SEASONAL FLIGHT ACTIVITY OF THE AMBROSIA BEETLE, TRYPODENDRON LINEATUM (OLIV.), FOR 1959, NEAR PARKSVILLE, B.C.[1]

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Introduction

Hadorn (1933) reviewed earlier work on the flight periods of *Trypodendron lineatum* (Oliv.) and contributed further information on this subject. Prebble and Graham (1957) outlined the biology of this and other ambrosia beetles found on the west coast of Canada. More recently, the seasonal flight activity of *T. lineatum* in the Lake Cowichan, B.C. area has been the subject of special investigation (Chapman and Kinghorn, 1958; see also Kinghorn and Chapman, 1959). In 1959 some further data were secured on this phase of the beetles' activity, to assist in carrying out and interpreting chemical control and various biological studies. It seems worth while to place this information on record.

Methods and Results

Through the co-operation of the Pest Control Committee of the B.C. Loggers' Association, two areas (logging settings) of approximately 20 acres each, on which all trees had been felled and cut into logs, were made available for an experiment on protection of logs from ambrosia beetle attack by helicopter - applied spray. One area was sprayed and the other, near-by, left untreated to serve as the control. The latter was also used for studies on seasonal development and biology of *T. lineatum*.

The experimental settings were situated on land owned by the MacMillan, Bloedel and Powell River Company, some seven miles south of Parksville, B.C., at an altitude of about 1,200 feet. The trees on both settings had been cut in December 1958 and were, presumably, suitable for *Trypodendron* attack in the spring of 1959. Much of the land surrounding these two settings and the intervening block of timber was clear, having been logged in previous years. In this area the land slopes rather gently to the north and there are no marked topographical features.

The several methods used to secure information on relative numbers of beetles in flight during the season will be described briefly. The information secured by each method is presented in Figure 1, together with weather data taken from the Department of Transport weather station at Cassidy (Nanaimo Airport), about 20 miles from the test area and near sea level.

Glass barrier flight traps, used in earlier studies (Chapman and Kinghorn, l.c.), were placed over felled logs at widely spaced positions, eight in the sprayed and eight in the control area. Collections were made from them throughout the season at intervals of one to seven days (C). The numbers of beetles in all records are averages, representing the number collected divided by the days since the previous collection. About the time beetles began to emerge from some of the logs after brood-rearing activity or development, two other sets of traps were placed in the control setting; four next to logs known to be attacked by the earliest beetle flights (F), and eight intended to reveal any movement of beetles into a block of timber between the spray and control settings (five outside and three within the timber)—(E).

Thirty-two collecting pans (Chapman and Kinghorn, l.c.) were placed

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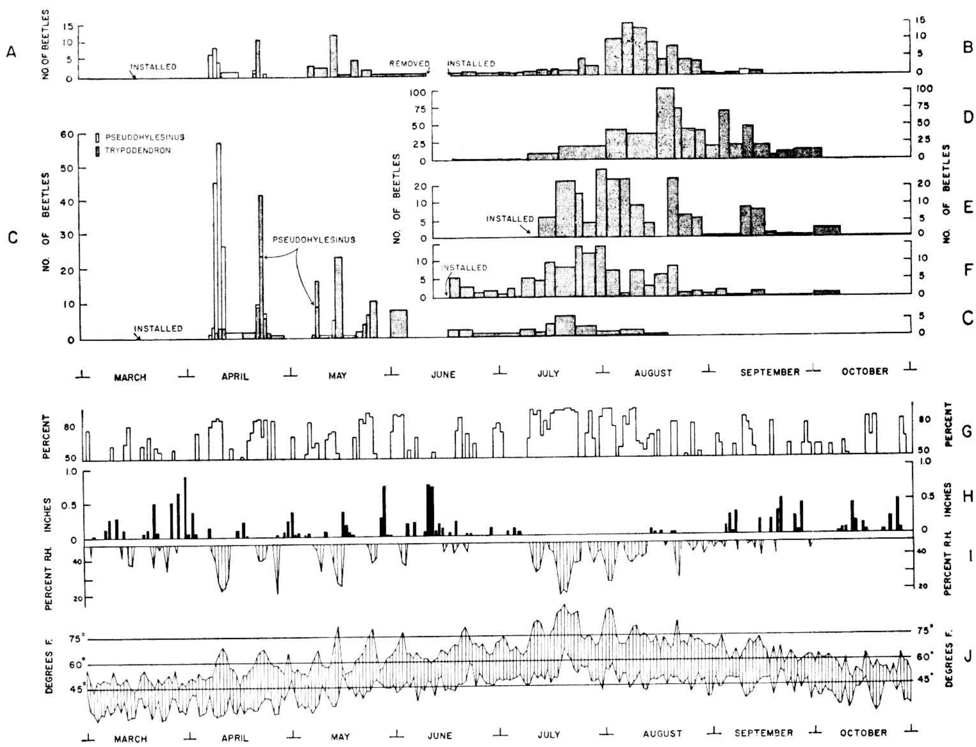

Fig. 1.—Numbers of **Trypodendron** taken in relation to weather and time of season. (A) and (B) from collecting pans under logs; (C), (E) and (F) from glass barrier traps; (D) from retaining cages on established galleries; (G) sunlight over 50 per cent of that possible; (H) precipitation in inches; (I) minimum relative humidity when below 50 per cent; (J) maximum and minimum temperatures (see text; all weather data based on daily values). In (C) the lesser catches of **Pseudohylesinus** relative to **Trypodendron** on some days are indicated by arrows.

under selected logs in the two settings, 16 in each, to cover the attack flight period (A); then, when beetles began to leave logs, they were removed and 16 placed under control setting logs known to be well attacked (B). The latter pans were located close to (F) traps. Between May 6 and June 10, 138 galleries in various parts of the control setting were fitted with cloth-covered aluminum rings, to retain beetles after they emerged, and the numbers leaving the galleries counted at intervals (D). Finally, it should be noted that opportunities for visual observations of beetle flight activity throughout the season were numerous.

Discussion

Although the data in Figure 1 are largely self-explanatory in indicating beetle flight activity in relation to weather and season, a few comments will be made to provide a background for better intepretation or to emphasize certain features. When comparisons are made or implied they refer to the previous Cowichan Lake area work and the conclusions based upon it.

The sunlight record (G) shows only the duration of sunlight over 50 per cent of that theoretically possible for each day at that latitude. It is felt that this shows more clearly than would the total hours of sunlight per day, the occurrence of sunny intervals during the season. This record, together with those of the daily maximum and minimum temperatures (J), precipitation (H), and minimum relative humidity on days when this fell below 50 per cent (I), shows fairly well the nature of the weather at various times during the season.

The numbers of beetles active about these logging settings and the resulting attack densities were relatively low compared with those encountered in previous studies. Moreover, the first beetles did not appear in the area during the first warm period with maximum daily temperatures substantially exceeding 60° F., as expected. Maximum air temperatures at the work area during the April 7-11 period did not differ by more than three degrees F. from those at the weather station. The slow appearance of the first beetles, therefore, cannot be attributed to a considerably lower temperature at the work area than at Cassidy. Also, beetle attacks continued over a relatively long time. It was obvious, from field observations, that many logs not attacked by beetles of the first flight were selected for attack during later flights. Peaks of attack and emergence activity, therefore, were not the same throughout the settings. It seems quite possible that the initial delay of attack, its long duration relative to earlier findings, and the small numbers of beetles involved, can all be explained by assuming that there was no large near source of beetles and that those reaching the area had come from distant and scattered sources. The logging history within a radius of about five miles of the area supports the suggestion that near-by forests harboured relatively few beetles.

It is of interest that *Pseudohylesinus* spp. again served as an indicator for *Trypodendron* by appearing shortly before, as well as during, its early flights. Also, the glass barrier traps and the pans under logs gave, in spite of the small numbers of beetles, substantially the same picture of times of attack (A and C).

There is general agreement between the various measures of beetle flight from logs after brood - rearing or development. The main feature of this movement to be noted is its long duration. One factor which probably contributed to differences in the pattern of emergence shown in Figure 1 is the previously mentioned variability in the times at which logs were attacked in different parts of the setting. Without doubt the duration of gallery construction and egg-laying activity differed in the various logs, also. The data represented at (B) and (F) were based largely on logs attacked by the earliest flights. Many of these logs had unusually long galleries and young beetles were still being produced relatively late in the season. The data in (C) represent pooled catches throughout both spray and control settings, but none of these traps were near logs which were attacked and they cannot be considered to represent the emergence period well. Item (E) represents beetles emerging near those traps of this group which were in the open and, in addition, movement of beetles from a large part of the control setting towards and into the block of timber between the settings. The data in (D) represent a composite picture based on galleries from several locations and logs attacked at different times.

The difference between (F) trap data and (B) pan data, which were taken in the same location, may perhaps be explained as follows. The traps were set up just above or to one side of the logs and, undoubtedly, took, for the most part, beetles leaving the upper surface of the logs. The pans, on the other hand, were placed beneath the logs and were much more likely to take beetles emerging from the more shaded, cooler under-portions where development would be slower.

Acknowledgments

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A Note on **Eulonchus tristis** Lw. (Diptera: Cyrtidae)

Eulonchus tristis Lw. is fairly common in the southern Kootenay region of British Columbia; Mr. H. R. Foxlee has collected many specimens in the vicinity of Robson and I have taken a few at Remac, Ainsworth, and Champion lakes. The adults frequent flowers, particularly those of queenscup, **Clintonia uniflora** Kunth.

Eulonchus tristis is a strong flier, and is capable of some unusual aerobatics. On June 13, 1959, near Remac, four of these flies, clinging together in a tight ball and producing a loud discordant buzz, flew past me and were gaining altitude and avoiding various obstacles before being netted. There were three males and one female.

The ability of insects in several orders to fly while copulating is so well developed that it scarcely merits attention; but this instance of four individuals combining to form a single airborne unit is, I think, remarkable.

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