

CORRESPONDENCE

Badgers guilty

SIR — In his letter published on 11 December 1980 (page 532), Stephen Harris, among many other misleading and biased remarks, stated that the rate of decline in the incidence of tuberculosis (TB) in badgers in the South West was “paralleled” by a decline in the incidence of reactors in cattle herds not only in the South West but also in the rest of England. This statement was based on a graph which was attached to a copy of the letter sent to Lord Zuckerman and which is now reproduced (Fig. 1). It was deduced from this that there might well be some common cause unconnected with the gassing campaign that was reducing the incidence of TB both in cattle and badgers throughout the country.

This “parallelism”, however, was only secured by expressing all plotted values as percentages of the corresponding 1974 values. In Fig. 2 I have plotted the breakdowns for the South West and for the rest of England on the same scale, subdividing the South West into (a) Gloucester, Avon and Wiltshire; (b) Cornwall; and (c) Devon, Dorset and Somerset. The radical differences between the counties that have a high incidence of herd breakdowns, (a) and (b), and the rest of England (d) is immediately apparent.

Table 10 of the report (*Badgers, Cattle and Tuberculosis*, Lord Zuckerman; HMSO, London, 1980) shows that the sources of infection are indeed different in the South West and in the rest of England. In groups (a)

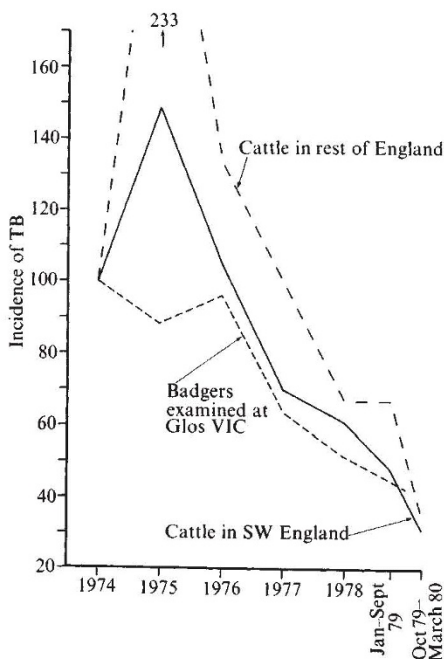


Fig. 1 Annual changes in the incidence of TB in badgers sampled at the Gloucester Veterinary Investigation Centre (page 62 of the report) and herds of cattle in South-West England and herds of cattle in the rest of England (page 64). The first year for which data were available in the report from all three samples (1974) was taken as 100 per cent; for subsequent years, the level of TB was expressed as a percentage of the incidence in 1974.

and (c) three-quarters of the infections are attributed to badgers, but only 1 per cent to imported Irish cattle, whereas in the rest of Great Britain one half are attributed to imported Irish cattle and none to badgers.

In Cornwall (b), as Harris observes, only 15 per cent were definitely attributed to badgers, but as almost three-quarters of the causes of Cornish breakdown were recorded as “unknown” and the remainder were either from purchased cattle or contiguous premises, it may be presumed that infection from badgers was much greater than this.

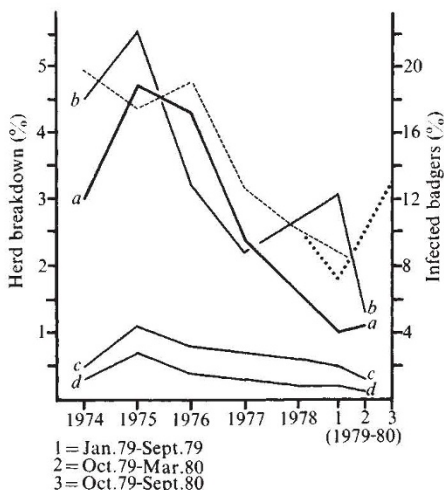


Fig. 2 The percentages of herd breakdown are shown by full lines (from Table 19 of the report). The percentages of badgers found to be infected are shown by the broken line (Table 15). The dotted line gives some supplementary information from Table 18 (updated).

The fall in the incidence of herd breakdowns following the introduction of the gassing campaign in Gloucester/Avon agrees well with the reduction in the incidence of TB in badgers (broken line), bearing in mind that in addition to the reduction in the percentage incidence in badgers the numbers of badgers in close contact with herds must have been substantially reduced by the gassing.

The dotted line is derived from the latter part of Table 18, updated to September 1980, and indicates the rise in TB incidence in badgers following the cessation of gassing. (Updated figures for herd breakdowns in Gloucester/Avon and Wiltshire are not yet available).

The only support that Fig. 2 gives to the suggestion that there was a common cause, other than appropriate action by ministry officials, affecting the decline in TB operating throughout the country is the substantial rise between 1974 and 1975. This cannot be related to infection from badgers. It may possibly have been due to climatic factors or to some improvement in the tuberculin test.

Figure 1 is a sad illustration of the way in which distorted and partial graphical presentation can be used for propaganda purposes.

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Rothschild retreat

SIR — It is not clear from your leading article in the January 1/8 issue (page 2) whether you regret the government’s “retreat from Rothschild” or just the manner in which it is happening.

One of the difficulties for the Medical Research Council (MRC) at the time of the Rothschild report was the uncertainty as to the failures in the then current system which it was intended to correct. The Ministry of Health did not identify any omissions on the part of the MRC in their contribution to improving the health of the nation, nor did they subsequently propose contracts in fields of work outside the previous commitment of the MRC. Rothschild, in a thoughtful comment, referred to the very low expenditure on research into ageing, one of the fundamental aspects of all living things, but the understanding of which is nowhere in sight. He failed to ask the practical question as to how much of the MRC budget was spent on investigating diseases most common in old age. The answer would have been a major part.

There are, at present, three developments in medical research on which great hopes of practical gain are based: interferon, antibody production by hybridomas and DNA technology. How far the expectations will be justified remains to be seen, but the heavy investments of pharmaceutical companies throughout the world in these fields is evidence that the hopes are held widely. MRC laboratories were responsible for the first two discoveries and made a very big contribution to the third. None came from planned research but from “Dr Gowans’ doctrine of investment in good ideas and good people”.

It has been argued strongly that much more attention should be given to public health and preventive medicine and that the MRC’s expenditure has the wrong emphasis. But one of the major advances in this field, the correlation of the incidence of lung cancer with cigarette smoking, came from work in an MRC unit.

No doubt governmental administration of civil science could be improved substantially, but the next enquiry which you appear to be advocating must surely start by identifying the omissions and failures of the present system whether in medical, agricultural or any other field of research before recommending changes to overcome them. Your generalized denigration of a system which has achieved obvious successes is not enough.

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Creating problems

SIR — Your readers should know of the court action by creationists against the State of California, now expected to begin on 2 March. The suit, which is sponsored by the Creation Research Society of San Diego, is in the names of Segraves *et al.*, students in California schools, including children of Mrs Nell Segraves of the society. The suit charges that the State of California has violated the

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provisions of the First Amendment of the Constitution by permitting the teaching of evolution. This, the suit says, disparages the religion of creationists and in itself amounts to the teaching of a religion — the religion of secular humanism.

The charges in the suit focus on the *Science Framework for California Public Schools, Kindergarten and Grades One through Twelve*, published by the California State Department of Education in 1978. Dr Richard Lemmon and I served on the committee that wrote this publication, a task that took about three years. It involved a steady battle with creationists who resisted the inclusion of statements concerning evolution. On some occasions, we obtained their consent, only to have them change their minds. For example, a statement that "Darwinian evolution is a cornerstone of modern biology" was first permitted, then deleted.

The final document says:

Living organisms have universal properties, including derivation of energy from outside sources, and reproduction. Evolutionary studies indicate that these organisms are naturally selected from generation to generation, producing descendants with different characteristics and producing variability among populations of living species. The process has been going on so long that it has produced all the groups and kinds of plants and animals now living as well as others that have become extinct.

... In addition to reproduction, another characteristic of life is change in its genetic material with passage of time. This process, termed evolution, takes place through changes in DNA. Changes in DNA molecules are produced by mutation, which includes replacement of some DNA bases by others, and recombination in which segments of DNA are added to or subtracted from genes. Duplication of genes sometimes also occurs. Most mutations are harmful and do not persist; they are eliminated by natural selection.

Beneficial mutations occasionally take place and are responsible for the appearance of new characteristics. A third class is "neutral" or "near neutral" mutations.

The Creation Research Society (through Creation-Life Publishers) does not confine itself to matters of religion but also addresses scientific questions. A complaint by a parent in Livermore is that the publication *Dry Bones*, published by Creation-Life in 1979, is being used in lower grades of an elementary school. It contains a dialogue between children and their father, including:

Q: "Did dinosaurs live when Noah lived, Dad?"

A: "That's what I think. The way it looks, dinosaurs were drowned in the Flood, too."

Q: "Did Noah have to take them on the Ark?"

A: "He surely did" . . .

Q: "I guess [Darwin] thought fossils were proof for evolution."

A: "No, Darwin said that fossils were 'perhaps the most obvious and serious objection' to his theory."

A: "... Did your friend also tell you about

scientists at Oak Ridge National Laboratories?"

Q: "No, what about them, Dad?"

A: "They used uranium dating on wood in rocks of the dinosaur group, and got ages of only thousands of years."

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Genes and race

SIR — Some time ago you published a letter from me concerning the use made by the National Front of apparently "scientific" justification of racist arguments. I asked, through your columns, Professors Eysenck and Jensen publicly to dissociate themselves from the use made of their names in apparent support of these views.

I now wish to bring an analogous issue to the attention of readers of *Nature*. Ever since the publication in 1975 of E.O. Wilson's *Sociobiology: The New Synthesis*, the danger has been clear that in due course racists would deploy sociobiology in support of their views. The "New Right" in France has been doing so for some time, and now the breakaway journal from the National Front in Britain, *New Nation*, has done so too. Its first two issues, dated summer and autumn 1980, carry articles entitled: "Nationalism, racialism: products of our selfish genes" and "Science is championing our creed of Social Nationalism", authors respectively John Thornton Bannerman and Richard Verrall (the latter is also the author of a pamphlet entitled "Did Six Million Really Die?").

The first cited of these comes complete with a picture of "Richard Dawkins, author of *The Selfish Gene*", and cites him, Wilson, Maynard Smith and one Trivers (presumably Trivers) amongst others. The final section of this article appears alongside an advertisement from "Nationalist Books" which includes such choice titles as *Debunking the Genocide Myth* and *Anne Franck's diary — a hoax*. Opponents of sociobiology, it is therefore scarcely surprising to note, are categorized as "Marxist" and "Jewish".

The concluding paragraph reads as follows:

For us, as racial nationalists, this is an important vindication of our position. For it is increasingly clear that it isn't just "bad luck" that our genes don't permit us to live in a Marxist-Rousseauesque egalitarian communist utopian World State of universal altruism. It was an inevitable result of the way evolution works that our genes would not permit us so to live. What the evolutionary theoreticians have shown us is that, with the system of genetic inheritance shared by all vertebrates, the only type of social organization which can evolve, let alone work, is one based upon kinship, upon the ties of blood and of race. Nationalism is not only an integral part of our genetic inheritance, it is an inevitable end product of the evolutionary processes which shaped that inheritance.

May I suggest that it would be in the public interest that John Maynard Smith and Richard Dawkins should clearly dissociate themselves from the use of their names in support of this neo-Nazi balderdash.

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Energetic consensus

SIR — It was disheartening to learn from your correspondent that the First European Bioenergetics Conference had shown a "general acceptance of the chemiosmotic concept of energy transduction" and that interest was now moving on from this assured base to the finer molecular details of the problem (*Nature* 4 December 1980, p.432). If there is such consensus on this matter there is very good reason to believe that it could be mistaken.

The chemiosmotic hypothesis is founded upon a very simple and invalidating illogicality: no evidence has ever been given that protons move into the bulk-phase during synthesis. Oxygen-pulse studies which supposedly support the hypothesis are carried out under entirely different experimental circumstances; and to have used the results of such studies to generalize upon the nature of proton movements in ATP synthesis was to introduce an inferential *non sequitur* into the energy transduction argument from the outset. The basic chemiosmotic equation:

$$\Delta p = \Delta \psi - Z \Delta pH \quad (1)$$

has no meaning if protons are not translocated to the bulk-phase.

We have attempted to state this view since 1974¹ and the accumulating experimental evidence we have obtained has led to the q -zone interpretation of mitochondrial energy transduction in which the proton-motive force has been regarded as a localized and surface electrical force, with a minimal osmotic involvement:

$$\Delta p^e \approx \Delta \psi^e \quad (2)$$

Recent experiments showing the generation of negative fixed charges on the inner membrane specifically associated with the energization process² have fulfilled the main prediction of the q -zone interpretation and given a further compelling reason to suspect the adequacy of the chemiosmotic view; they also call into question our own formulation of the proton-motive force given in equation (2).

It now seems probable that during synthesis the proton-motive force should be regarded as a coulombic rather than a chemiosmotic force, and that its assessment should be made in terms of charge-charge relationships taking place in a surface region of variable dielectric. Some of the more recondite thermodynamic implications of such a system have already been anticipated by Ashcroft and Coster³; meanwhile an unsophisticated estimate of the interchange distance, l , may be gained from the relationship:

$$W = \frac{q_1 q_2}{\epsilon l} = 15 \text{ kcal } (\Delta G_p)$$

and the speculative use of a now dubious chemiosmotic H^+ / ATP stoichiometry of 3. Substituting the dielectric constants for the "limit" media ($\epsilon_{aq} = 75$; $\epsilon_{lipid} = 2$) interchange distances of 0.9 and 33 Å are obtained; the functional value may reasonably be expected to lie between these extremes and to be in accord with the requirements of the q -zone interpretation.

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1. Archbold, G.P.R. *et al. Biochem. Soc. Trans.* 2, 751-754 (1974).
2. Archbold, G.P.R. *et al. Biochem. Internat.* 1, (in the press).
3. Ashcroft, R.G. & Coster, H.G.L. *Bioelectrochem. Bioenerg.* 5, 37-42 (1978).