those to the rectum below the level of the posterior vaginal vault or upper border of the prostate. Each group is separated into those done for malignant and for non-malignant conditions. Overall nine anastomoses have leaked (2.25%). A leak is considered to have occurred when obvious faeces appear through a drain or the abdominal wall, and whenever there is any evidence of perianastomotic induration. Endoscopic or barium examinations have not been carried out as a routine but have been done only when a leak has been suspected before restoring continuity of the colostomy performed to relieve the leaking anastomosis.

Anastomoses have been felt digitally or seen endoscopically or by barium contrast in 20 cases. The suture line is difficult to detect by these investigations. At postmortem examination 41 anastomoses have been seen to be a thin line, easily distensible and mobile. Seven anastomoses have been examined at later laparotomy and detected only by the silk or nylon (black) stitches. Two strictures have occurred, needing a further resection. In nine cases there were pre-existing colostomies; in none of these were there leaks.

Inpatient stays after operation have varied from 11 to 15 days except in cases with leaks or other major complications.

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Pseudomembranous colitis after treatment with metronidazole

SIR,—Dr Robin P Bolton advocates the use of metronidazole for the treatment of pseudomembranous colitis (25 July, p 311), in support of which he quotes a study of metronidazole in antibiotic-induced diarrhoea. Although this condition forms part of a spectrum of disease with pseudomembranous colitis, it does not necessarily follow that metronidazole is suitable therapy for the more severely ill patient with the latter problem.

In our experience² metronidazole failed to control pseudomembranous colitis in the only patient so treated, with fatal consequences. Since 1978, when the value of vancomycin in pseudomembranous colitis was established,³ it has been our policy to prescribe vancomycin in all such patients. So far six patients have been successfully treated, although six relapses were subsequently encountered in four of them.² Contrary to Dr Bolton's assertions, the value of metronidazole in the management of pseudomembranous colitis has not been formally assessed. Because of the potential morbidity and mortality associated with this condition, it would seem prudent to use vancomycin until the role of metronidazole is established.

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Foodborne gastroenteritis of unknown aetiology: a virus infection?

SIR,—There are many viruses which may be found in the stools of patients with gastroenteritis: rotavirus, Norwalk-like viruses, adenovirus, astrovirus, calicivirus, and coronavirus-like particles.¹ It is unclear which or how many of these viruses can be foodborne.

Electron microscopy and tissue-culture

techniques failed to detect viruses in stools from 14 outbreaks of non-bacterial foodborne gastroenteritis (30 May, p 1801). The particles seen after extraction and concentration with caesium chloride were 23-26 nm in diameter with a density of 1.40 g/cm³. Dr Hazel Appleton and others implied that the agent was not a Norwalk virus, because maximum excretion of the particles occurred on days 4-6, while the Norwalk virus is normally excreted during the first 48 hours; the particles were, however, of the same shape, size, and density (caesium chloride) as the Norwalk virus. Another study has shown that Norwalk virus is detectable by immunoelectron microscopy in stools up to 72 hours after the onset of illness.² This technique is valuable for the recognition of viruses, such as Norwalk virus, which do not replicate in cell culture or which are present in small numbers.

Other viruses of unknown affiliation have been associated with gastroenteritis. They have been named: Hawaii, Montgomery County, Ditchling, and W agent. Although the number of antigenically distinct strains is unclear, there are at least three serotypes of Norwalk virus. A recent review³ compared the characteristics of Norwalk virus with rotavirus, but the differences between other viruses are less clear. Until a variety of cheaper and less complex techniques becomes available, the properties of new isolates and the aetiology of viral gastroenteritis will remain unresolved.

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Benign familial tremor treated with primidone

SIR,—Dr M D O'Brien and his colleagues (17 January, p 178) report their results in the treatment of benign familial tremor with primidone. On the basis of the pharmacokinetic data on two patients they conclude that one of the two active metabolites of primidone, phenylethylmalonamide, would be effective while phenobarbitone would not have any effect on tremor. On the basis of our experience we suggest a different evaluation of these data.

Before the advent of propranolol barbiturates were the suggested drugs for the medical treatment of essential tremor, though controlled clinical trials have never been performed so far as we know. So we first planned a dose-response study for phenobarbitone.¹ Twenty-four patients (five women, 19 men) with postural tremor were treated with phenobarbitone. Tremor was evaluated both clinically and instrumentally by means of a linear accelerometer. Each patient was evaluated before therapy and subsequently about once a month. The duration of the study ranged from three to 16 months (mean $\pm$ SD 8.7 $\pm$ 3.6). The dose with the best effects on symptoms and no unwanted ones was 1.3 $\pm$ 0.4 mg/kg (mean $\pm$ SD), with corresponding plasma levels of 13 mg/l (range 8-20 mg/l). During the study tremor frequency did not change, but amplitude showed a marked reduction from a mean of 0.97 $\pm$ 1.17 g before treatment to 0.34 $\pm$ 0.46 g during phenobarbitone treatment ($g = 9.8 \text{ m/s}^2$). The clinical evaluation showed a similar improvement in tremor amplitude. Nineteen patients out of 24 reported subjective benefit, and the effects lasted with no change after many months of therapy.

Our second step was to undertake a controlled trial to compare phenobarbitone and propranolol treatments with placebo. A double-blind cross-over study with a Latin square design was chosen (the complete results are to be published shortly). Twelve patients (six women, six men) with previously untreated essential tremor and no other neurological abnormality entered the trial. Subjective, clinical, and instrumental evaluation of tremor were carried out. Standard oral doses of propranolol (about 1.7 mg/kg, as recommended by many authors²⁻⁵) and phenobarbitone (about 1.3 mg/kg, on the basis of our previous study) were used.

Accelerometric data showed a notable reduction in tremor amplitude during treatments by comparison with baseline values: about 34% with placebo (NS) and more than 50% with propranolol and phenobarbitone ($p < 0.05$). Six patients preferred phenobarbitone, six propranolol, and none placebo. Side effects were minimal and only one patient dropped out because of them—while on propranolol, because of excessive bradycardia.

As our studies confirm the efficacy of phenobarbitone for essential tremor, the role of phenobarbitone in the work of Dr O'Brien and his colleagues might be reassessed. Substituting phenobarbitone for primidone, they used 90 mg of phenobarbitone daily, a dose that seems inadequate to maintain the previous phenobarbitone plasma levels, obtained with 750 and 1000 mg of primidone daily,⁶ so that worsening of tremor may be also explained by decreased phenobarbitone plasma levels. When they abruptly substituted phenylethylmalonamide for primidone for three days, the same effect was maintained, while subsequent withdrawal of phenylethylmalonamide was followed by a marked increase in tremor amplitude during the next 96 hours. Again, we suggest that this could at least in part be due to the fall in plasma phenobarbitone levels. Even if the restarting of treatment with phenylethylmalonamide produces impressive improvement, confirming the relative efficacy of phenylethylmalonamide, one cannot exclude the possible importance of a placebo effect.

In conclusion, even if further studies seem necessary to elucidate further the role of primidone and its main metabolites in the control of tremor amplitude, our experience suggests that phenobarbitone itself has a definite and important efficacy.

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Poliomyelitis serosurveillance in adolescent population

SIR,—With a gradual improvement in the socioeconomic status of the developing countries and a drastic reduction in poliomyelitis incidence in the developed world, it is essential that the adolescent population should be regularly screened for poliovirus antibody levels to ensure that the number of triple

negatives is not alarmingly high. With the scant possibility of exposures to wild viruses in an individual during the postvaccination phase, alarmingly high proportions of triple negative adolescents, some having received five doses, are now known to leave the schools.¹ The waning of the antibody level after oral poliovaccine has been shown to be directly related to the time when the last dose was given and not to the number of doses administered.² Is there not now a possibility of a future adolescent epidemic in areas where the primary coverage is good? It is worth recollecting in this connection the 1945 poliomyelitis epidemic in St Helena,³ when the cases were minimal below five years but the maximum incidence and mortality were confined to the age groups 10-13 and 15-19.

Undoubtedly such a catastrophe could be easily avoided by continuous serosurveillance for antibody negatives in different age groups in the various economic strata from rural, urban, and hilly or desert populations. No such programme could really be complete without serological surveillance of children on entering and leaving the primary and secondary schools as well as of exposed professionals like nurses and doctors. Moreover, the appropriate age for a vaccine booster, the number of doses needed, and the ideal age for starting the primary immunisation can be determined only on the basis of the prevailing serological pattern and assay of antibodies in breast milk from lactating mothers and in paired cord and maternal blood samples. The need for a regular review of the primary vaccination schedule as well as the possible booster dosages in different areas is obvious.

It also goes without saying that apart from serological surveillance the vaccine administration practices in vogue⁴ and the individual serotype content in a trivalent vaccine⁵ should be continuously monitored as well, no matter whether live or killed vaccine is in use. Such a step is bound to go a long way towards ensuring the success of poliomyelitis surveillance and immunisation programmes.

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Attitudes to malarial prophylaxis

SIR,—There is a danger that surveys of attitudes to malaria prophylaxis which are confined to immigrants to this country from the Indian subcontinent (8 August, p 411) will divert attention from the group of people who are at most risk of dying from the disease—namely, travellers to areas where there is a substantial risk of acquiring infection with *Plasmodium falciparum*. In the last 10 years over 90% of cases of falciparum malaria notified in the United Kingdom were acquired in Africa and only 2% in the Indian subcontinent.

We would suggest that more attention should be paid to the reasons why many travellers to Africa fail to take prophylaxis properly. From conversations with European expatriates in Africa, consultations with returned travellers,

and questioning of patients with falciparum malaria it is clear that there is a widely held misconception that the need for prophylaxis becomes less the longer one stays in an endemic zone.

Travellers to areas where *P falciparum* is endemic must understand that they will always need prophylaxis even if they stay for several years, even if local friends or doctors advise them differently, and even if they suffer from febrile episodes while on prophylaxis. Long-stay expatriates must be advised that the agent they use may become obsolete in the future and they should seek advice on this point every year or so.

Finally, practitioners in this country need not feel overcome by the complexity of published recommendations on malarial prophylaxis. They can obtain succinct advice by telephoning the centres in London, Birmingham, Liverpool, and Glasgow.

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Haematology in developing countries

SIR,—Your leading article on haematology in developing countries (25 July, p 262) highlighted anaemia as a major world health problem but did not emphasise its importance in childhood morbidity. A World Health Organisation report concluded in 1970 that more than half of the children in Asia were anaemic and that nine out of 10 of those with anaemia were under the age of 2 years.¹ The mean haemoglobin concentration of 1200 village children under 2 years of age in Punjab, India, was less than 10 g/dl.² In an East African community with anaemia children had lower mean haemoglobin concentrations than men and women.³ Inadequate nutrition, frequent infections, and parasitic infestations deplete the meagre supply of nutrients essential for haemopoiesis in the period of rapid growth in young children in developing countries. Poverty affects most seriously the vulnerable half of the population in developing countries—that is, children in whom anaemia is an indicator of longstanding malnutrition. Ignorance of infant feeding with the improper use of powdered milk for young infants has contributed to the frequency of anaemia, particularly in oil-rich Arab countries.

Children with anaemia are deficient in both iron and folate, and in many young children deficiencies of these haemopoietic factors frequently co-exist.^{4 5} The increased incidence of infection in anaemic children in developing countries is probably related to iron deficiency. Evidence accumulated from investigations of the immune response show that while children with iron-deficiency anaemia may have an abundance of unsaturated transferrin to act as a bacteriostatic agent they also have both impaired cell-mediated immunity and reduced bactericidal activity of polymorphonuclear neutrophils, defects which were reversed by iron therapy.^{6 7} Further clarification of the relation between iron metabolism and susceptibility to infection by controlled studies in iron-deficient children in the tropics to determine whether the administration of iron would reduce the prevalence and severity of acute bacterial infections is currently in progress. In addition to these environmental

factors, genetic disorders of haemoglobin synthesis found in Africa, the Caribbean, Latin America, South-east Asia, and the Mediterranean affect children exclusively. Haemoglobinopathies such as sickle-cell anaemia and the thalassaemias are major causes of chronic anaemia in the developing world. A full review of childhood anaemia in developing countries has been published elsewhere.⁸

Anaemia in infants and children in developing countries poses problems of diagnosis, epidemiology, and management that can be resolved provided there are competent clinicians who also are able to perform simple laboratory tests and examine blood films. Laboratory tests based on minute amounts of blood have been devised for investigations in newborn infants and these have been successfully adapted for use in the tropics—for example, the fluorescence method for the detection of glucose-6-phosphate dehydrogenase deficiency, an inherited disorder which is a major cause of kernicterus in tropical Africa and South-east Asia. Serum ferritin, usually estimated by radioimmunoassay, can now be measured with an enzyme-linked immunosorbent assay (ELISA)⁹ that is simple enough for use under field conditions.

The problem of appropriate training and the organisation of health services to cater for the major haematological problems of developing countries is equally relevant to the discussion of the training of overseas doctors in the United Kingdom. There are only two centres in this country that provide courses designed to meet the needs of doctors and other health personnel from developing countries, and only Liverpool has a clinical course with hospital appointments for the training of paediatricians from abroad.

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Emergencies in the home

SIR,—Before your general practitioner readers equip themselves according to the recommendations made by Dr B G Steggle (18 July, p 195) they should in my opinion be made aware of some relevant matters.

The Brook airway is supplied with a choice of curved oropharyngeal extensions. The longer extension option ("Professional Model"), while more satisfactory as a tongue depressor, carries the risk of provoking vomiting by stimulating the pharyngeal reflexes and requires a careful assessment of the patient's unconsciousness before insertion. The shorter extension is known as the "Universal Model."