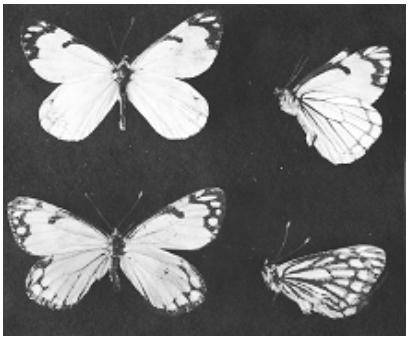
Insects and Damage

Poplar and willow borer. This weevil, *Cryptorhynchus (Sternochetus) lapathi* (L), is native to Europe where it infests willows and poplars. It was discovered in New York in 1882 and reported in Montana in 1911 at Missoula and Helena (Furniss 2003). Photos from the former Coeur d'Alene Forest Insect Lab show that it was present in Idaho at least by 1936 (Bunco Ranger Station, Coeur d'Alene N.F.). In Idaho, it commonly infests Scouler willow, which is a large, seral, shrub that follows wildfires on forested slopes particularly in the Clearwater River drainages where this shrub is important habitat and browse, especially for moose. As the willows mature and age, they out-grow the reach of browsing animals. Then, infestation of the basal stems (1-3 inches diameter) stimulates sprouting of new growth, thereby replenishing available browse. Thus, in this particular environment and circumstance, it is beneficial. -- *Malcolm M. Furniss*

Reference:

Furniss, M. M. 2003.Forest entomology in the northern Rocky Mountains: 1909-1917, as reflected in the correspondence between Josef Brunner and A. D. Hopkins. Amer. Entomol. 49: 102-111.



Pine Butterfly, Neophasia menapia (Felder & Felder). This pierid is similar in appearance to the common cabbage butterfly but differs in having black borders on the wings instead of spots and its primary host is ponderosa pine instead of your cabbage and broccoli. Its population mounts to impressive levels after long intervals of time and generally not in the same area. Outbreaks are short lived (2-3 years). Population collapse seems due to effects of starvation although an ichneumon was credited in some accounts.

I began employment in California in 1950 and often saw this white butterfly flitting about the tops of old growth pine in Lassen Co. during late summer. However, I never saw any sign of defoliation or any of its immature stages. Throughout my subsequent work in Idaho, I have rarely seen this butterfly. The only time that I have actually seen an out break was in 1973 on the Bitterroot N.F., Montana. That outbreak was treated experimentally with Mexacarbate and Bacillus thuringiensis (Dewey et al. 1974) and I took the accompanying photo there.

I am intrigued by several aspects of this native forest insect and have decided to compile information here about three historical outbreaks in Idaho for which I have information at hand. But, first, a story to reinforce that this insect is rarely seen in its immature (damaging) stages. In 1958, I visited Noel Wygant and Bill Wilford at the Fort Collins, CO, forest insect lab. They took me in an open WW II surplus military jeep into the surrounding mountains. I think that they were testing my mettle by driving off-road and up-and-down some breathtaking slopes. At one point, they stopped to examine a partially defoliated young pine but did not recognize that the larvae were the pine butterfly. I was impressed by that because both men were older than I and they had worked extensively in the west, yet they had no familiarity with it. I speculate that probably few forest entomologists have ever seen an infestation of the pine butterfly. I wonder ... how many have you seen?

Moscow Mountain, Latah Co., Idaho, 1896 - 1898. Some observations of this outbreak were recorded by the prominent Dipterist, J.M. Aldrich, who was a professor at the University of Idaho from 1893 - 1913 (Aldrich 1912; letter to R.C. Barker 1922). He pointed out that up to 1890, this insect was extremely rare in collections. During 1896-1898, however, an outbreak occurred on Moscow Mountain, seven miles distant. He noted that "the woods was full of butterflies. On one occasion a strong breeze came up from the Northeast at Moscow and in a

few minutes the town was simply alive with the white butterflies, which had been blown from the neighboring mountains." Aldrich reared an icheumon, *Theronia fulvescens*, from pupae of the butterfly. "The parasite reached its maximum abundance in 1898, at which time it swarmed in the woods in late summer in incredible numbers. In places, the air was full of them and they made a very perceptible humming sound like a swarm of bees. At the University of Idaho, about seven miles from the forest, it was abundant and on one occasion I collected 40 specimens by picking them off the walls of the administration building while going once around it - and this seven miles from where any of them matured. ... In ten years afterwards I think I saw only one specimen (of pine butterfly) alive."

Payette National Forest (New Meadows - McCall area), Idaho, 1921-23. The next outbreak occurred during 1921-1923 on somewhat scattered areas totaling 27,000 acres in the upper Little Salmon and Payette River drainages (Evenden 1926, 1940). About 25% of the mature pine died. The course of infestation, including parasitism by *Theronia fulvescens* conformed to the 1896-1898 infestation near Moscow, Idaho. Tall, mature, trees were severely defoliated in 1922, the peak year. In 1923, the infestation was confined largely to small trees. He attributed this to there being no needles on the tall trees on which to lay eggs.

Up to this time there was some confusion concerning the seasonal history of the butterfly. Aldrich, for example, had thought that it was "... much like its near relative the cabbage butterfly in having continuous series of broods during summer, probably three or four." Others thought that it overwintered as pupae. Evenden (1926) summarized the seasonal history as follows: One generation occurred per year. Eggs were laid in August in rows on needles where they overwintered. Eggs hatched when new needles began to appear in the following spring. Larvae matured in late July and lowered themselves to the ground on silken threads where they pupated on various objects. Adults emerged in 15-20 days and immediately mated and began laying eggs.

He also marked 100 representative trees in 1924 and examined them until 1933. Of 84 severely defoliated trees, 12 died from defoliation alone and 14 died from a combination of defoliation and infestation by the western pine beetle. No mortality occurred in moderately or lightly defoliated trees. Eighty-nine percent of the study trees failed to add any basal increment for 1 - 11 years (Ave 2.6 years).

Among photos in the WFIWC archives is one of F.C. Craighead beside one of Evenden's study trees near New Meadows, June 1922. He had just succeeded A.D. Hopkins as Chief of the Division of Forest Insects, USDA, Bureau of Entomology, and was making his first trip west in that capacity. I have seen numerous photos of "F.C." and note that he never looked at the camera and always wore leggings in the field probably as protection against snake bite. His attire and demeanor were so characteristic that I was able to identify him in a photo of the Tenaya "Ghost Forest" in Yosemite N.P. I had wondered who the person was for many years.

Boise National Forest, Idaho, 1953-54. An outbreak occurred in ponderosa pine on the Boise N.F., Idaho, in 1953 involving 169,000 acres. The area was sprayed in 1954 with DDT in fuel oil at a rate of 1 lb of DDT per gallon of oil per acre. The project entomologist was Leslie W. Orr, stationed at Ogden, UT. He and other employees of the Div. of Forest Insect Investigations had been transferred to the Forest Service when the Division was dissolved in Dec. 1953. He transferred to New Orleans soon after the project. I know of no detailed record of this infestation but I was stationed at Idaho City in charge of a spruce budworm control project in 1955 and saw no effect of the outbreak, due apparently to effectiveness of the DDT treatment. -- *Malcolm M. Furniss*

References

Aldrich, J.M. 1912. Note on Theronia fulvescens. Jour. Econ. Entomol. 5: 87-88.

Aldrich, J.M. 1922. Letter to Reginald Barker, Boise, ID, Sept. 30, 1922 recollecting the 1896-98 outbreak and regarding pine butterfly seasonal history. (WFIWC archives).

Dewey, J.E., et al. 1974. Mexacarbate and Bacillus thuringiensis for control of pine butterfly infestation-Bitterroot National Forest, Montana--1973. USDA For. Serv., Division of State and Private Forestry, Rpt. 74-10, 25 pp. illus.

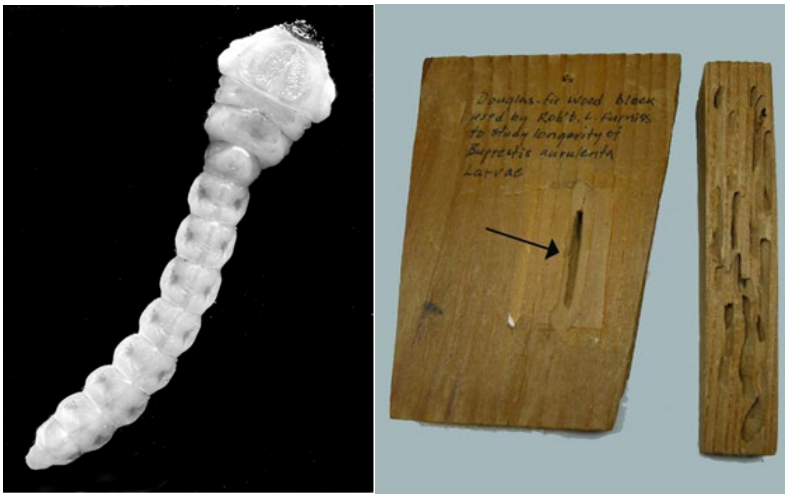
Evenden, J.C. 1926. The pine butterfly, Neophasia menapia Felder. Jour. Agric. Res. 33(4): 339-344.

Evenden, J.C. 1940. Effects of defoliation by the pine butterfly upon ponderosa pine. Jour. Forestry 38(12): 949-955.

The larch casebearer (*Coleophora laricella*), a native of Eurasia, was accidentally-introduced into Massachusetts by 1886. It was discovered in the western U.S. in May 1957 by David Fellin and Richard Schmitz near St. Maries, ID. They were students at Oregon State University en-route to Missoula, MT, for summer employment with the Forest Insect Laboratory. On a downgrade south of town, they observed discoloration of western larch foliage and collected some case-bearing caterpillars feeding on the needles. Subsequently, numerous native parasites adapted to the casebearer and several European hymenopterous species were released in an effort to control it (photo). However, for the next ten years, the casebearer continued to spread over the range of western larch and every spring the larch forest looked as though it was dying. The phone in my office would ring repeatedly as the public wanted to know what was wrong. At one point, the Forest Service regional office decreed that larch should be discriminated against in favor of propagating other tree species, although no convincing evidence existed that needle mining was having any impact due apparently to inherent characteristics of this deciduous conifer and the nature of the mining itself.

However, in summer of 1967, a nearly total collapse of the casebearer occurred due to extreme hot, dry, weather which desiccated needles containing the fragile young larvae. Aided by this decimation of the population, the various introduced and native parasites gained control of the casebearer to where it can be noted only by careful scrutiny of many needles. I recall Donald Parker, who had experience with the casebearer in the eastern U.S., saying at the start that: "Give it 20 years and it will become "naturalized" (under natural control)". He missed it by only 10 years too long. Although future forest insect immigrants may settle down at different rates and under different influences, perhaps we can take solace in the resilience of the forests as they have adapted in the ever going evolutionary process. That has proven to be difficult for Man and his short life span and inherent need to intervene in nature's processes. -- *Malcolm Furniss*

Ponderosa pine stand killed by the western pine beetle NW of Timber Mtn, Modoc N.F., California. Photo by John M. Miller, Sept. 1934. He wrote to Paul Keen: "This is the first time that I have been in the northern Modoc area for 3 years and was impressed both by the improved roads and the deterioration of the forest since my last visit. The areas where we first noticed heavy killing in 1925 have been greatly extended and the belt of dead forest seems to be extending into the better timber to the south." Severe drought occurred during that period and from Miller's observation, it would seem that over-mature pines on the poorer sites such as evident here were first to go. Miller took stand photos that show great composition. He also always positioned a person in the photo, which enhances viewer interest and provides scale. I believe that he was influenced in that regard by association with John E. Patterson, who had been an apprentice photographer before being hired by Miller in 1914 at Ashland, OR, during study of bark beetles and seed and cone insects.



Robert L. Furniss, stationed at Portland, OR, became interested in the longevity of woodborers in lumber used for house construction. In 1939-1941, he inserted hatched larvae of *Buprestis aurulenta* L. (golden buprestid) in Douglas-fir wood blocks (arrow, lower left photo). After 23 years, he reported that some were still living (ESA ann. meeting, Phoenix, AZ).

In 1980, after his death, I (M. Furniss) took the remaining blocks to Moscow, ID. Several larvae were still alive in 1973 (34 years) and one was alive in 1986 (1941-1986 = 45 years) after which I discontinued the study.

He seemed to think that surviving larvae might still mature to adult stage but none did and they became very shriveled, probably from desiccation. One thing that impressed me was that no larva ever bored to the outside. I wonder how they sensed not to do so. That is evident in the lower left photo showing the face and cross section of a block.

The larva photo (upper left photo) is in Western Forest Insects and a print is in the WFIWC archives. This larva was a normal one not involved in this study.

A (left). Lodgepole pine killed by the mountain pine beetle and subsequent regeneration in Tenaya Creek drainage, Yosemite N.P., July 1925.

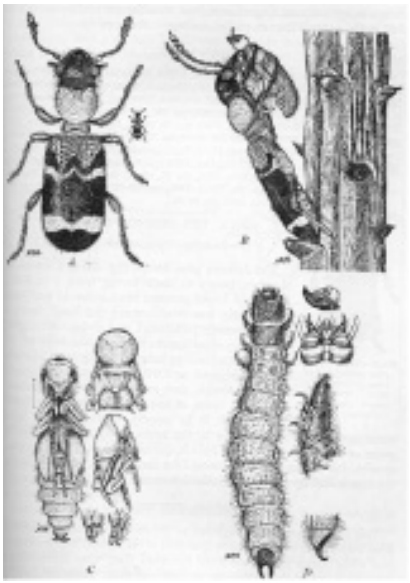
B (right). Same scene 59 years later in August 1984. The overmature pines have been replaced by a new forest. Note that at this high elevation, some snags still remain standing and that vegetation is encroaching on the lake causing the rock at right to appear to have raised.

A. Photo by J.M. Miller. B. Photo by M. Furniss. Furniss 2007B, Fig. 10.

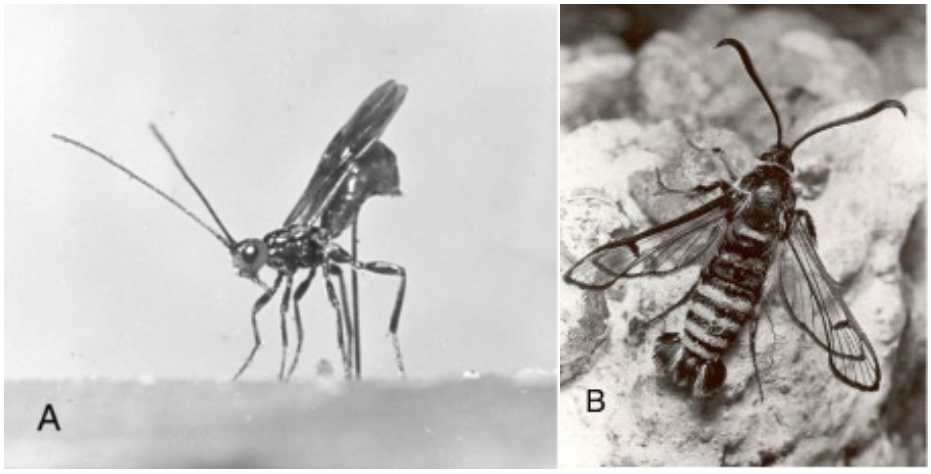
"Ghost Forest" beside the Tioga road north of Tenaya Lake in Yosemite N.P., 1924. The forest consisted of over-mature lodgepole pine when it became infested by the mountain pine beetle about 1896. Now, a young stand has begun to renew the forest. The man in lower center is F. C. Craighead, second Chief of the Division of Forest Insect Investigations, USDA Bureau of Entomology. Photo by J.M. Miller, 6 August 1924. Furniss 2007B, Fig. 9A. (see sequential photos 9B and 9C, below)

Tenaya Ghost Forest, August 1953. Several snags still stand that are identifiable in Fig. 9A (above). Removal of the overmature stand by the mountain pine beetle has resulted in a pure stand of young lodgepole pine destined to continue this cycle. In the Rocky Mountains, where lodgepole pine cones are serotinous and fuel is far more plentiful, fire regenerates lodgepole pine. Furniss 2007B, Fig. 9B. (see sequential photos 9A above and 9C below)

Tenaya Ghost Forest, August 1984. Some identifiable snags remain standing but the growing forest will soon leave no trace of the Ghost Forest for passing tourists to wonder about. Furniss 2007B, Fig. 9C. (see sequential photos 9A and 9B above)



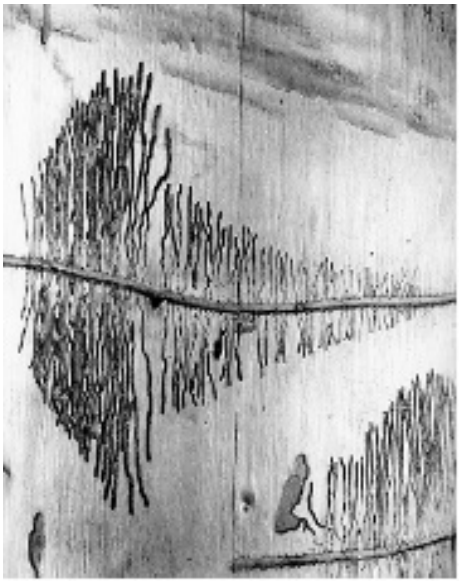
Drawing of a clerid, *Thanasimus formicarius*, by A.D. Hopkins. In 1892, he went to Germany to collect this predator for release in West Virginia where he had discovered a vast outbreak of the southern pine beetle. This effort was partly responsible for his being granted an honorary PhD by WV University in 1893. The clerid was never established, however (Hopkins 1899). (Furniss 2003, Fig. 5).



Josef Brunner, a Bavarian with forestry training, was hired by A.D. Hopkins in 1909 to investigate forest insects in the northern Rocky Mountains. A (upper left). This braconid parasite of the Douglas-fir beetle was named*Coeloides brunneri* after him; however, it is now a synonym of *C. vancouverensis*. B (lower left). A clearwing pitch moth, *Vespemima sequoiae*. Brunner studied this and other pitch moths beleiving that the pitch flowing from injury caused by mining by its caterpillars contributed to forest fires. Brunner was often at odds with Forest Service officials regarding the relative importance of insects and fire. A. Photo by Roger B. Ryan. B. By M. Furniss. (Furniss 2003, Fig 3A & 9A).

The 1936 Tillamook Burn (Oregon) killed a vast amount of Douglas-fir and western hemlock, much of it old growth. To aid salvage logging, R.L. Furniss investigated the rate at which several wood-boring insect species degraded the dead trees. He also took photos of the logging operation. At that time, trucks had just replaced trains for transporting logs but trees were still being felled by ax and crosscut saw. Here Bob Furniss examines a butt log displaying early stage of mining by a cerambycid, *Asemum striatum* (L.). This and other borers eventually riddled sapwood of fire-killed trees but the heartwood remained salvageable for years. Photo F-607 by R. L. Furniss, WFIWC archives. (Wickman et al. 2002, Fig. 10 A).

The pandora moth defoliated thousands of acres of ponderosa pine in southern Oregon during 1918-1925. (Furniss and Wickman 1998, Fig. 12D). Photo no. 2450 by J.E. Patterson, WFIWC archives.



Gallery system of the fir engraver, *Scolytus ventralis*, on inner bark of white fir. George Struble of the Berkeley FIL studied this beetle in the Sierras of California. The horizontal tunnel is made by a female after entering at what is now the middle. She began tunneling to the left, laying eggs in niches above and below the tunnel; those laid first have the longest larval mines. He found that the beetle could infest trees without killing them, which made it impractical to control by direct means. Photo no. 8409-d, WFIWC archives (Furniss and Wickman 1998, Fig. 6)