I myself relied were first, the many scientists and veterinary surgeons from the Ministry of Agriculture, Fisheries and Food whom I cross-examined during my enquiry; second, the three internationally-known students of animal disease whose help I acknowledged in my report — Sir William Henderson, FRCVS, FRS, Dr L. Goodwin, FRCP, FRS, and Dr W. Plowright, DVSc, FRCVS; and third, Professor T. McKeown, FRCP, well known for his studies of trends in tuberculosis and other diseases; the authorities in the Medical Research Council and Department of Health and Social Services who are concerned with tuberculosis; and Dr B.R. Cook, until recently with the New Zealand Ministry of Agriculture.

The officers of the Mammal Society may believe that their society is exempt from the usual convention that no scientific society has the licence to make corporate statements of a scientific nature on behalf of all its members. But if it is exempt, one is entitled to ask — indeed, one is in duty bound to ask, since we are talking about a matter of animal and public health that is of international concern — who were the authorities on whom the Mammal Society leant, and whose counsel was denied me. Dr Flowerdew bluntly declares that the officers of the society were responsible for the statements that have appeared over his and Dr Harris's name. But apart from Dr Frazer, not one of the officers listed by the society is shown as having either a medical or veterinary qualification, and while some of its members, in particular Dr Neal, are well-known badger naturalists, none has written — unless in some unquoted journal — either on TB in cattle or on disease in badgers. Indeed, apart from Dr Neal's writings, I can find only one paper on badgers by any officer of the society, and that is a note by J.F.D. Frazer on badgers in Kent. The society's publications appear in the *Mammal Review* and in the form of "notes" in the *Journal of Zoology*, published by the Zoological Society of London.

Four of some 120 papers that have appeared in the lifetime of the *Review* concern badgers, and only seven deal with pathological matters (mainly ectoparasites — none deals with TB or with diseases in badgers); while only 15 of 311 "notes" concern badgers, and not one TB. In the circumstances, I find it more than a little strange that Dr Flowerdew suggests, presumably on behalf of his society, that the Ministry of Agriculture, Fisheries and Food should establish a Scientific Advisory Group "containing a small number of independent scientists such as wild-life epidemiologists and statisticians" — he offers no names — to "analyse the data in detail" for the ministry's Consultative Panel on Badgers and Tuberculosis, with the unfortunate imputation that in the view of the Mammal Society the ministry's scientific and veterinary officers are incompetent, and that their analyses of the data they collect cannot be relied upon.

LORD ZUCKERMAN

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SIR — Why has the Mammal Society (*Nature* 26 February, p.742) not attempted a reasoned reply to the criticisms contained in the letters by Dr Plowright (*Nature* 1/8 January, p.8) and myself (*Nature* 22 January, p.218), and by Zuckerman in his further article (*Nature* 19 February, p.628)?

If it is now accepted that the use of gassing by the ministry has substantially reduced herd breakdown in affected areas, its continuation is clearly indicated. There does not at present appear to be any other way of tackling this source of infection. Reduction of badger densities in affected areas not only reduces the chance of infecting cows because there are fewer badgers around, but offers the best hope of greatly reducing and possibly, as more is learnt, substantially eliminating tuberculosis from the badgers themselves. In this respect badgers are fortunate in that there is now no major external source of infection and the TB monitoring of dairy herds gives early warning of the presence of infected setts in a locality.

In their earlier letter the Mammal Society, while suggesting that "other more subtle factors may be significant", did not dispute that density might be of importance in the spread and maintenance of TB in the badgers. They have now gone back on this, stating that "there is no unequivocal evidence that TB in badgers is density-dependent". This statement is based on the maps of badger density and herd breakdowns included in the Zuckerman report (p.68,70) which, they say, show that "TB is not only prevalent in areas of high density, but also in areas such as South Dartmoor where the badger population is very low". Had they referred to the subsidiary reliability diagram relating to the badger density map they would have found that the cluster of infections in South Dartmoor falls in an area classified on the reliability diagram as "mainly guesswork". They have completely ignored Zuckerman's discussion in his article of the statistical laws governing the propagation of infectious diseases, and his deduction that the establishment and maintenance of TB among badgers in an area is likely to be strongly density dependent, from which it follows that, as a matter of long-term policy, badger population densities should not be allowed to become excessive, as they certainly appear to be in parts of the South West at present.

The reactions to our other criticisms are similarly irresponsible and misleading. They dismiss Dr Plowright's letter with the comment that it "presented no new information nor did he answer any of the points we raised". The main point of my letter was to cast doubt on the Mammal Society's suggestion that the apparent success of the gassing campaign might be due to the decline of TB throughout the country. They appear now to have partially, but not wholly, conceded this point. They make much of the large decline from 5.5 to 3.2 per cent of herd breakdowns in Cornwall from 1975 to 1976 "highlighted" by my graph, and claim that it could not have been wholly produced by the gassing compaign. That there was a marked rise all over the country in 1975, followed by a corresponding decline in 1976, was clearly shown by my graph, and was pointed out in my letter, but this does not preclude that a large part of the Cornish decline was due to the removal of infected badger groups, some of which may have been done by farmers without the cooperation of the ministry. In any case, if the Mammal Society wished to comment on the irregularities of the Cornish data they might better have directed attention to the disturbing rise of infection between January 1977 and September 1979 which, however, was matched by a substantial fall between October 1979 and March 1980.

There are two further glaring distortions of the evidence in their current letter. The first is my "contention", for which I gave reasons, that the 15 per cent of Cornish herd breakdowns attributed to badgers in the report was clearly much too low. That this contention was indeed correct was substantiated by the further information that Lord Zuckerman gave in his article. The Mammal Society accept this, but by lumping together the figures for 1974–75 and 1976–78 they conceal the progressive reduction in the proportion of "unknowns" and were able to claim that "since 1974 badgers were still only believed responsible for a minority of breakdowns".

A similar concealment of the full evidence occurs in their comment on the origins of infection from specific badger setts. Zuckerman reported that he had been informed that for the whole of Cornwall 72 per cent of the 51 outbreaks definitely attributed to badgers were within 2 miles of infected setts and 33 per cent were within half a mile, and that for the West Penwith area the corresponding percentages were 97 and 47. All that they state is that for the whole of Cornwall 28 per cent (100 minus 72) were attributed to setts more than 2 miles away and that badgers rarely travel this distance in areas of high density. A glance at the herd breakdowns map (p.20) of the report shows that the West Penwith area, which covers the western tip of Cornwall, contains the major pocket of infection and was clearly the source of the majority of the herd breakdowns.

Finally, in connection with their long and almost unintelligible argument on the effects of the moratorium on gassing, may I make it clear that neither Zuckerman nor I ever argued that "TB in badgers and cattle immediately increased as a result of the moratorium"; we merely reported the latest available data. Obviously there are time lags. The full effects of the moratorium cannot be properly assessed until data for a further year are available. Also in this connection, what is one to make of the statement: "This . . . totally ignores the likelihood of natural cyclic trends in TB prevalence, as discussed in our original letter and the reply by Dr Yates"? There is no mention of cyclic trends either in their letter or in my reply!

FRANK YATES

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SIR — You have recently drawn attention to the controversy over the badger-gassing issue.

The Zuckerman report shows a rise and fall of tuberculosis in the South West and also in the rest of England from 1974 to 1980. Some factor, common to the South West and the rest of England, must therefore be sought. I believe that factor is one which the Zuckerman report carefully avoids — the resumption of health-certification of the Irish cattle imports in June 1976 after nearly two years of importing TB-infected cattle into the United Kingdom during the Irish veterinary inspectors' strike.

The reluctance of the Animal Health Authority to suspend Irish cattle imports at that time contrasts sharply with their present enthusiasm to destroy badgers on scant evidence.

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