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THE PINE WHITE BUTTERFLY IN SOUTHERN IDAHO

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The insect enemies of our forests in North America fall into two classes; the defoliating insects and the bark beetles.

The defoliating insects belong to the families of moths and butterflies. They work upon the leaves and twigs of the trees to such an extent as to completely destroy the foliage, thus preventing its necessary vital functions and in some instances to such an extent as to cause the death of the tree.

The defoliators, which have caused the principal losses in North America, are the Pine White Butterfly, the Hemlock Spanworm, the Forest Tent Caterpillar, the Brown Tail Moth and the Larch Worm.

Away back in 1868 a man named Dr. William H. Edwards, who at that time knew more about the butterflies of the U. S. than any other living person, announced that he had discovered a new kind--the only species of that genus. This butterfly he named "Nephasia Menapia", (the Pine White). At the same time he announced that the caterpillar of this butterfly fed exclusively upon the needles of the Yellow Pines of Idaho, Washington, Oregon and British Columbia. But, timber being more than plentiful at that time, nobody paid any particular attention to the "theory of a bug-cologist".



Whether the Pine White Butterfly is an imported pest cannot be proven, but the fact remains that the only other known varieties of its family are found at the present day among the islands of the Malay Archipelago. So it is possible, even probable, that the first eggs, or possibly the larvae, were brought to one of the Pacific sea-ports upon vessels from those islands.

The years passed and save by a few "bugologists" the Pine White butterfly became forgotten -- until 1882, when it suddenly appeared in incredible numbers in the woods near Spokane, Washington, and completely denuded of their foliage several hundred acres of yellow pines.

The following year Professor C. V. Piper, of Pullman, Washington, stated that these insects were so numerous around Seattle that the waters of the bay were white with their floating bodies. In 1890 they appeared in the Olympic Mountains and again in 1895, when they were so abundant their dead bodies covered the ground. In 1896 Doctor Fletcher observed an outbreak in western yellow pine in the interior of British Columbia and in the Douglas fir on Vancouver Island. In 1893 they appeared in the Payette and Boise River water sheds in Southern Idaho, and in the words of the oldest settler, "They practically stripped the pines from Squaw Creek Hill to the Payette Lakes". This same old-timer insists that they first appeared in 1893 and kept increasing in numbers for three years but disappeared the fourth year. To quote him further: "The last year they hung in ropes from the limbs to the ground and drove people out of the huckleberry patches and even springs and pools of water had to be skimmed before one could get a drink of water". In 1894 it worked on the northern pine on Mt. Hood and the following year made its appearance in the pine timber near Goldendale,

Washington. In 1898 it again appeared among the yellow pine in Southern Idaho in such numbers that pools and small streams were covered with their dead bodies. In 1899 an area of yellow pine timber, killed the preceding year in the Cedar Mountains near this place, was investigated by Doctor Hopkins, who pronounced the damage done to the timber to have been caused by the joint work of the butterfly and bark beetle, the butterfly having been the first offender and weakened the tree so it succumbed to the succeeding attack of the bark beetle. In 1903 many square miles of coniferous forest was defoliated in Southern Washington in the vicinity of Mt. Adams. In 1903-4 it again appeared in Southern Idaho. In 1907 there was another outbreak in Spokane County, Washington, and in Southern Idaho. The present infestation in Southern Idaho first showing up in the Salmon River District in 1920.

There is no reliable data as to just how destructive the invasion of the pine butterfly was to our yellow pine forests during these invasions for the reason that it appeared in conjunction with the depredations of the *Dendroctonus Brevicornis* (Bark Beetle) and my own observations were similar to those made by G. B. Mains and by Doctor Hopkins in this vicinity that the attack of the defoliating insects was not usually fatal unless followed by a new infestation of the trees by the bark beetles.

These butterflies are seen in small numbers every year but the normal damage amounts to nothing but an occasional dead limb.

The pine white butterfly (*Neophasia menapia* Felder) resembles very closely the common cabbage butterfly which is often seen flying around gardens and roadsides. The wings of the pine butterfly are marked at the tips and on the under side with black, the females being the most heavily marked and with

small orange spots on the under side. (See photograph #1). Eggs are flask shaped and fluted on the sides. The eggs are deposited in rows, five to fifteen on the needles of mature pine. (See photograph #2). The larvae, or caterpillars, are dark green in color and are about one inch in length when full grown. The transformation from the caterpillar to the adult butterfly takes place during June and July.

There has been considerable controversy regarding the time of year that the Pine White first makes its appearance. Some eminent authorities claim that the eggs are laid by the butterfly in the fall of the year upon the foliage of the pines, there to remain dormant until spring, others equally as eminent contend that the eggs are deposited during July and August and hatch out the following spring. In the opinion of Mr. Reginald Barker of Boise, Idaho, the claim that the eggs winter over is untenable as he has been unable to find any records of the eggs of any known species of butterfly inhabiting the temperate zone, remaining dormant for so long a time. And altho the larvae (caterpillars) of certain butterflies fall into a state of hibernation immediately after emerging from the egg and before having passed thru the first moult (shedding of the skin) it seems hardly probable that the tiny green caterpillar of the Pine White could survive the winters of the Western mountains. He says that from close observation he can testify that in June 1917, near Idaho City, specimens of the Pine White emerged from chrysalids which had lain dormant in the folds of the bark of yellow pines the whole of the previous winter. Fifteen minutes after emergence, the wings of the imago (adult insect) had attained full size, and it soared upwards, presumably to find its mate. A few days later, Mr. Barker found

the whitish green, flask shaped eggs upon the needles of a pine he had felled. Seven days later the tiny caterpillars emerged from the eggs and immediately began to feed upon the dying needles. The caterpillar itself is dark green in color -- the green being the natural result of the chlorophyll which constitutes the coloring of the needles upon which it feeds. The body is cylindrical in shape, bearing a broad white band upon each side and a narrow white band upon the back, and terminates in two short anal tails.

In the case mentioned, Mr. Barker says that the caterpillars after going thru a succession of moults, went into the chrysalid stage seventy-one days later, and two weeks after that the adult butterfly emerged. According to his theory, this proves that the Pine White is doubled brooded, for of course the butterflies immediately began mating and carrying on their cycle of life, dying shortly after having laid their eggs.

Now, according to the above basis, the second brood would not reach the chrysalid stage until the year had advanced so far that there was sufficient warmth in the sun's rays to hatch out the adult insect from the chrysalid. So it is a reasonable hypothesis that the last brood winters over in the chrysalid stage, for, altho at the time Mr. Barker was felling yellow pines every day in the infested area, in no case did he find eggs after the second brood of chrysalids had made their appearance.

Again, nature has provided that the adult caterpillar, when undisturbed, lets itself down from the branches of the pines by a silken thread and pupates, not in the top of the trees, but upon underbrush, fences, or among the dry needles beneath the trees. If the needles of the pines are, as some claim, infested by the dormant eggs all winter, why would it be necessary for the insect to prepare for its own propagation by descending to the grounds? The

answer seems to be because it cannot survive the winter in the egg stage upon the tops of the snow covered trees.

It appears at irregular intervals in different localities in such numbers as to attract the attention of the timber owners to the defoliated trees. Though large areas are defoliated, which if repeated for a few years, might cause the death of the trees, its natural enemies prevent the continuance of the epidemic in any one locality long enough to be independently destructive to the timber. The great danger from these outbreaks is the possibility of a subsequent attack by destructive bark beetles, which would find the weakened trees very favorable host material.

Thoughts of actual insect control for forest tree defoliators are practically prohibited because of the expense involved. And in the case of the Pine White Butterfly epidemics we are obliged to place our hopes on the history of previous outbreaks with the hopes that the natural enemies of this pest will bring about a check to its ravages. Careful observations on all defoliated areas should be maintained and all bark beetle attacks promptly stamped out, with the idea of preventing another epidemic of a more serious nature.

But, you may ask, "Why is it that the epidemic only appears at irregular intervals"?

The logical answer to that is, that a certain number of the caterpillars are always to be found in certain areas. Also it may be safely asserted that an epidemic of a minute fungus has so preyed upon the ranks of the various Ichneumon flies that are the natural enemies of all caterpillars, that Nature has been unable to maintain her balance. Consequently, freed

from the molestation of the Ichneumons, the caterpillars of the Pine White have temporarily achieved a superiority of numbers.

But, why the parasitic fungus praying upon the enemies of the Pine White?

Because each year there has been an epidemic of the Pine White, the atmospheric conditions have been more than usually favorable to the fungus, which, of course, is a microscopical, vegetable growth, seen by the naked eye as a fine greyish white powder upon the bodies of the flies.

The Ichneumons, of which there are nearly two thousand known varieties, attack the caterpillars, and boring a hole in their bodies, lay their eggs which hatch out into small, white, footless grubs that prey upon the juices of their living host; and when the numbers of the Ichneumons exceed the numbers of the Pine White caterpillars, there are few of the butterflies seen for years in that locality, until once again Nature has restored her balance. This year has been one exceptionally prolific in all forms of insect life, particularly butterflies and moths. The present infestation in Southern Idaho is unusually severe, not only in the degree of defoliation, but in the area covered by epidemic infestation. Practically all the mature timber on South and West ridges is heavily defoliated and a large percentage of the Yellow Pine timber on the Payette, Weiser and Little Salmon rivers is infested to a greater or less degree. The infestation seems to be most severe in the Salmon Meadows and Lake Fork tracts and on some slopes the defoliation is complete in the mature trees. To make our problem more serious we now have in this territory three small areas with an epidemic infestation of Pine bark beetle; one so severe that we deemed it advisable to begin to

log the area this fall and to institute control measures under the direction of an official entomologist.

The present infestation seemed to have reached its crest about August 10th. At that time both butterflies and caterpillars being present all over the woods in countless millions. At about that time we had two days of cold rain followed by warm sunny days. The rain seemed to kill a great number of the butterflies but the following warm days hatched out enough more of the chrysalids so that none were missed. At this time, September 10th, the butterflies and caterpillars are all gone and in the more heavily infested areas the ground is white with their dead bodies.

The "Butterfly Burn" of 1903 and 1904 was followed in 1905 and 1906 by an epidemic infestation of bark beetles at three points, namely Smiths Ferry, Clear Creek and Centerville. At these three points our timber loss was probably 15% of the mature stand. An interesting coincidence in connection with these three "bug kills" is the fact that they all occurred on areas within the boundaries of main sheep trails. The Smiths Ferry and Clear Creek areas being on the Tripod and Clear Creek sheep trail over which an average of probably 100,000 head of sheep passed twice each year for probably 40 years to and from their summer range. The Centerville "Bug Kill" being on the main Boise Basin, Sawtooth and Bear Valley trail and over which an average of probably 60,000 head of sheep passed twice annually for some 40 years. These trails, which are about one half mile wide, have become completely denuded of brush, grass or weeds thru the action of countless hoofs on the forest floor and in their steeper pitches are simply dust beds. The

dust from the bands of sheep passing these places can be seen as far as smoke. On their smoother stretches these trails are as hard and smooth as a pavement and practically all snow and rain runs off too rapidly to be of any advantage to trees in the trailed area.

There can be no question but that the vitality of the trees on these trails is reduced which would make them more susceptible to insect attack. The lateral roots of all trees near the center of these trails are exposed due to the severe trampling of the sheep and the severe erosion following the complete destruction of all floor cover. The bark on these exposed roots has been killed by sun scald, and the base of most all of the mature trees are hosts to the (*Dendroctenus Valens*) turpentine beetle. It may be that the weakening of the trees on these sheep driveways resulted in a centralization of the beetle infestation. I wish most emphatically to warn all of you that the beetle infestation which is likely to follow this "butterfly burn" is the thing which you should prepare to fight. None of us can fight this alone. The State and Federal Government should be shown their duty in this matter and an insect control law similar to that in Oregon should be on our Statutes. As the control work now advised for the beetles is done in April and May and in September and October we could use our present fire organization both before and after the usual fire season and the knowledge each patrolman has of his district could be utilized to advantage and the overhead costs reduced. The Federal work and appropriation in Oregon for insect control is a precedent in point and it would be well for us to organize on this question and begin our educational work.

I know the Chairman will pardon me for continually talking "beetles" when he gave me "butterflies" for a topic but I think I have shown you what I wanted to.

In conclusion I wish to make due acknowledgement of my indebtedness to Mr. James C. Evenden, Government Entomologist, of Coeur D'Alene, Idaho; Mr. Guy B. Mains, Supervisor of the Payette National Forest, of Emmett, Idaho; Professor A. D. Hopkins, of the Bureau of Entomology, Washington, D. C. and to Mr. Reginald Barker, Entomologist of Boise, Idaho, for all of the biological data and much of the historical information included in this paper.

Thank you

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Land Agent

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