underlying the vagal respiratory reflexes, we may consider the nuclear column adjoining the tractus solitarius as the common interneurone pool for these reflexes, with a cranial part of expiratory, *i.e.* inspiratory-inhibitory, and a caudal part of inspiratory-excitatory, internuncial neurones. It is suggested that these solitary interneurones are controlling the inspiratory motoneurones directly, in an excitatory as well as in an inhibitory way. But a higher reflex integration involving the autonomous divisions of the respiratory center also exists, for it alone could account for some particular features of the vagal control of breathing.

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A New Disease of the Variegated Cutworm, *Peridroma margaritosa* (Haw.)

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In February 1947 we received from F. H. Wymore, of the Union Oil Company insectary at Anaheim, California, several diseased specimens of the variegated cutworm, *Peridroma margaritosa* (Haw.). This species was being reared in a small insectary room to obtain eggs on which ovicidal tests were being run. In the accompanying correspondence Wymore wrote that the disease had been causing an extremely heavy mortality among the older caterpillar population for a period of about four or five weeks. Only a small percentage of the caterpillars ever reached pupation, and only about 50 per cent of the eggs produced by the moths which later emerged proved fertile.

Microscopic examination of the cutworms revealed the presence of bacteria in the blood and a pathology of the fat tissues characterized by the presence of large numbers of small, granular inclusions in the cytoplasm of the fat cells. The nuclei of the fat cells were usually hypertrophied and in a state of degeneration. The bacteria, possibly secondary invaders, were gram-negative small rods which, for the most part, did not ferment lactose.

Additional diseased as well as normal caterpillars were kindly furnished by Mr. Wymore, and with this material infection experiments were conducted which provided the following information.

Healthy variegated cutworms may be infected by direct inoculation into the body cavity, and through the mouth by means of contaminated food. (There is also some evidence that the infecting agent may pass from one generation to the next through the egg.) After two or three days the infected insects begin to eat less food; they may remain slightly smaller in size than normally developing insects, have a somewhat languid appearance, and, in the cases so far observed, usually die before pupating. The fragility of the integument and the marked internal liquefaction of tissues, so characteristic of polyhedroses, is absent. The larvae are flaccid, but the body wall remains relatively firm.

Upon dissecting a diseased larva, one immediately notices an opaque whiteness of the fat tissue which may be solidly white or, in lighter infections, of the normally clear appearance except that it is flecked with opaque, white areas. Under a compound microscope these opaque areas may be seen to consist of nodules of hypertrophied fat cells filled with large numbers of minute (0.4–0.6 μ) granules. Suspended in an ordinary wet mount the infected cells break down rather rapidly, liberating the contained granules until eventually the entire preparation consists of millions of discrete granules together with some cellular debris. The granular inclusions are nearly spherical, are not as refringent as are polyhedral bodies, possess a very slight cream coloration when seen *en masse*, and are readily visible with an ordinary light microscope. When ordinary stained preparations are attempted, these bodies lose much of their distinct granular aspect and appear as lightly stained amorphous particles, frequently coalesced. They do not have the characteristic attributes of bacteria and are not cultivable on the usual bacteriological media.

Sections of the diseased cutworms show a characteristic histopathology of the fat tissue. The nuclei of the fat cells appear either as considerably enlarged, densely staining masses or as disintegrated particles of chromatin material scattered over an area which represented the originally hypertrophied nucleus. The cytoplasm of these cells is packed with large numbers of the granular inclusion bodies. Sometimes the cell membranes are broken down so that the contents of several cells are enclosed in a single area the size of several cells.

The exact nature of the granular inclusions has not been determined. Whether or not they themselves represent the causative agent, probably a virus or agglomerates of a virus, or a peculiar type of granular degeneration, is not known. A few filtration experiments have shown the filtrates from Mandler filters of coarse porosity to be infectious but, so far, not those from Mandler filters of medium or fine porosity. The granular inclusions characteristic of this disease have points of similarity with those described by Paillot (*2*) in the case of *pseudograsserie 1* of another cutworm, *Euxoa segetum* Schiff., and possibly with those briefly described by Graham (*1*) in the case of a disease of the spruce budworm, *Archips fumiferana* (Clem.). It is possible that these agents are representatives of a distinct group of virus diseases of insects, the other two groups being the well-known polyhedroses and those infections (e.g. sacbrood) characterized by the absence of inclusion bodies of any kind.

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