 200 yards (180 m), whereas the cyclist on this fuel can travel 15 miles (24 km). One final fact perhaps deserves recording: caviar is weight for weight a marginally more powerful fuel than unenriched muffins. But if you are a working doctor or a working anything else and need your calories quickly go for the muffins.

Evolution

And what of the future, for us whose physiology is still—as it always was—more fitted to the austerities of the stone age than the enticements of affluence? It does not take much imagination to discern a fork in our evolutionary path. Our descendants will look back on a time of some difficulty for *Homo sapiens*—as he had hopefully and with some reason called himself. An originally

privileged subgroup of the species failed to readapt. They came to believe that they could not move any distance unless they were carried, either by their cars or by some other propulsive aid. They ceased to do any significant muscular work, and by one of those strange twists of history they became in the end the prisoners of the machines which were to have set them free. The phenomenon was seen in all races and in some more than others. Only isolated communities in rough terrain escaped. This pitiable creature was known at first as *Homo vehiculo constrictus*, but as it rapidly became apparent that he was constricted not only in his freedom of movement but also in his world view and his arteries he came to be called simply *Homo constrictus*. The writing was on the wall and by the end of the holocene he was gone. All future races of mankind descended from the other more active subgroup—*Homo se propellens*. This very advanced human primate was clever, keen, and cultured. His archetype in many societies was the cross-country runner. He walked or went on a bicycle, and he survived.

References

- ¹ Angrist, S. W., and Hepler, L. G., *Order and Chaos. Laws of Energy and Entropy*. New York, Basic Books Inc., 1967.
- ² Williams, R. E., *Lancet*, 1973, 1, 596.
- ³ Lawther, P. J., personal communication.
- ⁴ Lamb, H. H., *Climate Present, Past and Future*. Vol. I. London, Methuen, 1972.
- ⁵ Wilson, S. S., *Scientific American*, 1973, 228, No. 3, p. 81.

Outside Europe

Should undergraduate medical training in a developing country be different?

BRIAN SENEWIRATNE, V A BENJAMIN, D A GUNAWARDENA, M KANAGARAJAH

British Medical Journal, 1975, 4, 27-29

It is claimed^{1,2} that the type of doctor needed in a developing country is different from that required in a developed country and that those trained in medical schools which base their curriculum on that in Britain are unsuitable for manning the health services of these developing countries. Whether the product of a medical school is considered satisfactory or not depends on at least three factors: (a) the basic raw material selected for training which, if bad, will result in an unsatisfactory end product; (b) the instruction given, its content, and relevance to the disease problems of the country; and (c) the work a doctor is called on to perform.

The curriculum, whether it is British based or not, is, therefore, only one of several possible reasons for "unsatis-

factory" doctors, and if Sri Lanka and other developing countries are to get value for the considerable investment they make in the training of doctors,³ all these factors must be considered.

Basic raw material: Defects in selection

Lack of interest in medicine—This is not a problem confined to the developing countries.⁴ Students embark on a medical career for a variety of reasons such as an interest in medicine, an assured job, a comfortable income, prestige and, possibly, the drama of medicine. It is doubtful whether more than half of those chosen are really interested in the care of sick people. The lack of interest is undoubtedly due to the way a student is selected—that is, entirely on his ability to pass an examination with no assessment as to his suitability for that particular career. Such methods of assessment as an interview or a school principals report, despite their known limitations, do offer some opportunity for judging the suitability of a student. An early opportunity for such assessment might arise in medical school if students were exposed to the care of patients in the first two years. This would also give the students an early opportunity of deciding whether to pursue this particular career. A decision is more easily taken at this stage to divert someone to a paramedical field rather than allow an unsuitable student to continue in medicine.

Wrong sex ratio—Because of the lack of suitable living quarters and the remoteness of some of the smaller hospitals there is a marked reluctance of women to staff these hospitals. Despite this the percentage

Department of Medicine, University Peradeniya and the General Hospital, Kandy, Sri Lanka

BRIAN SENEWIRATNE, MD, MRCP, associate professor of medicine
V A BENJAMIN, MS, FRCS, surgeon
D A GUNAWARDENA, MD, MRCP, dermatologist
M KANAGARAJAH, MD, MRCP, physician

of women admitted to our medical schools has increased from 26.1% in 1964 to 51.2% in 1974.⁵ The developing countries must realise that the male doctor is a better investment in the delivery of health care under difficult rural conditions.

Lack of knowledge of English—Selection of students with inadequate English results in the student battling with the language rather than with the subject since there are no national language textbooks. However politically expedient it may be to boast that all instruction is now given in national languages, as it is, for example, in China and Japan, to do so in many developing countries would result in a marked lowering of standards. English as a medium of instruction can be replaced only by another world language and attempts to use languages that are spoken only by a few million people will result in inadequately trained doctors.

Instruction given

CURRICULUM

Difference in spectrum of disease—The prevalence of different diseases in different countries should certainly influence the curriculum. It is not often realised that “non-tropical” diseases are predominant in tropical countries (as shown in one of our research units). A random 10% sample of all patients (20 500) admitted to this hospital during a three-month period were classified according to their final diagnosis into “tropical,” “doubtful tropical,” and “non-tropical” diseases. The diseases were grouped according to their position in a popular British textbook.⁶ Those appearing in the main section of the book were considered non-tropical. Those exclusively described in the “tropical disease” section of the book were considered tropical and those listed in the tropical section but described in the main section were considered “doubtful tropical.” On this basis, only 0.9% of the 2060 patients had a “tropical disease,” and 6.8% a “doubtful tropical” disease. Thus over 90% of the admissions were for non-tropical diseases. In a study of consecutive patients in the general outpatient department in Sri Lanka (who would be similar to those attending a general practitioner's clinic in the West) 2% had a tropical disease, 14% a doubtful tropical disease, and 84% a non-tropical disease. These figures emphasise the importance of non-tropical disease in tropical countries.

Over-emphasis on preventive medicine—Preventive and social medicine have been neglected in many countries. Like any suppressed situation which, on release, tends to rebound, we in the developing countries are now in the midst of a surfeit of preventive and social medicine. In the new curriculum of the Colombo Medical School, 973 hours were spent in teaching medical students public health and only 979 hours on the rest of medicine (which included time for clinical appointments in medicine), and only 256 hours on the teaching of paediatrics.⁵ These attempts to make doctors into public health inspectors is as bad as the previous unsatisfactory system of training doctors, which omitted preventive medicine. If there is a shortage of public health personnel, it would be far more economical to produce more of these people (whose training is much shorter and hence cheaper) than attempt to make every doctor into a public health inspector. The importance of a good knowledge of preventive and social medicine, especially in a developing country, is unquestionable, but unless an already long medical course is made even longer, *over-emphasis* of its place in the curriculum must result in inadequate instruction in curative medicine. All that an undergraduate in a developing (as well as in a developed) country needs is a sound basic knowledge of the principles of this subject. The detailed delivery of preventive medicine should be the province of staff specifically trained in this field.

UNCritical INTRODUCTION OF NEW TEACHING METHODS

A new trend in some developing countries is to adopt without question methods of teaching developed in other, very different, countries—for example, the United States. Any new ideas, such as the abolition of formal lectures, student-led discussions, “active learning,” etc are introduced (usually after a brief visit to these countries) with no thought as to whether these systems are applicable in *their* environment to students with *their* background.

Lectures are abolished on the grounds that if the student “actively” seeks out the information for himself, it will result in a better retention of knowledge. This is very true. What is not realised is that in this country there are no textbooks in the national languages and the availability of textbooks in English is greatly limited by foreign exchange difficulties. In addition to a wide range of books, most

Western medical schools have various teaching aids such as tape recordings and audiovisual aids, luxuries which we in the developing countries cannot afford. All this must necessarily result in a breakdown of this method of training which has been developed in the West where these problems do not exist. It is also not appreciated that, unlike in the West, students here who have all their lives been “taught” in their schools are unable suddenly to adapt to a new mode of instruction upon entry into the university.

Small group and student-led discussions are in vogue. Again it is not appreciated that our average student, unlike his Western counterpart, is unwilling to take part in a discussion, having been almost indoctrinated throughout his school life to accept unquestioningly what the teacher says. This is undoubtedly very unsatisfactory, but it is equally unrealistic to expect a sudden change of attitude in students simply because they change their place of instruction from school to university.

However desirable the new teaching methods may be, the changes should be made first in the schools. A reversal of this order, as is happening in this country, is likely to create chaos and result in inadequate training.

The work a doctor is called on to do

A considerable amount of a doctor's time, especially in peripheral hospitals, is spent in administration. In an extensive study of the health manpower problems in this country,⁷ it was found that district medical officers spent 26.5% of their time on administration. Doctors responsible for preventive medicine (medical officers of health) spent 58.9% of their time on administration and only 14.8% on “the prophylactic and promotive activities” which should have been their main concern. Attempts to use a doctor who has not the interest, ability, or training in administration may give the appearance of an “unsatisfactory doctor”. This is not due to any fault in his professional training but to the misuse of that training.

Unrealistic work loads are another problem. Outpatient visits in many developing countries are more a ritual than a proper consultation. In the teaching hospital in Kandy nearly a thousand patients are seen every morning sometimes by as few as five doctors over a period of four hours (an average of one patient per minute). The situation in the smaller peripheral hospitals is even worse. Doctors who are well-trained and unprepared to take part in this bluff may be considered “unsuitable doctors” who are unable to “fit in.” Specific training is necessary to enable a newly qualified doctor to recognise quickly the occasional patient among the multitude seen in the outpatient department who requires further investigation. This is an art in itself which can be learnt by attachment during the training period to the outpatient department.

The rational answer, however, is the provision of more people rather than a change in the curriculum. In the outpatient study in the Kandy General Hospital (referred to earlier) it was found that 66.1% of the patients could initially have been seen by someone far less qualified than a doctor—for example, a medical assistant or a senior staff nurse. There is no doubt that the training of medical auxiliaries⁸ will greatly reduce the work load of doctors. The fear is that they will be used not to assist but to replace doctors, which would have disastrous consequences.

Doctors in the developing countries are often faced with poor working conditions. In small peripheral units even the most basic requirements for the practice of modern medicine do not exist. This is due more to political pressure than to a reasoned decision as to whether they can be usefully employed there. Should a doctor's training be modified because of our inability to decide on what situation calls for a doctor and what does not? Until it is economically feasible to provide certain basic requirements for the practice of Western (as opposed to indigenous) medicine, these small peripheral units should really be referral stations equipped with an ambulance, staffed by a senior staff nurse, and visited by a doctor, say, once a week.

Training of doctors in developing countries

There should be no difference in the basic training of doctors in developed and in developing countries. The training of a doctor in any country should be aimed at turning out a good doctor who can fit in anywhere.

The problem seems to be a confusion about the medical needs of a developing country. As we see it, there are three basic health needs in such countries.

Firstly, there is a need for preventive medicine, which, because there is so much preventable disease in the tropics, requires a large body of people trained in preventive medicine (public health personnel).

Secondly, some access to Western medicine is needed in remote villages. This requires men and women trained in family health who can make a few basic decisions such as when a patient should be referred to a larger hospital. A definite programme of training is needed for this and for the medical auxiliary⁸ or "bare foot" doctor.⁹ The undisputed need for such people in developing countries should not have any effect on the training of a doctor.

Lastly, doctors are needed for the diagnosis and treatment of disease. Disease and its complications are the same the world over. Tuberculosis and endocarditis present the same problems in diagnosis and management, carry the same serious prognosis, and have to be managed in exactly the same way in Britain, America, India, or Sri Lanka.

The claim^{1,2} that undergraduate medical training in the developing countries should be altered is probably the result of an inability to recognise the need for these different groups of medical personnel. Attempts to produce one type of medical practitioner who is expected to satisfy these different functions

will only result in a lowering of the standards of curative medicine, preventive medicine and family health care.

We are grateful to Dr K A Gunawardena and Dr Shanthi Tham-bipillai, research assistants, who made their data on the inpatient and outpatient studies and their views available to us, and to the Nuffield Foundation, London for a research grant to one of us (BS).

References

- ¹ Fendall, N R E, *British Medical Journal*, 1975, 2, 190.
- ² Waterston, A J R, *British Medical Journal*, 1975, 2, 190.
- ³ Senewiratne, B, *British Medical Journal*, 1975, 1, 618.
- ⁴ World Health Organization: *The Selection of Students for Medical Education*, Regional Office for Europe, Copenhagen, 1973.
- ⁵ Wijesinghe, C P, and Zarkovic, G, *National Health Manpower Study in the Republic of Sri Lanka. Substudy B, Medical Education*, Colombo, Ministry of Health, 1973.
- ⁶ Davidson, S, *Principles and Practice of Medicine*, 8th edn, London, Livingstone, 1967.
- ⁷ de Silva, W A B, et al, *Interim Report on National Health Manpower Study in Republic of Sri Lanka*, Colombo, Ministry of Health, 1974.
- ⁸ Gisch, O, *Lancet*, 1973, 1, 1251.
- ⁹ *Health Care in China*, Geneva, Christian Medical Commission, 1974.

Medical Education

The Nottingham medical school

J S P JONES

British Medical Journal, 1975, 4, 29-31

An important milestone in British medical education was reached in July 1975, when the first students at the University of Nottingham Medical School graduated with the degrees of Bachelor of Medicine, Bachelor of Surgery.

Planning for the first new medical school to be established in the United Kingdom this century was started in 1964, when the University of Nottingham appointed an advisory committee under the chairmanship of Sir George Pickering, FRS, then Regius Professor of Medicine in the University of Oxford. This committee produced their report—a blueprint for medical education of the future—in June 1965. In addition to setting down educational guidelines, the Pickering committee also recommended that a medical centre, consisting of a medical school and university hospital complex, should be sited adjacent to the existing university campus.

Professor A D M Greenfield was appointed dean of the medical school in June 1966, and he brought together a team of professors and academic staff in the basic medical sciences and clinical subjects. This group, together with a newly created administrative and planning team, had the task of translating the Pickering concepts into reality. Coincidentally with the curriculum planning, the architects—Building Design Partner-

ship—drew up a design for the buildings to house the medical school and university hospital. They worked in conjunction with a planning team responsible to a local joint committee, which consisted of representatives of the University of Nottingham and the then Sheffield Regional Hospital Board.

The first stage of the new medical school buildings comes into use this autumn, and in the meantime much of the medical school has been temporarily housed in new buildings on the university campus. Because of delays in the building programme the clinical undergraduate training to date has been provided entirely at the existing Nottingham hospitals, mainly at the City and General Hospitals. The Children's Hospital and Mapperley Hospital have been used for child health and psychiatric training respectively. The new University Hospital will open in phases over the next few years and will play an increasing, and eventually a major, role in clinical teaching as the student intake increases from the present 48 admitted each year up to 1974 to the 160, or even 192, expected at the turn of the decade.

The curriculum

The first and second years of the five-year course consist of a basic medical sciences course, the third year of a special medical sciences course, and the fourth and fifth years of a clinical course.

BASIC MEDICAL SCIENCES COURSE

The two-year basic course has been designed to encourage good habits of learning, to lead to a familiarity with the broad field of medical science, and to extend the student's curiosity. We hope that the