described, probably nine would fall into the category of true primary irritation, but whether any of these are due to detergents or, more particularly, are the same as the cases described by Dr. N. E. Jensen (31 January, p. 299) could only be established by a careful investigation into the aetiology.

The manufacturers of detergents are only too conscious of their responsibility to the public and to housewives in particular. A vast amount of research is done and many thousands of tests are carried out with the willing co-operation of housewives before any new product is put on the market. A description of the testing on enzyme detergents carried out by Procter & Gamble in the U.S.A. is given by Griffith and *al.*¹ A similar amount of skin testing on housewives and babies, with which I have been associated, has been done in Britain. Between the two countries a total of more than 12,000 housewives and 600 babies have participated in home usage tests. Full details of this skin-testing programme are available to any interested person.

In the whole of this work no examples of dermatitis specifically attributable to the enzyme products were encountered, and the effects of these detergents were no different from those of comparable detergents without enzyme. Such cases as have since been reported of dermatitis attributed to these products represent an insignificant number compared with the many millions of housewives who use them (28 February, p. 518).

Just why cases have been reported at Sheffield and Nottingham, and not to any significant extent elsewhere, is an interesting problem, and it is to be hoped that the careful investigation in progress at Sheffield will throw some light on the special circumstances of the cases reported there and at Nottingham. Discussions I have had with dermatologists at leading centres throughout the country indicate that apart from these cases reported at Sheffield and Nottingham there have only been isolated cases which might be attributed to enzyme detergents, and the feeling is that there has been no increase in housewives' dermatitis since the introduction of these products.—I am, etc.,

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REFERENCE

- 1 Griffith, J. F., Weaver, J. E., Whitehouse, H. S., Poole, R. L., Newmann, E. A., and Nixon G. A., *Food and Cosmetics Toxicology*, 1969, 7, 581.

SIR,—I read the paper by Drs. Christina F. J. Ducksbury and V. K. Dave (28 February, p. 537) on contact dermatitis, and the leading article (p. 518) on biological detergents with great interest.

I was, however, surprised that the latter did not mention the contact dermatitis due to wearing clothing washed in these enzyme detergents. Such reactions are not common, but I have observed several in recent months. In the acute phase the reaction appears as an intense oedematous erythema, particularly marked on the upper and inner thighs, the sides of the neck, the antecubital fossae, the axillary folds, the waist, and sometimes on the dorsa of the feet. When seen in a later stage, these areas show desquamation and desiccation of the skin, not unlike the reaction caused by benzyl benzoate.

After such severe reactions, the applications of patch-tests was deemed unwise, but one patient, when he had recovered, was bold enough to have his clothes again

washed in the biological detergent, and endured a typical recurrence. I have also suspected that several patients have developed a nummular eczema precipitated by the desiccating action of the detergent.—I am, etc.,

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SIR.—Drs. Elizabeth and N. Bamji (7 March, p. 629) described the enzymes in washing powders as "remarkably stable" and relate this to the possibility that enzyme may persist not only in washed garments but also in rivers and seas. The description "heat-stable and alkali-stable" given to the enzyme in the reference quoted¹ is relative only. In fact, the enzyme in these washing products starts breaking down as soon as the product is dissolved in water, the process speeding up with increasing temperature, and being extremely rapid at temperatures above about 150°F. (66°C.). Furthermore, it is relatively stable in alkaline solution only, so that any enzyme remaining after a low temperature wash would break down rapidly in the plain (non-alkaline) water used for rinsing and during the drying and ironing that follow. Finally, even if all this were not so, the enzyme would be deactivated by contact with the acid of body sweat.

With regard to the possibility that effluent from sewage treatment of enzyme detergent waste water could have some effect on aquatic life, it should be recognized that bacterial enzymes are present naturally in domestic sewage and natural waters at very low concentrations. There is ample evidence² that in conventional sewage and septic tank systems the detergent enzymes are first deactivated by the pH change and the aerobic conditions, and the resultant protein is then totally and irreversibly degraded by the bacteria in the treatment. By the same token, any detergent enzyme that might otherwise get into the rivers and coastal waters would also be rapidly destroyed by the natural bacterial fauna of the water.—I am, etc.,

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REFERENCES

- 1 *Nature*, 1968, 220, 526.
- 2 Swisher, R. D., *Bioscience*, 1969, 19, 1093.

Holiday Typhoid and T.A.B.

SIR,—Your leading article on holiday typhoid and T.A.B. (28 February, p. 515) is both interesting and timely. You refer to one-dose prophylactic vaccination against typhoid proving effective in Guyanese children, this being attributable to the endemicity of typhoid in that country, with the consequent probability that its inhabitants may ingest subinfective doses of typhoid and related organisms, so that one dose of typhoid vaccine acts like a booster rather than as a primary vaccine dose.

You warn your readers, however, of the dangers of extrapolating results in Guyana to situations obtaining in Great Britain, and add that there "can be no justification

for assuming that in Britain there is a basal immunity to enteric infections. Two doses of T.A.B. vaccine are therefore necessary for protection, and three doses are even better."

There is a close parallel with this as regards cholera prophylactic vaccination, where one dose has been accepted by W.H.O. for the purposes of international certification and travel and also stated by many workers to be protective. The populations (except for the very young) of far eastern countries may well become sensitized to the cholera vibrio antigens under various circumstances. Reinfections with cholera vibrios are common in endemic areas but recurrent disease is rare; this can be shown by the prevalence of vibriocidal antibodies which increase in titre *pari passu* with age. Hence a single dose of a cholera vaccine to such a population acts more like a booster provoking a secondary response; but here again results of the efficiency of single dose vaccination in an endemic area would not necessarily be applicable to inhabitants of a non-endemic area.

Nevertheless, the inhabitants of non-Asian countries, in Europe and America, may have significant titres of vibriocidal antibodies in their blood. This may be best explained by recognizing antigenic affinities between *Vibrio cholerae* and other genera of bacteria like *Brucella* and *Pseudomonas*, and indeed adults from countries as far apart from the far east as Czechoslovakia and the U.S.A. have reacted with a secondary-type response to a single dose cholera vaccine. Now many "normal" sera examined by the Widal test may show antityphoid antibodies. Thus in Great Britain a titre of *Salmonella typhi* 'O' antibodies, and *Salmonella paratyphi* A 'O' antibodies up to 1 in 50 is commonly interpreted as being within normal limits and without significance so far as diagnosis of enteric fever is concerned, but nevertheless it may be taken to mean that the individuals concerned have become sensitized to typhoid antigens. This need occasion us no great surprise, since there must be wide intergeneric antigenic relationships amongst the great family of Enterobacteriaceae, and beyond that family as well.

Therefore, though I am all for two doses (preferably three doses) and in complete agreement with the views expressed in your leading article, in any primary vaccination programme for the prophylaxis of typhoid, or indeed any other bacterial disease utilizing inactivated non-adjuvanted bacterial vaccines, the possibility must be entertained, until proved otherwise, that travellers from Great Britain with no previous history of primary immunization or enteric infection may well be afforded protective cover by a single dose of a potent (? acetone-inactivated) typhoid vaccine for the duration of a holiday or short stay abroad.—I am, etc.,

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SIR,—Your leading article (28 February, p. 515) is most surprising, coming only a few weeks after an Any Questions discussion giving entirely different advice on the same topic (7 February, p. 354). First we are told that unimmunized "Persons going abroad