

ON THE INCIDENCE, DENSITY AND DECLINE OF CERTAIN INSECTS IN BRITISH COLUMBIA

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It is a well known fact, supported by many records in literature, that certain insects indigenous to this country such as chinch bugs and some species of grasshoppers, bark beetles, cutworms and several forest-defoliating caterpillars, have more or less definite rhythmic cycles of abundance and decline: the factors governing this increase are less well known than those producing the decrease although a great deal of research has been done upon them.

In the case of insects which have come in from a foreign country and have become established in North America, the pattern is somewhat different; after a period of often undetected establishment and gradual or sudden rise in abundance, the insect reaches a peak and then subsides to a level which remains fairly constant except for periodic or irregular minor fluctuations which are common to both native and to foreign insects. This is the case with the Hessian fly, the Gypsy and brown-tail moths, the cabbage butterfly, the San Jose scale, the European corn borer and the European earwig. Insects which may be cited as not yet having reached their level after importation, are the Japanese beetle in some of the Eastern States and southern Ontario, and the codling moth in its relatively new territory, the Okanagan Valley of British Columbia.

To repeat, while the factors producing an increase of any insect are not well understood, those bringing about the decrease may be one, or a combination of:—unfavourable weather conditions (as opposed to climate), predators, parasites, or sickness caused by fungous, bacterial, polyhedral or virus disease.

In the course of the last few years, a number of instances in British Columbia have come to attention in connection with several insect species, of the rare occurrence of one or two individuals only, of sudden rises in population followed by

rapid or slow decrease, and of the invasion of an area by a species not hitherto recorded there.

In connection with the first item, namely the taking of one or two specimens only of a species in an area where systematic collecting has been conducted for nearly two decades, one is forced to ask "Why is an insect rare? If only one or two specimens are taken over a period of years, why should not more of them occur in the same place?" The rarity of an insect in any region is usually attributed to hostile weather conditions or to the presence of its natural enemies; on the other hand it may be attributable to insufficient collecting or to collecting at the wrong time, to the insect being at its extreme range in that area or to the fact that its Order or Family is dying out at this time of the world's history.

One of the criteria that I find useful for gauging the abundance or increase of any insect, is the number of letters of enquiry concerning it, that are sent in to the University; this is particularly true of insects of the household which have periods of increase and decrease in a normally very uniform though highly artificial habitat, the human home.

Instances of the rarity of one species or the fluctuation of others, can be cited in practically all Orders and are familiar to all entomologists, especially to those of this Province which has a richer and more varied insect population than any other part of Canada. At this time it is possible to select only a few outstanding instances of the many which have come to my attention.

Of the Order THYSANURA, the family MACHILIDAE is represented by some 5 species in the Dry Belt, all apparently undescribed, which either occur very rarely over a considerable area or in fair numbers in very restricted spots sometimes of only a few square yards in extent. Conditions

would seem to be ideal for their increase and spread but this does not occur. At the Coast a mottled species occurs rarely on the damp forest floor. Dr. M. L. Prebble informs me that he found an arboreal form common at the Coast, and H. B. Leech reports that specimens are sent in constantly from forest rangers all over the Province in connection with the Dominion Forest Insect Survey; unfortunately the latter are too battered to be identified.

Limited to one rocky headland at Departure Bay near Nanaimo, may be found large numbers of *Machilis maritima* L. a cosmopolitan species. It is difficult to see why *maritima* does not spread up and down the coast where conditions would seem to be ideal for it.

For years I have hunted for *Japyx* of the family JAPYGIDAE but have never yet found any; in Oregon it is not uncommon under bark of dead forest trees. In February 1945 Dr. Saunders of the University of Saskatchewan told me that he found a *Japyx* at Brentwood, Vancouver Island in 1944, under the rosette of leaves of a fall dandelion; intense search revealed only one more specimen. As far as I can determine, this is a first record for this Province.

Of the COLLEMBOLA, the late Dr. J. Folsom told me that at least 100 species should occur in this Province; at least a dozen species have been abundant every autumn for many years in the trash of the forest floor at the University. They were especially abundant in October 1943, but at the same time in 1944 every last specimen seemed to have died out; not one could be found in a large number of samples treated in the Berlese funnel. The summer of 1944 was very dry at the coast and this one season's drought seems to have wiped out the entire population of these tiny insects.

Of the ORTHOPTERA, only 2 species need be mentioned. The season of 1943 saw an increase of the lesser migratory locust *Melanoplus mexicanus mexicanus* Saus.; the autumn of that year was open and fine: *mexicanus* was seen on the Nicola ranges even until the first week in Decem-

ber. Every female must have laid her full quota of eggs and every last egg must have been fertile because 1944 saw an outbreak of this locust unparalleled in the history of this Province and it occurred in areas where it has never been seen before. Now we have had long, mild autumns before, and *mexicanus* is widely distributed; what combination of factors produced this devastating outbreak in 1944?

The other orthopteran under consideration is the European house cricket *Gryllus domesticus* L. which appeared first in Vancouver about 1934, being suddenly reported in numbers in two widely separated apartment houses, and a few specimens only, in one house in West Point Grey; it has occurred in small numbers for years in the locker rooms of a golf club on the outskirts of the city. No measures were taken to control the 1934 populations and I feared an outbreak of the cricket but it seemed to disappear entirely until April 1944 when it turned up in swarms in the furnace room of an apartment house at the junction of Broadway and Granville Street, several miles from the previous infestations. Where did it go during those ten years and what caused the 1944 outbreak?

About 1937, J. D. Gregson found *Grylloblatta campodeiformis* Walk. at Kamloops in the talus slope of Mount Paul, at an elevation of 1,400 feet only. The face of this slope is one of the hottest spots in the Dry Belt and *Grylloblatta* seems to retreat into the cold interior of the rock pile during summer, coming out to the surface only when November cools down the countryside with sharp frosts. Its previous records were from Lakes Louise and Agnes and on Rundle Mountain, in the Rockies, Alberta, and in British Columbia, a reported record from Forbidden Plateau near Courtenay on Vancouver Island and at the top of Grouse Mountain near Vancouver. To find it in numbers at 1,400 feet at Kamloops, provides a most remarkable record of discontinuous distribution. It is probable that further collecting in this Province, in late autumn will show that *Grylloblatta* is widely distributed

in locations similar to those occurring at Kamloops. The insect must have followed the skirts of the receding ice sheet 15,000 years ago and persisted in situations where it could retreat in summer time to near-frozen spots deep in rock piles.

Of the DERMAPTERA, the European earwig *Forficula auricularia* L., formed a terrible plague in Vancouver as late as 1927-28. Since then it seems to have reached an equilibrium at a rather low level and though it becomes fairly numerous some years, it is far from being the great plague it was two decades ago. Moreover its reduction cannot be attributed to the introduction of the tachinid fly *Digonochaeta setipennis* (Fallen) which is only now becoming apparent in some numbers in West Point Grey. This earwig is a good example of an imported insect increasing to outbreak proportions in a new country and then sinking to a fairly inconspicuous level. The conditions in the country remain the same: what has produced the equilibrium?

Contrast with this the case of the ring-legged earwig *Euboriella annulipes* (Lucas) which has existed for over a decade in the gardens of the Empress Hotel in Victoria without spreading out into contiguous gardens, let alone over the rest of the city.

Concerning the ISOPTERA or termites, the damp wood species *Zootermopsis angusticollis* (Hagen) which is widespread in the Vancouver region, on the Gulf Islands and on the mainland as far as Powell River, seems to be slowly increasing in the city of Vancouver where more and more complaints are coming in about its invasion of homes. One would think that with the building-up of the city this inhabitant of rotting timbers on damp ground, would decrease, but such seems not to be the case. The dry land termite *Reticulitermes hesperus* Banks occurs along the upper Fraser Valley from Lytton to Kamloops, up to the 1,800 foot level on the ranges. I have turned over literally hundreds of fallen fence posts on the ranges and know of only one post where a colony has existed for over ten years, and not in the posts on each

side of it. What are the hazards which so restrict the distribution of this insect up the Fraser Valley?

Three records have come to hand in 18 years, of severe outbreaks of PSOCIDAE or book lice, originating in upholstered furniture in homes and one record of its increase from behind a damp draining board in a kitchen. Two species of these insects are common in practically every basement in Vancouver. Why do not these outbreaks become general all over the city?

Turning now to the MALLOPHAGA or bird lice, to date we have one record only of the biting cat louse *Felicola subrostratus* (Nitzsch) occurring on a kitten born and bred in Vancouver. Now cats are rather promiscuous animals, yet this louse is apparently rare in the city. The same thing goes for the dog louse *Trichodectes canis* Degeer, of which I have only two records from dogs born and raised in Vancouver and a number of records from dogs in Kamloops. It is a different matter with this louse on coyotes for on these animals it extends from the Merritt district up to the Bulkley Valley and sometimes in such immense numbers that it literally shears off all the fur from the poor beasts, leaving them almost naked with fur only on their tails so that trappers call them "flag-tails." Porcupines are widespread in the Dry Belt but though I have examined many specimens from widely scattered places, only those from Quesnel to Barkerville have harbored the louse *Eutrichophilus setosus* Giebel, a species which is specific to porcupines and which has been reported outside of this Province, from California to Alaska.

Again of the sucking lice ANOPLURA, we have the record published recently in our Proceedings (35: 27-28. 1939) of the yellow-bellied marmot collected by George Holland at Kamloops, when the poor beast was driven from its den in November by more lice than there were hairs on its body. Holland collected a half ounce bottleful of the insects and then threw away the animal in disgust. Why should this one marmot have had such an infestation when the scores that the Kamloops

laboratory staff has collected, usually have very few on them? Another instance of almost unbelievable louse abundance occurred in 1943 when a man living in a shack in Vancouver was reported to have been killed by the human body louse which left the dead body and spread over the walls and furniture and even crept out through the cracks around the door and on to the sidewalk.

Turning to more pleasant insects, the ODNATA, we all know that dragon flies occur everywhere in this Province, sometimes in considerable numbers in one place. During the summer of 1943 there occurred a three-day flight of one species of dragon fly on the campus at the University in such immense numbers as to attract the attention of even the most unobservant; on the 4th day there was not one to be seen. Unfortunately no one thought of keeping a specimen for identification. Whence came this migrating horde and where did it go?

Of the HOMOPTERA, two records are striking. The campus of the University was landscaped and planted in 1923-24; in 1931 there occurred a most conspicuous series of colonies of the giant aphid *Pterochlorus viminalis* (Fons.) on one of two similar willow trees whose branches almost touch one another. The aphid is relatively huge, at least one half centimetre long, with a conspicuous black tubercle on the middle dorsum. Essig says that it occurs throughout parts of Europe, Africa, Asia and in North America, and in California it is common on willow, rare on poplars and occurs occasionally on apple, apricot and peach. During the winter of 1931 the colonies which were only on the trunk and larger branches of the local tree, died out. Every year since the tree has been examined but not until September 1941 did the great patches of aphids appear again and were shortly attacked by some disease which literally liquefied the bodies into black drops which fell to the ground. I have never seen the aphids on any other trees at any other time. Whence did it come in such sudden great colonies? Mr. R. Glendenning who very kindly confirm-

ed my tentative identification has told me that he took it once, in 1925 at Agassiz, on willow.

Again concerning aphids, in the autumn of 1929 a silver-leaf *Eleagnus argentata* transplanted to the campus in 1925, showed red aphid eggs covering all parts of the trunk so closely that the entire bush looked as if it had been painted red. Something killed off the eggs during the winter and they have never appeared since.

Of the HEMIPTERA, brief mention need be made of two species only. *Leptoglossus occidentalis* Heid., the large leaf-footed bug, suddenly showed up in Vancouver around Christmas time, 1939, in people's gardens where it was apparently hibernating. Since then it has been reported in increasing numbers and in 1944 it was sent in from many parts of the city, reported as crowding into houses for hibernation. Now K. F. Auden collected a specimen of this conspicuous bug in Vancouver in 1924; for what reason is it suddenly and steadily increasing?

The box-elder bug *Leptocoris trivittatus* (Say) which feeds on Manitoba maple, has been abundant in the Okanagan for at least 15 years. In the last 3 years it has shown up at Kamloops in such great numbers as to cause considerable alarm. In the autumn of 1944 it was sent in from Spence's Bridge with the report that it was present in large numbers although it had never been seen there before.

Instances of the abundance or scarcity of many species of the LEPIDOPTERA and COLEOPTERA are well known to every entomologist present. To mention only one instance of the latter, the varied carpet beetle *Anthrenus verbasci* (Linn.) invaded Vancouver apparently for the first time in 1937 and has since spread over the whole lower mainland until it now constitutes one of the worst pests in homes in the city; many people have had their homes cyanide-fumigated against it. Yet Dr. Melville Hatch, of the University of Washington, at Seattle, informs me that it has been present in that city for many years and that it is relatively inconsequential there.

Of the HYMENOPTERA, the species of

Vespa (*Vespula*) both black and yellow wasps, were so abundant in 1943 in many parts of the Dry Belt that they proved a plague of first magnitude, especially to fruit pickers. In 1944 queens and dwarf workers appeared in spring and then disappeared. (See p. 4 of the previous volume of this journal.) In 1945, up to mid-July, only 9 specimens of *Vespa* by careful count have been seen by two of us who are collecting them especially. This is the only instance of sudden rise and disappearance of insects where I dare to offer an explan-

ation satisfactory to me. The year 1944 was very dry, and aphids, normally so widespread and abundant, were conspicuously absent. Now wasps feed their young on chewed-up animal food, largely insects, but the adults can consume only liquid food of which honey-dew is the main item especially of the white-faced wasp *Vespula maculata* (Linn.) I suggest that the wasp plague of 1943 died out in 1944 through failure of aphids and the consequent honey-dew crop.

THE CAPTURE OF CALENDRA AEQUALIS FORM UNIVITTATA ON THE RUSH SCIRPUS ROBUSTUS (Coleoptera, Curculionidae).—On the Heron sheep ranges of the old Bulman lease north of Kamloops, at an altitude of about 1800 feet, lies an alkaline pond of some ten acres in extent. This contains from one to two feet of water each spring, but dries up in summer leaving an expanse of white alkali, deeply cracked and fissured. The pond is almost completely encircled with a belt of the rush *Scirpus robustus* Pursh, which is increasing each year forming in parts, a dense mat of roots sending up stems almost two feet in height.

Sweeping a net over the thickest part of these rushes in the third week in July, 1943, I got a specimen of the largest snout beetle I have so far collected in the Province, so I immediately beat over the area again but obtained only one more; however, on the thinner patches of rush that fringe the pond, the beetles were fairly common and I took thirty in all, roughly in the proportion of two females to one male. Both sexes vary in size from $\frac{1}{2}$ to $\frac{3}{4}$ inch in length.

The beetles were feeding on the upper part of the rush stems and on the leaves, gouging out holes of considerable size. None were found mating, no eggs or egg punctures could be located, and slitting a number of stems showed no tunnels where grubs might have developed. The larvae probably live inside the root-stocks; if so, they must endure submergence in spring when the lake bed is flooded.

The adults have long and very sharp tarsal claws with which they cling so tenaciously to the smooth, polished surfaces of the rush stems that it was found necessary to grab them quickly and pull, all in one movement; if the pull was slow they tightened their grasp so effectively that they could be removed only when all tarsi broke off. If dropped, they feign death and then either dive down a crack in the mud or quickly climb another rush stem.

In a week's time they had practically disappeared, only two being found over the whole area.

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CALOSOMA LUGUBRE IN QUEBEC (Coleoptera, Carabidae).—*Calosoma lugubre* LeConte is a large carabid beetle whose metropolis is Texas, with isolated records as far north as Nebraska. I picked up one at Duparquet, Quebec (27-VIII-1936). It was identified by A. S. Nicolay, who was amazed at the record. The newness and remoteness of the locality barred out the possibility of it being introduced by man, but I have a single guess:—That summer a dark pall spread over our sky; at first it looked like smoke from distant fires, then more reminiscent of volcanic dust. Then the Press began to take notice, with reports of severe tornadoes in the States to the far south, and explained the cause of the darkened skies of our region as dust from the tornadoes. Had this powerful insect, capable of strong flight in its own right, been caught in the maelstrom of a tornado, then landed back to earth exactly where it should have—on the path of an entomologist?—G. Stace Smith, Creston, B.C.

WHERE TO LOOK FOR LUDIUS LARICIS (Coleoptera, Elateridae).—*Ludius laricis* Brown is one of the most distinctive and most localized click-beetles in our fauna. It was described in THE CANADIAN ENTOMOLOGIST for February, 1939, from a series of 30 specimens collected by myself at Creston, B.C., within an area of two acres. A few subsequent catches have been made, and all under unvarying circumstances. No other specimen is known. The field is now about exhausted, and surrounded forests and other likely places have been tested without result; but collectors in other localities where larch occurs might try their luck.

Adults of *L. laricis* are small, reddish-brown, without maculation, about 8 mm. in length; that is, slightly larger than *L. triundulatus* (Randall). They are found in the thick trunk bark of large western larch (*Larix occidentalis*), living trees only, usually about a foot from the ground, sometimes less, but never over two feet; they are well embedded in the bark, where they pupate, from 3 to 6 inches from the surface. I find no trace of them in the summer months, and the collection dates are from late October until early May.—G. Stace Smith, Creston, B.C.