of the changes taking place in the oil is not mentioned in the literature, though oxidative changes may be involved. Bearing this in mind, the 1943 honey was tasted from time to time, and it was found that the cat-like flavour gradually faded and gave way to a muscatel flavour of increasing intensity. By July 1944, the cat-like flavour had disappeared entirely, leaving a delicious rich muscatel flavour. Honey is usually eaten within a short period of its production, but as with wines and cheeses it would pay to store some kinds until the flavour matures. This applies to *Ailanthus* and *Castanea* honeys, the latter also losing its strong flavour on keeping, and possibly other ill-flavoured honeys that a beekeeper would feed back to his bees in disgust.

Ailanthus honey does not appear to have been recorded hitherto from Great Britain, although it has been reported from time to time from other countries. Zander¹, for example, mentions a sample which he describes as having a strong peculiar flavour recalling muscatel; evidently this was not fully matured. I am indebted to Mr. A. Chesnikov for the honey samples.

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¹ Zander, E., "Pollengestaltung und Herkunftsbestimmung bei Blütenhonig" (Berlin, 1935).

Larval Growth-Stages of *Agriotes sputator*

THE analysis of wireworm populations has been impeded by lack of knowledge of the number of growth-stages through which wireworms pass during their larval life. In the course of a study of wireworm larvae, I have found that the growth-stage to which any larva belongs can be determined by counting the number of teeth on the borders of the spiracles.

There are eight growth-stages, and the average number of teeth per row for each stage is as follows: on the thoracic spiracles, I, 3-4; II, 4-5-6; III, 6-7-9-7-5; IV, 10-5-14-25; V, 15-25-20-7-5; VI, 21-5-30-5; VII, 32-5-40-5; VIII, 42-62; and, on the abdominal spiracles, I, 0-25-2; II, 2-7-5-4; III, 4-5-6; IV, 6-7-5-9-25; V, 9-7-5-13-7-5; VI, 14-19-5; VII, 20-28-5; VIII, 29-25-39. All the spiracles of 950 larvae have been examined, and all the larvae, although collected at different times of the year, fall into these eight groups.

To count the teeth on all the spiracles is too laborious a process for large-scale work, and a method has therefore been devised whereby the growth-stage can be ascertained by examining a minimum number of spiracles while maintaining an accuracy of more than 97 per cent. The quick method is as follows. Count the teeth on the two outer rows of either thoracic spiracle. If the average number per

row falls within the ranges of the eight groups given in column 1 of the accompanying table, the growth-stage is determined as indicated. If it does not, count the teeth on the other thoracic spiracle and test the average number of all four rows now counted against the groups in column 2. If the growth-stage remains still uncertain, recourse must be had to the abdominal spiracles, the teeth on one, two or three of which can be counted and tested similarly against columns 3, 4 and 5 of the table. If desirable, the teeth on any abdominal spiracles can be counted first, and columns 3, 4 and 5 consulted. Should this not show to which growth-stage the larva belongs, the thoracic spiracles should then be examined. By this quick method, all the larvae can be placed in their growth-stages by counting the teeth on no more than five spiracles.

A full account of the investigation is being prepared for publication.

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Aug. 12.

Reduction by Carbon Dioxide of Susceptibility of Beans to Tobacco Necrosis Viruses

A COMPLICATING factor in the use of the local-lesion technique for estimating the concentration of plant viruses is that a standard inoculum may give widely different numbers of lesions on different leaves. Differences in age of the plant, nutrition, illumination and position of the leaf on the plant can all affect the susceptibility; but it is unknown whether they do so by altering resistance to injury during inoculation, or whether they produce more fundamental changes in the physiology of the injured cells which prevent infection. We have found that exposing plants to atmospheres containing 30-60 per cent carbon dioxide greatly reduces the susceptibility of bean plants (*Phaseolus vulgaris*, var. Canadian Wonder) to tobacco necrosis viruses. As this reduction can be brought about by exposure after inoculation, the effect is presumably due to physiological changes within the cell and not to the number of entry points opened during the inoculation.

The reduction in the number of local lesions depends on the length of exposure to carbon dioxide. To quote one experiment: plants exposed immediately after inoculation for 15, 30, 60 and 120 minutes gave 46, 39, 17 and 13 per cent of the number of local lesions produced on control plants. When plants are exposed for two hours to the gas mixture, they show the same reduced susceptibility whether inoculated with the virus immediately

TABLE FOR DETERMINING THE LARVAL GROWTH-STAGES OF THE WIREWORM *Agriotes sputator*.

Thoracic spiracles		Abdominal spiracles		
1	2	1	2	3
I 3-3-5	I 3-4	I 0-2	I 0-2	I 0-2
II 5-5-5	II 4-5-6	II 3-3-5	II 2-5-3-7-5	II 2-5-4
III 7-9-5	III 6-7-5-9-7-5	III 4-5-5-5	III 4-25-5-7-5	III 4-3-6
IV 11-13-5	IV 10-5-14	IV 7-9	IV 6-5-9	IV 6-5-9-3
V 15-19-5	V 15-20-7-5	V 10-5-13	V 10-25-13	V 9-8-13-8
VI 22-30	VI 21-5-29-7-5	VI 14-5-18-5	VI 14-25-18-5	VI 14-18-8
VII 32-39-5	VII 31-7-5-40-25	VII 20-5-27-5	VII 20-25-27-7-5	VII 19-5-27-7
VIII 42-62	VIII 41-7-5-62	VIII 30-40	VIII 28-7-5-40	VIII 28-7-40