Letters

Comfort and Environment

Your "Dog days" editorial [*Science* **130**, 131 (1959)] indicates adverse reaction to the "discomfort index" for business reasons. There are additional grounds for dispensing with the new discomfort index. Since human comfort is a rather complex function of ambient temperature, humidity, wind, and radiation load (principally solar, but also infrared as represented by wall temperature in a room), it would appear that a discomfort (or comfort) index should include the effects of all four environmental quantities. Additionally, however, the large individual differences in personal reaction to the physical environment, with both physiological and psychological factors, would appear to make determination of a rational discomfort index a virtual impossibility.

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Properdin

Having read with great interest D. W. Talmage's "Immunological specificity" [*Science*, **129**, 1643 (1959)], I would like to comment on the hypothesis raised, in reference to the properdin system.

No really satisfactory definition of properdin is available at the present. Although most investigators consider it a discrete entity—"a naturally immune factor"—recent work, especially that of Nelson (*1*), attempts to erase the distinction between the properdin and the classical antibody system. Properdin is considered a "natural antibody of broad if weak spectrum of activity." Although properdin does seem to possess certain distinct physicochemical characteristics, yet discrepancies are found in its immunological activity. For instance, there is lack of correlation of its activity as measured by phage neutralization, zymosan titration, or antimicrobial activity (*2*).

H. Isliker of Bern, Switzerland, indicated recently that properdin is a polymer of 7-S globulins linked reversibly by disulfide bonds (*3*). Thus it may be that the wide spectrum of properdin activity is due to the different affinities of component "natural globulins," and that the lack of correlation in measurements of its activity made by different methods results from variation in the ratios of immunologically different globulins incorporated into the macromolecule.

I have always been impressed by the fact that properdin titers are consistently found to be decreased in infections and malignancies and in military personnel subjected to a massive immunization program (*4*)—all conditions involving a specific antibody formation. As this had never been adequately explained, we felt that something in the nature of a "competitive equilibrium" was involved—properdin polymer dissociating into its component globulins which were then "retooled" to fit the antigens flooding the organism. With Talmage's hypothesis, such a "retooling" would not be deemed necessary, with natural globulins reaggregating into specific complementary patterns. This hypothesis should certainly be easy enough to check experimentally with labeled globulins.

I certainly agree with Talmage that it would be of interest to check whether properdin could be inhibited by the mechanisms of immune tolerance. Zymosan would seem to be the logical inhibitory agent. Such an experiment would be helpful in elucidating the true nature of properdin. A finding of complete suppression would tend perhaps to strengthen the position of those who consider it a natural antibody. Also, it would provide an opportunity to ascertain properdin's role as a defense mechanism.

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References

1. R. A. Nelson, *J. Exptl. Med.* **108**, 515 (1958).
2. K. M. Cowan, *Science* **128**, 778 (1958).
3. H. Isliker, *Proc. Intern. Congr. Biochem., 10th Congr., Vienna* (1958).
4. I. Schultz and G. H. Stollerman, *Clin. Research Proc.* **5**, 304 (1957).

Without commenting directly on Rytel's interesting hypothesis of the nature of properdin, I would like to clarify an apparent misunderstanding of the word *combination* as used in my article. I used the word in its abstract mathematical sense to indicate the number of different ways that independently reactive globulin molecules can be grouped. There was certainly no intention of implying a physical aggregation of natural globulin molecules. Studies with sulfur-35 amino acid incorporation in a number of laboratories have clearly shown that antibodies are formed directly from amino acids *de novo*—that is, not from preexisting globulin or other protein precursors.

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