

nor so anthropomorphic as to identify non-material with mind. I am hoping that Admiral Beadnell may be among those who can accept my understanding of the term, though it would take too much space to explain it here.

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In my letter of May 16, to which Prof. Kapp refers, I tried to explain that the disequilibrium in question, involving as it does an increase of entropy, was a necessary (though, as I pointed out, not a sufficient) condition for the occurrence of the photochemical process, since the latter involves an increase of order and a decrease of entropy. I was careful to point out that the work of the biochemists and plant physiologists was necessary in order to complete the associated complex of conditions and processes which, together with the fundamental condition, constitutes a satisfactory causal analysis of the phenomenon. It will be obvious, I think, to those who have followed the discussion, that what Prof. Kapp now says constitutes a complete travesty of my remarks and demonstrates in the clearest manner that he has failed to understand their meaning.

I am glad, however, that Prof. Kapp has written this second letter, because readers of NATURE can now see for themselves Prof. Kapp's method of conducting his type of "causal analysis". Let me give one or two examples. The molecules of glucose are found to build up the starch granules in the chloroplasts of a plant cell. Why is this? Because they follow the course specified for them. A chemical substance *A*, when presented in an organism with a mixture of substances *B*, *C*, *D*, etc., is found to combine with *B*, but not with *C*, *D*, etc. Reason for this? Very simple, an unknown *X* discriminates. And so on, *ad infinitum*. This sort of thing is not even "medieval mysticism"; the medieval philosophers and scientists, though suffering in general from a great paucity of facts, were after all good rationalists. Sound and sufficient experiments and sound and sufficient reasoning make science. One cannot buy (or sell) it with the currency of mere words; though you may run a dumb film on captions.

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General and Social Biology

THE article by Mrs. S. Neville Rolfe in NATURE of January 24, p. 90, calls for comment and support. Does it occur to the average man that, except at some schools, everything taught is factual, with definite conclusions? For example, history, geography, grammar, mathematics, physics and chemistry all produce definite results. But when we enter the world in which we live, we are emerging into a world of living and thinking beings. The facts can be ascertained, though often with much difficulty, but the conclusions are too often matters of probability.

It is true that contact with the world teaches some men the peculiarities of social life and human nature. But I cannot understand a nation without any universal training in social biology taking the sound road easily. Their minds have not been trained as they should be.

In administration the defect is obvious, and the difficulties in the way of problems of health are known to many people who have seen them in the Colonial

empire. One item—and it is only one item—illustrates. During the War of 1914–18—and there I can speak from personal knowledge of the difficulties—in the British and Dominion troops there were 400,000 reported cases of venereal disease, and in the American Army 340,000, that is, 740,000 in all, with an average absence from duty of five-six weeks and causing a heavy burden on the services. Could this have happened if the military direction had grasped the situation before it developed? Much the same thing may be said of malaria, which took a heavy toll, although Field Marshal Allenby realized the danger and acted accordingly.

How many people realize that there are 650 million people suffering from malaria—about 1 in 3 of the population of the world. But the very good medical education in the universities is directed chiefly towards the treatment of disease. The prevention of disease and the maintenance of health, apart from disease, do not receive much attention. The social problems of housing, play space, town planning, etc., scarcely enter the medical curriculum.

Prevention means not only advice but also the active concurrence of everyone. But the general mass of the population, untrained in biology, will continue to make serious mistakes. All universities naturally divide their work into compartments, but the great problems of life very often do not fit into any compartment, and have to be attacked by other methods; hence the need for some form of sociological training.

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Higher Algebra

My attention has been directed to an unfortunate error in my review of "The Tutorial Algebra" in NATURE of July 11, p. 39. In fairness to the author especially, I should like to correct this. My query, "Is the condition . . . biquadratic?", should have referred to the converse, namely, Does the condition $ac - b^2 > 0$ hold for every biquadratic having at least two complex roots? My chief concern was to prevent the inference that the roots are all real when $ac - b^2$ is not positive; hence the example. I think the whole point would become quite clear if a brief note were added at the end of the proof of example (2) on p. 510 indicating (i) what happens when H is not positive or equal to zero, and (ii) whether the converse to the theorem proved is true, H being $ac - b^2$.

F. G. W. BROWN.

Pyrethrum Sprays

In my article published in NATURE of June 27 (p. 720) on "Biological Assay of Insecticidal Sprays", it was stated that a solution of pyrocatechol in ether was recommended as a stabilizer for the standard pyrethrum spray. It must be pointed out that this statement should apply only to a pyrethrum solution used as a standard for comparison in laboratory tests.

A solution of this type, in which ether is employed, would not be suitable for incorporation in a pyrethrum spray intended for commercial use, and the statement concerning its addition does not form part of the standard specification for this type of spray.

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