sonal basis. I do not accept that the "family doctor is too busy" for this type of consultation. Many of the conditions listed by Professor Illingworth can be handled adequately during routine consultation times; and in any case many interested general practitioners run similar "no-appointment" child health clinics as part of their usual working week.

I wholeheartedly agree with Professor Illingworth's "firm belief" that lecturers in paediatrics and paediatric registrars should have experience of paediatrics in the community, rather than total commitment to sterile academic paediatrics; but why not acquire the experience in a general practice setting?

BRYAN L ANDERSON

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SIR,—I am delighted to learn that Professor R S Illingworth (24 March, p 797) has worked in child health clinics and welcome his suggestion that hospital-based paediatricians and medical students should have an opportunity to see the paediatric problems that present in the community.

It might be thought from Professor Illingworth's article that a health visitor is but a useful aid in a child health clinic, whereas in many child health centres it is a health visitor who takes the clinics, without a medical officer, and a health visitor who must deal with the many paediatric problems and queries mentioned in this article. Only 46.6% of under-5s ever attend such a clinic, according to figures in the Court Report; many of the paediatric problems of those who never attend are also dealt with by health visitors during home visits.

Professor Illingworth does not tell us on what evidence he bases his statement that health visitor training should be more realistic, beyond his reference to the examination papers. Perhaps his work in child health clinics did not allow him to observe the full range of the health visitor's work and skills? The health visitor training, part of which is undertaken with an experienced health visitor field work teacher, enables a nurse to work with families in the community carrying out health education, advising on child health, detecting deviations from normal, and helping parents to find and utilise the services their children need. Health visitors attend regular refresher courses, and continuing education through lectures and seminars on paediatrics helps them to remain up to date. I would agree that teaching by clinical medical officers is important too, as is the teaching carried out by doctors working in the primary health care team. After the basic health visitor training, as after every other basic training, continuing education and updating are essential.

LINDA DOWNING

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SIR,—Professor R S Illingworth suggests that health visitors have an important role in helping the clinic doctor, but that their training should be more realistic and appropriate facilities should be provided to keep them up to date in their work (31 March, p 866).

We suggest that health visitors are practitioners in their own right with a duty to liaise with all those concerned with health and welfare. Their training enables them to do this in a competent manner, and using the opportunities available both to attend lectures

and to study they are able to remain well informed about current ideas. A health visitor's training includes study of normal human development and deviations from normal, the social factors which influence behaviour, social policy, the social factors involved in health and disease, and the principles and practice of health visiting.

In relation to young children, health visitors are in a unique position in that they visit both mother and baby once the care of the midwife has ceased—usually between the 11th and 14th day after delivery. They usually make this visit having some knowledge about the mother's pregnancy, delivery, and subsequent health and also some information about the baby. The parents are seen subsequently with their children, either at the clinic or at home, by health visitors trained not only to look at individual problems but to observe the total situation. Health visitors learn to deal competently with many minor problems, but they also develop skill at knowing when to refer to others.

The role of the health visitor is to promote health in all its aspects through education. If Professor Illingworth is prepared to learn from health visitors I am sure that he will be able to score a few marks on one of their examination papers.

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Upper gastrointestinal endoscopy

SIR,—I would like to comment on the paper "Upper gastrointestinal endoscopy: its effect on patient management" by Dr C D Holdsworth and others (24 March, p 775).

The authors state that 44 out of the 95 patients underwent a change in their management after endoscopy. This, I think, is a considerable number of patients and thus they correctly emphasise the usefulness of the procedure. However, what is more important is the fact that in their patient population there were at least 95 cases where the clinicians felt that endoscopy was needed in addition to the barium-meal examination. Therefore it seems that in these patients the conventional barium meal proved unnecessary and endoscopy should have been the primary investigation rather than radiology. It would be interesting to know how many of their 2500 endoscopic examinations yearly were preceded by an unnecessary conventional barium meal. I think the number must be high since the clinicians have changed to double-contrast barium meal in one of the centres since this study.

As experience with fiberoptic endoscopy increases all over the country, it seems that the conventional barium meal does not have a place in the investigation of the stomach and duodenum. Why should one bother with conventional radiology when in almost every radiological situation one needs endoscopy either for histological confirmation of the diagnosis (as when carcinoma is speculated), for assessment of progress of healing (as in duodenal ulcers and benign gastric ulcers), or in barium-meal-negative dyspepsia which is persistent?

May I point out that the statement that endoscopy has not been evaluated objectively in conditions other than acute upper gastrointestinal haemorrhage is wrong? There is at

least one study¹ that assesses fiberoptic endoscopy in the diagnosis of gastric carcinoma in relation to the conventional barium meal. The conclusion was that the barium meal has nothing to offer and thus endoscopy is the primary diagnostic tool.

Fiberoptic endoscopy therefore will be even more cost effective if it is not preceded by the expense of an unnecessary conventional barium-meal examination.

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¹ Moshakis, V, and Hooper, A A, *Clinical Oncology*, 1978, 4, 359.

What shall we teach undergraduates?

SIR,—I was interested to see the article by Professor V Wright and others (24 March, p 805) which set out the teaching choices of some 600 doctors. But I was sad to see no mention of occupational medicine. This is an expanding specialty, with probably the largest group of doctors practising predominantly outside the NHS, and is one of the specialties recognised as such by the Joint Committee on Higher Medical Training. Scarcely a year ago a new Faculty of Occupational Medicine was established within the Royal College of Physicians of London, which has already attracted over 500 members and associates to its ranks. In addition, the Society of Occupational Medicine, which dates its antecedents back to 1935, has now nearly 1500 members, of whom between 800 and 900 are thought to be full-time occupational physicians.

Training schemes in occupational medicine will be launched in 1979, but this article makes it all too clear that if the subject is not taught at undergraduate level it is simply not considered when the aspiring doctor chooses his career for a lifetime in medicine.

May I make yet another plea, by no means the first, that the health of people at work is of vital importance, provides a stimulating and varied medical career, and must receive its rightful place in the undergraduate curriculum?

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SIR,—In their most interesting paper "What shall we teach undergraduates?" (24 March, p 805) Professor V Wright and his colleagues appear to have neglected the views of the 600 doctors surveyed when they propose only the best taught specialties remain in the undergraduate curriculum. A majority of doctors did not recommend even one specialty for restriction to postgraduate study. Furthermore, some of the specialties the authors suggest are optional in the undergraduate curriculum were considered suitable for postgraduate study alone by under 1% of doctors.

A survey of 55 first- and second-year clinical students at King's College Hospital (including only those who had not read the above paper) was carried out to determine what priority students gave the specialties listed by Wright *et al.* Two points emerged. Firstly, 95% of students considered that 23 of the 28 specialties should be separately taught in the undergraduate curriculum. Secondly, the results of

the students' questionnaire compare closely with those of the doctors—there was only one difference in the top six specialties of each group. This therefore does not support the view of Wright *et al* that students are in danger of being unable to differentiate the palatable from the nutritious.

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SIR,—In the 24 March issue (p 826) there is a letter from Professor June Lloyd summarising paediatric training for doctors. This is eight to 12 weeks of the undergraduate curriculum. In the preregistration year there may be more. Yet people say that 30% of the time of the general practitioner is occupied in paediatrics. In the same issue (p 805) an article on "What shall we teach undergraduates?" by Professor V Wright and others gives 28 subjects taught in the medical curriculum, from anaesthetics to venerology. Paediatrics is placed as a very high priority by the vast majority of those who responded to the questionnaire. But one of the remarkable phenomena is that among these 28 subjects there is no mention of nutrition.

The Department of Agriculture, Fisheries, and Food has produced a handbook¹ of 135 pages, of which one-third of a page is devoted to malnutrition. Nutrition depends not just on food but on the consumer. Most of us who have spent much time working with children recognise that the training of doctors and nurses in nutrition in this country is grossly defective both in time and in subject matter. The subjects that are especially inadequate in nutrition are clinical nutrition, organisation of services, the training of staff, and family health (in co-operation with health visitors).

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¹ Department of Agriculture, Fisheries, and Food, *Manual of Nutrition*. London, HMSO, 1978.

Fats and atheroma

SIR,—I am sure that many of your readers will be as delighted as I am at the prospect of a heated controversy between Sir John McMichael (31 March, p 890) and Dr J I Mann (17 March, p 732). For controversy is the life-blood of science. Not only does it heighten the drama of a problem but it nearly always leads to new experiments and new evidence. I make the following remarks in the hope that they may add fuel to the flames of this promising battle.

I have never found the dietary hypothesis, favoured by Dr Mann, easy to accept. There is no doubt that fatty deposits can be produced in the intima of rabbits and other animals by feeding cholesterol. But the lesions in man are not at all similar. Dr Louis Katz at my request once showed me the coronary arteries of the chickens in which he had produced what he called atherosclerosis (literally hardening through the agency of porridge or grits) by feeding them cholesterol. The intima and adventitia were literally stuffed with cholesterol, as was the liver. I had never seen anything like it in human atheroma. In the human lesion the fat is not superficial in the intima: it is deep. Moreover, the outstanding clinical feature of the human disease is thrombosis, and thrombi are not prominent

in cholesterol-fed animals. It has long seemed to me that the most probable explanation of the human disease is that it is a thrombotic disease throughout. This hypothesis was fathered by Rokitsky and greatly advanced by Duguid. But the thrombi they had in mind were composed of fibrin. Evidence which I collected in my Thomas Lewis Lecture of 1964¹ suggested strongly that the thrombi were platelet-fibrin-leucocyte thrombi. These seem to occur episodically on the arterial wall. They may remain in situ, eventually lose their cellular identity, and become amorphous and indistinguishable from fibrin. They are then organised to produce the fibrous or fibro-fatty plaques. One of the striking pieces of evidence for this hypothesis is the appearance of platelet leucocyte thrombi as emboli in the retinal arteries, arising apparently from nodules in the carotid.

This hypothesis supposes that the fibrous and fibro-fatty plaques which are the essential feature of atheroma arise from organisation of these thrombi. This would accord with the episodic nature of atheromatous disease in man in territories such as that of the heart, the brain, the legs, and the kidneys. It would be natural to suppose that two factors are concerned in their causation: a general factor favouring the formation of platelet thrombi and a local factor determining their actual site. This is in conformity with clinical experience, which shows that the risk factors in myocardial infarction are not identical with those in cerebral infarction.

Whatever the hypothesis there is surely a great deal of evidence that the state of the blood lipids themselves acts as a risk factor in the pathogenesis of atheroma. There is not only the case of the familial xanthomatosis instanced by Dr Mann but all the evidence collected by the Framingham and other surveys. There is now quite a lot of evidence that suggests that a genetic factor is concerned, though I must confess I am unhappy with the view of Goldstein and Motulsky that many of the survivors from myocardial infarction have in fact a Mendelian dominant lipid disorder. When my colleagues and I had our argument with Platt it proved quite impossible to analyse our families on the either/or basis which is demanded by Mendelian inheritance. When I tried to perform this analysis on the Goldstein-Motulsky families I found it just as difficult. Fortunately there is still a good deal of work to be done.

Scientific research reminds me of gambling on the stock exchange or betting on a horse. I would put my money on the thrombotic hypothesis: the dietary hypothesis would be for the birds.

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¹ Pickering, G, *British Medical Journal*, 1964, 1, 517.

Myocardial infarction imaging

SIR,—If a new diagnostic test attempting, for instance, to differentiate between myocardial infarction and not myocardial infarction is compared with an imperfect old one it is not possible to show that the new one is better than the old.^{1 2} It may well be that imaging of the myocardium with ^{99m}Tc-imidodiphosphate does permit a more definite diagnosis of infarction in patients for whom electrocardiographic (ECG) and enzyme data are uncertain, but I submit that the design of the study by

Dr S P Joseph and others (10 February, p 372) did not allow this to be shown. From their data there is no way of telling whether the patients who had positive scans and equivocal ECGs or enzyme data, or both, had or had not had myocardial infarctions.

Demonstrating the value of myocardial imaging requires a data base for the subjects consisting of clinical history, ECG data, enzyme data, myocardial imaging data, and definitive evidence for the presence or absence of myocardial infarction. The definitive evidence for myocardial infarction could be obtained either in the postmortem room or by demonstrating irreversible incoordinate contraction of the left ventricle. A subject should be included in the data base only if his or her clinical history, ECG data, enzyme data, and myocardial imaging data have been interpreted separately and by observers unaware of the interpretations made for that subject's other investigations.

With such a data base investigators could then determine the sensitivity and specificity of clinical history alone, ECG data alone, enzyme data alone, myocardial imaging data alone, or of any combination of the four. It would thus be possible to assess how much of an improvement in the diagnosis of myocardial infarction can be obtained by adding myocardial imaging to the physician's armamentarium.

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¹ Buck, A A, and Gart, J J, *American Journal of Epidemiology*, 1966, 83, 586.

² Rautaharju, P M, and Smets, P, *Computers and Biomedical Research*, 1979, 12, 39.

Detection of deep venous thrombosis by ^{99m}Tc-labelled red-cell scans

SIR,—One cannot but agree with the criticisms raised by Mr P C Chan and others (24 February, p 552) concerning the conclusions of the investigations of Dr W Beswick and others into the detection of deep vein thrombosis using ^{99m}Tc-labelled red blood cells (13 January, p 82). It seems illogical that there should be any reluctance to submit patients to conventional x-ray phlebography on the basis of results obtained from an experimental procedure whose reliability was under investigation. The absence of objective criteria for positivity, despite the sophisticated imaging system of a gamma-camera and its associated technology, does little to engender faith in the technique as a viable alternative to phlebography.

In the current state of the art it is unlikely that any nuclear medicine investigation can ever yield comparable information to conventional x-ray phlebography in terms of the degree of fixity of the thrombus, condition of the vessel wall, and other aspects of prognostic significance. The assertion that the use of ^{99m}Tc-labelled red cells is an alternative to x-ray phlebography is therefore unacceptable.

Some time ago my colleagues and I¹ reported a procedure which, it appears, would fulfil Mr Chan's criteria of acceptability. Our technique used ¹³¹I-MAA (macroaggregates of albumin) with a detector system composed of a 2.54 cm iodide crystal, photomultiplier tube, and portable, battery-operated ratemeter. The choice of radiopharmaceutical was prompted by the demonstrable affinity of MAA for blood clot.² The isotope permitted the proce-