satisfactory as routine hypnotics for the elderly, because they are not liked by the patients." A much more appropriate conclusion from the work of Exton-Smith *et al.* is that one particular barbiturate, amylobarbitone, in the single dose examined, did not perform well in their hands. To generalize from this to all barbiturates, all doses, and all patients seems unwarranted.

It was, on the other hand, most gratifying to find Dr. Parsons's data agreeing so well with my previously reported data. Like him, I found minimal differences between quinalbarbitone and phenobarbitone at doses of 100 mg., but substantial differences between these two drugs when the dose of each was doubled. It is thus clear that, as Gertrude Stein might have said, "a barbiturate is not a barbiturate is not a barbiturate."—I am, etc.,

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New Curricula

SIR,—In your leader (November 16, p. 1220) it is suggested that significant revision of the medical curriculum or any "radical experimentation" is unlikely to be practicable in one of the existing medical schools.

In the Newcastle Medical School a completely revised medical curriculum was started in October, 1962. Although it does not have the division into a B.Sc. course in human biology followed by a course for the medical degree, it does incorporate some of the features suggested by Dr. N. Malleson's group. A full description of the new curriculum will be published later, but your readers may be interested in the following brief statement.

The revision is planned to preserve all the features that are believed to be valuable in the traditional form of medical teaching and also to give as much as possible of the systematic instruction in an integrated form. We have tried to remove the sharp division between the preclinical and the clinical periods of study and also to bring the contributions of the various departments together so that medicine is taught as a whole and not in departmental compartments.

After the first or premedical year, which is unchanged, the student starts on Stage I with the integrated study of normal structure and function, including development and growth, psychology, and sociology. This stage lasts for four terms. The first trial of this part of the course is now nearly completed; it has been hard work especially for the staff, but we have every reason to believe that it has been a success.

Stage II lasts for two terms and is devoted to the study of the general and introductory aspects of pathology, microbiology, clinical

chemistry, pharmacology, environmental medicine, and clinical methods. It is of necessity less closely integrated.

In Stage III, occupying the fourth and most of the fifth years of the course, the student spends his mornings in the wards and in the afternoons gets integrated instruction about each of the systems of the body in turn. The relevant anatomy and physiology is revised and developed and teachers of all other subjects (paraclinical and clinical) make their contributions, sometimes in symposia or conferences, on the current subject. More emphasis will be given than in the past to psychiatry, geriatrics, and general practice.

In the last year of the course—Stage IV—the student, having finished all his systematic instruction, will be attached to the wards of the teaching hospital or other selected hospitals for prescribed periods of work as a senior student. During this time he should be able to take some measure of responsibility.

The summer vacation at the end of the fourth year and a period of one month in the final year will be "elective," and throughout the course there will be free time when the better students will be encouraged to take up investigation projects. Examinations will be held at the end of each stage, but we hope that they can be made less formidable and frightening experiences than they have been in the past. The curriculum will be kept under constant review by a structure of committees. I think we can reasonably claim that it is a "radical experiment."—I am, etc.,

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SIR,—In your leader of November 16 on this subject (p. 1220) you question the necessity for the establishment of university departments of general practice. Your reason for doing so is doubt about its academic nature.

Medicine to-day is becoming more complicated, and the general practitioner is required to diagnose and treat a wider range of conditions than any other clinician. He must be aware of, if not fully familiar with, many of the esoterica. Since the total range of medical knowledge is beyond the scope of any one brain, the general practitioner must work through a knowledge of fundamental principles derived finally from physiology, psychology, pathology, and pharmacology. This is what makes general practice an academic discipline in its own right. Without the establishment of departments to systematize this knowledge the teaching of general practice remains simply a catalogue of hints and tips given by old hands to apprentices. This may be good enough for a trade, but not for training young men and women who are going to spend 40 or more years wrestling with human problems produced by nature and society combined.—I am, etc.,

ALBERT JACOB.

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Fish Against Mosquito

SIR,—Your annotation "Fish Against Mosquito" (November 23, p. 1286) will assuredly attract the attention of many local authorities in this country who for years have been trying to combat mosquito nuisances, usually with very limited success, by using larvicides and insecticides of one kind or another. As the result of your annotation I have already received inquiries about mosquito control by introducing fish into mosquito-infested waters, and therefore I think it may be helpful to make a few comments.

Our several species of sticklebacks are gluttons for mosquito larvae, and several years ago in an experiment it was found that a hungry stickleback devoured 500 fourth instar culicine larvae in a few hours. But this was in a tank free from aquatic vegetation. When vegetation was introduced into the tank so that the mosquito larvae were on one side and the fish on the other, the fish never even attempted to penetrate the vegetative barrier to get at the larvae. When ponds, lakes, and other collections of fresh (non-brackish) waters are known to be infested with mosquito larvae, the sides of the breeding-grounds should be tidied up and vegetation removed before introducing sticklebacks or other predator fish. Furthermore, the sides of the breeding-grounds should be periodically examined and tidied up after the fish have been introduced, especially in early spring and during the summer months.

Finally, our greatest mosquito nuisances are around low-lying coastal areas where seasonal high tides cause brackish swamps which, in time, become more brackish than the sea itself. In these waters sticklebacks would play no useful part in controlling our most troublesome species of mosquitoes, *Aedes detritus* and *Aedes caspius*, which breed in brackish waters.—I am, etc.,

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Immunity to Poliomyelitis

SIR,—I imagine that most readers of the *British Medical Journal* have considered that the anonymous series of articles called "To-day's Drugs" are authoritative and accurate. It is therefore unfortunate that in the article on poliomyelitis (September 21, p. 731) there were a number of quite misleading statements. The Table which appeared in that article might form the basis of a "true, false, or unrelated" multiple-choice question for students, and should be referred to in relation to the following comments.

Development of immunity

It could be true to say that after feeding monovalent oral polio vaccine "immunity" develops in a few days, but it is not true to say that when Sabin's trivalent oral polio vaccine (O.P.V.) is

used, as in the United Kingdom, "immunity" to all three types of virus develops in a few days, nor is it correct to state that immunity develops some weeks after administration of Salk inactivated polio vaccine (I.P.V.). Protective levels of circulating antibody to one type of virus are probably found in most subjects within one week of administration of a dose of trivalent O.P.V. and to all three types of virus after the administration of a dose of *potent* I.P.V. There are two possible disadvantages as far as trivalent O.P.V. is concerned. Firstly, when trivalent vaccine is used antibody to the important types 1 and 3 viruses develops in only about half the subjects following a single (first) dose of O.P.V.¹ This deficiency is rectified when second and third doses of vaccine are given two or three months later. Secondly, if the vaccinated subject is already infected with a "wild" virus the vaccine virus is unlikely to afford any protection. It is for this reason that when O.P.V. is used in an outbreak of poliomyelitis its true protective effect is not observed until after a period of time equal to the normal incubation period of the disease.

Duration of immunity

There is evidence that the duration of immunity following three doses of British trivalent O.P.V. will be superior to that following three doses of I.P.V. as used in the United Kingdom in the past. There is no evidence that when more potent I.P.V. is used the immunity will be inferior. It will probably be superior to that now obtained with O.P.V. It is misleading to state that "in at least one of the United States of America a total of 12 doses of Salk-type vaccine are recommended," without also stating that annual revaccination up to the age of 8 years is recommended in the U.S.S.R.—a total of 11 or 12 doses of oral vaccine.² Neither of these schedules have any bearing on present-day schedules in the United Kingdom.

Formation of antibodies

There are one trial³ and one small field survey⁴ conducted in the United Kingdom which are more relevant to the formation of antibodies than the Swiss trial mentioned. Both these British studies indicate, as does the Swiss trial, that British trivalent O.P.V. stimulates the formation of neutralizing antibodies to all three poliovirus types in nearly 100% of subjects. Potent I.P.V. does the same. It is probably an illusion to imagine that more reinforcing doses will be required with I.P.V. than with O.P.V.

In the text of the article it is stated "by analogy with other attenuated viral vaccines, it [immunity] may well be life-long." By analogy with which attenuated viral vaccines—with vaccinia, for example, where revaccination every three years is recommended for those at risk?

What degree of protection is provided?

The answers given to this question in your article are not comparable. The

actual protection given by O.P.V. will be apparent over the next few years—I believe it will be very high. This should not be confused with the occurrence of vaccine-associated cases—i.e., cases of poliomyelitis due, or possibly due, to administration of the vaccine. There has been more than one such case in the United Kingdom,⁴ though there is no indication that the number of cases of poliomyelitis casually related to the use of O.P.V. is higher in the United Kingdom than in the United States (given in your article as 1 per 1.04 million). It should be borne in mind that this is an overall measurement of risk which does not take into account the greater susceptibility of adults. Most of the vaccine has been given to children, but most of the possible vaccine-associated cases have been in adults.

The data given in the Table for Salk vaccine is virtually meaningless in the context. The Salk vaccine previously used in the United Kingdom probably gave 90–95% protection following three or four doses. There is ample evidence from other countries that I.P.V. of increased potency gives virtually complete protection.

Can vaccinated subjects act as "carriers" of poliomyelitis virus?

It is correct to state that those who have received an adequate course of O.P.V. become much less likely to act as carriers of "wild" polioviruses. There is no absolute resistance to reinfection in all individuals who receive the vaccine, and, more particularly, in those who develop a low level of immunity as a result of vaccination. Intestinal resistance is of questionable duration. As far as I.P.V. is concerned I think it would be fair to say that those individuals who received I.P.V. of relatively low potency were less likely to act as carriers of "wild" viruses than unvaccinated people but more likely than those who have received O.P.V. It seems probable that the newer more potent I.P.V. will have a more pronounced "anti-carrier" effect than the earlier batches of I.P.V. used in the United Kingdom. Anyone familiar with the epidemiological evidence in favour of I.P.V. having had a "community protective effect"^{5–7} would hesitate to be as dogmatic as the writer of your article. It seems reasonable to assume that the much more potent I.P.V. available now will have a more pronounced effect than the low potency vaccines of the past.

In my opinion Sabin O.P.V. is on present evidence a better vaccine than the type of I.P.V. used in the past in the United Kingdom, but I am not at all sure whether it will eventually prove to be as good as the more potent types of I.P.V.

It is a pity that your contributor was not able to give a more balanced picture of the situation. I.P.V. is still preferred to O.P.V. in several of the most advanced countries. Would this be so if the issue was as black and white as your contributor makes out?

Finally, your article states that Sabin vaccine stored between 10° and 25° C. has a life of one week. This is contrary to the advice of the Ministry of Health (C.M.O. letter D/P/44/5 of July 25, 1963, to medical officers) in which it is stated that the vaccine at ambient temperature (i.e. up to 25° C.) has a life of 14 days.—I am, etc.,

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- ⁵ Gard, S., *Yale J. Biol. Med.*, 1961-2, 34, 277.
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Round the Fountain

SIR,—I have the highest and warmest regard for Professor Douglas Hubble (November 23, p. 1333), but I should feel guilty of an impiety if I asked you for no space in which to mitigate, if I can, his strictures on my first father in medicine, J. H. Drysdale. I myself am sorry that Drysdale's barbed darts, shot at colleagues, should now be recorded. Of course, the more outrageous cannot be excused, but I still find it hard to believe that as a teacher of diagnostic physical medicine to the undergraduate student he could, either then or since then, be surpassed, and it is impossible to dissociate that inimitable dry irony which delighted and stimulated his pupils from that which inspired those unhappy sallies.

He taught, above all, accuracy, alike in history-taking, physical examination, use of words, and reasoning. He taught us, for example, to distrust percentages and to present differential leucocyte counts in absolute figures. He taught us the cardiac arrhythmias before Mackenzie's findings had soaked into slower minds. I cannot believe that any student who absorbed his teaching could thereafter be woolly-minded, either in medicine or in life.

True, he taught us little of the whole man, and between Drysdale and a child in a cot there was a great gulf fixed. Like Professor Hubble himself, I was privileged, later, to learn about patients and the nature of medical practice from Walter Langdon-Brown, but, greater physician though he unquestionably was, I do not believe he could have taught, at least to me, what Drysdale taught me when, by a stroke of fate, he had charge of his senior physician's beds in, I suppose, 1912, and I have not ceased to be grateful.—I am, etc.,

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