S/P ratio at ten days of age, when the first sections were taken. This difference appears to be too large to have developed since birth, and strongly suggests that the late pre-natal development of secondary follicles may be affected by the fœtal environment. In a further series of observations, a significant correlation ($r = 0{\cdot}56$) between birth-weight and S/P ratio at birth has been noted, and seems to establish beyond doubt that the ratio at birth is influenced by the general pre-natal environment. Subsequent observations have also shown that the rate of development of secondary follicles during early post-natal life is closely associated with growth-rate in general and particularly with rate of expansion of skin.

These observations form part of a larger series being conducted at this College, and financed largely by the Commonwealth Scientific and Industrial Research Organization from the Wool Research Trust Account; grateful acknowledgment is made for this assistance. The detailed observations will be published elsewhere in due course.

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Inhibition of Populations of *Hæmonchus contortus* in Sheep fed on White Clover (*Trifolium repens*) High in Lotaustralin

MELVILLE *et al.*[1] have shown that strains of New Zealand white clover (*Trifolium repens*) may contain up to 0·033 per cent hydrogen cyanide. It occurred to me that such a concentration might be lethal to internal parasites of sheep.

Preliminary *in vitro* experiments demonstrated that solutions of potassium cyanide, approximating to the concentration of hydrogen cyanide which could be expected in the rumen of sheep fed on white clover, killed some trichostrongylid infective larvæ. Further, some infective larvæ in water exposed over macerated clover also were killed.

A third step was to administer known populations of *Hæmonchus contortus* infective larvæ to lambs reared free from parasitism and fed on pure stands of the following plants: (1) New Zealand certified pedigree white clover, a strain selected and bred by the Grasslands Division of the Department of Scientific and Industrial Research, high in the cyanogenetic glucoside, lotaustralin; analysis at the initiation of the experiment revealed 0·023 per cent hydrogen cyanide. (2) Red clover (*T. pratense*) containing a doubtful trace of hydrogen cyanide (white clover of low cyanide content was not available at the time of the experiment). (3) Cocksfoot (*Dactylis glomerata*), a grass chosen because it was available and did not contain hydrogen cyanide.

Fourteen seven-month old Romney lambs were simultaneously placed in each of the three parasite-free experimental paddocks. The lambs were permitted four days to become accustomed to the diet, and then each was given 2,000 *H. contortus* infective larvæ. After fourteen more days in the paddocks, the lambs were killed and the *H. contortus* populations counted. Only fifth-instar parasites were found. The average *H. contortus* populations for the groups were: on white clover, 509·6 worms; on red clover, 613·9 worms; on cocksfoot, 698·6 worms. Thus the average populations of the white and the red clover groups were, respectively, 72·9 and 87·8 per cent of the cocksfoot group. The average differences required for significance between the groups at the 5 per cent and 1 per cent levels are, respectively, 121·9 and 163·1. Thus it is seen that there is a highly significant difference in worm populations between the white and the cocksfoot groups; but between these two groups and the red clover group, population differences do not reach the 5 per cent level of significance. There is doubt that cyanide content is the only factor involved. The work is being continued.

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Action of Insulin on the Frog (*Rana temporaria*)

EARLIER investigations of the action of insulin on cold-blooded vertebrates have shown that, although large doses usually lead to the appearance of typical convulsions, there is often a long latent period (1–2 days at room temperature) during which there are no visible symptoms[1–3]. In experiments performed in March and May 1952 the action of insulin on the blood-sugar level of the frog was followed, at intervals, from the time of injection to the development of convulsions. The frogs were kept at room temperature (17°–20° C.) and were injected with four units of insulin (Wellcome 40) in the dorsal lymph sac. The sugar content of the blood was determined by a modification of the method described by King[4] for obtaining "true sugar" values, which are 15–20 mgm./100 ml. lower than those previously recorded for the frog[5].

There was no change in the mean blood-sugar level in the first 1½ hr. after insulin (23 ± 1·81 mgm./100 ml.), but after 5 hr. it had fallen to a very low value (3 ± 0·69 mgm./100 ml.), which was maintained to the end of the experiments when the frogs had shown typical insulin convulsions[1,2]. In one series of experiments (May 1952) parallel estimations of the glycogen content of the liver and gastrocnemius muscles were made (calculated as percentage wet weight of tissue). The mean muscle-glycogen content fell slightly between 5 hr. and 24 hr. after insulin (from 0·53 ± 0·06 to 0·32 ± 0·06 per cent, $P < 0{\cdot}05$), possibly followed by a further decrease associated with the occurrence of convulsions (0·23 ± 0·05 per cent). The changes in liver-glycogen content in the first 24 hr. were not significant, but after convulsions had occurred there was a marked fall (from 1·71 ± 0·13 to 0·36 ± 0·22 per cent, $P < 0{\cdot}001$).