prime factor in wear, at least under New Zealand conditions. Although Baker *et al.*[2,3] suggest, in a number of interesting papers, that plant phytoliths could be responsible for wear, it seems unlikely that plant phytoliths would exceed 15 g/day at the 1 kg/day dry-matter intake-level, a relatively small figure as compared with peak intakes of soil of more than 200 g/day. Further, the percentages of phytoliths in pasture samples from the three farms are not sufficiently different to explain the wear differences. This would suggest that, under New Zealand conditions, plant phytoliths are not a primary cause of wear.

After this investigation was under way it was found that another New Zealand worker, E. Suckling[4], who was studying the effect of stocking rates on pasture composition, body-weights, wool weights, footrot, and internal parasites, had noted excessive wear in sheep at high stocking rates, which he has attributed to abrasion by soil. Co-operative studies between us now under way should enable us to establish if wear is optimal at peak soil ingestion periods.

The surprisingly high amounts of soil ingested on the high-wear farm may have other implications in the soil–plant–animal field. Ingested soil may be a significant source of microelements and of insecticides, and these aspects are also being investigated.

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ENTOMOLOGY

Changes in Size of the Corpus Allatum in a Polymorphic Insect

In order to gain some insight into the part played by the endocrine system in determining form in a polymorphic insect, an investigation was undertaken of changes in volume of the corpus allatum in virginoparous alate and apterous forms of the cabbage aphis, *Brevicoryne brassicae* (L.).

Aphids of known ages were fixed in alcoholic Bouin containing 0·5 per cent trichloroacetic acid, sectioned frontally at 8μ, and stained with iron-haematoxylin. The length and width of the corpus allatum were measured using a screw-type eyepiece micrometer and the approximate volume of the gland was calculated assuming it to be an ellipsoid having equal minor axes.

It was found that during the third and particularly the fourth nymphal instar apteriform aphids had larger corpora allata than did alatiform aphids. At the imaginal moult the corpus allatum of the apterous aphid was twice as large as that of the alate. The corpus allatum of the alate did not increase in volume between the beginning of the third instar and the imaginal moult, but by 24 h after the imaginal moult it had doubled in size. In contrast, the corpus allatum of the adult aptera decreased sharply in volume soon after the imaginal moult.

The observations on the nymphal stages support the theory that apterous characteristics may be brought about by a relatively high concentration of juvenile hormone[1,2].

The relative sizes of the corpora allata in adult apterous and alate aphids were particularly interesting. It has been observed that alate parents give birth almost exclusively to apterous young, while the progeny of apterous parents may be apterous or alate[3]. There is also evidence which suggests that the young of alate parents are determined as apterae before birth, while the progeny of apterae may not be irreversibly determined as apterous or alate until as late as the second instar[4]. This could be explained by supposing that the form of the embryos is influenced by the hormones of the mother. An active corpus allatum in the mother would thus increase the amount of juvenile hormone passing into the embryos and direct them to the apterous pathway of development. A small or inactive corpus allatum such as occurs in apterous adult aphids would have less effect on the form of the young, and its influence could be modified postnatally by various environmental factors.

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Periodic Aggregating and Take-off in Anthophorid Bees, *Anthophora acraensis* Fab.

It is well known that a number of insects refrain from work at dusk, congregate to 'sleep' (or at least to rest in a comatose state), and then resume activity as soon as it becomes bright again[1]. However, little detailed work[2] seems to have been done on the pattern of the alighting and take-off phases of these 'sleeping' aggregations. The present observations have established both the periodicity and temporal pattern of the two phases in *Anthophora acraensis* Fab.

The observations were made between October 10 and November 14, 1964, on small groups of the species aggregating daily in the same tree in a garden at Achimota, Ghana. The number of bees in each day's group varied between 33 and 17 in October; but thereafter fell steadily until there were only 6 individuals coming to the tree on November 14. These groups consisted apparently of males only. On two separate days a single male specimen of *A. albigena* Lep. was observed among the *A. acraensis*. In analysing the results 'William's mean'[3] has been used as the measure of central tendency.

The bees alighted in the evening between 1720 and 1800 h, with a peak in the period 1745–1750; spent the night on the tree, using more or less the same branches each time; and took off in the morning between 0525 and 0605 h, with a peak in the period 0535–0540 (Fig. 1—based on detailed observations made on twenty evenings and twenty mornings). This pattern was repetitive from day to day. The evening peak occurred during the first 5-min period after sunset (1745 h); whereas the morning peak occurred during the second 5-min period before sunrise (0545 h). In these circumstances, the light intensities during the two peak periods could not obviously have been the same; and records (on four evenings and five mornings) made with an 'Eel' photometer indicated that the peak and cessation of alighting occurred under greater illumination than the onset and peak of take-off (Fig. 1).

There was a general tendency for the bees to settle very close to each other on the branches, usually about half an inch apart. It was also observed frequently that attempts by oncoming bees to alight between those that had thus settled were actively repulsed, the latter raising their hind legs at the approach of the former. This behaviour towards an intruder somewhat resembles that noted by Young[4] in the beetle, *Altica bimarginata*, aggregating to 'sleep'.

On alighting, the bees instantaneously clasped the selected branch of the tree with their mandibles and apparently spent the night like this, without using their legs for holding on. Prior to take-off they stretched their hind legs vigorously for a few minutes and became very