KHAPRA BEETLE, *Trogoderma granarium*, Everts, INTERCEPTED AT VANCOUVER, B.C.

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On 26 January, 1963, numerous Khapra beetle larvae were found during a routine examination of the holds of the M.S. Bengalen, Java Pacific Line, at Vancouver. Since the ship had unloaded at Los Angeles, San Francisco, Portland and Seattle, the U.S. Department of Agriculture was notified.

In No. 1 lower hold were some dried, larval skins of *Carpophilus humeralis* (Fab.). There were Khapra beetle larvae in moderate numbers in the No. 2 lower tween deck. In No. 4 lower hold were isolated infestations in fair numbers. No. 6 lower hold contained the heaviest infestation. Here bags of coconut were piled solidly, 8 feet high across the after end. This is a shallow hold, and the sides of the shaft are oil tanks. After the coconut was unloaded the tops of the tanks were found to be warm, and this circumstance may have helped in obtaining a good kill under the solid piles of bags. There was a great amount of extensively riddled wheat residue under the wooden ceiling in this hold.

Since the Khapra beetle was found in scattered sections of the ship, it was decided to fumigate the entire vessel as well as the cargo in holds 2 and 6. The rate was 10 lb. of methyl bromide per 1000 cu. ft. for 18 hr., hence 613,000 cu. ft. took 6,130 lb. gas. The fumigation was started at 9:30 p.m., 26 January, and the last hold was cleared at midnight, 27 January. The starting temperature was 34°F.; the opening temperature 40°F. A complete kill was achieved and the cargo was undamaged.

This vessel had been in Vancouver in January, 1962, when No. 6 hold was 'passed for loading.' It could not be 'cleared' because American wheat was loaded in the lower hold. It is possible that the Khapra beetle was present at that time.

The Bengalen trades from the Persian Gulf and India *via* Singapore, to the west coast of North America bringing such cargoes that infestations might be found at any time. It was with great difficulty that larvae were seen in the cargo discharged at Seattle, for Khapra beetle larvae hide so effectively that they are difficult to detect unless they are present in numbers. Cast skins are usually associated with and buried under debris, and the adults are not often seen.

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FURTHER RECORDS OF DELAYED EMERGENCE OF *Buprestis aurulenta* L. (COLEOPTERA: BUPRESTIDAE)

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Within recent years there has been an increasing number of records of delayed emergence of *Buprestis aurulenta* L. from woodwork. In 1930 (2) I stated my belief that larvae of this beetle could develop from eggs laid in timber recently sawn from logs, without having to feed first on the cambium layer before entering sapwood and later heartwood. Dr. Gorton Linsley, University of California (1) questioned my view but I think

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he inferred that I meant finished wood as in furniture, rather than rough sawn timber.

According to the authors in whose books the statement occurs, the span of life of an average buprestid is said to be 3 years, from the egg in a crevice of the bark, through the bark, cambium, and wood stages, to emergence. Only by controlled experiments upon caged trees could this statement be validated.

When lumber is purchased there is no way of telling its history of exposure to beetles; how long the larvae were inside the logs or how fast the wood has been drying out. This is borne out by the following emergence records taken from many on hand:

24 November, 1942; one adult and several larvae from a house in the 6000 block, Gladstone Street, Vancouver *one* year after it was built.

January, 1930; one adult from the woodwork of a corridor in the (then) Applied Science building of the University of British Columbia, *five* years after it was built.

8 June, 1954; one adult from a fir floor, 2500 block Trinity Street, Vancouver, *five* years after it was built.

June, 1953; one beetle from the badly damaged floor and subfloor of a house in North Vancouver, *eleven* years after it was built.

I have many records of beetles emerging from 14 to 33 years after houses were built, one more than 40 years after, and two more than 50 years after. The first of the 50-year records occurred in February and March, 1953. Beetles emerged in All Saints Church, Alberni after doing considerable damage to joists, timbers, flooring and other parts of the building. One beetle sent to me had been dug out of a pew. According to Mr. G. S. Wright, Chairman of the building committee, this Church was started in 1900 and completed in 1904. (*in litt.* 23 March, 1953).

The most recent record would seem to be the ultimate. In November, 1960, I received specimens from Port Washington, Pender Island, B.C. I identified these and gave the sender some details of their life history. His reply dated 22 November, 1960 states: ". . . this house which I am now tearing down was built in 1897 and the flat-headed wood borer I sent you was taken from a piece of fir flooring from the second story . . . the grub was taken from near the middle of the room away from any upright beams . . . I have seen the green beetle at different times in the house and am familiar with it having been a logger . . . my own observation is that the green beetle will not go from one board to another, while one board is absolutely chewed up the next one is untouched and I may add that there has been quite a number that I have examined."

These beetles emerged and a mature larva was found in a floor board sixty-three years after the house was built. *Either* the larva was over 63 years in developing in the extremely dry wood *or* the parent beetle had laid in prepared lumber. While the second alternative may sometimes (2) occur it is more likely that these larvae may, under adverse conditions, take almost incredibly long periods to develop.

In a much-perforated verandah post of a 32 year-old log house on Bowen Island I watched *B. aurulenta* adults running in and out of new and old emergence holes. One that I attempted to catch ran down a tunnel and did not reappear. These beetles may have been laying eggs in the tunnels. The longicorn, *Opsimus quadrilineatus,* which infests the same house, does so to my knowledge.

If newly emerged beetles lay eggs

in tunnels from which they have just emerged, the eggs should be mature in their ovaries and ready to be laid shortly after they emerge. To test this point, I asked the caretaker of the log house to drop newly emerged beetles into a bottle of preservative. I dissected nine of these and found that none had mature reproductive organs; in fact both ovaries and testes were so small as to be barely discernible. A specimen from West Vancouver which had just emerged from the railing of a small bridge had almost mature ova in well-developed ovarioles. It may have matured before it was caught. Only by dissecting newly-emerged beetles and by rearing others can we decide if this species can mate and lay eggs shortly after it has emerged. It seems reasonable that it should require a flight period and maturation in the sun before depositing fertile eggs.

As support for the view that maturation of larvae sometimes takes many years, I quote from a letter dated 22 August, 1955 from R. L. Furniss, Chief, Division of Forest Insect Research, U.S.D.A., Portland, Oregon:—"In 1939 I thought it would be a good idea to attempt to rear *Buprestis* from the egg to the adult stage because all of the records of prolonged development up to that time were of a circumstantial nature. That year and for several years subsequently we were able to get *B. aurulenta* and *B. langi* established in blocks of Douglas-fir. Periodically since then we have dissected the blocks, measured the larvae and re-established the survivors in other blocks of wood. Quite a number of them are still in rearing. Some have been in rearing for 16 years. The most advanced larvae are about ½ grown. Some of them have grown only 1 millimeter since they were introduced into the blocks 13 to 16 years ago. Consequently I expect that in another 15 or 20 years some of the adults will begin to emerge. Quite likely the more retarded individuals will vie with your 50-year old stock for longevity."

This experiment appears to support the view that the larval development of this beetle is sometimes remarkably protracted.

References

1. Linsley, E. G., 1943. Delayed emergence of **Buprestis aurulenta** from structural timbers. J. Econ. Ent. 36:348-349.
2. Spencer, G. J., 1930. Insects emerging from prepared timber in buildings. Proc. Entomol. Soc. of Brit. Columbia 27:6-10.

Adult Insect Collection, Forest Entomology Laboratory, Vernon, B.C.

The writers have prepared this statement for the benefit of entomologists interested in obtaining information on host records, insect distribution, etc., in the interior of British Columbia and Yukon Territory.

The number of pinned adult specimens in the collection is estimated at over 25,000. Much of the material has been identified by specialists of the Entomology Research Institute, Ottawa. In all there are over 3,100 designated species distributed as follows in the major orders:

Order	No. of families	No. of species
Lepidoptera	43	724
Coleoptera	77	1,749
Hymenoptera	33	225
Diptera	33	227
Hemiptera	14	124
Homoptera	7	61

The collection is made up largely of insects that frequent forest trees and shrubs; although others such as Carabidae (245 species) are well represented. Most lepidopterous specimens were reared from immature stages taken during the course of the Forest Insect Survey; the majority of coleopterous specimens were collected as adults, a number by early entomologists such as Ralph Hopping.

Most of the Diptera and over two-thirds of the Hymenoptera are parasites reared at Vernon from host material collected for the Forest Insect Survey.

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