THE INSECTS ATTACKING STRUCTURAL TIMBERS AND FURNITURE IN HOMES IN COASTAL BRITISH COLUMBIA

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Arranging wood-eating and timber-destroying insects of coastal British Columbia in order of wideness of distribution and frequency of occurrence, we have: termites; carpenter ants; the golden Buprestid; the dry rot beetle; the anobiid *Hadrobregmus destructor*; the European furniture beetle; the longicorn *Opsimus quadrilineatus*; the powder post beetle *Lyctus brunneus*; the garden ant *Lasius niger* s. sp. and the wharf borer.

Termites

Three species of Termites are indigenous: *Zootermopsis angusticollis* (Hagen), the damp wood termite, found on the west coast of Vancouver Island, around Victoria and at Nanaimo, on the mainland coast from the international border to Prince Rupert, around Salmon Arm and Revelstoke and perhaps at Quesnel Lake; another damp wood termite, *Z. nevadensis* (Hagen), occupies much the same territory but less commonly; and *Reticulitermes hesperus* Banks, the subterranean or dry land termite, which occurs in the Dry Belt from Osoyoos, up the Okanagan Valley to Kamloops and from Lytton to Lillooet, on Vancouver Island on the eastern dry side from Victoria to Nanaimo and on some of the gulf islands.

Z. angusticollis is far more widespread than is generally recognized. It is particularly bad in townsites carved out of heavy timberland, such as Powell River, and in old logs on the coast that lie half embedded in sandy beaches, which serve as reservoirs from which flights emerge during August and into September.

The establishment of colonies of the two damp wood species apparently comes about by the winged reproductives spreading widely in all directions and coming down randomly against the sides of buildings where they may succeed in founding a colony in places where the wood is very damp or where damp earth is in contact with the sides of the house. All others not finding such areas of soggy wood, must perforce perish. Opposed to this theory is the supposition that males and females in flight detect from a height of hundreds of feet in the air, very limited areas of damp or rotting wood, and drop down to found colonies therein. This would seem to be beyond the powers even of these remarkable insects. The bases of old telephone poles are susceptible to termites, especially those that are surrounded by tall grass and weeds. I have one record, however, of a flourishing colony in a telephone pole isolated three feet above the ground where the insects were able to survive by the moisture maintained by rains beating into wide cracks in the pole. These insects require an almost saturated atmosphere in which to nest; given such conditions, they sometimes tunnel into solid dry wood as much as six feet from the damp nesting area, obtaining the necessary humidity by sealing up tunnels to produce dead air spaces. I have another record of a flourishing colony far removed from damp earth, where the termites were doing much damage to one of the upper floors in a 6-storey concrete warehouse; the floors were of 2 x 6-inch laminated planks and the infested floor must have been subjected to persistent, slow leaks either from pipes or the roof, to provide the decay in which the termites flourished.

Woodwork in dead-air crawl spaces beneath one-storey buildings, is very susceptible to termite infestation as is that in partly excavated basements and most particularly, the woodwork under enclosed front steps of stucco houses or the cribbing left behind by

builders under concrete steps leading up to houses. From colonies in such concrete-enclosed spaces, reproductives may emerge in swarms from exit tunnels cut for them by workers, through oak flooring in halls or through sills or walls on each side of the steps. Another susceptible point is woodwork behind brick planter-boxes up against buildings where moisture seeps through the bricks or when the metal boxes rust through several years after construction. Such colonies are difficult to destroy because it is so hard to reach them except by removal of the bricks.

Colonies of *Zootermopsis* in this region do not make earthen and frass tubes up the sides of buildings in order to cross concrete walls and to reach woodwork out of contact with the earth. Only once have I seen these tubes, three of them, over three feet long under the steps of a house where the insects had riddled all damp wood and were migrating sideways into a dry 2 x 6-inch sill and into dry 2 x 4-inch studs; the tubes had been dropped *downwards* from the dry wood to obtain moisture from the damp earth at the base of the wall. Two of the tubes had reached the earth and the third had almost reached it and was in process of being built when I examined it.

Sawdust bins in basements, made of ship-lap on 2 x 4-inch studding, holding wet, old, decaying sawdust, are often heavily infested with termites, even to the ¾-inch boards themselves. The infestation may spread even to the lath of stucco walls. I have a record of the north and east sides of a bungalow where all woodwork was so destroyed that daylight was visible through many parts of the walls; the joists and sills of the living room above were perforated and the front steps had to be replaced; the damage was estimated at $2000.

The best treatment for termites in this region is to replace all infested wood with new, treated timber and to spray the termites as they are exposed. Soil treatment is not necessary. If damage to beams is not very extensive and the colony is small, spray or dust can be blown in through holes drilled for the purpose. Since coastal species do not throw up tubes to reach wood lying above concrete walls, it is unnecessary to equip houses with angled metal stripping above the concrete or brick foundation walls. Damp earth touching wooden or stucco walls, leaking roofs and blocked tile drains are the chief causes of termite infestation and the first things that should be remedied.

Although slight damage to homes and other buildings is very widespread in Vancouver and severe damage is not uncommon, no houses have collapsed as yet in the city. In Victoria where all three species of termites occur, two houses have been reported to have collapsed and one each in Kamloops and Kelowna where only *R. hesperus* occurs.

Carpenter ants

Not so widely distributed as termites but causing very severe damage where they do occur, are carpenter ants, *Campanotus herculaneus* var. *modoc* M. Wheeler. They excavate tunnels in very dry wood remote from contact with damp earth *and* they are infinitely harder to get rid of than termites unless their nests can be located at once. They do not work in darkness or in an atmosphere of 95 per cent saturation as do termites, but they forage outside and thus reveal their presence, as they do by throwing out sawdust from the tunnels. Although they excavate very dry wood and have exits almost anywhere, the nests and nurseries are always in damp spots, sometimes of very limited size, such as may be produced by rain oozing through a nail hole or between a sill and the top of a concrete wall. The nests are usually difficult to locate and while they are often under window sills or in window and door frames, they may be in corner posts, studding of walls, floor joists, rafters, under hand split shingles or even between sub-flooring

and hardwood floors. In both small and especially in large houses, several nests may be present and ants may wander out into every room.

In log houses especially, carpenter ants may work for years without arousing suspicion, often chewing out soft, summer wood in concentric rings between the hard, winter check wood, until one side of the house begins to settle. By that time the only thing to do is to replace the logs one at a time starting from the bottom.

Colonies may start in several ways. In older houses in built-up areas, colonies generally start from over-wintered "queens" that were fertilized on a marriage flight; such colonies take at least three years to become evident. Or a colony may become established in a house from long-piled firewood or from infested timbers salvaged from another building. Old stumps left in corners of hill-side homes often contain colonies and it is a matter of time before the ants move into the house itself especially if the stump is rooted up and the ants allowed to survive. When houses are being built on newly cleared soil long-established ant colonies may be disturbed and may move *en bloc* into the new houses. If the houses are of post-and-beam or Panabode type in which the tongue-and-groove lumber does not always fit tightly, ants may make runways sometimes the full length of a house. I have seen a quart of ant sawdust dumped into a switch box in a huge Panabode house that had been occupied less than six months; one could hear the ants rasping away all over the house.

When a large house is infested it is generally difficult to locate the nests without stripping off the stucco or sheeting. When nests cannot be located and the whole colony destroyed, it is necessary to put down a residual insecticide right around a house and to maintain it all summer, destroying the colony by attrition, a process that may take one whole season or even two. The feeding places of ants should be located by watching foraging workers which often get honeydew from aphids on Douglas fir trees or from the glands on the petioles of laurel bushes; the marching columns can be sprayed with three to five per cent chlordane.

Where colonies are known to be living in large beams, injections into the wood through drilled holes, of a 50-50 mixture of creosote and kerosene, will cause hordes of ants to pour out, when they can be sprayed. This is permissible in basements or in raw wood but in painted or papered walls which would be spoiled by the brown stain of crude creosote, it is better to use a solution of carbolic acid.

Golden Buprestid

For frequency of occurrence and wide distribution the golden Buprestid, *Buprestis aurulenta* Linn. ranks high, although it is rarely abundant enough to cause much damage. I have many records of emergences from buildings ranging from 5 to 50 years of age with most emergences coming in the 12 to 30 year range. The larvae of this beetle can persist in wood longer, I think, than those of any other insect in any other medium. In August, 1931, at Aspen Grove near Merritt, I cut up a pine tree of 8-inch diameter, into slices $\frac{3}{4}$ to $\frac{7}{8}$-inches thick and stacked them; *B. aurulenta* laid eggs in the topmost slice. The wood was brought to Vancouver in September and laid on a shelf in the laboratory; soon afterwards, very fine boring dust was thrown from minute tunnels in the infested slice. The slice was thin so the larvae moved from side to side of it throwing out sawdust at intervals until September, 1951, when we moved into another building and the larvae died, exactly 20 years after the eggs were laid and even then they were only one-third grown. The 50-year record concerned emergence of adults from pews in a church in Alberni, Vancouver Island. (4).

From one to five beetles only emerge from any one house of average construction, but in some log houses currently under observation, especially

one enormous residence built in 1931 of whole logs, thick slabs and thin stair posts, beetles emerge every year by the dozen. In 1957 one emerged from a banister as I was walking up the stairs. Everything points to females of this beetle laying eggs in crevices in recently cut timbers in log houses and larvae therefrom, developing in this slow-drying wood without having to feed for several weeks in the cambium layer as do the larvae of most buprestids. I have noted beetles running in and out of their own and former exit tunnels and from the scores of holes in one verandah post, I am convinced that eggs were laid in it over a period of years and larvae successfully developed in it.

Only two pieces of 2 x 4-inch wood have come to my attention which were absolutely riddled by larvae of this beetle, completely destroying them. Both larvae and beetles were recovered from this wood so there can be no question about the identity of the species. An intensive study of this beetle is long overdue.

Dry rot beetle

Also high in frequency of occurrence but of little consequence, is the anobiid beetle *Coelostethus quadrulus* (Lec.) which I have called the dry rot beetle. Dry rot is common in the lower Fraser Valley, especially in homes where tile drainage is blocked or absent and woodwork becomes damp. Sooner or later the diseased parts are discovered by this beetle, even small spots some two inches square in remote corners of a basement. Woodwork in damp, dead-air spaces almost invariably develops dry rot and equally surely this beetle infests the affected parts.

It is an effect, not a cause and of little consequence since it does not attack sound wood.

Hadrobregmus destructor Fisher

Also in houses, summer homes and lakeside log cabins, occur extensive perforations made by another anobiid *H. destructor,* (2) whose emergence holes in dry posts under a house sometimes look like a scattered charge of No. 10 shot. Fortunately, attacks by this beetle are generally restricted to sapwood and do not materially reduce the compression strength of the wood. However, in a timber or plank consisting mostly of sapwood, the damage may be very extensive resembling that of true powder-post (*Lyctus*) beetles. A small ant-like, wingless hymenopteran sometimes parasitizes the larvae of this beetle in their tunnels, but it is never sufficiently abundant to wipe out the pest.

European furniture beetle

Increasingly frequent infestations of homes are occurring in Vancouver, of the European furniture beetle, *Anobium punctatum* DeGeer, erroneously called the death-watch beetle. These arise from heirloom furniture imported from Europe or from antique furniture purchased locally. From these sources, the beetles may spread throughout the house; but they attack chiefly Douglas fir sapwood occurring in the basement. From furniture in the upper part of a house, beetles may infest oak or maple floors and then spread into the basement. They perforate hardwood very thoroughly and also attack curved surfaces of log furniture and walls.

Opsimus quadrilineatus Mann.

A very unusual record is that of this longicorn, which was extremely plentiful in the enormous log house mentioned earlier. In one measured linear foot of a post of 7 inches diameter, occurred 91 emergence holes. Two varnished 30-foot key posts supporting the roof, were similarly perforated. Each mature larva throws a cascade of sawdust out of the oval hole it cuts to the surface and then retires backwards to pupate inside the tunnel.

This is one insect that definitely oviposits in its old tunnels and in those of *B. aurulenta* into which it readily retreats when alarmed. I have

studied the newly-hatched *Opsimus* larvae burrowing into the walls of old buprestid tunnels where the eggs were laid, throwing out behind them cascades of minute particles of sawdust and frass. Adults of this brown, 18-22mm. beetle are very active, flying freely around a house by day and by lamp-light; they are also active in dim light as in a windowless basement.

This insect infests chiefly the curved surfaces of varnished and unvarnished vertical posts and horizontal logs. However, I have a record of one larva each, attacking two 6 x 6-inch beams in one house, and another record of a heavy infestation in a short length of 2 x 3-inch wood which must have been infested when the wood was freshly cut, before it was painted.

Log houses in heavily wooded areas and the shady side of other log houses are more subject to attack than those out in the open.

Powder post beetle

Lyctus brunneus (Steph.) occurs sporadically in Vancouver, emerging from oak floors, usually within one year of the floors being laid. They do not reinfest the house. They occur mostly in ¾-inch grooved and tongued mill-end strips imported from some five southern states. All oak flooring is required to be kiln-dried before being exported, but eggs are apparently deposited in the strips after being dried and while piled in yards, before it can be shipped.

The firm importing most of this oak flooring brings in several million feet annually and considering the huge amount imported, infestations are relatively uncommon. Retail flooring firms replace infested pieces without dispute.

Infestations of *Lyctus planicollis* Lec. occasionally occur in imported furniture and another species not infrequently destroys bamboo articles shipped from China or Japan such as strip screens, picnic baskets and garden posts. Usually this occurs within one year of the goods being brought in.

Garden ant

The last insect of any consequence that infests woodwork in local homes, is the common garden ant *Lasius niger* s. sp. which often becomes established in timbers that have been wet for a long time and are rotten at the centre. Sills lying on concrete walls and sills below windows that are dampened by contact with outside earth; studding inside a wall that is drenched from a leaking roof and soggy timbers under concrete steps — all these may become infested and completely tunnelled by colonies of this ant. Every summer large flights of reproductives of both sexes, the brown and yellow females ten times the bulk of the black and brown males, pour out into the house causing great alarm. Sometimes flights develop in nests in the ground adjacent to walls and the winged forms move into the wall under the siding or stucco and emerge into the rooms from behind the quarter-round or baseboard, giving the impression of having developed in the wall itself. Removing the cause of the dampness and replacing the sodden wood, is the answer to this trouble.

Wharf borer

Nacerda melanura (Linn.), the wharf borer (3), seems to be spreading widely in Vancouver. It came to my notice first in 1945 in piling at a sugar refinery. In 1952 one specimen was sent me from a greenhouse on the property of this same refinery. In 1957 a very large number of beetles emerged from under the flooring of the branch library at Kitsilano where sodden timbers, rotting in a dead-air space, were perforated by larvae and beetles. During April-May, 1958, an immense number of beetles infested a black-topped parking lot in the heart of downtown Vancouver. The owners said that this was the third year that the beetles had appeared but never in such numbers and they were causing

great alarm. Emergence was from cracks in the asphalt around a small concrete office. The manager mentioned that timbers from large wooden buildings formerly on the site, were buried under the present office so the flood of beetles must have come from this rotting wood. Like the swarms of *Lasius niger*, the presence of these insects is an effect, the result of sodden wood and not the cause of wood decay.

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DISTRIBUTION OF STORED FOOD INSECTS IN BRITISH COLUMBIA[1]

PETER ZUK[2]

This is a report of a continuing survey of grain elevators, cereal warehouses, and flour mills in British Columbia for the seven years 1952 to 1958, to determine the distribution and relative importance of established stored food insects.

A few reviews have been published on these pests in British Columbia. Follwell reported on the Ptinidae in cereal warehouses (1952) and issued a circular on stored product insects and their control (1953). King (1953) assembled some information on these pests and Gray (1953-56) listed the ones most commonly found. Spencer (1942) recorded some of the common forms occurring in dwellings.

The present survey consisted of visits to establishments in the large centres in the province, from Vancouver to Cranbrook in the south and to Prince George in the north. On Vancouver Island warehouses were inspected from Victoria to Courtenay and Port Alberni. In the interior and on Vancouver Island inspections were made during July or August only, but on the lower mainland they were made throughout the year.

An inspection consisted of a check of the premises for crawling and flying insects and an examination of the stored food in sacks and in bulk. Some specimens were obtained by screening samples. The insects taken were often brought to the laboratory to be reared and questionable specimens were submitted to the Systematics Unit, Ottawa, for identification.

A total of 584 visits was made to establishments during the seven years, in which 35 species of insects were recorded:

Year	Firms visited	Species
1952	101	21
1953	108	25
1954	80	16
1955	76	17
1956	40	14
1957	97	20
1958	82	19

In many cases the same species of insects showed up year after year in the same premises. Table I shows that the most widespread insects were: the Australian spider beetle, *Ptinus ocellus* Brown (*P. tectus*); yellow mealworm, *Tenebrio molitor* L.; black carpet beetle, *Attagenus piceus* (Oliv.); and the granary weevil, *Sitophilus granarius* (L.). Other insects of prime actual or potential importance under all B.C. conditions are: cadelle, white-marked spider beetle, saw-toothed

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