## Pining in Sheep not Curable by Cobalt Administration

WORK in Australia has shown that deficiency of cobalt in the diet is responsible for characteristic disorders of sheep and cattle. The view that a sheep disease known as 'pining' results from cobalt deficiency was advanced by Corner and Smith[1], who claimed that cobalt administration prevented and cured this disease north of the Scottish border. In our opinion these experiments were inadequately controlled. During a large-scale investigation of 'pining' in the Cheviot area south of the border, undertaken in collaboration with Dr. Taylor and Dr. Green of the Veterinary Laboratory of the Ministry of Agriculture at Weybridge, a well-controlled experiment was carried out to test the curative effect of cobalt on sheep suffering in varying degree from this disease. Cobalt solution was administered for five months to one half of the sheep, the other half being left as untreated controls. The death-rate from 'pining' was as high in the treated as the untreated group, and at the end of the experiment the treated sheep were no better than the controls as judged by body-weight records and hæmatocrite estimations. The details of this experiment have been described in a recent number of the *Veterinary Record*.

In a preliminary report[2] the view was expressed by us that 'pining' in the area concerned was caused by interaction between malnutrition and parasitic infestation, the worm species *O. circumcincta* being especially incriminated. Field investigation over the last three years has shown that 'pining' may be prevented either: (1) by feeding a special mineralized cake containing considerable quantities of calcium and phosphorus as well as small amounts of iron, cobalt, copper and other trace elements; or (2) by systematic anthelmintic treatment to remove worms. The mineralized cake may have prevented 'pining' by removing specific mineral deficiencies or by obviating undernutrition in the more general sense by supplying additional protein and calories. Although administration of cobalt has failed to cure pining, the possibility is not ruled out that specific deficiency of this element may play an initial part in some areas in the cause of pining by lowering resistance to parasitic disease. There is, however, no evidence for this view apart from the fact that parasitic infestation has been controlled and 'pining' prevented by feeding a mineralized cake containing cobalt as well as other trace elements. Our investigations are being extended with the object of eliminating the non-essential constituents from the pining-preventing cake and continuing observations upon anthelmintic treatment.

The claims of Corner and Smith for the specific significance of cobalt have been recorded in biochemical and medical as well as in agricultural literature, and it is therefore thought of general interest to direct attention to the article entitled "Pining not Curable by Cobalt Administration" being published in the *Veterinary Record*.

W. LYLE STEWART.
A. PHYLLIS PONSFORD.

Veterinary Branch,
Agricultural Department,
King's College,
Newcastle-upon-Tyne.
May 6.

[1] Corner and Smith, *Biochem. J.*, **32**, 1800 (1938).
[2] Stewart and Ponsford, *J. Comp. Path. and Ther.*, **49**, 49 (1936).

## Practical Science in Schools

A COMMUNICATION from my former biology master, Mr. A. G. Lowndes, in NATURE of June 1, p. 863, cannot, I feel, be allowed to pass without an answer. Since the time when I was very ably taught by Mr. Lowndes with plenty of laboratory work, I have become a biology examiner both in scholarships and School Certificate. I have, therefore, experienced the results of laboratory work in biology at school from two aspects in quite a short space of time, and my conclusions are the very opposite to those expressed by Mr. Lowndes.

Candidates for scholarships come up knowing advanced genetics, but when presented with a twig of larch they do not recognize it nor can they make a constructive effort to understand it. Similarly, they know all the details of stomatal mechanism, but the stoma that they draw would be quite incapable of opening and closing as described, and in one case a candidate admitted that he had never really properly examined one. I can, therefore, only believe that this result is achieved by too much book and lecture work and too little laboratory work. On Mr. Lowndes' scheme there will be a tendency for children to acquire knowledge which they do not properly understand because they have not handled the material for themselves.

Furthermore, I sincerely believe that a plant or animal which has been handled and cut up can be remembered very much more readily than the same plant or animal described and demonstrated. I remember that I learnt very much more of plant systematics at school when I collected and identified two hundred flowers than at the University when I saw many of them as demonstrations.

In this letter I only feel qualified to refer to biology, and so I may perhaps add that I believe one great asset of laboratory work is that one learns to draw accurately what is observed, and there cannot be too much of this, especially as many who come up to the university are very poor in this respect.

As I understand the problem, the solution would be for the universities to demand a smaller syllabus so that adequate time is allowed for laboratory work and the student becomes really grounded in the fundamental facts. I also find it difficult to subscribe to a statement quoted in an article on the same subject in the same number, namely, that the function of the teacher is "to stimulate wonder and imagination". I should have thought that a better function would be to stimulate understanding and appreciation.

I realize that *elementary general biology* is perhaps in a different category but I would still maintain my thesis, namely, that, so far as possible, actual examination of specimens helps one to remember better than any amount of talking.

V. J. CHAPMAN.

Botany School,
Cambridge.
June 2.

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WE are glad to publish the above views of a member of a university staff who has also examined school students of biology. It should be borne in mind, however, that the majority of secondary school students do not proceed to a university, and furthermore only a minority of those who do so continue their studies in the science faculties. Science in