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MEDICAL PRACTICE

NEWS AND NOTES

SUPPLEMENT

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CORRESPONDENCE

We may shorten letters to the editor unless the authors specifically state that we may not. This is so that we can offer our readers as wide a selection of letters as possible. We receive so many letters each week that we have to omit some of them. Letters must be typed with double spacing between lines and must be signed personally by all their authors, who should include their degrees. Letters critical of a paper may be sent to the authors of the paper so that their reply may appear in the same issue.

Correspondents should present their references in the Vancouver style (see examples in these columns). In particular, the names and initials of all authors must be given unless there are more than six, when only the first three should be given, followed by et al; and the first and last page numbers of articles and chapters should be included.

Appropriate technology

SIR,—Dr Katherine Elliott (28 April, p 1251) identified six criteria to be met if a technology is to be regarded as appropriate. One of these was that it "must be sustainable locally—that is, the technology should not be overdependent on imported skill for its continuing function, maintenance, and repair." In my own field of vaccine production much of the new equipment being introduced into developing countries fails to meet this criterion in that it is not sustained locally. I refer specifically to fermenters, which, although basically simple electromechanical devices, are today festooned with superfluous, highly sophisticated electronic gadgetry. Much of this is totally unnecessary, raises the price of the equipment, makes local servicing next to impossible, and to some extent embarrasses the visiting short term adviser who may have some knowledge of general and electrical engineering but who cannot undertake repairs to pH controllers, gas analysers, or multichannel recorders. None of these are needed in the production of diphtheria and tetanus toxoids or of pertussis vaccine, and my advice to frustrated local production staff is to take the unit out of circuit and carry on without it.

Tetanus toxin and toxoid production on a large scale needs a vessel (usually stainless steel of 200 to 300 litres capacity) which can be kept sterile and stirred slowly to void noxious gases produced by *Clostridium tetani*. Such stirring is not necessary when production is in volumes of 10 to 15 litres because the gases do not reach a concentration sufficient to interfere with toxin production. For diphtheria toxin or toxoid and pertussis vaccine production a similar type of vessel suffices but with provision for high speed stirring to enhance aeration of the culture. None of these products need pH control, gas analyses, oxygen tension control, or automatic recording and display of the values. When pH control is necessary, as in the production of cholera and typhoid vaccines, it is readily and effectively achieved by incorporating a buffer system into the culture medium. The irony is that where control is electronic, growth of a culture often stops through the accumulation to inhibitory levels of the end products of pH control itself.

For 16 years I have been involved in the development of magnetic drives to avoid problems with gland seals on fermenters, a potentially dangerous defect rarely serviceable in developing countries.[1 2] This type of drive seemed to be a useful introduction in fermenter design, particularly for developing countries, since the only expertise needed is the ability to maintain the driving motor. The commercial development of such drives unfortunately has resulted in them being regarded as "gimmicks" or in the units becoming highly complex in design, expensive, and not always operating satisfactorily. The simplicity of the basic idea seems long ago to have been forgotten.

The problem is twofold—superfluous gadgetry and the need to educate the user in basic fermenter needs for vaccine production. The design of the fermenter has not changed since the classical publication by Ernest Chain 32 years ago.[3] Manufacturers want to sell fully instrumented equipment but if they are unwilling to study local needs and to offer advice about acceptably "stripped down" units, the alternative is construction by small, interested, engineering companies in Europe, North America, or in the Third World. India is one country well able to undertake this kind of construction. If the national and international aid agencies continue to supply highly sophisticated equipment electrical and electronics engineers will have to be recruited as short term consultants to service it.

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1 Cameron J, Godfrey EI. *Biotechnol Bioeng Symp* No 4 1974:821-5.
2 Cameron J. Some problems—and their solutions—in the production of DTP (diphtheria, tetanus, pertussis) vaccine. *Dev Biol Stand* 1978;41:45-53.
3 Chain EB, Paladino S, Callow DS, Ugolino F, Van Der Sluis J. Studies on aeration—1. *Bull WHO* 1952;6:73-97.

SIR,—In 1977-78 I helped to look after the patients of a small rural hospital in central Zaire. These included over 700 under current outpatient and dispensary based management for tuberculosis during a whole year when the radiology unit had broken down. Obviously, I found Professor P E S Palmer's article interesting (12 May, p 1435-7).

In our case one or two doctors and 50-60 assorted staff and nursing students looked after 100 beds and 150 000 people scattered over an area the size of Wales. I doubt if many doctors in similar circumstances could justify $25 000 on one piece of equipment for which parts