Smallpox vaccination carried out at the appropriate age under strict aseptic conditions, preferably by the single scratch method, with instruments reserved solely for the purpose, and the wound covered by an aseptic dressing until the scab falls off, is invariably safe and successful. I have never known it to be otherwise. On the other hand to advise people to postpone vaccination "until it is needed" is to court disaster. It may be too late.

Smallpox vaccination provides full protection for three years and partial or residual immunity for many more years which results in a revival (or boost) of immunity with a diminished risk of severe local reaction in any subsequent revaccination which may be required.

In these circumstances there seems to me to be no valid reason to give up this most useful measure, at least not until smallpox has been completely eradicated from every part of the world—I am, etc.,

W. H. CRICHTON

Polstead Heath,
near Colchester, Essex

Mass Immunization Technique

SIR,—The Porton Needle-less Injector was designed for mass immunization and three have been used very successfully by Oxfam workers in the cholera epidemic amongst the refugees from East Pakistan. Under these conditions the Injector is connected to a vaccine reservoir of suitable size (50-500 ml) by a length of Neoprene tubing (Fig. 1). For satisfactory operation the tubing must be completely filled with vaccine, free of bubbles, and the injector fully primed. The instrument can be adjusted to give doses of 0.1, 0.25, 0.5, 0.75 or 1 ml as required. Most vaccines and therapeutic agents for use in small quantities by injection are usually prepared in ampoules of 0.5 to 10 ml which have to be opened and poured into the reservoir. For mass immunization the total volume of vaccine to be used usually exceeds 50 ml and the reservoir can be as large as required.

Circumstances do occur, however, when the technique of needle-less injection is of value but for various reasons only a small

volume is likely to be used and the large reservoir and attached tubing inhibit the use of the technique. Under these conditions the following procedure is recommended. The material to be injected should be taken from the ampoules into a suitable syringe. A short length of Neoprene tubing (about 20 cm) is then attached to the nozzle of the syringe, and when all the air has been expelled the free end of the tubing is pushed on to the side arm of the injector. The syringe reservoir is then attached to the injector by means of a pair of spring clips held together by a small bolt (Fig. 2). One clip grips the injector and the other the syringe. If the syringe is filled to a little more than the marked capacity the tubing can be filled and the injector primed for use in the usual way so that the piston descends to near the normal capacity level of the syringe. Any size of syringe between 2 and 50 ml can be used in this way.

This modification enables the needle-less injection technique to be used when only small total volumes of material are needed or are available. The method makes for greater economy and allows the operator total freedom of movement since the injector is not connected to a static reservoir. It can be used at any angle or in any position. When empty the reservoir can be discarded and a fresh loaded syringe attached to the Neoprene tube. If a bubble is introduced into the tube it can easily be withdrawn into the reservoir. This method may be of particular value when a large number of 0.1-ml inoculations need to be given—for example, typhoid and cholera vaccines, or in skin testing, and removes the necessity for numerous graduated syringes and/or repeated changes of needle—I am, etc.,

G. THOMAS

Microbiological Research Establishment,
Porton, Wilt

Scotland's Anaesthetists

SIR,—Dr. G. D. Parbrook (31 July, p. 293) rightly draws attention to the current shortage of anaesthetists. However, his decision to ignore the existence of the important S.H.O. grade and his failure to relate the number of anaesthetists to the population are hard to understand. The registrars are recruited from the S.H.O. grade and any expansion of the number of anaesthetists in training must start in this grade. It is perhaps unfortunate that Dr. Parbrook's article appeared in an issue of the *B.M.J.* that advertised 68 anaesthetic vacancies (p. xiv), only one (S.H.O. at Perth) being in Scotland.

All medical staffing statistics must be related to population, as both surgeons and anaesthetists exist to give a service to a section of the population. Scotland has approximately 10% of the population of England and Wales and Dr. Parbrook's Table IV shows that the number of consultant posts in surgery and anaesthetics in Scotland is respectively 16% and 13% of that in England and Wales, but the seriousness of the shortage of anaesthetists is not so much in numbers as in maldistribution of slender resources. In England and Wales there are 4.8 anaesthetists for 100,000 population while in Scotland there are 6.5. However, there is a gross disproportion of anaesthetic

staffing between the peripheral and city areas as can be illustrated by the fact that Ayrshire has four anaesthetists per 100,000 while Glasgow has 14.—I am, etc.,

L. R. WALKER

Ballochmyle Hospital,
Mauchline, Ayrshire

SIR,—Dr. G. D. Parbrook (31 July, p. 293) may be correct in arguing that there is a need to increase the number of doctors in training for consultant anaesthetist posts, but the statement that there is "a shortage of senior anaesthetists in Scotland relative to England" needs closer examination.

His case is based on the ratio of consultant surgeons to consultant anaesthetists being unfavourable to Scotland. However, in 1968 there were 10.4 consultant "surgeons" for every 100,000 people in Scotland compared to 6.7 in England, comparable figures for consultant anaesthetists being 2.93 and 2.36. ("Surgeons" includes the specialties in Dr. Parbrook's Table IV plus ophthalmology, gynaecology, and dental surgery.) No comparative figures for surgical operations are available for the same year, but at that time each "surgeon" in Scotland was responsible for 600 inpatient discharges compared to 740 per "surgeon" in England and Wales, with this relativity still applying when trainees in the senior registrar and registrar grades are included (340 to 415).

Applying the number of surgical discharges to anaesthetists the following emerges:

	Scotland	England and Wales
Consultant anaesthetists	2,160	2,110
Consultants plus senior registrars, plus registrars	1,310	1,290

Surgical inpatient discharges per anaesthetist 1968.

Patients, as represented by surgical discharges, are to my mind a better indirect measure of anaesthetic work-load than "surgeons," and on this score there is no significant difference between the two countries. The best measure would be the number of fully utilized theatre sessions, and unless it can be shown that the greater number of Scottish surgeons serving a similar sized population to their English and Welsh colleagues generate more of these, then the argument that there is a relative shortage of anaesthetists in Scotland cannot be sustained.

While I cannot agree with some of Dr. Parbrook's conclusions, he must be congratulated on shining some light on the problems of staffing and training. The complexities of manpower planning in medicine are immense, and are often underestimated in the present discussions on career structure.—I am, etc.,

H. G. PLEDGER

Abingdon,
Berks

Halothane Hepatitis

SIR,—Professor B. R. Simpson and his colleagues (24 July, p. 245) have mistaken the aim of our study (3 July, p. 18). It was not intended to supply an answer to whether halothane is the causal element in "post-