organic nitrogen in an otherwise berberine-free nutrient medium, serve to supply other bacteria with nitrogen. The bacteria that utilize the nitrogen of 'berberinized' cells may be the same species that provided the nitrogen, or other species. Evidence of this 'secondary assimilation' is found both in the yellow fluorescence of the second-culture cells, and in the clear zones of proteolysis surrounding their colonies on agar plates.

P. H. H. Gray
R. A. Lachance

Department of Agricultural Bacteriology,
Macdonald College,
Quebec.
Jan. 27.

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Flight-muscle Changes during Adult Life in a Scolytid Beetle

It has long been known that in ant and termite queens the wings are lost and the flight muscles degenerate after the mating flight. Recently, flight-muscle degeneration has been reported in aphids[1] and mosquitoes[2], although in the latter group further studies appear to be desirable[3]. In the Coleoptera, protection of the posterior membranous wings, when at rest, by the tough anterior wings or elytra makes possible utilization of confined habitats, such as burrows of various types, which are unavailable to many other winged insects. Whether or not such protection is related to loss or reduction of wings, the fact remains that in several families of this group flightless species have evolved[4]. Most of these species have membranous wings greatly reduced in size; but small wing muscles and other morphological indications of loss of the ability to fly have been noted in some instances where wings are normal. Certain species are variable with respect to capacity for flight, some individuals being able to fly although others are not. A seasonal change in flight muscles has been noted in a weevil, and evidence suggests that such a change occurs in certain water beetles.

I have recently investigated the capacity and inclination to fly in a member of the Scolytidae, the ambrosia beetle, *Trypodendron lineatum* (Oliv.). Individuals have been flown on fixed mounts or flight mills and have been tossed into the air at various times during their adult life. Beetles taken in the spring often show considerable capacity for flight. Some will fly for several (up to eight) hours continuously on flight mills or on fixed mounts. Individuals taken in flight will fly immediately when tossed; but those removed from well-established galleries will not.

In this species the young adults, after a feeding period within the galleries, generally fly from the brood logs to their over-wintering site and again the following spring when they carry out their first attack. The parent adults also fly from the brood logs in the first season and may attack other material then or in the following season, producing another brood in either case. Young or parent adults taken from galleries before natural emergence usually will not fly when tossed. They take to flight, however, after a period of time at room temperature.

Dissection of parent adults of either sex removed from galleries containing eggs or larvæ reveals that the large indirect flight muscles are greatly reduced in size, to such an extent that they have almost disappeared. In the females, the much enlarged ovaries project forward into space normally occupied by these muscles. In both sexes the ventriculus is enlarged at this time and also fills part of this space. Parent adults taken just before they emerge naturally from galleries, however, have large flight muscles which appear normal. We thus have an example of temporary but marked reduction in size of flight muscles during brood establishment, followed by return to normal size and, apparently, function.

The reduction of flight muscles occurs at a time of adult activity without feeding and, consequently, of depletion of metabolic reserves. Later, the beetles feed intensively within the galleries, and this permits a building up of these reserves and presumably affects the redevelopment of the flight muscles. The details of the changes in these muscles, however, remain to be worked out.

The flightless period during adult life has ecological significance in that beetles cannot abandon their galleries by flight during this time. It seems likely that the phenomenon occurs in other members of the Scolytidae also, as the pattern of life within the entire family is essentially similar and involves long periods within plant tissue preceded by, or alternating with, relatively brief periods of flight. In any event *Trypodendron* shows an interesting compromise, within the Coleoptera, between the need for sustained flight at certain times and the occurrence of long periods of adult activity in burrowing and establishing a brood in a protected and confined habitat, where flight is not necessary.

John A. Chapman

Forest Biology Laboratory,
Victoria, B.C.
Jan. 20.

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Heat Increments of Feeding in Ruminants

In ruminants the heat losses associated with carbohydrate dissimilation amount to 30–70 k.cal./100 k.cal. carbohydrate digested[1], whereas in man such losses are only 5–7 k.cal./100 k.cal.[2]. In calorimetric experiments with fasted sheep, we have found that the steam-volatile fatty acids which are the major end-products of rumen fermentation of carbohydrate produce a greater heat increment than does glucose given under similar conditions, precautions having been taken to minimize bacterial fermentation of the sugar. Furthermore, in starved animals, and also in those receiving food, the energy-loss as heat is considerably greater for acetic acid than for propionic or butyric acids.

A typical starvation experiment was as follows. A fasted sheep, with a permanent rumen fistula, was confined in a respiration chamber[3], and physiological saline (6,570 ml./24 hr.) was dripped into its rumen at a constant rate. Oxygen consumption, carbon dioxide and methane production, urinary nitrogen and ketone body-excretion were measured