

FAT CONTENT OF THE AMBROSIA BEETLE, *TRYPDENDRON LINEATUM* (OLIV.) DURING ATTACK AND BROOD PRODUCTION

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ABSTRACT

After emergence from hibernation the ambrosia beetle, *Trypodendron lineatum* (Oliv.), flies to attractive host material where it arrives with about one-half the fat it had at the start of hibernation. Analyses of beetles during attack and brood production showed a steady increase in the fat content of males, starting 5 days after the attack. The fat content of the females declined in the first 5 days, then maintained this level for about 1 week after which it rapidly increased.

Introduction

An important phase in the life cycle of the ambrosia beetle, *Trypodendron lineatum* (Oliv.), is the period after emergence from hibernation when the beetles fly and search for attractive host material in which new brood can be established (Prebble and Graham, 1957). The beetles use about one quarter of their fat in overwintering and a similar amount in the spring flight (Nijholt, 1967). This leaves about one-half of their original fat deposits when they start excavating galleries. This report deals with the fat content of beetles during attack and brood production and completes our understanding of changes during a 1-year cycle of adult activity.

Methods and Materials

The studies were carried out near Cowichan Lake, B.C. where, in April 1967, several "greenhouse" cages containing Douglas-fir logs which had been felled in Dec. 1966, provided attractant sources for *Trypodendron* (Chapman, 1966). Window flight traps (Nijholt and Chapman, 1968) were mounted on the cages to catch beetles alive during flight periods. Unattacked, equally attractive logs were exposed for 1 day during heavy flights, and samples were taken of beetles crawling on them and in flight at that time. Beetles were dug from

the logs at intervals during the following 3 weeks. All were oven dried and the fat content of groups of about 50 individuals was determined by Soxhlet extraction with petroleum ether (Nijholt, 1965).

Results and Discussion

When beetles arrive on an attractive log they crawl for a short time, presumably in search of a suitable spot to start excavating a gallery. After mating, the females dig the brood gallery and lay eggs while the males clear the boring dust from the gallery. In a few individuals the fat supply appeared to be completely depleted in the first few days after the attack. It is possible that non-ether-soluble components such as carbohydrates are then used as an energy source. However, the averaged results do not indicate a significant drop in the fat free dry weight during this period, because of the small number of beetles involved.

The proportion of fat in beetles caught during flight corresponds to that measured in the previous year (Nijholt, 1967). The percentage fat of total dry weight clearly indicates a sex difference in fat changes (Fig. 1). Student's *t* values showed significant differences in the first sample, and in those at 12, 13 and 21 days (1% level).

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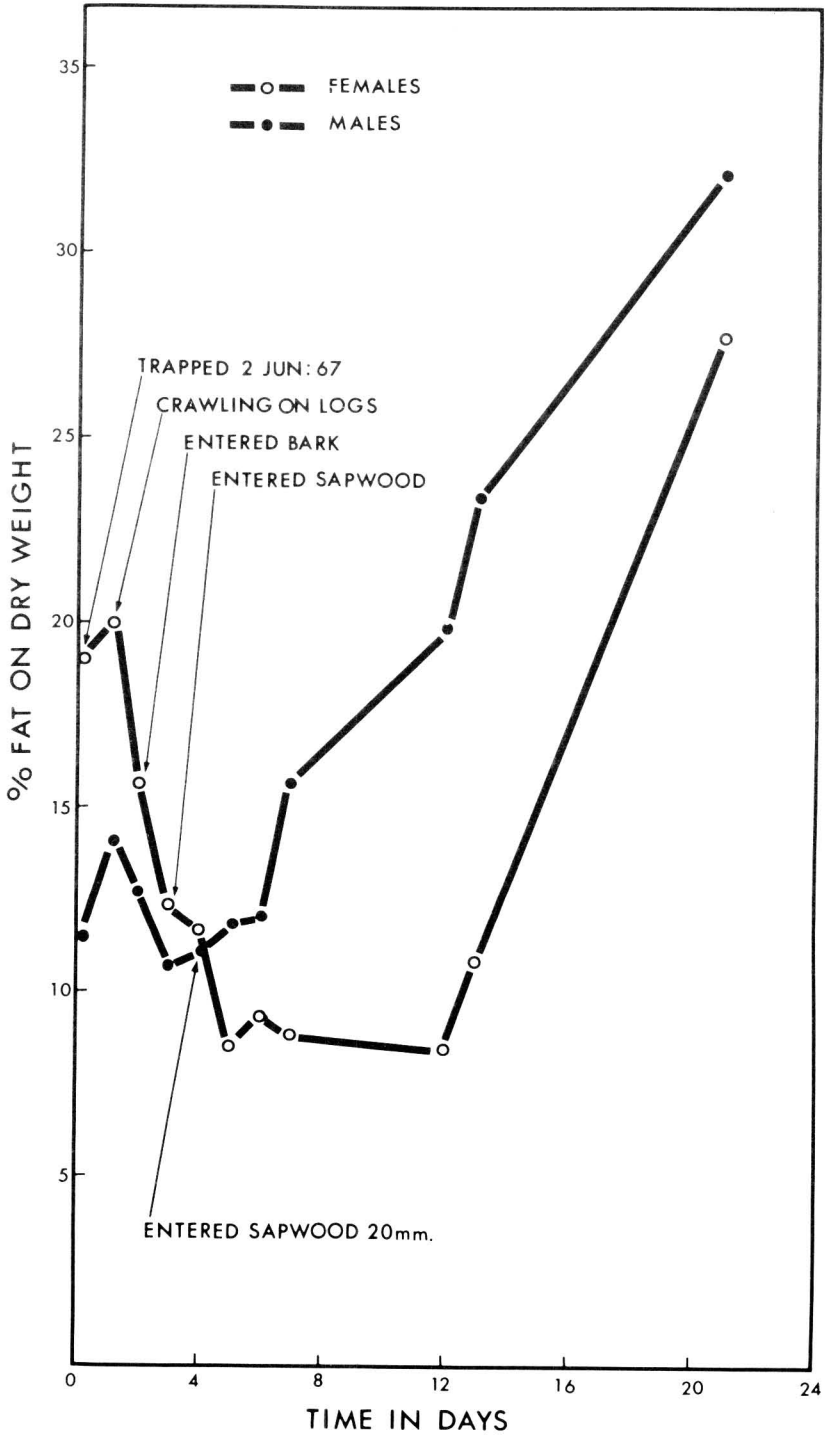


Fig. 1. Average percentage fat of dry weight in samples of 50 *Trypodendron lineatum* (Oliv.) during flight period and excavating activities.

Under the conditions of this experiment, the males steadily increased their fat content after about 5 days from attack to a three-fold level after 3 weeks. The females, needing more energy than the males for excavating and ovipositing, depleted their fat reserves by one-half during the first 5 days and then maintained this level during the next week, when they probably balanced the need for energy by feeding on fungus. Their fat content then rapidly increased, perhaps due to cessation of ovipositing, to a level slightly less than that of males at 3 weeks but equivalent to their own level at the end of hibernation. The time when feeding on fungus starts was not known and explanations for the changes in fat content are speculative.

Both sexes attain a high fat con-

tent by the time they leave the brood logs, enabling them to go through another attack and brood establishing phase or into hibernation. Previous data indicated that on a dry weight basis the females can reach a level of about 40% fat content compared with 30% for males.

The data from this and earlier studies give a general understanding of fat changes during the adult life of this beetle and provide a basis for comparison of fat values in beetles sampled in the natural environment. They also form a basis for a study of the qualitative aspects of fat metabolism in these insects.

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ERRATUM

In Vol. 65, page 4, column 2, paragraph 1, on the 10th line from the top of the page ": . . . 65c per animal per year." should read ". . . 6.5c per animal per year."