Paradoxical Effect of ALS

RECENT advances in cellular immunology seem to have provided an understanding of the array of cells involved in immunological responses. It seems that many immune responses involve the participation of at least three kinds of cell—T lymphocytyes of thymic origin, B lymphocytes of bone-marrow or bursal equivalent origin and macrophages. In some situations it is possible to deduce that the activities of T cells lead to the production of humoral factors which, when bound to the macrophages, can stimulate B cells to produce antibody. The net results thus seem to be attributable to the activities of an immunological orchestra. It may also prove to be the case that the responses to some kinds of antigenic stimulus involve only small sections of the orchestra. Clearly it will often be a complicated matter to gain a concise interpretation of the effects of an extrinsic immunosuppressant on such an intrinsically complex function. A report by Cantor and Asofsky on page 39 of this issue exemplifies this.

Antilymphocyte antiserum (ALS) has been found to be a potent immunosuppressive agent in a variety of animals. It is often supposed that its effect is caused by selective depletion of T cells and that it has little influence on the thymus as a source organ. There are, however, reports which have indicated an effect on bone marrow, on the thymus and on macrophages and thus any simplistic view of the mode of action of ALS is probably wrong. The variety of results can in part be attributed to the variety of methods used to produce ALS and the variety of the producing animals. Cantor and Asofsky dealt with ALS produced according to a recipe of Levey and Medawar (*Proc. US Nat. Acad. Sci.*, **56**, 1130 ; 1966). They injected this material, in relatively small amounts, into parental mice. At various times later the capacity of the thymuses of these animals to engender a graft-versus-host (GVH) reaction in newborn F_1 recipients was determined.

Cantor and Asofsky found that the GVH activity of the thymocytes of recipients of ALS was much increased for about the same time that the comparable activity of the spleens of the same animals was reduced. There was no evidence of a reduction in the cellularity of the thymuses of the ALS-treated mice but no histopathological evaluation is given. Cantor and Asofsky do not feel that the effect they observe on thymuses can be attributed to stress which might reduce the cortical cell population as a result of high amounts of corticosteroid. They prefer to suggest that ALS somehow causes an alteration in the proportion of mature cells which are about to leave the thymus to become T cells. It is reasonably supposed that T cells initiate GVH reactions.

Whatever the mechanism involved, these experiments suggest that studies on immunosuppressive agents should take into account changes in the source organs of immunologically reactive cells. From a Correspondent

How Fickle is the Finger of Fate?

IT is sometimes difficult to know how seriously to take those who suggest that the constants of physics are really variables. The numbers game is fun, of course, and is undoubtedly an exercise which ranks among the better kinds of mental gymnastics for preventing premature decay of the grey matter. But is there really any practical point to it? As Noerdlinger points out, in introducing the latest version of this game, "there are grave doubts as to the meaning of saying that any dimensional constant changes, because presumably dimensional constants only express something about the sizes of the standards we use in measuring them". Nevertheless, Noerdlinger goes on to consider the implications of the 2.7 K background radiation for the constancy of Planck's constant h (*Phys. Rev. Lett.*, **30**, 761; 1973).

The latest bout of speculation about the constancy of h seems to have been sparked off by the suggestion of Bahcall and Salpeter that measurements of the dispersion of QSO light by prisms and by gratings could provide a measure of the fickleness of the constant (*Astrophys. J.*, **142**, 1677 ; 1965). Their idea is straightforward enough: because prisms essentially react to the energy of photons whereas gratings measure wavelength and $E=hv$, comparison of the two kinds of observation would show up changes in h since the QSO light started on its journey. Experiments to test this possibility have come up with negative results in every case. But still, these experiments have only finite accuracy, so the possibility of a variable h remains. Now Noerdlinger has come up with an alternative test which, while proving equally negative (or equally positive, perhaps, if one's point of view is that universal constants really should be constant throughout time and space), does provide further mental stimulation.

A fundamental requirement of any such contribution to the numbers game is to make enough initial assumptions to ensure that something can be deduced. Noerdlinger's assumptions about the origin of the black-body background are reasonable, although one could quibble over his exact choice of parameters, and do not seriously affect his principal point. Like the QSO light idea, this is quite simple. The Rayleigh-Jeans part of the measured 2.7 K curve gives the present value of kT irrespective of the value of h. On the other hand, the turnover in the spectrum gives an indication of the parameter (hv/kT). Treating kT as one parameter, and leaving aside any question that k changes, a measure of h which might be expected to carry some memory of conditions earlier in the evolution of the Universe again seems possible. If h was larger in the past, for example, the spectrum ought to turn over below the points measured. Noerdlinger concludes that $\delta h/h<0.3$ in the interval of redshift $0<z<1{,}000$ (his upper limit on z corresponds to the assumed time at which the last energy interchange between matter and radiation occurred—the end of the decoupling era).

An interesting possibility remains, however. If the QSO experiments do produce a positive result, the lack of a positive result from the background radiation test might imply that the speed of light varies, that one should not write (hv/kT) but rather $(hc/\lambda kT)$, and/or that the 2.7 K radiation is travelling at a speed not equal to c.

By our Cosmology Correspondent