THESIS

On

The Aegeriidae of the Pacific States

Submitted to the

OREGON AGRICULTURAL COLLEGE

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

In

The School of Basic Arts and Sciences

By

Benjamin G. Thompson

May 15, 1924

APPROVED:

[redacted]

Professor of Entomology In charge of Major

Chairman of Committee on Graduate Study

TABLE OF CONTENTS.

Foreword

During the summer of 1915 the writer became greatly interested in the Aegeriidae. Because of their great economic importance and rare beauty, the study of this group has been continued. Considerable data on the life histories, distribution and economic importance of the several species occurring on the Pacific coast have been acquired. Unless otherwise stated, the life histories, descriptions, distribution records and control measures mentioned in this paper are based on original investigation.

Nomenclature.

There seems to be a great difference of opinion among Lepidopterists as to the correct name of this group, some claiming Sesiidae to be the valid name while others maintain that Aegeriidae must replace Sesiidae, basing their claim upon the law of priority.

In 1758, Linnaeus, in the tenth edition of his Systema Naturae, established the genus Sphinx, making four divisions, the first containing those with the outer margin of the forewing angulated; the second, those with the wings entire and the abdomen without anal tufts; the third with entire wings but with anal tufts and the fourth of uncertain location.

In 1775, Fabricius published his Systema Entomologiae in which he adopts the Linnean genus Sphinx, restricting it to the first two divisions given by Linnaeus, and established the genus Sesia for the third division, and the genus Zygaena for the fourth. In his Genera Insectorum, published in 1776, Fabricius gives the characters of his genera and although very superficial, those given for the genus Sesia appear to apply better to the so-called Aegerians than to any of the Sphinges although he had some of both under his genus Sesia.

In 1805, Latreille, in the Histoire Naturell des Crustaces et Insectes, separated tiliae, ocellata and populi from Sphinx and established for them his genus Smerinthus, and removed stellatarum,

fuciformis and bombyliformis from the genus Sesia where Fabricius had placed them and located them under the genus Sphinx. This purified the genus Sesia of its incongruous species and left it restricted as now used by the French and German Entomologists.

In 1807, Fabricius prepared his Systema Glossatorum in which he restricted the term Sesia to certain species of the Sphingidae and proposed the generic name Aegeria for the group afterwards known by the English Entomologists as Aegeriidae. Dr. Hagen in his invaluable Bibliotheca Entomologica (according to Fernald) states this work of Fabricius was never published and only advanced sheets were sent out, and the manuscript was lost. But Laterille had two years previous, as shown above, restricted Sesia to those species for which Fabricius in an unpublished paper proposed the name Aegeria. We should, therefore, regard Aegeria as a synonym of Sesia as restricted by Laterille.

Wm. Beutenmuller makes the following statement: "Sesiidae must be used over Aegeriidae for reasons given by me in my monograph of the family. Rothschild and Jordan in their monograph of the Sphingidae use Sesia for a certain group of Sphingids but this is invalid because Laspyres in 1801 monographed the European Sesiidae leaving out all species not belonging to this family. Since Sesiidae becomes a valid restriction of the group the name cannot be rejected unless other evidence is found to prove the contrary. Rothschild and Jordan's restriction is arbitrary and cannot stand."

Beutenmuller also makes the following statement: "Hubner in 1806 restricts the name Sesia to S. culiciformis of Clerck. This is

apparently the first restriction, and this species should be considered as the type of the genus, unless we can find another author mentioning a type before this."

This interpretation was adopted by most Lepidopterists up until about 1915 when most authorities changed over to Fabricius interpretation. As the most recent check-list of the Lepidoptera (Barnes and McDunnough) use this interpretation we will follow it throughout this paper.

Position of the Family.

The family Sesiidae was placed at the head of the Heterocera for over a century but of late has been shifted from place to place by various authors and has not yet found a definite phylogenetic position.

In 1758 Linne places the species in the Sphingidae. Later they were placed between the Sphingidae and the Zygaenidae and were left in this position for several years. In 1832 Newman called attention to the relationship of Sesiidae to Cossidae and Hepialidae. In 1895 Edward Meyrick placed the family in the Tineina before the Gelechiadae. Beutenmuller also placed them among the lower families of the Heterocera and states that he was upheld in this by Dr. Dyre.

According to Prof. Comstock, this family in its course of evolution has progressed far from the primitive type of the order. The species, however, have kept closely together, there being less variation in the structure of the wings and other organs than one would expect to find in a group so highly specialized.

Characteristics and Habits of Adults.

The adults of this family are known as the clear-wing moths. This name is derived from the fact that a greater part of one or both pair of wings are devoid of scales. Due to the clear wings and in most cases bright color, many of the group resemble bees and wasps in appearance. They are very swift fliers and are usually active during the warmer part of the day, however the writer has taken one species, Sesia saxifrage, at a light which would indicate that some are night fliers. Some of the adults frequent flowers, thus increasing their resemblance to bees and wasps.

The adult moths are small to medium in size with a small head and naked eyes. Ocelli present; labial palpi long, curved, ascending, with a short, pointed terminal segment; proboscis either well developed or rudimentary; antennae long, dilating from about the middle to near the apex, thence rather pointed, sometimes almost filiform. The antennae are ciliate or pectinate in the male and simple in the female. The anterior wings are very narrow, at least four times as long as wide, and have a great reduction of the anal area, while the posterior pair have a widely expanded anal area. The inner margin of the forewing and the costal margin of the hind wing are narrowly folded and interlocking holding the two wings tightly together. This one character distinguished this group from all other moths. The wing veins and the margins of the wings are clothed with scales. The abdomen is usually elongate and slender. At the anal end of the abdomen there is a tuft of long hairs. The

legs are covered with tufts of hairs or scales. The mid-tibia has one pair of spurs and the hind tibia has two pairs. In most of the Sesiids the bristles composing the frenulum are consolidated in the female as in the male. The female also possesses a frenulum hook as in the male. This, however, is not so highly specialized as that of the male.

So far as is known to the writer, the Sesiid larvae are all internal plant feeders, restricted to the habit of boring in the stems or roots of plants. There is, therefore, little need for diversity of structure or special adaptions and little development of coloration. The larvae of the several species are very similar, of a yellowish or whitish color without markings.

The Aegeriid larva is of a low type and closely allied to the Cossidae, also wood-borers. The head is rounded, with the apex retracted below the prothorax, a very high clypeus, small antennae and weak ocelli, the lower posterior one often missing. The body is normal or somewhat flattened. The abdominal feet are short or nearly sessile, with well developed crotchets in a single transverse ellipse. Shields are not strongly developed as is the case with most boring larvae, but degenerate. The abdominal segments are divided into three annulets as in Torticidae and Pyralidae. The tubercles and setae are all single, there never being any development of warts or secondary hairs. The skin is minutely granular. The spiracles are small and slightly elliptical in shape.

The larvae are all borers but there is a wide diversity in the choice of food plants. Some bore in and devour solid wood, some

work in the pith of woody stems, others are found in the cambium layers, and still others attack the roots of plants both woody and herbaceous. (Some species are found in the borings of other insects as is the case with Sesia scitula which is found in the galls of Andricus cornigerus). The members of this family hibernate in various stages of development but none of the species found on the Pacific Coast pass the winter as pupae or adults.

Characteristics of the Pupae.

The pupae are of a brown color with transverse rows of teeth or spines on the back of the abdominal segments. The males have two rows of these spines on the first six segments and one row on the last two segments. In the females there are two rows on the first five segments and one row on the last three. By the use of these spines the pupae is enabled to work its way out of its tunnel at the time of emergence.

Key to Genera.

1. Hind wings with veins 3 and 4 stalked - - - - - - - - - - - - 2
   Hind wings with veins 3 and 4 not stalked - - - - - - - - - - 10

2. Forewings with 11 veins; one vein absent - - - - - - - - - - - 3
   Forewings with 12 veins - 4

3. Forewings with a costal vein (10) absent - - - - - Alcathoe
   Forewings with a dorsal vein (4) absent - - - - - - Bembecia

4. Tongue rudimentary; forewings with vein 7 to termen - Aegeria
   Tongue developed; forewings with vein 7 to costa or apex - - 5

5. Labial palpi nearly smooth; if rough beneath then with short scales - 6
   Labial palpi hairy - 8

6. Hind tibia nearly smooth throughout - - - - - - - Parharmonia
   Hind tibia not smooth throughout - - - - - - - - - - - - - - -7

7. Hind tibia roughed haired throughout - - - - - - - - Sannina
   Hind tibia tufted at the spurs, smooth between - Synanthedon

8. Hind tibia nearly smooth - - - - - - - - - - - - - - Podosesia
   Hind tibia rough haired - 9

9. Labial palpi upturned, nearly reaching vertex - - Vespamima
   Labial palpi short, porrected - - - - - - - - - - - - - Palmia

10. Forewings with veins 7 and 8 coincident - - - - - - - - - - 11
    Forewings with veins 7 and 8 stalked - - - - - - - - - - - - 12

11. Tongue rudimentary
    Tongue developed.- - - - - - - - - - - - - - - - - - - Calasesia

12. Hind wings with vein 3 closely approximate to 4 - - - - - - 13
    Hind wings with vein 3 approximate to 2 - - - - - - - Melittia

13. Tongue rudimentary - 14
    Tongue developed - - - - - - - - - - - - - - - - - Parathrene

14. Head and thorax long-haired - - - - - - - - - - - - - Euhagena
    Head and thorax smooth - - - - - - - - - - - - - - - - - Gaea

Melittia Hubner.

Melittia Hubner, Verz. bek. Schmett, 1816, p.128.

Palpi upturned, clothed with short hairs above and below. Antennae with fascicles of cilia in the male, clavate, pointed at the tip, simple in the female. Hind tibiae and tarsi thickly clothed with very long hairs. Forewings with 12 veins, R_4 and R_5 on a stalk, second anal vein very short. Hind wing with 9 veins; M_3 from middle of cell; Cu_1 from end of cell. Abdomen cylindrical tapering toward the apex, anal tuft very slight, similar in both sexes. Type: Melittia setyriniformis Hub.

This genus may be easily recognized by the robust form and by the hind legs being thickly clothed with very long hairs. But one species, Melittia glorosia, is known to occur in the Pacific states.

Melittia glorosia Hy. Ed.

Melittia glorosia H. Edwards, Bull. Brooklyn Ent. Soc. Vol.III,p.71; Grote, New Check-list N.A.Moths, p.11; Riley, Proc. Ent. Soc. Wash. Vol.I,p.85; Beutenmuller, Bull. Am. Mus.Nat.Hist. Vol.IV,p.171; ibid,Vol. VIII,p.216; ibid Vol.IX,p.216; ibid, Vol.XII,p.150.

Male:- Head gray, white in front; palpi white outside, yellow above. Eyes black with a yellowish tint. Collar white. Thorax steel grey edged with orange posteriorly and an orange spot at base of anterior wings. Antennae brown, pectinations black. Abdomen all but last two segments yellow splashed with bluish purple on top, orange on sides and all segments yellow beneath; last two segments bluish purple above. Anal tuft, small, yellow washed with blue. Forewings opaque, gray, slightly tinged with olivaceous, underside, orange. Hind wing transparent except veins and a large spot near the inner margin which are clothed with orange scales and hairs. Fringe on inner margin, orange; outer margin brown. Front and middle legs yellowish brown above and white and yellow beneath; tarsi purple and brown. Hind legs clothed with long orange hairs on inside.

Female:- Similar to male but more robust and hind wings entirely covered with orange scales.

Wing Expanse. Males, 40-45 mm. Females, 40-58 mm.

Habitat. Calif. Arizona, N.M. Arizona.

This is the largest and most beautiful of the Pacific State Aegeriidae. It occurs throughout Southern and Central California and the Willamette Valley. It is quite common at Corvallis.

Life History, Habits, etc.

Nothing of the life history or food plants of this insect is recorded but we find it in its larval stage working within the roots of wild cucumber. The adults appear from July 15 to September 15. Mating takes place soon after the female emerges and before her wings are dry. The eggs are deposited in the soil above the roots of Echinocystes oregana, and the adults soon die. Upon hatching the young larvae crawl down through the soil to the roots of the host and feed at first on the surface of the root, later boring within. The larvae are active throughout the winter. When the larvae are fully mature they form a cell near the surface of the ground and form a cocoon of silk and small particles of earth. The life cycle is completed in one year.

Bembecia Hubner.

Bembecia Hubner, Verz. bekant. Schmitt, 1816, p.128.
Herrick-Schaeffer, Syst. beerbeit Schmett. Europa. 1845, p.61.

Palpi upturned, not reaching the top of the head, with long hairs at base. Head small; thorax well rounded in front. Abdomen robust, with elevated hairs on the first and second segments. Anal tufts of male, short, broad and flat; female very slight. Middle and hind femora and tibia clothed with hairs. Antennae short, tapering, simple in the female and with pectinations in the male.

No tongue. Forewings with 11 veins, R_4 and R_5 stalked; Cu_2 absent. Hind wings with outer margin strongly sinuate; veins M_3 and Cu_4 on a long stalk; vein Cu_2 running almost parallel.

Type: Sesia hylaeiformis Laspeyres, Europe.

Bembecia marginata (Harris).

Trochilium marginata Harris, Am. Jr. Arts & Sci.Vol.XXXVI, 1839, p.309; Morris Synop.Lepi. N.A.1862,p.137; Lintner, 23rd N.Y. State Cab.Rep.1869, p.60.

Sphecia marginata Walker, Cat. Lepid. Brit. Mus. Pt. VIII,1856,p. 12.

Bembecia marginata Hy.Edw. Papilio,Vol.II,p.52; Grote,New Checklist N.A.Moths, 1881,p.11; 11th Rept. Ent. Soc. Ont. 1888, p.81; Riley, Am.Nat.Vol.XVII,p.792; Saunders, Inj.Insects to Fruit,p.303;Beutenmuller Ann.N.Y.Acad. of Sci. Vol.V.p.204;Bull.Am.Mus. Nat.Hist.Vol.V.p.22. ibid. Vol.VIII,p.118, ibid. Vol.IX,p.218;Smith,Cata.Ins.N.Y.p.288; Webster, Ent.News, p.277, Science Vol.XX,p.338; Fletcher, Rept. Ent. Dept. Agri. Canada, p.149; Lugger, 4th Rept. Ent. Agri.Exp.Sta.Minn. p.54-55

Aegeria pleciaeformis Walker. Catalogue Lepid.Brit. Mus. pt.VIII, p.40. Hy.Edwards, Papilio, Vol.I, p.266.

Sesia pleciaeformis Boisduval, Suites a Buffon, Nat. Hist. Lep.Het. I. p.436.

Bembecia pleciaeformis Grote. New Ck. List. N.A.Moths, p.11. Beutenmuller, Am. Mus. Nat.Hist. Vol.V. p.23.

Sesia odyneripennis Boisduval, Suites a Buffon Nat.Hist. Lepi. Het. I. p.437.

Trochilium odyneripennis Morris, Synop.Lepid. N.A. p.332.

Albuna odyneripennis Grote, New.Ck.List N.A.Moths, p.12.

Sesia flavipes Hulst, Bull. Brooklyn Ent. Soc. Vol.III, p.76. Beutenmuller, Bull. Am. Mus.Nat. Hist. Vol.IV. p.171.

Male:- Head brown, orbits of eyes pale yellow, palpi and collar

yellow. Antennae blue black in color and do not enlarge toward tip. Thorax deep brown with yellow markings; two spots on each side in front, a short mark at the base of the wings and a sub-circular ring posteriorly. Abdomen deep brown with a golden yellow band on the posterior part of each segment encircling the body. Anal tuft black and yellow. The third segment of the abdomen has a bunch of raised yellow and black hairs. Legs yellow marked with black outside. Anterior wings transparent with broad borders, veins and discal mark brown. Under side yellowish brown. Hind wings transparent with narrow borders on veins brown.

Female:- Similar to male, but larger and more robust with broader yellow bands on the abdomen with the last segment entirely yellow.

Wing Expanse. Male 20-27 mm. Female 20-35 mm.

Habitat. Common throughout the Pacific states where blackberry or raspberry is found.

Egg.

The egg of this insect is about .8 mm. long by .6 mm. wide. It appears to be oblong oval when viewed from above; it is greatly flattened on the base, and flattened ovate when viewed laterally; it is profusely covered with minute, irregular, reticulated ridges enclosing deeper pitted dipersions. It is deep chesnut brown in color.

Larva.

The larva is of a pale yellow color with a dark brown head. Mandibles black; cervical shield pale brown and each segment of the body with eight pale, shiny, piliferous spots transversely arranged

on the second, third and twelfth segments; the dorsal four are quadrangularly arranged; the lateral two interrupted by stigmata. Lower posterior ocellus distinct and like the others. Thoracic legs slightly tinged with brown; prolegs with dark colored hooklets. The full grown larvae vary from 25 mm. to 30 mm. in length.

Pupa.

The pupae are from 15 mm. to 20 mm. in length and from 4 mm. to 5 mm. across the thorax. They are of a uniform dark brown color. The clypeus is drawn out into a sharp pointed process. The mediodorsal ridge of the thorax is unusually prominent.

Life History.

The adults of this species emerge during August and September. The males emerge from noon until four p.m. and the females from 3 until 5 p.m., copulation usually taking place after 5 p.m. This is different than for any other known species as all others emerge and mate during the hottest part of the day, usually about noon. The females remain inactive until the following day. When ready to deposit their eggs, they alight on the upper surface of the leaf, flutter their wings, rise up on "tiptoe", move sidewise at the same time bending the abdomen around the edge of the leaf and deposit a single egg. The eggs are always deposited on the under side of the leaf. Each female deposits about 140 eggs. The eggs are mostly hatched by the end of September. The young larvae, as soon as hatched, crawl down the stem and bore under the bark near the crown. Here they may either make a small blisterlike cavity and hibernate over winter or, if hatched early, they may feed on the sapwood or

bore within the stem and become from 5 to 10 mm. long before winter. The following spring the larvae bore into the lower stems and roots and tunnel through them promiscuously until the second spring, and then working upward eating the pith for a distance of from one to five inches.

At the end of the first summer the larva is from twelve to twenty mm. long and at the end of the second summer it is full grown. It then bores an exit hole through the wood just above the crown leaving the hole covered by the epidermis and descends into the tunnel to pupate.

When ready to emerge, the pupa works its way through the epidermis, by means of the spines or teeth on the abdomen, until about half of its length is protruded from the stem and emerges during August or September, thus completing the life cycle in two years.

Control.

This is one of the most important pests of bramble fruits in the Pacific states. It attacks blackberry, loganberry, and raspberry and unless controlled does serious damage.

About the only way to successfully control this pest is to remove the larvae from the plant and destroy them. If the plants are badly infested they should be dug up and burned. Aspinwall Brothers of Brooks, Oregon sucessfully control this pest by the following method: In the spring at the time the plants are being trained, the infested shoots are pulled off and the larvae killed with a piece of wire that the laborer carries attached to his wrist. The infested canes are easily located by their wilted appearence.

The plants are gone over again later in the summer. In this way the insect is combated quite successfully.

Another method which might prove successful was suggested by the late Prof. A.L. Lovett as follows:

By the last of August the crop has been harvested and the leaves have begun to fade. By this time most of the eggs of this insect have been deposited and none have yet hatched. If the leaves were at this time removed either by knocking them off by hand or with a spray, it is quite probable that the majority of the larvae upon hatching would never reach the plant and thus perish.

Alcathoe H. Edwards.

Alcathoe H. Edwards, Papilio, Vol.II, p.53.

Palpi nearly ascending, scarcely reaching top of head, loosely scaled; second joint very long, third very short. Antennae of equal width, slightly tapering at the tip; very slightly ciliated in the male, simple in the female. Hind tibia clothed with a bunch of hairs at each end and a similar bunch at the base of the tarsi contiguous with the one on the tibia. Fore and middle legs without bunches of hairs. Abdomen of male with a long, hairy tail-like appendage which divides a flat anal tuft. Tongue present, distinct. Forewings with 12 veins, R_4 and R_5 stalked. Hind wings with vein Cu_2 from cell, M_3, Cu_1 on a short stalk. Sc and R_1 coalescent. Type: Aegeria caudata Harris.

Alcathoe korites (Druce)

Sannina korites Druce, Biol. Cent. Am. Vol.I. Het. p.34.

Male:- Head black, palpi orange red below. Antennae orange washed with black near the tip. Thorax and abdomen bluish black with a few red scales on the edge of the patagia and centre of the thoracic disc. Anal tufts and caudal appendage bluish black. Legs bluish black. Wings opaque, orange, with the margins and veins lined with black. Under side similar to above but less black.

Female:- Similar to male but without the caudal appendage.

Wing expanse. Male and female, 25-28 mm.

Habitat. Mexico and Central America and Southern California.

We have taken but one specimen of this species, a male, from Redland, Calif. The larvae is reported to live in the roots of clematis sp.

Aegeria Fabricius.

Aegeria Fabricius, Illiger, Mag. Insectenk, Vol.VI, p.288.

Specia Hubner, Verz, bek.Schmett, p.127.

Head small, palpi upturned and scarcely reaching the top of the head, clothed with long hairs toward the base. Antennae short and thick, about as long as the thorax, strongly pectinate in the male, simple in the female. Body robust, abdomen cylindrical, blunt at tip, male with anal tuft not prominent. Tibiae thickly clothed with short hairs. Femora and tarsi not hairy. Tongue absent. Forewings with veins R_4 and R_5 stalked. Hind wings with M_3 and Cu_1 from angle of cell or on a very short stalk.

Type: Sphinx apiformis Clerck.

Aegeria pacifica (Hy.Edw.)

Trochilium pacificum Hy.Edw. Papilio, Vol.I, p.180; Grote, Check-list N.A.Moths, p.11; Beutenmuller, Bull.Am. Mus. Nat.Hist. Vol.IV, p.171; ibid; Vol.VI, p.365; ibid; Vol.VIII, p.117; ibid. Vol.IX, p.218; ibid. Vol.XII, p.159.

Trochilium californicum Neumoegen, Ent. News, Vol.II, p.108.

We have seen but one specimen of this species, a male in the collection of the California Academy of Sciences. It was taken in southern California and so far as known is confined to that locality. Nothing is known of its life history or food plants.

Male:- Head black, orbits and sides yellow;palpi yellow. Antennae brown black, paler beneath. Legs yellow. Thorax deep brown, with a yellow line on each side on top, forming an angle in front and running obliquely downward. At the junction of the thorax and abdomen are some black hairs and a small spot of the same color at the base of the forewings. Abdomen with first and second segments black, the latter narrowly edged with yellow in front, remaining segments yellow, the third very narrowly edged with black posteriorly and the fourth and fifth slightly suffused with testaceous. Under side wholly yellow. Wings transparent, narrowly bordered with orange brown; discal mark on forewing and veins orange brown.

Female:- Similar to male but more robust with tapering abdomen.

Aegeria tibialis Harris.

Trochilium tibiale Harris. Am. Jr. Art. & Sc. Vol.XXXVI,p.306; Morris, Syncp.N.A.Lepid. p.138; Lintner, 23rd N.Y.State Cab.Rept. p.60; Packard, Ins.Inj.For & Shade Trees, p.123; Hy.Edw. Papilio,Vol.II, p.53; Grote, New Ck.List N.A.Moths,p.11; Beutenmuller, Bull.Am. Mus.Nat. Hist. Vol.VI,p.366; ibid; Vol.VIII,p.118; ibid. Vol.IX,p.218; ibid. Vol.XII,p.159.

Melittia ? flavitibia Walker, Cat. Lepid. Brit. Mus. Pt. VIII, p.67.

Trochilium minimum Neumoegen, Ent. News, Vol.II, p.108.

This insect is very common in willows and poplars throughout Calif. Eastern Oregon and Eastern Wash. It is less common in Western Oreg. and Wash.

Male:- Head black, orbits and top yellow. Palpi yellow. Antennae black with pectination brown. Collar yellow. Thorax black with a yellow line on each side ending in a yellow spot behind. Shoulders and spot at base of forewing yellow. Posterior edge of thorax with fringe of black and yellow hairs. Abdomen, first segment black narrowly edged with yellow posteriorly, second segment black, third segment yellow, fourth segment brown, all other segments yellow narrowly edged with brown. Anal tuft brown and yellow. Under side of abdomen yellow with narrow brown bands. Legs yellow marked on outside with brown. Wings transparent with narrow brown borders and veins of same color.

Female:- Much more robust than male with marking of thorax and head similar to male. Abdomen similar but fourth segment with a purple hue. Margins of wings broader. Anal tuft very small, yellow. Long prominent ovipositer. Antennae black with brown tips.

The adults of this species emerge during June and July. They emerge during the hottest part of the day. Their complete life history has not been worked out.

Synanthedon Hubner.

Synanthedon Hubner, Verz. bekant. Schmett, p.129.

Sesia Fabricius, Syst. Ent. p.549. Hubner, Tentamen, p.1.

Aegeria, Fabricius, Syst. Glossat. 1807. Illiger, Mag. Insect. Vol.VI, p.288.

Bembecia Hubner, Verz. bekant. Schmett. p.128.

Conopia Hubner, L.C. p.129.

Setia Mergen, Syst. Beschreib. Europ. Schmett. p.119.

Pyrrhotaenia Grote, Can. Ent. Vol.VII, p.174.

Carmenta Hy. Edw. Papilio Vol.I, p.184.

Palpi ascending, reaching the top of the head, with oppressed or loose scales or hairs, third joint small, conical. Antennae slightly thickened toward the tips, simple in the female, ciliated or simple in the male. Abdomen slender, anal tuft large, fan-like in the male, brush-like in the female. Legs with tufts at joints or with loose short hairs. Fore wings with veins R_4 and R_5 stalked. Hind wings with veins M_3 and Cu_1 stalked, Sc and R.

Type: Sphinx tipuliformis Clerck.

Synanthedon rutilans (Hy.Edw.)

Albuna rutilans Hy.Edw. Papilio Vol.I, p.186; Grote, New Check-list N.A.Moths, p.12.

Aegeria rutilans Beutenmuller, Bull. Am. Mus. Nat. Hist. Vol.VI,p.94.

Sesia rutilans Beutenmuller, Bull. Am. Mus.Nat.Hist. Vol.VIII,p.130; ibid. Vol.IX, p.219.

Aegeria aureola Hy.Ed. Papilio Vol.I, p.184; Grote, New Check-list N.A.Moths, p.12.

Sesia aureola Smith, List. Lep. N.A. p.20.

Aegeria hemizonae Hy.Edw. Papilio Vol.I, p.184; Grote, New Check-list N.A.Moths, p;12.

Sesia hemizonae Smith, List Lepidoptera N.A. p.20; Lugger 4th Rep.

Ent. Agri.Exp. Sta. Minn. p.64.

Aegeria lupini H.Edw. Papilio Vol.I, p.192; Grote, New Check-list N.A.Moths, p.12; Beutenmuller, Bull. Am. Mus. Nat. Hist. Vol.IV, p.173; ibid. Vol.V. p.24; ibid. Vol. Vi, p.91.

Sesia lupini Smith, List Lepid. N.A. p.20.

Aegeria preplexa Hy.Edw. Papilio, Vol.I, p.192.

Aegeria impropria Hy.Edw. Papilio Vol.I, p.193.

Sesia washingtonia Smith, List Lepid. N.A. p.20.

Aegeria madariae Hy. Edw. Papilio Vol.I, p.201.

Male:- Head black, palpi yellow with a black stripe outside; collar and underside of thorax yellow. Antennae black. Thorax black, patagia tipped with yellow at the posterior end or with a yellow line. Femora black, tibiae black outside, with a yellow band, yellow inside; tarsi yellow. Anterior coxae yellow. Abdomen black, with a rather broad yellow band on the second and fourth segments, sometimes edged on each side with yellow points. Anal tuft black above, yellow on each side beneath and at the middle. Fore wings with borders rather broad, brown black, slightly violaceous; between the veins, along the broad outer border, are traces of yellow rays more or less distinct. Discal mark large; basal transparent area small and triangular; outer area small and round. Underside streaked and washed with golden yellow. Hind wings transparent, bordered with brown black and a few yellow hairs at the base of the inner margin. Underside with costa yellow and a line of the same color in the outer and inner margins.

Female:- Head black, palpi and collar yellow. Antennae black.

Thorax black, with a yellow stripe along each side and a small transverse yellow spot on the posterior portion; thorax yellow beneath. Abdomen black, a yellow band on each of the second, fourth, fifth, and sixth segments, sometimes the band on the fifth segment absent, or with a band on the first, second, fourth, and sixth segments. Anal tuft yellow, black at the base and middle above. Legs similar to those of the male, but yellower. Fore wings blackish brown, brightorange between the veins in the opaque portions. Transparent area smaller than in the male. Underside washed and rayed with golden yellow. Hind wings transparent, outer border brown with a more or less distinct golden yellow line. Underside with the yellow line distinct.

Expanse. Male and female, 13-22 mm.

This species is common throughout the Pacific states and is very destructive to strawberries.

The adults emerge in June and early July and deposit eggs. The eggs hatch in about 3 weeks and the young larvae bore within the crown. They are active throughout the winter and pupate during May within the larval tunnels.

Control.

Essig states that flooding is an efficient control for this pest but this is limited, of course, to irrigated lands. In unirrigated lands the only known method of control is to dig up and destroy the infested plants.

Synanthedon tipuliformis (Clerck).

Sphinx tipuliformis Clerck, Icones Insects. rariorum fig. 1. Linne Fauna Succia 2nd Ed. p.289. Syst. Nat. 11th Ed. p.804.

Sesia tipuliformis Fabricius, Syst. Entomol. p.549; Spec. Insect. Vol.II, p.157. Mant. Insect. Vol.II. p.99. Ent. Syst. Vol.III, p.382.

Trochilium tipuliformis Leach, Edinburgh Encyclo. Vol.IX, p.131.

Trochilium tipuliforme Newman, Ent. Mag. p.178; Fithc, 3rd Rept. Nox. Ins. N.Y. p.423.

Bembecia tipuliformis Hubner, Verz, Be. Schmett, p.129.

Aegeria tipuliformis Stephens Brit. Ent. Haust Vol.1, 1828, p.142. Nom. Brit. Ins. p.39.

Setia tipuliformis Meigen Syst. Besch. Europ. Schmett. Vol.II,p.619.

This pest is known as the imported currant cane borer and is common throughout the Pacific States. We have taken it on both currants and gooseberries.

Male:- Head black with white orbits; palpi and antennae black marked with yellow beneath; collar yellow. The thorax is black with two longitudinal yellow stripes above and with yellow markings beneath. The abdomen is purplish black with yellow bands on the second, fourth and last two segments. The anal tuft is a bluish black. The legs are a purplish black with yellow markings on the tibia; tarsi yellow with black markings. Wings transparent; borders and veins purplish blue.

Female:- Similar to male but with only three yellow bands on the abdomen.

Wing Expanse. 15-22 mm.

Larva.

Dyar described the larva as follows: "Slender, with proportionably small head; otherwise normal. Basal depression of clypeus punctiform, no other; paraclypeal pieces following the outline of clypeus, rounded above and constricted opposite the top of clypeus, not so below; dark brown, shining, smooth, mouth black. Segments with central annulets small, elevated. Cervical shield concolorous, only faintly cut at the corners by the curved groove. Spiracles minute, brown edged. Crotchets 21 to 14 in a row, small. Tubercles rather large, a little elevated, an elevation without setae also above and below spiracles, another behind IV and V and another before VI, setae minute. White, no marks."

Life History.

The eggs which are laid in early spring, soon hatch and the larvae work into the pith of the stem. The larvae reach maturity in early fall but remain active during the winter. The adults begin to emerge early in May. Larvae brought into a heated room in early winter pupated during January. The pupal stage lasted for from 15-20 days.

Synanthedon albicornis (Hy. Edw.)

Aegeria albicornis Hy.Edw. Papilio Vol.I, p.201; Grote, New Checklist N.A.Moths p.12; Riley, Proc. Ent. Soc.Wash. Vol.I, p.85; Beutenmuller, Bull. Am. Mus. Nat. Hist. Vol.IV, p.174; ibid. Vol.VI. p.92.

Sesia albicornis Smith, List Lepid. N.A. p.21

Aegeria albicornis Hy.Edw. Papilio Vol.I, p.201; Grote, New Checklist N.A.Moths, p.12.

Sesia proxima Smith List Lep.N.A.p.21.

Male:- Head bronzy black; palpi white, rarely pale yellow. Antennae blue black, rarely with a white patch before the tip. Thorax bronzy black with a very slight, pale yellow stripe on each side, sometimes absent. Underside of thorax with a very pale yellow spot on each side. Abdomen wholly bronzy black. Anal tuft marked with white beneath. Legs blue black; tibiae with white tufts; anterior coxae pure white. Fore wings transparent, with violet brown borders; costal and inner margins narrow; outer margin broad, golden yellow between the veins. Discal mark distinct, blue black. Underside scaled with pale yellow. Hind wings transparent with outer margin narrow, violet or blue black. Underside similar to the above.

Female:- Wholly bronzy black with violaceous reflections, except the transparent parts of the wings. The legs with bluish reflections and white tufts on the tibiae. Fore wings beneath on the costal margin and discal marked with yellow scales. Antennae always with a prominent white patch before the tip.

Wing Expanse. Male, 15-18 mm. Female, 18-22 mm.

We have taken this species only at Sacramento, Calif. Nothing is known of its life history or food plants.

Synanthedon tacoma (Beuten.)

Sesia tacoma Beutenmuller, Jr. N.Y.Ent. Soc. Vol.VI, p.240.

This is a high altitude species. The specimens in our collection were taken on Mt. Hood, Mt. Jefferson, and Mt. Rainier. We also

have specimens from the Crater Lake Nat. Park.

Male:- Head deep black, palpi yellow above and clothed with long black and yellow hairs beneath. Collar narrowly yellow in front. Thorax deep black with a narrow yellow stripe patagiae and a narrow yellow transverse mark at the posterior end. Abdomen deep black with a narrow yellow band at the end of the second, fourth, and sixth segment. Anal tuft black, fanlike and mixed with a little yellow beneath at the middle. Thorax beneath with a large yellow patch on each side. Femora black with loose scale; tibiae banded with yellow; tarsi yellow. Anterior coxae with a yellow line. Fore wings transparent, brown-black at margins and on the veins; space between median vein and inner margin orange-red, also orange-red between the veins on the outer part of wings and border of the cell. Transverse mark large, black and touched with orange red on each side. Transparent part beyond this mark rounded; elongate and triangular in cell. Fringes brown. Hind wings wholly transparent and narrowly bordered with violet black; fringes brown. Antennae black. Forewings beneath largely orange red except borders and the transverse mark which is much reduced. Hind wing like above, but with an orange line in outer border.

Female:- Head, thorax, legs and abdomen as in the male, but the abdomen is heavier with the bands somewhat broader. Palpi wholly yellow. Fore wings with the orange-red heavier giving them a red appearance with narrow black margins. Hind wings with a narrow red margin before the brown fringes. Underside almost entirely

golden orange-red and narrowly bordered with brown-black outwardly and the fringes. Transverse mark red, sometimes with a black center. Hind wings beneath similar to the above. Abdomen beneath with three bands at end. Anal tuft black, a little yellow beneath. Wing Expanse. Males, 19-21 mm. Female 20-22 mm.

The adults of this species fly during June, July and early August. The food plant of the larvae is Polygoninum sp. Its complete life history is not known.

Synanthedon saxifragae H. Ewd.

Aegeria saxifragae Hy. Edw. Papilio Vol.I, p.190.

Sesia saxifragae Smith, Check-list N.A.Moths p.20; Beutenmuller, Bull. Am. Mus. Nat. Hist. Vol.VIII p.135;

Aegeria henshawii Hy.Edw. Papilio Vol.II, p.56; Grote, New Check-list N.A.Moths, p.12.

Sesia henshawii Smith, List Lepi. N.A. p.20.

We have but one specimen of this species in our collection, a male, which was collected at a light at Forest Grove.

Male:- The head, thorax and abdomen is a metallic blue-black. There is an orange spot on each side of the thorax beneath the wings. The palpi are orange with black tips. The legs are orange with black femora. The anterior wings have blue borders and a orange red spot at the base. The posterior pair of wings are transparent with a bluish-black border.

Beutenmuller states that the female is similar to the male,

but larger with more black on the legs and palpi.

Nothing is known of the life history or food plants.

Synanthedon novaroensis (Hy.Edw.)

Aegeria novaroensis Hy.Edwards, Papilio Vol.I, p.199; Grote, New Check-list N.A.Moths, p.12; Beutenmuller, Bull. Am. Mus. Nat.Hist.Vol.IV, p.172.

Sesia novaroensis Smith, List Lepid. N.A. p.20; Beutenmuller, Bull. Am. Mus. Nat. Hist. Vol.VIII,p.133.

Male:- Hed, palpi and collar orange red; antennae blue black. Thorax black, with the patagia and a large round spot at the posterior portion orange red; underside of thorax orange, abdomen black with a broad orange band on each segment except the last. Anal tuft orange red, abdomen beneath orange red. Legs orange red splashed with black. Anterior wings transparent with bluish black borders and veins. Discal mark bluish black. Under side like above but orange red near base. Posterior wings transparent with narrow border, discal mark and veins bluish black. Under side same.
Female:- Similar to male but larger and more robust with more black on legs and broader orange bands on abdomen.
Wing Expanse. Male, 30-34 mm. Female, 32-36 mm.

This insect is common throughout Wash. Oregon and Northern Cal. The larvae work in Douglas fir and Engleman spruce. They enter in the cambium layer usually at a knot or wound. Their work causes the sap to flow forming a sticky mass through which the larvae tunnel. The adults of this species emerge and deposit eggs during June and

July. The eggs hatch in about three weeks and are active until the following May. The pupal stage is from 25 to 30 days.

Synanthedon americana (Beuten.)

Aegeria culiciformis Beutenmuller, Bull. Am. Mus. Nat. Hist.Vol.VI, p.93.

Sesia culiciformis Beutenmuller, Bull.Am. Mus.Nat. Hist. Vol.VIII, p.136.

Sesia americana Beutenmuller Bull. Am. Mus. Nat. Hist. Vol.IX.p.136.

Male:- Head deep bluish black; orbits white; antennae black, pectinate; palpi black above, bright orange beneath. Thorax and abdomen metallic blue black, thorax with a large orange spot on each side beneath the wings; abdomen with the fourth segment red. Anal tuft blue black. Legs metallic blue black; tarsi splashed with white. Wings transparent, opalescent, with blue black borders and discal mark; under side pale yellow at base.

Female:- Same as male but more robust and with simple antennae.

Wing expanse. 21-25 mm.

We have taken this insect only at central Oregon but it is reported from Wash. In its larval stage it bores within the trunk and large branches of alder. But little is known of its life history. The adults emerge during June and early July.

The four following species are reported to occur in Calif. and were described by Beutenmuller as follows:

Synanthedon fragariae (Hy.Edw).

Pyrrhotaenia fragariae Hy.Edwards, Pipilio, Vol.I, 1881, p.202; Grote, New Check-list N.Am. Moths, 1882, p.12; Beutenmuller, Bull.Am. Mus.Nat.Hist. Vol.IV,1892,p.174;ibid. Vol.V,1893,p.26; Vol.Vi,1894,p.55; Vol.VIII, 1896,p.431.

Pyrrhotaenia orthocarpi Hy.Edwards, Pipilio, Vol.I,1881, p.204; Grote, New Check List N.Am.Moths,1882, p.12; Beutenmuller, Bull.Am.Mus.Nat.Hist. Vol.IV,1892, p.174.

Male:- Head black with a metallic blue reflection; palpi red, slightly black outside. Antennae blue black. Collar red in front. Thorax metallic bronze, patagia tipped with red posteriorly. Anal tuft red, blue black on each side above. Femora bronze; tibiae red, bronze at each end; tarsi bronze, slightly red on one side. Fore wings with margins and discal marks broad, metallic green, and transparent spaces very small; inner margin bright red to about the middle of the wing. Underside same as above, but the costa and inner margins are red to the discal mark. Hind wings transparent, red along inner margin; outer margin bronzy brown.

Female:- Fore wings opaque, metallic green or blue, inner margin orange red, sometimes a minute transparent streak in the cell and two or three between the veins beyond the discal mark. Hind wings opaque or partly so, orange red. Anal tuft wholly orange red. Otherwise similar to the male.

Wing Expanse: Male, 18 mm. female, 15-22 mm.

Habitat: California.

Nothing is known about the life-history of this species.

Synanthedon behrensii (Hy.Edw.)

Pyrrhotaenia behrensii Hy.Edwards, Papilio, Vo.II,1882,p.123; Ent. Amer. Vol.III.1888,p.224; Beutenmuller, Bul. Am.Mus.Nat.Hist.Vol.IV,1892,p.174; ibid; Vol.V,1892,p.26; Vol.VIII,1896,p.143.

Pyrrhotaenia elda Hy.Edwards,Ent.Amer.Vol.I.1885,p.49; ibid.Vol.III 1888,p.224; Beutenmuller, Bull.Am.Mus.Nat.Hist. Vol.IV,1892,p.175.

Pyrrhotaenia helianthi Hy.Edwards, Papilio,Vol.I,1881,p.202;Grote, New Check List N.Am.Moths,1882,p.12;Beutenmuller,Bull.Am.Mus.Nat.Hist.Vol.VI,1894,p.95.

Male:- Head black, face with a violet lustre, palpi and collar orange. Antennae black. Thorax metallic blue or green black with a red stripe on the patagia and a patch of the same color on the underside. Legs red; femora black; tarsi marked with black. Abdomen metallic green or blue with the last four segments red and a stripe of the same color along the sides of the first three segments. Underside banded with red. Anal tuft red, blue or green black laterally. Fore wings opaque, metallic blue or green black with a red stripe along the inner margin; underside dull brown black, red along the costa, inner margin, and basally. Hind wings transparent, outer margin violet brown, inner margin and base red.

Female:- Differs from the male by the following characters: Head with a bunch of red hairs on the crown. Abdomen with the last three segments above, all the segments beneath, and the anal tuft red. Hind wings opaque, bright scarlet red, with outer margin and fringes brown.

Expanse: Male and female, 18-22 mm.

Habitat: California.

Types: Three males; P. elda, two females; P. helianthi, one female. Coll. Hy. Edwards, Am. Mus. Nat. Hist.

Synanthedon polygoni (Hy. Edw.)

Pyrrhotaenia polygoni Hy. Edwards, Papilio, Vol. I, 1881, p. 202; Grote, New Check List N. Am. Moths, 1882, p. 12; Beutenmuller, Bull. Am. Mus. Nat. Hist. Vol. IV, 1892, p. 174; ibid. Vol. VI, 1894, p. 95; Vol. VIII, 1896, p. 144.

Pyrrhotaenia meadii Hy. Edwards, Papilio, Vol. I, 1881, p. 204; Grote, New Check List N. Am. Moths, 1882, p. 12; Beutenmuller, Bull. Am. Mus. Nat. Hist. Vol. IV, 1892, p. 174.

Male:- Head and collar black; palpi bright scarlet red, black outside. Thorax black with a bluish lustre, patagia tipped with red posteriorly. Underside with a red patch on each side. Legs black, middle and hind tibiae each with a broad scarlet band. Abdomen black with a bluish lustre, fourth and last two segments, and lateral stripe scarlet red. Anal tuft scarlet red with a blue black stripe laterally. Fore wings bright metallic blue black with a scarlet stripe along the inner margin, fringes brown; underside orange basally. Hind wings transparent, margin violaceous, red basally on the inner margin, fringes brown, Underside same as the upper.

Female:- Somewhat like the male, but the hind wings are bright scarlet red with the outer border broadly brown black with a violaceous lustre. Abdomen with the fourth and last segments scarlet red; lateral red line also present.

Expanse: Male and female, 18-20 mm.

Habitat: California.

The larvae of this insect bores within the stems of Polygonum paronychia.

Synanthedon achilae (Hy.Edw.)

Pyrrhotaenia achillae Hy.Edwards, Papilio, Vol.I,1881,p.203; Grote, New Check List N.Am.Moths,1882,p.12; Beutenmuller, Bull.Am.Mus.Nat.Hist.Vol.VI, 1892, p.174; ibid. Vol.VIII,1896,p.144.

Pyrrhotaenia eremocarpi Hy.Edwards, Papilio,Vol.I,1881,p.203; Grote, New Check List N.Am.Moths, 1882, p.12; Beutenmuller, Bull.Am.Mus.Nat.Hist.Vol.IV, 1892, p.174.

Male:- Head, collar, and antennae black; palpi black, red basally beneath. Thorax metallic blue black with the patagia tipped with red posteriorly and a red patch on each side beneath. Abdomen wholly metallic blue black above and below. Anal tuft red, blue black on each side above. Legs wholly blue black. Fore wings bright metallic blue or green black with a red streak on the inner margin basally. Underside same as the upper. Hind wings transparent with a blue black border.

Expanse: 15-18 mm.

Habitat: California.

Synanthedon mellinipennis Boisduval.

Sesia mellinipennis Boisduval, Species Gen. Lep. Vol.II,p.402; Beutenmuller, Bull.Am.Mus.Nat.Hist.Vol.VI,p.26; ibid. Vol.VIII,p.129.

Aegeria mellinipennis Hy.Edw. Ent. Am. Vol.IV. p.224.

Albuna artemisiae Hy.Edw.Papilio Vol.I. p.186.

Aegeria senecioides Hy.Edw.Papilio Vol.I, p.198.

Male:- Head black, palpi yellow; collar yellow. Antennae black. Thorax deep black with a golden yellow band on each side and a transverse mark of same color posteriorly. Underside of thorax yellow. Abdomen black, second and last four segments with yellow bands. Anal tuft black and yellow. Legs golden yellow with a black band on the tibia. Anterior wings transparent, borders, discal mark and veins brown black, with the opaque portions between the veins more or less coppery red. Basal transparent area elongate triangular, outer area small, rounded; underside with the red parts predominating and brighter than above. Hind wings transparent, outer border narrow, brown with a broad coppery red line, under side like upper.

Female:- Similar to male, but the fore wings are usually more opaque and redder, or yellow between the veins. The last three segments are broadly banded with yellow, instead of the last four as in the males.

Wing Expanse: Males, 22-25 mm. Females, 25-28 mm.

This insect is common through Calif. The larvae work in the stems of Ceanothus thrysiflorus. The adults emerge during June and early July.

Vespamima Beutenmuller.

Vespamima Beuten. Bull.Am.Mus.Nat.Hist.Vol.VI,p.87.

Palpi slightly upturned, hairy, tip bare. Head rather small. Body robust, anal tuft of male broad and flat, that of female slight. Middle and hind tibia hairy. Tongue present. Antennae long, slightly enlarged toward the tip with fascicles of cilia in the male, simple in the female. Forewing with 12 veins; R_4 and R_5 stalked. Hind wing veins M_3 and Cu_1 on a short stalk.

Vespamima sequoiae (H.Edw.)

Bembecia sequoiae H.Edw. Papilio Vol.I, p.181.

Vespamima sequoiae Beutenmuller Bull.Am.Mus.Nat.Hist.Vol.VI,p.87; ibid.Vol.VIII, p.119.

Bembecia superba Hy.Edw. Papilio, Vol.I, p.181.

Aegeria pinorum Behrens, Can. Ent. Vol.XXI, p.163.

We have found this species common throughout the Pacific states. The larvae attack pine.

Male:- The head and antennae are black. The palpi are yellow slightly marked with black on the outside. The collar is yellow. The thorax is black with a yellow line on each side near the wings. There is a large yellow patch on the sides of the thorax beneath the wings. There is a row of yellow hairs across the posterior margin of the thorax. The abdomen is black with all the segments except the first and third, bordered with bright yellow bands. The anal tuft is fan shaped, black above and yellow beneath. The femora are black outside and yellow inside. The fore coxa and tibia are yellow. The tarsi are yellow with black bands. The wings are transparent with narrow black borders. There is a yellow spot on the

base of each fore wing. The inner margins of the hind wings are clothed with yellow hairs.

Female:- Similar to the male but larger with broader yellow bands on the abdomen. The anal tuft is straight, yellow with a few black hairs above.

Life History.

It takes two years for this species to complete its life cycle. The adults appear in late summer and early fall, being present in greatest numbers during August. We have not observed the eggs but the young larvae begin to appear in October at Corvallis. These larvae reach maturity and begin pupation about a year from the following June. The pupal stage lasts about two months.

Albuna Hy.Edw.

Albuna Hy.Edwards, Papilio, Vol.I, p.186.

Palpi ascending, reaching the top of the head, with short hairs, antennae filiform finely ciliated in the male. Body slender, anal tuft of male flat and divided in the middle, thus forming two narrow flat brushes. Fore wings 12 veined, R_4 and R_5 stalked. Hind tibiae with short hairs. Hind wings with veins M_3 and Cu_1 from end of cell.

Albuna pyramidalis (Walker).

Aegeria pyramidalis, Walker, Catalogue Brit. Mus. Pt.VIII,p.40.

Trochilium pyramidalis Morris Synop.Lepi.M.Am. p.331.

Albuna pyramidalis, Beutenmuller Bull.Am.Mus.Nat.Hist.Vol.VI,p.89.

Aegeria hylotomiformis Walker, Cat. Lep.Brit.Mus.Pt.VIII,p.43.

Albuna vancouverensis Hy.Ed. Papilio Vol.I, p.188;

Only the adults of this species have been taken and nothing is known of its life history.

Male:- The head, thorax, and antennae are black. The orbits and palpi are yellow. There is a yellow spot at the base of each fore wing. The patagia are lined with pale yellow and there is a yellow mark across the posterior end of the thorax. The abdomen is black with pale yellow or whitish bands on each segment. The anal tuft is black. The legs are black with yellow markings on the tibia. The margins of the fore wings are reddish brown. The discal mark is red. The hind wings are transparent with dark brown borders. Wing spread about one inch.

Female:- Same as male but larger.

Albuna pyramidalis var. coloradensis H.Ewd.

This form seems to be more common in Oregon than the type. It differs from the type in that it is entirely black.

Sanninoidae Beut.

Sanninoidae Beutenmuller, Bull.Am.Mus.Nat.Hist.Vol.VIII,p.126; ibid. Vol.XII,p.160.

Palpi upturned, scarcely reaching the top of the head, first and second joint loosely scaled, third joint very short with oppressed scales. Antennae filiform, long, with fascicles of cilia in the male. Abdomen slender in the male, anal tuft somewhat wedge shaped; abdomen robust in the female with a short tuft of hairs on each side. Hind

legs with oppressed scales, tufted at the spurs. Fore wings with 12 veins; R_4 and R_5 stalked. Hind wings with veins M_3 and Cu_1 on a short stalk, $3a_1$ present.

Sannioidae opalescens (Hy.Edwards)

Aegeria opalescens Hy.Edw. Papilio Vol.I,p.199; Grote, New Check List N.A.Moths, p.12; Beutenmuller Bull.Am.Mus.Nat.Hist. Vol.IV, p.174.

Sannina opalescens Beutenmuller, Bull.Am.Mus.Nat.Hist.Vol.VI,p.366.

Sannioidae opalescens Beutenmuller, Bull.Am.Mus.Nat.Hist.Vol.VIII, p.126; ibid. Vol.IX, p.219.

Sannina pacifica, Riley Insect Life Vol.III, p.393.

This species is one of the most common Aegeriids found in Oregon. It is also one of the most destructive, the larva being a serious pest of the peach and prune.

Male:- Head, antennae and palpi metallic blue black; collar blue black with scattering white hairs. Thorax blue black, a longitudinal white line on the shoulders; a small patch of white hairs on the posterior margin of the notum and a patch of long white hairs at base of hind wings posteriorly. Anterior wings transparent with transverse mark, veins, and broad margins of blue black; fringe purplish black. Posterior wings transparent, narrow margins and veins blue black; fringes purplish black. Legs blue black with white tufts of hairs at spurs and between segments of tarsi; mid-tibia marked with white scales on outside. Abdomen and anal tuft blue black.

Wing Expanse: 28 mm.

Female:- Head, thorax, abdomen and legs blue black. Anterior wings

blue black; fringes purplish black. Posterior wings transparent; veins and discal mark blue black; fringe purplish black.

Wing Expanse:32 mm.

Life History.

The eggs are brown in color with depressed sides and end. They are deposited on the trunks of the trees singly or in clusters during July and early August. The eggs hatch in from three weeks to a month. The larvae begin at once to enter the trees by boring through the bark, usually seeking a crack or check for entrance. Apparently but few of the borers become established and reach maturity. The writer has observed as high as fifty eggs on the bark of a single tree and in most cases but two or three larvae became established. When fully mature the larvae usually enter the soil where a cocoon of silk and fras is spun and pupation takes place.

At Corvallis pupae occur from May until October. The majority of the adults emerge during June and July. We have observed, however, apparently mature larvae during November so it is quite probable that some of the late hatching larvae do not pupate until the following spring. The larvae work around the crown of the tree in the cambium layer and are most destructive to young trees.

Parasites.

The Aegeriidae as a whole have but few parasites. We have taken one species of Ichneumonid, Stamoplex tejonensis, from Sanninoidae opalescens but have never found in numerous enough to be of much value

in the control of this pest.

Control.

Numerous methods of control have been suggested but few have proven practical.

Essig of the California Experimental Station states that trees budded or grafted upon the Myrobalan plum are immune to the attack of the borers.

Various preparations such as asphaltum, white wash, tar paper, etc. when applied to the crown of the tree obtain a partial control, but not complete enough to be practicable so that the common method used through the Pacific states up until quite recently was the worming or digging out method. During the past two seasons, the Entomologists of the Experiment Station of the Oregon Agricultural College have demonstrated the use of paradichlorobenzene will prove a very efficient control.

"Paradichlorobenzene. Chemically pure paradichlorobenzene is a white crystalline solid which gives off gas slowly at ordinary temperatures. To obtain the best results in borer control the crystals of paradichlorobenzene should be dry and fine enough to pass through a screen ten meshes to the linear inch. These small crystals, when exposed in the soil to a temperature of 60° F., or above, change to a gas which penetrates the burrows of the borers. This gas is decidedly poisonous to the borers when they are exposed to it for a considerable period of time. Man and domestic animals are not injured except by prolonged exposure or by taking the crystals internally.

"Method of Application. Level off the surface of the soil about

the base of the tree, but avoid disturbing the soil below the surface. Remove all large masses of gum that may be present at the base of the tree. Having prepared the soil, proceed to sprinkle the finely ground crystals in a ring around the base of the tree. This should form a circle about one inch wide and about two inches distant from the tree trunk. This part of the treatment should be done carefully. If the material is placed too far from the base of the tree the toxic effect of the gas is greatly lessened. On the other hand if it is placed too near, injury to the tree is likely to result.

"As soon as the paradichlorobenzene has been properly distributed aroung the tree, it should be carefully covered with a few shovels of loose earth, and the mound so formed should be well packed over the material. The first shovel of earth placed above the "death ring" should be finely divided and carefully placed on top of the crystals in order that the position of the crystals will not be disturbed.

"Time of Application. The most satisfactory time to make the application of paradichlorobenzene is from August 15 to September 15. It is desirable to delay the treatment to as late a date as weather conditions permit in order to avoid reinfestation from moths which may be flying, and to allow the worms to collect about the crown of the tree. A sufficient time, however, must be allowed for the gas to act before unfavorable weather conditions set in. If this treatment is to be effective the soil temperature must be 55° F. or higher for a period of ten days or more after the material is applied, and the soil must be reasonably dry during this time.

"Dosage. From three-fourths to one ounce of the paradichlorobenzene

is sufficient for an ordinary tree six years of age or older. The application of the material to younger trees may injure them and is not advised. A measure holding just the required amount is convenient for use in the orchard."

Sanninoidae graefi (Hy.Edw.)

Sciapteron graefi Hy.Edw. Papilio Vol.I, p.183.

Porharmonia graefi Beutenmuller, Bull.Am.Mus.Nat.Hist.Vol.VI, p.87; ibid. Vol.VIII, p.125.

Male:- Head black; palpi bluish black marked with yellow beneath; collar bluish black margined with yellow. Antennae black. Thorax blue black with narrow yellow line on the patagia. Abdomen blue black with narrow yellow margin on each segment. Anal tuft blue black marked with yellow beneath. Anterior wings translucent with broad bluish black margins; discal mark blue. Posterior wings translucent with narrow border and cilia black; inner margin scaled with yellow. Legs blue black with yellow tufts at spurs and between segments of tarsi.

Female:- Head, palpi, antennae, thorax and legs metallic blue black. Abdomen blue black with fourth segment scaled with orange or entirely orange. Anterior wings bluish black. Posterior wings translucent with black borders.

Wing Expanse:

This species is closely allied to S. opalescens. Its native host is wild cherry but it attacks prune, peach and apricot. Life history similar to S. opalescens. Control same as for S. opalescens.

Paranthene Hubner.

Memythrus Newman, Sphinx vespiformis an essay. Ent. Mag. Vol.I. p.44-47.

Sciapteron Staudinger, Sesiis Agri.Berol.1845; Ent. Ziet. Stett.Vol. XVII, p.195.

Tarsa Walker, Cat. Brit. Mus. Pt. VIII, p.61.

Tratua Hy.Edwards, Papilio Vol.II, p.97.

Palpi strongly upturned, first and second joints, long, with thick hairs, third joint short, with oppressed scales. Antennae, more or less pectinate, with fascicles of cilia. Abdomen of male with anal tufts straight, bunch like, or with four long pencils at base of last segment. Tongue present. Fore wing 12 veined; veins R_4 and R_5 stalked. Hind wings with veins M_3 and Cu_1 from end of cell slightly separated at base; Cu_2 from cell. Legs long; tibiae slightly hairy.

Paranthene robiniae (Hy.Edw.)

Sciapteron robiniae Hy.Edw. Bull. Brooklyn Ent. Soc. Vol.III,p.72; Packard Inj.Ins.For.& Shade trees Bull.No.7 U.S. Ent.Com.p.103; Grote New Check List N.A.Moths, p.11; Riley, Proc.Ent.Soc.Wash. Vol.I,p.85; Insect Life Vol.II, p.18; Beutenmuller, Bull.Am. Mus.Nat.Hist.Vol.VI,p.171; ibid. Vol.VIII,p.120; ibid. Vol.IX, p.218.

Male:- Head and palpi yellow, outside of palpi orange yellow with scattering black hairs near base; epicranium clothed with orange colored hairs. Antennae pectinate, orange brown, with patch of black scales near the tip. Collar black bordered anteriorly ab orange colored hairs and posteriorly by hellow scales. Thorax black, a patch of yellow scales laterally beneath the wings and a patch of yellow

scales at base of fore wings bordered anteriorally by orange brown hairs. A crescent shaped yellow mark on the posterior margin of notum. First segment of abdomen black, second black bordered with yellow; the third black very narrowly bordered with yellow, all others yellow; anal tuft straight, yellow with scattering black hairs. Anterior wings orange brown with a patch of yellow scales near base. Veins light brown; posterior wings translucent with orange brown margin and dark brown fringe. Inner margin yellow. Fore and mid femora black bordered on outside with orange; tibia black with orange marks on inside. Tarsi orange brown. Hind femora black, tibia orange, black near junction with femora. Tarsi orange.

Female:- Similar to male but larger with simple antennae.

Wing Expanse:

This insect is common throughout the Pacific states working in various species of willow. The adults emerge from March to August depending on locality. In central California most of the adults are out by June 15 while we have taken adults in Eastern Wash. as late as Sept. 10. The eggs are deposited in crevices and around knots and wounds. They hatch in about 20 days and the young larvae bore within the trunk and larger branches, reaching maturity in late Feb. to June. About 30 days are spent in the pupal stage.

SYNOPSIS OF SPECIES.

Sexes Similar.

Large species. Fore wings more or less transparent or opaque; hind wings transparent.

Abdomen with fourth and fifth segments red.
- Fore wings with outer margin black - - - - - - - - - - rubrofascia
- Fore wings with outer margin orange red - - - - - - - - bolteri

Abdomen with fourth segment red.
- Fore wings at base above and beneath golden yellow - culiciformis
- Fore wings not golden at base, beneath blue - - - - - americana

Abdomen with fourth segment orange and last two segments banded with orange.
- Fore wings heavily marked with orange - - - - - - - - - praestans

Abdomen black, first three segments orange beneath. Legs orange.
- Fore wings with very narrow black margins - - - - - - - - fulvipes

Abdomen with first and second segments above orange.
- Fore wings with blue margins - - - - - - - - - - - - - - tepperi

Abdomen wholly black.
- Fore wings with black margins.
  - Legs orange - saxifragae
  - Legs black, with white tufts - - - - - - - - - - - - albicornis

Abdomen bluish, with two very narrow yellow bands.
- Fore wings with very narrow margins - - - - - - - - - - pictipes

Abdomen of male with two (rarely three) female with four yellow bands.
- Fore wings with margin black, sometimes rayed with golden, male - rutilans
- Fore wings rayed with golden, female - - - - - - - - - - rutilans
- Fore wings filled with orange, female - - - - - - - - refulgens

Abdomen with two white bands, male.
Fore wings with black margins - - - - - - - - - - - - - - alaskae

Abdomen of male with four, female with three distinct yellow bands.
Fore wings with outer margin rayed with golden yellow - tipuliformis
Fore wings heavily marked with orange red- - - - - - - - - tacoma
Fore wings with narrow black margins - - - - - - - - - - - giliae

Abdomen of male with four, female with three orange bands.
Fore wings rayed with orange.
Thoracic markings very prominent - - - - - - - - - - - - marica
Thoracic markings slight; small species - - - - - - - seminole
Fore wings almost opaque, brownish - - - - - - - - - - - texana

Abdomen of male with four, female with three very narrow yellow bands.
Fore wings with margins black.
Anal tuft bright red - - - - - - - - - - - - - - - - - - corni

Abdomen with three yellow bands in both sexes.
Fore wings with black margins and orange transverse mark - sigmoidea

Abdomen of male with five, female with four very broad golden yellow bands.
Fore wings with margins red, golden yellow, or golden bronze - mellinipennis

Abdomen of male with six, female with five yellow bands.
Fore wings with margins and discal mark bronze - - - - lustrans
Fore wings with margins very narrow, black, male, or very broad, ferruginous, female.

Discal mark red - - - - - - - - - - - - - - - - - - - rileyana
Like rileyana but very much paler var. mimuli
Fore wings marked with orange, female - - - - - - - - - arizonae

Abdomen brown, with five narrow white bands, female.
Fore wings black filled with white - - - - - - - - - - - - morula

Abdomen with all the segments banded with orange.
Very large species: wings with narrow black borders - novaroensis

Abdomen not banded, scaled with yellow.
Fore wings rayed with yellow; discal mark black.
Anal tuft orange red - - - - - - - - - - - - - - - - - - acerni

Small species. Wings more or less transparent.

Abdomen with one narrow and one very broad yellow band.
Fore wings with black margin - - - - - - - - - - - - - - - scitula

Abdomen with two narrow yellow bands.
Fore wings with black margins - - - - - - - - - - - - - - - - pyri
Fore wings almost opaque, golden yellow, female neglecta

Abdomen with two white bands.
Fore wings with margins black; rayed with white
Fringes of hind wings white - - - - - - - - - - - - - - - prosopis

Abdomen of male and female with three yellow bands.
Fore wings with narrow violet black margins
Discal mark red - - - - - - - - - - - - - - - - - - rubristigma

Abdomen of male with four, female with three yellow bands.
Fore wings with margins broad, filled with yellow.
Discal mark orange - - - - - - - - - - - - - - - - - dicipiens
Fore wings with margins narrow, bronze.
Discal mark bronze - - - - - - - - - - - - - - - - - corusca

Abdomen with four bands and fourth segment yellow.
Fore wings with narrow black margins - - - - - - - - - - - querci

Abdomen with five yellow bands.
Fore wings with narrow black margins - - - - - - - - - - - tecta

Abdomen wholly black.
Fore wings not marked with white.
Fringes of hind wings black - - - - - - - - - - - - - ithacae

Fore wings opaque; hind wings transparent.

Abdomen with fourth segment yellow.
Fore wings violaceous - - - - - - - - - - - - - - - pyralidiformis

Abdomen with two white bands.
Fore wings black with a small white spot - - - - - - - - - sanborni

Abdomen with three yellow bands.
Fore wings violaceous, marked with red minuta

Abdomen with four yellow bands
Fore wings violaceous aureopurpurea

Abdomen red.
Fore wings blue - geliformis

Abdomen with last three segments red.
Fore wings streaked with red. - - - - - - - - - - - sapygaeformis

Abdomen with three red bands.
Fore wings streaked with red - - - - - - - - - - - - floridensis

Sexes Dissimilar.

Males.

Fore wings with transparent spaces; margins green.
Hind wings transparent.
Abdomen green, with fourth and last segments red - - fragariae

Fore wings opaque, blue; inner margin red.
Hind wings transparent.
Abdomen with fourth and last two segments red - - - - polygoni
Abdomen blue - achillae
Abdomen with last two segments red - - - - - - - - - animosa
Abdomen with last four segments red - - - - - - - - - behrensii

Fore wings brown, dotted with yellow.
Hind wings opaque, brown.
Abdomen with traces of yellow bands subaerea

Fore wings black, marked with a little white.
Hind wings black.
Abdomen with three white bands - - - - - - - - - - - - - nigra

Females.

Fore wings opaque, metallic green or blue, red along inner margin.
Hind wings scarlet, partly tramparent.
Abdomen with fourth and last segments red - - - - - - - fragariae

Hind wings wholly scarlet, border black.
Abdomen with last three segments scarlet- - - - - - - - behrensii
Abdomen with fourth and last segments scarlet - - - - polygoni

Hind wings opaque, green black.
Abdomen green black, red along the sides
posteriorly - animosa

Hind wings black, partly transparent basally.
Abdomen wholly green black - - - - - - - - - - - - *mariona*, sp.nov.

Fore wings brown, rayed with white.
Hind wings brown.
Abdomen with two yellowish bands - - - - - - - - - - - - *verecunda*

Fore wings brown.
Hind wings orange.
Abdomen with two bands and fourth segment yellow - - *edwardsii*

BIBLIOGRAPHY.

1758. Linne, Carl, Systema Naturae. 10th Edition. Holmiae 1758.
Original description of Sphinx (= Sesia)

1759. Clerck, Carl A. Icones Insectorum Rariorum. Holmiae 1759-1764.
Original figures and names of Sphinx (= Sesia) tipuliformis and others.

1761. Linne, Carl. Fauna Suecica, Editio altera auctior, Stockholmiae, 1761.
Description of Sphinx (= Sesia) tipuliformis.

1762. Geoffroy, Etienne L. Historie des Insectes qui se trouvent aux environs de Paris. 1762.
Records and describes Sphinx (= Sesia) apiformis.

1766. Hufnagel, Tabelle von den Tagvoegeln der Gegend um Berlin. Berlin Mag. Bd. II St. 1. 1766.
Records Sesia tipuliformis and others.

1766. Schaffer, Jacob. Icones Insectorum circa Ratisbonam, Regensburg 1766-79.
Figures Aegeria apiformis.

1767. Linne, Carl. Systema Naturae. 12th Edition. Holmiae 1767.
Description of Sphinx (= Sesia) tipuliformis.

1767. Houttuyn, Martin. Naturerlyke Histoire Nitvoorige Beschryving der Dieren, Planten etc. Verlog der Insecten erste Deels, Elfte Stuk 1767, Amsterdam.
Account of Sphinx (= Sesia) tipuliformis.

1771. De Geer, Carl. Memoirs pour servir a l'Histoire des Insectes. Tome II. Stockholm, 1771.
Account and figures of Sphinx (= Sesia) tipuliformis.

1773. Muller, P.L. Vollstandiges Natursystem, Nach der Zwolften Lateinischen ausgalie etc. Theil V. Nurnberg 1773.
Description Sphinx tipuliformis.

1775. Fabricius, John C. Systema Entomologiae, Flegensburgi et Lipsiae 1775.
Erects the Genus Sesia.

1775. Fuessly, J.C. Verzeichniss der ihm bekannten Schweizerischen Insecten Zurich, 1775.
Records Sphinx apiformis.

1775. Rottenburg, S.A.Von. Ammerkungen zu den Hufnagelschen Tabellen der Schmetterlinge der Wiener Gegend. Wien, 1775.
Critical notes on Hufnagels species (1766).

1775. Denis und Schiffermuller. Verzeichniss der Schmetterlinge der Wiener Gegend.
Records Sphinx tipuliformis and others.

1776. Sulzer, Johann. Abgekurzter Geschichte der Insecten, nach dem Linneischen System 1776.
Description of Sphinx apiformis.

1776. Harris, Moses. An Exposition of English Insects. London 1776.
Description and colored figures Sphinx tipuliformis, etc.

1776. Muller, Otto, Zoologiae Danicae Prodromus sve animalium Danie etc. Hafniae 1776.
Records Sphinx apiformis, etc.

1777. Gladbach, Georg. Beschreibung neuer Europaischen Schmetterlinger etc. Frankfort am Mayn 1777.
Describes Sphinx tipuliformis.

1777. Scopoli, J.A. Introductio ad Historiam Naturalem etc. Pragae 1777.
Proposes the Genus Trochilium.

1777. Fabricius, Johann. Genera Insectorum Eorumque Characters Naturales etc. Chilonii 1777.
Restricts Sphinx melas to genus Sesia.

1778. Grotze, J.A. Des Herrn Baron Karl De Geer, Abhandbengen zur Geschichte der insecten etc. Nurnberg Zweiter Band 1778.
Account and figures of Sphinx tipuliformis and others.

1779. Esper, Eugen J. Die Smetterlinger in abbildung nach den Natur mit Beschreibungen Theil II Nachtvogel, Erlangen 1779.
Description and good colored plates of several species of Aegeria.

1781. Fabricius, John C. Species Insectorum. Tom.II Hamburgi et Kilonii, 1781.
Account of Sphinx tipuliformis.

1783. Retzius, Andreas, Genera et species Insectorum etc. Lipsiae 1783.
Description of Sphinx tipuliformis.

1787. Fabricius, Mantissa Insectorum. Tom II. Hafniae 1787.
Description of Sesia tipuliformis.

1788. Zschach, J.J. Museum N.G.Leskeanum, Lipsiae 1788.
Notes on Sesia tipuliformis etc.

1789. Lang, H.G. Verzeichniss seiner Smetterlinge. 2nd Edition Augustburg 1789.
Mentions Sphinx apiformis.

1789. Borkhausen, Naturgeschichte der Europaschen Schmetterlinge, Tom. II 1718.
Description of Sphinx tipuliformis.

1789. Vieweg, Carl. Tabellarisches Verzeichniss der in der Churmark Brandenburg einheimischen Schmetterlinge. Berlin 1789-90.
Description and records Sphinx tipuliformis.

1789. Villers, C.J. Entomologia Fauna Sueciae etc. Tom.II Lugduni, 1789.

1789. Schrank, Frank. Entomologische Nachrichten Fuessly's Neues Mag. fur Liebh. Entomolgie Band II 1789.
Critical review of the work by Denis and Schiffermuller(1775)

1789. Gmelin, J.F. Systema Naturae, etc. Tom. I Lipsiae 1789.
Description of Sesia tipuliformis and others.

1790. Rossi, Peter. Fauna Etrusca, sistens Insecta etc. Tom. II Liburni 1790.
Records Sesia tipuliformis and others from Italy.

1791. Jung, C.C. Alphabetisches Verzeichness der bisher bekannten Schmetterlinge etc. Marktbuit 1791.
Alphabetic list of all known Lepidoptera including the known clear-wings.

1793. Fabricius. Entomologia Systematica etc. Tom. III Hafniae 1793.
Brief description of Sesia tipuliformis.

1793. Donovan, Natural history of British Insects. Vol.II London 1793.
Description, habits, figures of food plants, larvae, etc. of several species of Aegeriids including Sesia tipuliformis.

1794. Rossi, Peter. Mantiss Insectorum etc. Tom.II Pisa 1794.
Description and records of Sesia tipuliformis.

1796. Latreille, Precis des Characteres Generiques des Insects, etc. Bourdeaux 1796.
Diagnosis of Genus Sesia.

1797. Lewin, John W. Observations respecting some rare British Insects. Trans. Linn. Soc. of London, Vol. III pp.1-2. Description and colored figure of Sphinx tipuliformis.

1801 Laspeyres, J.H. Sesiae Europea etc. Berolini 1881, pp.1-30. First monograph of the Sesiidae of Europe.

1801. Schrank, F.P. Fauna Boica, Tom.II Nurnberg. Brief treatise of the family Sesiidae.

1802. Haworth, A. Prodromus Lepidopterorum etc. Halt. 1802. Mentions Sesia tipuliformis.

1802. Stewart Elements of Natural History. London and Edinburg 1802. Habits and food plants of Sphinx tipuliformis.

1803. Mease, James. Archives of Useful Knowledge. Vol. III. 1803 pp.40-42. Account of Sanninoidea exitiosa.

1803. Olivier and Latreille. Noubeau Dictionnaire d'Histoire Naturelle etc. Tom. XX Paris. General account of the family.

1805. Latreille, P.A. Histore Generale etc. Tom. XIV. Paris. Description of Sesia tipuliformis and others.

1806. Turton, Wm. A general system of nature through the three grand Kingdoms, etc. Vol. III pt. 2 London. Describes Sesia tipuliformis.

1807. Illiger, Karl. Die Neueste Gattungs ein theilung der Schmetterlinge etc. Mag. Insecten kunde pp.277-289. Review of classification of Fabricius and Latreille.

1808. Cooper, J. Mem. Phila. Soc. Prom. Agri. Vol.I. pp.11-14. Account of peach tree borers.

1808. Ochsenheimer, F. Die Schmetterlinge von Europa Bd. II 1808 pp.121-182. Description of 26 species of Aegeriids.

1808. Peters, R. Mem. Phila. Soc. Prom. Agri. Vol.I pp.15-19. Experimental work for control of peach tree borers.

1808. Matlack, T. Mem. Phila. Soc. Prom. Agri. Vol.I. pp.273-279. Control of peach tree borer.

1809. Latreille, P.A.Genera Crustaceorum et Insectorum etc.Parisus et Argentorati Tom. IV. 1809. General discussion of the family Sesiidae.

1813. Coocke, J.H. Archives of Useful Knowledge, Vol. III 1813. p.131.
Account of Life history and control of peach tree borer. Used tobacco leaves.

1815. Leach, Wm. Brewster's Edinburg Encyclopaedia. Vol. IX.1815. p.131.
Uses name Aegeria for Sesia.

1816. Dalman, J.W. Forsok till Systematik uppstolluing of Sveriges Tjarillar. Kongl, Vetensk, Akad. Handl, T.37 p.217.

1816. Hubner, Jacob. Verzeichniss bekannter Schmetterlinge. Augustburg 1816.
Erects genus Sphecia.

1819. Samouelle, George. The Entomologists Useful Compendium,etc. London 1819.
Occurence of Sesia tipuliformis in England.

1820. Cocke, J.H. American Farmer. Vol. I. pp.350-51.
Account of peach tree borer and its control.

1820. "W.T." Plough Boy Vol. I 1820, p.331.
Account of life history of peach tree borer.

1821. Godard, J.B. History Naturelle des Lepidopteres etc. Descrits par M. Godart, peirets par M.C.Vanthier Tom. III.
Description and figures of Sesia tipuliformis.

1822. Thatcher, J. American Orchardist 1822 p.198.
Account of peach tree borer.

1823. Worth, James. An Account of the Insect so Destructive to the Peach. Jl. Acd. Nat. Sc. Phila. Vol. III 1823. pp.217-21.
Account of life history etc.

1823. Say, Thomas. Jour. Acad. Nat. Sc. Phila. Vol. III p.126.
Original description Aegeria exitiosa.

1824. Haines, R. American Farmer, Vol. VI. 1824 p.401.
On control of Peach tree borer.

1824. Smith, J. American Farmer Vol. VI. 1824 p.324.
Recommends methods of control for peach tree borer.

1824. Shortwell, W. Am. Farmer, Vol. VI. p.14.
Recommends lime wash for control of peach tree borer.

1825. Hubner, Jacob. Zutrage zur Sammlung Exotischer Smetterlinger etc. Augustburg 1825.
Colored figure Sanninoidea exitiosa.

1825. Say, Thomas. American Entomology Vol. II.
Redescribes Aegeria exitiosa.

1826. Harris, T.W. Peach Tree Insect. New England Farmer, Vol.5, pp.33-170.
The Best complete early account of the peach tree borer.

1826. Risso, J.A. Histoire Naturelle des Principales productions de l'Europe etc. Tom. III Paris.
Description Sesia tipuliformis.

1827. Stabler, T.P. American Farmer, Vol. IX. p.29.
Experiment in control of peach tree borer.

1827. Dumeril, A.M.C. Dictionnaire des Science Naturelles, Tom.XLIX
General discussion of the family.

1828. Harris, T.W. Insects. New Eng. Farmer Vol. VII. 1828. p.33.
Original description of squash borer.

1828. Stephens, James Francis. Illustrations of British Entomology etc. Haustellata Vol. II.
Description and habits of Aegeria tipuliformis.

1828. Boitard, P. Manual d'Entomologie Tom. II.
Description Sesia tipuliformis.

1829. Stephens, James F. The Nomenclature of British Insects. London.
Mentions Sesia tipuliformis.

1829. Boisduval, J.A. Europaeorum Lepidopt. etc. Paris 1829.
Mentions Sesia tipuliformis.

1830. Harris, Wm. T. Insects. New Eng. Farmer, Vol. IX. pp.1-2.
Original description of Aegeria pyri.

1832. Griffith, E. Animal Kingdom. London.
Figures Sesia asilipennis.

1832. Rennie, James, Conspectus of British Butterflies and Moths. London. 28 pages.
Description and habits of Aegeria tipuliformis.

1832. Brown, Thomas. Book of Butterflies and Moths.
Article on the peach tree borer.

1832. Newman, Ed. Sphinx vespiformis. Westley and Davis. London 8 vo.
Erects Genus Memythrus.

1832. Newman, Ed. Monographa Aegeriorum Angliae. Ent. Mag. Vol.I. pp.45-47,66-84.
Monograph of English Aegeriidae.

1834. Lucas, Hippolyte. Histoire Naturelle des Lepidopteres d'Europe, etc. Paris 1834.
Account of Sesia tipuliformis and other European species.

1835. Lenex. The Cultivator Vol.II, 1835, p.40.
Account of peach tree borer near Philadelphia.

1835. Lamarck, J.B.P. Historie Naturelle des Animaux sans Vertebres. Tom.IV. p.230.
Account of Sesia tipuliformis and others.

1836. Boisduval, J.A. Historie Naturelle des Insectes, etc. Suites a Buffon. Tom. I. Paris.
Original description of Sesia mellinipennis.

1836. Duncan, James. British Moths etc. Jardini's Naturalists Library Vol. IV. Edinburgh.
Diagnosis of Genus Trochilum.

1836. Doubleday, Ed. Remarks on Ento. etc. Ent. Mag. Vol.III p.385.
Notes on occurence of Aegeria tipuliformis in England.

1839. Harris, Wm. T. Descriptive catalogue of North American Insects, etc. Am. Jr. Arts and Sci. Vol. XXXVI pp.282-320.
Original description of Bembecia marginata and others.

1839. Lancaster, S. The Cultivator Vol. VI. p.133.
Notes on peach tree borer in Tenn.

1839. Wood, Wm. Index Entomologicus etc.
Colored figure Sesia tipuliformis.

1840. Zetterstedt, J.W. Insecta Lapponica descripta. Lipsiae 1840.
Account Sesia tipuliformis in Lapland.

1840. Zeller, P.C. Lepidop. Beitrage.Isis, Vol.I pp.115-143.
General discussion of Sesiidae.

1840. Westwood, J.O. An Introduction to Modern Classification of Insects etc. Vol. II p.372-73.
Good account of structural characters of the Sesiidae.

1840. Boisduval, J.A. Genera et Index Methodicus Europaeorum Lepidopterorum, Paris.
Diagnosis of Genus Sesia.

1841. Anon. The Cultivator, Vol. VIII p.90-95.
Records planting red cedars among the peach trees for control of peach tree borer.

1841. Harris, T.Wm. A report on the insects of Mass. etc.
Contains account of several species of Aegeriidae.

1842. The Squash-vine Destroyer. New Eng. Farmer. Vol.XX.p.260.
Habits and ravages of Melittia satyrininiformis.

1843. Boitard, P. Nouveau Manual complet d'Entomologie etc. Tom.III. p.230.
Description Sesia tipuliformis.

1843. Harris, T.Wm. Peach-tree Worms. Mass. Ploughman. Vol.II.p.1
Ravages etc. of peach tree borer.

1844. Gaylord, W. Treatise on Insect Injurious to Field Crops etc. Trans. New York Soc. of Ag. pp.161-2.
Account of peach tree borer.

1845. Blisson, J.F.J. Notice sur les Moeurs des Larves des Sesies.
Description of larvae of several species of Aegeriids.

1846. Anon. The Cultivator Vol. III p.217.
General compilation of peach tree borer.

1846. L'Hommedieu, Trans. Cincin. Hort. Soc. for 1843-45 p.17.
Record use of salt petre against peach tree borer.

1849. Fixsen, H.J. Lepidopteren - Verzeichniss der Umgegend etc.
Bull. Soc. Imp. Nat. Mosco. Vol. XXIII. p.170.
Records Sesia tipuliformis from Russia.

1850. Herrich-Schaeffer, G.A. Sammlung neuer order wenig Schmetterlinge, Regensburg.

1850. Nickerl, F.A. Synopsis der Lepidop. Fauna Bohmens. Prag.
Record Tipuliformis from Bohemia.

1850. Doubleday, H.A. Synonymic list of British Lepidoptera etc.
Mentions Sesia tipuliformis.

1851. Harris, T. Wm. Squash-vine Borer. Am. Agriculturist. Vol.X. p.108.
Character, habits and ravages of the squash-vine borer.

1851. Schmitd, H.V. Verzeichniss der Europe. Schmetterlinge. 1851 3rd edition.
Record Sesia tipuliformis from Prussia.

1851. Harris, Thad. Wm. The Currant Borer. Mag. Hort. Hovey. Vol. XVII. p.241-2.
Natural history and means of control.

1854. Westwood, J.A. Index Entomologicus etc.
Figures Sesia tipuliformis.

1854. Harris, T.W. Rept. on some of the Diseases and Insects affecting Fruit trees. Proc. Amer. Pomolog. Soc. 1854 pp.197-210.
Habits and ravages of several aegeriids.

1854. Staudinger, Otto, De Sesii's Agri Berolinensis. Beroline, 1854.
Monograph of Sesiidae of Berlin.

1854. Emmons, E. The Natural History of New York, etc. Vol.5, pp.222-223.
Brief compiled account of Sesia tipuliformis.

1855. Glover, Townsend, Insects Injurious and Beneficial, etc. Rept. of Comm. of Patents. 1855, pp.59-89.
General account of damage, control, etc. of peach-tree borer and others.

1855. Fitch, Asa. First Rept. on Noxious and Beneficial and other Insects of New York. Trans. New York State Agri. Soc.812-20.
Detailed account life history, description, etc. of peach-tree borer.

1856. Chenu, J.C. Encyclopedie d'Historie Naturelle etc.
Notes on Sesia tipuliformis.

1856. Staudinger, Otto, Beitrage zur Feststellung der bisher bekannten Sesien, etc. Ent. Zeit. Stettin, Vol.XVII, 1856 pp.145-176.
Monograph of European Aegeriidae

1856. Walker, F. List of the Specimens of Lepidoptera in Coll. of British Museum, Pt. VIII, pp.1-71.
Original descriptions of Bembecia marginata and several others.

1857. Anon. Ann. Soc. Ent. Belgique, Vol. 1, p.33.
Records Sesia tipuliformis from Belgium.

1857. Humphres & Westwood. British Moths, etc.
Characters and life history of S. tipuliformis.

1857. Stainton, T. A Manual of British Butterflies and Moths.
Description of S. tipuliformis.

1858. Anon. Northern Farmer. Vol. V. p. 116.
Records use of tansy against peach-tree borer.

1859. Merriam, J.P. Gardener's Monthly Vol. II. p. 168.
Records use of gas-tar against peach-tree borer.

1859. Morris, M.H. The Horticulturist, p.508.
Habits and injury of peach-tree borer.

1860. Peticolas, T.V. Country Gentlemen, Vol. XV, p.226.
Control of Peach-tree borer.

1860. Morris, M.H. Horticulturist, Vol. XV, p. 18.
On peach-tree borer (Very popular)

1860. Nowicki, Maximilian, Enmumeratio Lepid. Haliciae Orientalis
Records S. tipuliformis from Galicia.

1862. Meyer. Dur Mittheil, der Schweizer, etc. Bd. I. p. 32.
Notes of habits of S. tipuliformis.

1862. Morris, J.G. Synopsis of Described Lepidoptera of North America. Smithsonian Miscell. Collection, pp.330-335.
Diagnosis of Family Aegeriidae.

1862. Bateman, M.D. Amer. Agri. Vol. XXVIII, p.141.
Records use of coal tar against peach-tree borer.

1863. Lederer, J. Wiener Ent. Monat. Bd. VII, p.20.
On occurrence of S. tipuliformis in Bulgaria.

1865. Riley, C.V. Peach-tree Borers, Prairie Farmer, 1865,p.122.
Control, Life history, etc.

1866. Walsh, Benj. D. Borers, Practical Entomologist, Vol. 1, pp.27-29.
Account and figures of peach-tree borer and S. tipuliformis.

1866. Walsh, Benj. On the insects - - - inhabiting the galls of certain species of wollow. Proc. Ent. Soc. of Phila. Vol. VI. p.270.
Original description of S. scitula.

1867. Cresson, E.T. The Squash-borer. Practical Farmer, 1867 p. 116.
Control of squash-vine borer.

1867. Riley, C.V. Currant-bush borer. Prairie Farmer, 1867, p.69.
Habits, description, etc.

1867. Glover, T. Entomological Mo. Rept. Dept. Agri. Oct. p.329.
Notes on grape-vine borer.

1867. Gavere, C. De. Notices sur quelques Macrolepidopteres etc. Tijds. voor. Ent. Neder. Ent. Vereen.
Records S. tipuliformis from Holland.

1868. Riley, C.V. Peach-borer. Prairie Farmer, Vol. XXI, p.301.
On control.

1868. Grote and Robinson, Description Am. Lepidoptera. Trans. Am. Ent. Soc. Vol.II, p.182, 184.
Original description of Sesia pictipes.

1868. Grover, T. Rept. of Entomologist. Rept. Com. of Agri. 1867, pp.58-76.
Account of grape root-borer.

1868. Dietrich, K. Beitrage zur Kenntniss der im Kanton Zurich, etc. Mittheil, der Schweiz. Ent. Gesella. Bd. II. p.337.
Records Sesia tipuliformis from Switzerland.

1868. Walsh,B.D. First Annual Rept. of Noxious Insects of Ill. Trans. Ill. State Hort. Soc. v. 1,
Life history of grape root borer.

1869. Riley, C.V. Prairie Farmer, p. 57 1869.
Notes on Sesia acerni.

1869. Riley, C.V. 1st Rept. on Noxious Insects of Missouri. 4th Ann. Rept. St. Bd. Agri.
Nature and history of peach-tree borer.

1869. Packard, A.S. Entomological Calendar. Am. Naturalist, Vol.II p.219.
Note on Sesia tipuliformis.

1869. Packard, A.S. Guide to Study of Insects.
Account of several species.

1869. Scudder, S.H. Entomological Correspondence of T.W.Harris.
Notes and description of most American species.

1869. Boisduval, Jean Alphonse. Lepidopteren de La Californie Bruxelles 1869.
Original description of Sesia nomadaepennis, S. chrysidipennis, and S. bibionipennis.

1869. Walsh and Riley, Mounding peach trees. Am. Ent. Vol. I. pp.180, 181, 201, 222. For control of peach-tree borer.

1869. Wakefield, Trans. Ent. Soc. of London. XIV.
Occurrence of Sesia tipuliformis in New Zealand.

1870. Haylaerts, F.J. Tijds, Ent. Neder Ent. Vereen. 2nd Series, Vol. V. p. 147.
Records Sesia tipuliformis from Breda.

1870. Riley, C.V. 2nd Annual Rept. on Noxious Insects of Mo. etc. 5th Annual Rept. St. Bd. of Agri. p. 64.
Squash vine borer.

1870. Fulton, J.A. Peach culture. 1877. p.120-125.
Life history etc. of peach-tree borer.

1871. Bowles, G.J. Quebec Currant Worms. Can. Ent. Vol. III. p. 9.
Description etc. Sesia tipuliformis.

1871. Clifford, J.R.S. Economy of Sesia tipuliformis. Entomologist Vol. V. p. 460.
Notes on habits of larvae.

1871. Riley, C.V. 3rd annual rept. on Noxious Insects of Missouri, etc. 6th Annual Rept. St. Bd. Agri. for 1870 p.75.
On grape root borer.

1871. Saunders, Wm. One the larvae of peach borer. Can. Ent. Vol. III. pp.22-23.
On peach tree borer.

1872. Rept. Ent. Soc. Ont. p. 381.
On Sesia tipuliformis.

1872. Can. Ent. Vol. IV. p. 133.
On peach-tree borer.

1872. Walsh, B.D. Prairie Farmer, Vol. XLIII May 11.
Remedies for peach-tree borer.

1872. Wocke, M. Zeits, fur Ent. Breslau, 1872. p.16.
Records Sesia tipuliformis in Silesia.

1872. Fitz, J. Southern Apple and Peach Culturist. 1872, pp.254-260.
On control of peach-tree borer.

1872. Le Baron, W. Prairie Farmer, Vol. XLIII May 11.
Control of peach-tree borer.

1872. Reed, E.B. Insects attacking the Cucumber etc. Rept. Ent. Soc. Ont. pp.89-90. (1871).
General account of squashvine borer.

1872. Lintner, J.A. Entomo. Contributions 23rd Ann. Rept. N.Y.State Cab. Nat. Hist. p. 60.
Notes on several species.

1873. Bethune, C.J.S. Grape vine borer Can. Ent. Vol. V. p.218.
Notes on grape-vine borer.

1873. Reed, E.B. Insects affecting the peach. Rept. Ent. Soc. Ont. 1872. pp.44-47.
Habits etc. of peach-tree borer.

1873. Glover, T. Mo. Rept. Dept. Agri. Oct. 1873.
On grape-vine borer.

1874. Germaduis, P. A New Aegerian Maple-borer. Am. Nat. Vol.VIII p.57.
On maple-tree borer.

1874. Riley, C.V. A new(?) Aegerian Maple-borer. Am. Nat. Vol.VIII. p.123.
Sinks S. acericola.

1874. Riley, C.V. 6th Rept. on Noxious Insects etc. from Mo. 9th Annual Rept. State Bd. Agri. 1873.
Original description Aegera rubi.

1874. Butler, A.G. Notes on the Aegeriidae etc. Ann. Mag. Nat. Hist. Vol. XIV. pp.407-11.
Mentions Bembecia marginata.

1874. Glover, T. Rept. of the Ent. and Curator of Insects. Rept. Comm. Agri. 1873.
On grape root borer.

1874. Lintner, J.A. Entomological Contributions III. p. 179.
Record capture of S. tipuliformis in June.

1875. Cook, A.J. Insects injurious to farm, garden and orchard. 13th Annual Rept. St. Bd. Agri. Mich.
Mentions peach-tree borer and others.

1876. Bateman, M.B. Country Gentleman 1876, p. 535.
Records use of tarred paper against peach-tree borer.

1876. Riley, C.V. Apple and Peach Borers. Coleman's Rural World p.11
Account life-history etc. of peach-tree borer.

1877. Gott, B. Report on some Fruit Enemies. Rept. Ent. Soc. Ontario 1877.
Note and figure of currant cane-borer.

1877. Packard, Alpheus. Rept. on Rocky Mt. Locust etc. Rept. U.S. G.S. Terr. (Hayden) 1875.
Note on squashvine borer.

1877. Packard, A.S. Half-hours with Insects. Boston. pp.281-282.
Notes on mimicry of Aegeriidae.

1877. Perkins, G.H. On Certain Injurious Insects. 4th Rept. Rept. Vermont Bd. Agri. 1877. pp.146-52.
Bembecia marginata.

1878. Hoffmeister, A.W. Rept. on Noxious Insects of Small Fruits. Ann. Rept. Iowa St. Hort. Soc. 1877. p.245.
Habits and damage of currant cane borer.

1878. Lintner, J.A. A squash-vine borer Cult. and Count. Gent. Vol. XLIII p.551.
Ravages, habits etc. of squash borer.

1878. Perkins, G.H. On some injurious insects of Vermont. 5th Rept. of Vt. Bd. of Agri. pp.261-3.
Life history etc. of currant cane borer.

1878. Thomas, Cyrus. 6th Rept. Noxious Insects etc. from Ill. Trans. Dept. of Agri. Ill. 1876.
Treatise on peach-tree borer and others.

1878. Thomas, Cyrus, 7th Rept. etc. of Ill. Trans. Dept. of Agri. ILl. 1877. Vol. VII.
Life history etc. of most American species known at this time.

1879. Bailey, J.S. The Natural History of Aegeria pictipes G.&.R. North Am. Ent. Vol. I. pp.17-21.
Detailed life history of lesser peach-tree borer.

1879. French, C.H. Notes on Squash and Cucumber Pests. Prairie Farmer. March 1, 1879.
Notes on squashvine borer.

1879. Lintner, J.A. Peach-tree borer. Cult. and Count. Gentleman, Vol. XLIV p.199.
Gives control methods for peach-tree borer.

1879. Milton, M. Country Gent. Vol. XLIV. p. 119.
Records San. exitiosa from Azalea.

1879. Osborn, H. Ash-tree Borer. College Quart. May, Vol.II. p.249.
Records a parasite from this insect.

1879. Osborn, H. Rept. on Noxious Insects. Trans. Iowa Hort. Soc. Vol. XIII.
Habits and life history Podosesia syringae.

1879. Smith, E.A. Shade trees etc. and insects that effect them.
Notes on San. acerni.

1880. Comstock, J.H. Rept. of Ento. Ann. Rept. U.S.Comm. Agri.1879.
Description, habits, control, parasites etc. of peach-tree borer.

1880. Edwards, H. Description of some new Aegeriids. Bull. Brooklyn Ent. Soc. Vol. 3, p. 71-72.
Original description of Melittia gloriosa.

1880. Fuller A.S. Peach-tree borer Infesting Almonds. Am. Ent.Vol.III.
Records San. exitiosa from almonds.

1880. Fuller, A.S. Insect Enemies of Small Fruits. Am. Ent. Vol.III. p.93.
Notes on habits of S. tipuliformis.

1880. Osburn, H. Ash tree borer Western Soc. Jr. and Farm. Vol.X August.
Character and life history of Podosesia syringae.

1880. Lintner, J.A. Squash borer. Country Gent. p.455.
Ravages, larval habits, etc.

1880. Osborn, H. Ash tree borer. Coll. Quart. Vol. III p.33,14.
Parasites, characters, life history, etc.

1881. Edwards, H. New genera and species of Aegeriidae, Papilio,Vol.I. pp.179-208.
Original description of Aegeria pacifica, Euhagena nebraskae, Vespamima sequoiae, Sanninoidae grafii and many others.

1881. Bell and Reed. Maple Tree Borer. Can. Ent. v. 13, p.236.
On ravages of this species.

1881. French. G.H. A parasite of Aegeria syringae.
Papilio Vol. I. p.106.
Records Phaeogenes ater as a parasite of this insects.

1881. Grote, A.R. A new Species of N.A.Aegeriidae. Bull. Brooklyn Ent. Soc. Vol. III. pp. 78-79.
Original description Memythrus similaris.

1881. Grote, A.R. North Am. Moths etc. Bull. U.S.G. and Geograph. Surv. Terr. Vol. VI. p.257.
Notes on Memythrus similaris.

1881. Kellicoott, D.C. Observations on Several species of Aegeriidae Inhabiting Vicinity of Buffalo N.Y. Can. Ent. Vol. XIII pp.3-8.

1881. Kellicott, D.C. Notes on Aegeria pini. Can. Ent. V.XIII,p.157.
Brief notes on.

1881. Martin, John, 10th Rept. State Ent. on Noxious Insects etc. Ill. Trans. Dept. of Agri. Ill. 1880.
Notes and description of the larvae of the Aegeriidae found in Ill.

1881. Packard, A.S. Insects Inj. to Forest and Stade Trees. Bull.7 U.S.Ent. Comm.
Account and food habits of Aegeriidae attacking forest and shade trees.

1881. Strecker, H. A Description of a New Species. Can. Ent. Vol.XIII p.156.
Original description of Melittia grande.

1881. Zimmerman, C.D. Insects Inj. to Nursery Stock. etc. Gardners Monthly Vol. XXIII, p.238.
Discusses peach-tree borer.

1882. Coleman, N. Papilio, Vol. II. p.50.
On habits of larvae of squashvine borer.

1882. Edwards, H. Notes on N.A.Aegeriidae, Papilio, Vol. II. p.52-57.
Description of several new species.

1882. Edwards, H. Further notes and Descriptions of Some N.A.Aegeriidae.
Original description of several new species.

1882. Grote, A.R. New Check list of N.A. Moths.
List of known Aegeriidae.

1882. Treat, Mary. Inj. Insects of Farm and Garden.
Brief account of peach-tree borer.

1883. Anon. Check list of Insects of Dominion of Canada.
Lists Aegeriidae of Canada.

1883. Edwards, Henry, New Species of Aegeriidae. Papilio, Vol.III. pp.155-157.

1883. Hulst, G.D. Notes on Some Sesiidae Bull. Brooklyn Ent. Soc. Vol. VI. p.8-10.
Excellent account of life history and habits of Bembecia marginata.

1883. Lintner, J.A. A New Sexual Character in the Pupa of Some Lepidoptera. Psyche. Vol. IV. p.106.
Points distinguishing characters of Aegeria tipuliformis.

1883. Riley, C.V. Stoddards Encyclopedia Americana p.137.
Notes on peach-tree borer.

1883. Riley, C.V. Entomological Notes Amer. Nat. Vol.XVII,p.782.
Critical review of Hulst's paper (1883).

1883. Rivers, J.J. Aegeria hemizonae , Papilio, Vol. III p.26.
Records Sesia rutlians from raspberry.

1883. Saunder, Wm. Insects Inj. to Fruit, Phila. 1883.
Gives account of known Aegeriidae injurious to fruit.

1884. Fernald, C.H. Standard Nat. Hist. Vol.II.
Diagnosis of family Aegeriidae.

1884. Lintner, J.A. Squashvine Borer. Country Gent. Vol.XLIX, pp.477-497.
Character, life history, etc.

1885. Lintner, J.A. 2nd Annual Rpt. on Insects of New York.
Control etc. of peach-tree borer and others.

1886. Lintner, J.A. Insects and Other Pests. New England Homestead Vol. XX, p.198.
On Bembecia marginata.

1886. Weed, C.M. The Currant Stem Borer. Prairie Farmer, LVII, p.233.
Life history and control.

1886. Wilcox. Peach Culture. 1886.
On control of peach-tree borer.

1887. Buckler, Wm. Larvae of British Butterflies, etc. Vol.II. pp.49-123.
On larvae of Sesia tipuliformis.

1887. Doran, E.W. Rept. of Economic. Ento. of Tenn. Bien. Rept. Comm. of Agri. Tenn. p.207.
On peach-tree borer and squashvine borer.

1887. Riley, C.V. Strawberry borers, Pacific Rul. Press, Vol.XXXIII p.559.
Control of Sesia rutilans.

1887. Webster, F.M. Insects of the Year. Trans. Ind. Hort. Soc. 1866.
On Sesia tipuliformis.

1888. Barry, P. The Fruit Garden. p.488.
On peach-tree borer.

1888. Bethune, C.J.S. Remedies for Noxious Insects. 18th Ann. Rept. Ent. Soc. Ont. p.54.
On tipuliformis.

1888. Edwards,H. Catalogue of Species, etc. omitted from Grote's List. Ent. Americana, Vol.III, p.221-232.
List of species not in Grote's catalogue.

1888. Hale, J.H. Trans. Mass. Hort. Soc. 1888, pt. I p.66.
On control of peach-tree borer.

1888. Klee, W.G. Rept. State Insp. of Fruit Pests. 3rd Bienn. Rept. State Board Hort. Calif. p.242-48.
On Sesia rutilans and San. opalescens.

1888. Lintner, J.A. Egg laying of peach borer moth. Country Gent. Vol. LIII, p.109.
On oviposition of San. exitiosa.

1888. Lintner, J.A. Inj. Fruit Insects of N.Y. Proc. N.Y.Farmers, 1886-87. pp.52-59.
Control of peach-tree borer.

1888. Lintner, J.A. Fourth Rept. etc. Insects of N.Y.
Account of squashvine borer.

1888. Riley, C.V. Notes on the life-history of Aegeriidae, Proc. Ent. Soc. Wash. Vol. I. p.85.
Records food plants, etc. of several important species.

1889. Cordley, A.B. Orchard and Garden 1889. p.211.
Notes on Western peach-tree borer.

1889. French, J.H. On Texas and California Moths, Can. Ent. Vol. XXI, p.163.
Larval habits, etc. of Vespamima sequoiae.

1889. Hillman, F.H. Orchard and Garden, p.179.
On S. tipuliformis.

1889. Klee, W.G. Proc. 10th Fruit Growers Conv. p.14.
On Sanninoidea opalescens.

1889. Lintner, J.A. Peach-tree borer. Country Gent. Vol. LIV, p.861.
Life-history, remedies, etc.

1889. Riley and Howard, Sciepteron in cotton-wood in Wn. Insect Life, Vol. II, p.18.
On Memythrus robinae.

1889. Townsend, C.H.T. Some Mich. Notes Recorded. Insect Life, Vol.II, p.42.
Ravages of peach-tree borer.

1889. Weed, C.M. Amer. Nat. Vol. XXIII, p.1108.
General account of Family Aegeriidae.

1890. Alwood, W.B. Peach Borers. Southern Planter, pp.565-66.
Account of ravages, etc.

1890. Beutenmuller, Wm. Catalogue of Lepidoptera Found Within Fifty Miles of N.Y. City and Food Plants, Ann. N.Y.Acad. Sci. Vol. V. pp.204-205.
Records all the species found in this locality and known hosts.

1890. Kellicott, D.S. Blackberry Borer. Jr. Columbus Hort. Soc. p.27.
Notes on Bembecia marginata.

1890. Kellicott, D.S. On Injurious Aegerians. Jr. Columbus Hort. Soc. Vol.V. pp.11-17.
Account peach-tree borer, San. tipuliformis, San. pyri, and others.

1890. Kent. G.H. Notes of the Season from Miss. Insect Life, Vol. II, p.283.
Records injury of squash-borer.

1890. Lugger, O. Insects Injurious to Small Fruits.
Rept. Minn. St. Hort. Soc. p.169.
On San. tipuliformis.

1890. Packard, A.S. Insects Injurious to Forest and Shade Trees, 5th Rept. U.S.Ent. Comm.
Life History and food plants of most of the then known injurious species.

1890. Smith, J.B. Catalogue of Insects of N.J.
Records 12 species of Aegeriids.

1890. Smith, J.B. Rept. of the Entomologist. 10th Ann. Rept. N.J. Agri. Exp. Sta. p.299-302.
Account and life history peach-tree borer.

1891. Bruner, L. Some Insects of Especial Interest to Fruit Growers of Nebraska, Rept. Neb. State Hort. Soc. p.151.
Account of Bembecia marginata and others.

1891. Coquillett and Riley. The California peach-tree Borer.
Insect Life, Vol.III, pp.392-3.
Injury, control, etc. of Western peach-tree borer.

1891. Jack, J.G. A Clematis Borer. Garden and Forest, Vol. IV, p.496.
Account life history etc. of Alcathoe caudata.

1891. Kent. G.H. Notes from Miss. Insect Life Vol.III, p.337.
On squash-borer.

1891. Lugger, Otto. Two New Lepidopterous Borers.Psyche,Vol.VI,p.108.
Original description Podosesia fraxini.

1891. Orcutt and Aldrich. Injurious Insects. S. Dak. Agri. Exp. Sta. Bull. 22, p.80-83.
Life history, control, etc. of Podosesia fraxini.

1891. Osborn. Entomology. Orange Judd Farmer. p.340.
Notes on San. tipuliformis.

1891. Smith, J.B. Insects Injurious to Blackberry. Bull. New Jersey Exp. Sta. "N".
Good account Bembecia marginata.

1891. Smith, J.B. List of Lep. of Boreal America.
List of known species of Aegeriidae.

1891. Smith, J.B. Notes on Blackberry Borers. Insect Life, Vol.IV p.22-30.
Account of life-history etc. Bembecia marginata.

1892. Beutenmuller, Wm. List of Types of Lepid. in Edwards Collection Bull. Am. Bus. Nat. Hist. Vol.IV, p.171-5.
List 72 species of types of Aegeriids.

1892. Gillette, C.P. Inj. Insects and Remedies. Proc. State Bd. of Hort. Colo. 1892, pp.230-241.
Account San. tipuliformis in Colo.

1892. Jack, J.G. Notes on Two Troublesome Borers. Garden and Forest, p.429.
Remedies, etc. Bembecia marginata.

1892. Kellicott, D.S. Notes on the Aegeriidae of Central Ohio I. Can. Ent. Vol. XXIV, p.42-47. and Insect Life, Vol.IV, p.81-85.

1892. Kellicott, D.S. Notes on the Aegeriidae of Central Ohio II. Can. Ent. Vol. XXIV, p.209-212.
Detailed account of the known species of Ohio.

1892. Smith, J.B. Notes on Melittea ceto. Can. Ent. Vol.XXIV,p.129.
Give reasons why but a single brood north of N.J.

1892. Smith, J.B. Notes on Blackberry Borers. 22nd Rept. Ent. Soc. Ont. p.52.
On Bembecia marginata.

1892. Smith, J.B. Rept. of Ent. 12th Ann. Rept. N.J.State Agric. Sta.
Good account Bembecia marginata.

1892. Townsend, C.H.T. Possible Influence of Irrigation on Insect Injury in N. Mexico. Insect Life, Vol.V. p.79.
Effect of irrigation on peach-tree borer.

1892. Walker, Treatment of the Squash-borer. Insect Life, Vol.IV, pp.271-272.
Life history, habits and control.

1893. Beutenmuller, Wm. Notes on Some N.A.Moths, etc. Bull. Amer. Mus. Nat. Hist. Vol. 5, pp.22-26.
Mentions about a dozen species of Aegeriidae.

1893. Gibb, L. Notes on Coll. Sesiidae in London. Can. Ent. Vol.XXV p.177.
Records taking San. tipuliformis.

1893. Kane, W.F. Catalogue of Lepidoptera of Ireland. Entomologist, Vol.XXVI, p.272.
Records San. tipuliformis from Ireland.

1893. Lintner, J.A. 8th Rept. Insects, etc. New York, Albany.
Detailed account of control of peach-tree borer.

1893. McCarthy, Bulletin 92, N.C.Agri. Exp. Sta. p.104-5.
On habits and control of peach-tree borer.

1893. Smith, J.B. Insects Injurious to Cucurbs. Bull. 94, N.J.Agri. Exp. Sta. p.27-40.
Account squash-vine borer.

1893. Smith, J.B. Rept. of Entomologist, 13th Ann. Rept. N.J.State Agri. Sta.
On habits of Bembecia marginata.

1893. Webster, F.M. Insects Affecting Raspberry. Bull. 45, Ohio Exp. Sta. p.915.
Life history and habits Bembecia marginata.

1894. Beutenmuller, Wm. Studies of Some N.A.Moths. Bull. Am. Mus. Nat. Hist. Vol.VI, p.87-99.
Mentions about 15 species Aegeriidae.

1894. Beutenmuller, Wm. On N.A. Moths. Bull. Am. Mus. Nat. Hist. Vol.VI, p.365-8.
Unites Aegeria californicum and A. pacifica.

1894. Jack, J.G. Notes on Some Injurious Insects. Trans. Mass. Hort. Soc. p.133-150.
On peach-tree borer.

1894. Riley, C.V. Notes from Sanbury. Insect Life Vol.VI, p.206.
On life history Podosesia syringia.

1894. Sirrene, F.A. Insects Injurious to Squash, etc. Bul.75,N.Y. Exp.Sta.
On squash-borer.

1894. Weed, H.E. The Peach-tree Borer. South. Cultivator, Nov.1894.

1895. Comstock. A Manual for the Study of Insects.
Gen. characters of Family Aegeriidae and account of several species.

1895. Cooke, A.J. Peach Borer. Rural Calif. 1895, p.436.
On Sanninoidea opalescens.

1895. Davis, G.C. Borers the Horticulturist Must Fight. Proc. Mich. Hort. Soc. 1894. pp.78-83.
On peach-tree borer.

1895. Lugger, O. Insects Injurious in 1895. Bull.43, Minn. Ag.Exp. Station, pp.184-7.
Detailed account remedies etc. San. tipuliformis.

1895. Meyrick, E. Handbook of British Lepidoptera.
Diagnosis of family Aegeriidae.

1895. Osborn and Malley, Observations on Insects 1894. Bull.21, Iowa Ag. Exp. Sta. pp.135-149.
On squash-borer.

1895. Perkins, G.H. Rept. of Ent. 8th Ann. Rept. Vt. Agri.Exp. Sta. p.130-132.
Account life-history etc. Syn. tipuliformis.

1895. Piper, C.V. Insect pests Farm, Garden, and Orchard. Bull.17, Wash. State Ag. Exp. Sta.
Note on San. tipuliformis.

1895. Slingerton, Habits of Squash-borer. Rural New Yorker, p.262.
On egg-laying habits.

1895. South, Richard. The Entomologist, Vol.XXVIII, p.45.
Notes on habits etc. Syn. tipuliformis.

1895. Webster, F.M. Ohio Farmer, 1895. p.291 and 157.
p.291 on squash-borer.
p.157 on peach-tree borer.

1896. Beutenmuller, W. Critical Review of Sesiidae of N.A. North of Mexico, Bull. Am. Mus. Nat. Hist. Vol.VIII, pp.111-148.
Notes on all the species known to date.

1896. Marlatt, Peach-tree Borer. Cir. 17, U.S.Bur. Ent.
Account life-history etc.

1896. Quaintence, Insects Enemies Truck and Garden Crop. Bull.30, Agri. Exp. Sta. Fla. pp.293-294.
Account squash-vine borer.

1896. Slingerland, N.V. The Life of the Peach-borer. Rural New Yorker, 1896, p.800.
Brief account life history.

1896. Smith, J.B. Econ. Ento. Phila. 1896.
Notes on squash-vine borer and others.

1896. Smith, J.B. Dept. Eco. Entomology. Ent. News, Vol.VII, pp.107-9.
General account peach-tree borer.

1896. Tutt, J.W. British Moths. London.
Brief notes on S. tipuliformis.

1896. Woodworth, C.W. Notes from correspondence. Rept. Ag. Exp. Sta. Cal. 1894-95. pp.231-249.
On San. opalescens.

1897. Beutenmuller, Wm. Notes on N.A. Sesiidae. Bull. Am. Mus. Nat. Hist. Vol.IX, p.213-216.
Notes and original description, several species.

1897. Beutenmuller, Wm. Food Habits N.A.Sesiidae. Bull. Am. Mus. Nat. Hist. Vol.IX, pp.217-220.

1897. Beutenmuller, Wm. Notes on Mellitia satyriniformis, Jl. N.Y. Ent. Soc. Vol.V. pp.34-35.

1897. Butz, G. Bull. 37, Pa. Agri. Exp. Sta. pp.23-25.
Brief account of peach-tree borer.

1897. Cordley, A.B. Bull. 45, Ore. Agr. Exp. Sta. pp.100-107.
On San. opalescens.

1897. Lowe, V.H. Proc. West. N.Y.Hort. Soc. for 1897, pp.65-66.
Brief account peach-tree borer.

1897. Slingerland, Rural New Yorker, p.800.
Account peach-tree borer.

1897. Smith, J.B. Dept. Eco. Entomology. Ent. News, Vol.VIII,p.208.
On life history of peach-borer.

1897. Webster, F.M. The Protective Value of Action Valitionae or Otherwise in Protective Mimicry. Jr. N.Y.Ent. Soc. Vol.V p.6.
Notes on protective mimicry of Podosesia syringae.

1897. E.T. Rural New Yorker, 1897. p.6.
Records finding borers in the gum in winter.

1898. Baker, C.F. Bull.90, Ag. Exp.Sta. Alabama, pp.22-23.
Control, life history, etc. peach-tree borer.

1898. Beutenmuller, W. Three New Species Sesiidae. Jr. N.Y.Ent. Soc. Vol.VI, pp.240-241.
Original description S. tacoma and others.

1898. Faville, and Parrot, Bull. 77, Dansas Ag. Exp. Station. pp. 44-47.
Account peach-tree borer.

1898. Gillett, C.P. Bull. 43, State Ag. College Colo. p.6.
On peach-tree borer and S. tipuliformis.

1898. Piper and Doane, Bull. 35, Wash. Ag. Exp. Sta. p.13.
On Sesia rutilans.

1898. Piper and Doane, Bull. 36, Wash. Ag. Exp. Sta. p.14.
On S. tipuliformis.

1898. Slingerland, Proc. West. N.Y. Hort. Soc. of 1898. p.67.
On control of peach-tree borer.

1898. Slingerland, Rural New Yorker, 1898, p.34.
Use carbon-bisulphide against peach-tree borer.

1898. Smith, J.B. Notes on Some Peculiarities of San. exitiosa. Ent. News, Vol.IX, pp.79-114-115.

1898. Smith, J.B. Bull. 128, Ag. Exp. Sta. J.N. pp.1-28.
Detailed life history peach-tree borer.

1898. Sterns, H.N. Bull. 42, Agri. Exp. Sta. Geo. p.226.
Brief acc't peach-tree borer.

1898. Stedmann, J.M. Bull. 44, Agri. Exp. Sta. Mo. pp.12-14.
On peach-tree borer.

1899. Beutenmuller, Wm. Synopsis of Melittia of N.A. Bull. Am. Mus. Nat. Hist. Vol.XII, pp.149-50.
Also description of M. magnifica.

1899. Beutenmuller, Wm. On Some Species of N.A.Lepidoptera. Bull. Am. Mus. Nat. Hist. XII, pp.157-160.
Synopsis genus Aegeria.

1899. Beutenmuller, Wm. Notes and Descriptions of Some New N.A. Lepidoptera. Jr. N.Y.Ent. Soc. Vol.VIII, pp.254-256.
Describes 3 new Aegeriids.

1899. Fernald, H.T. Bull. 47, Pa. Dept. Ag. p.14-15.
Add. peach-tree borer.

1899. Lugger, O. Fourth Ann. Rept. of Ento. of State Exp. Sta. Minn. for 1898. pp.1-279.
Mentions Minn. Aegeriidae.

1899. Slingerland, M.V. The Peach-tree Borer, Bull.176, Cornell Sta.
Detailed life-history, control, etc. of peach-tree borer.

1899. Slingerland, M.V. Trans. Mass. Hort. Soc. Pt. I, p.5.
Control, life history peach-tree borer.

1899. Slingerland, M.V. Rural New Yorker, p.222.
Use of tar paper against peach-tree borer.

1900. Beutenmuller, Wm. A New Sesiid from Alaska, Can. Ent. Vol. XXXII, p.208.
Sesia artica.

1900. Beutenmuller, Wm. Note on Sesia artica. Can. Ent. XXXII, p. 277.

1900. Beutenmuller, Wm. Food Habits of Sesiidae, Can. Ent. Vol. XXXII, p.301.
Synopsis of food habits of N.A. Aegeriidae.

1900. Beutenmuller, Wm. Two New Sesiidae. Jr. N.Y.Ent. Soc. Vol. VIII, p.250.
Original description San. barnesi.

1900. Beutenmuller, Wm. Monograph of Sesiidae. Mem. VI. Am. Mus. Nat. Hist.
Monograph of Sesiidae N.A.North of Mexico.

1900. Dyar, H.G. Papers from the Harriman Alaskan Expedition XII. Proc. Wash. Ac. Sc. Vol.II, p.499.
Records S. culiciformis from Alaska.

1900. Anon. The Control of Insect Pests etc. Bull. 71. Calif. St. Board of Hort. p.215-246.
On Western peach-tree borer.

1900. Arnold, C.G. Notes on the peach and the borer. American Gardening, Feb. 17, 1900.
On peach-tree borer.

1900. Burns, C.E. The Peach Root Borer. Pac. Rural Press, Feb.17, 1900.
San. opalescens.

1900. Fowler, Some Insects of the Year 1899-1900. Rept. Agri.Exp. Sta. Calif. p.73.
On San. opalescens.

1900. Woodworth, Notes from Calif. Bull. 26, U.S.D.A.Bur.Ent. New Series, pp.90-94.
San. opalescens.

1900. Chittenden. Strawberry Crown-borer. Bull.23, U.S.D.A.Bur. Ent. New Series. pp.85-90.
Sesia rutilans.

1901. Wickerson, Summertreatment for peach moth. Pacific Rural Press, June 15, 1901.
San. opalescens.

1901. Wickerson, Treatment for crown-borer. Pacific Rural Press, Dec. 14, 1901.
San. opalescens.

1905. Ehrhorn, Calif. Hort. Comm. Bien. Rept. 1905, p.113.
On peach-tree borer.

1905. Moulton, Calif. Hort. Comm. Bien. Rept. p.178.
Economic aspect San. opalescens.

1905. Gossard, Ohio Bull. 164, p.24.
Currant cane borer.

1905. Quaintance, Farmers Bulletin 330.
On peach-tree borer.

1905. Cooper. Cal. Hort. Comm. Inj. Ins. 1905, p.66.
Western peach-tree borer.

1906. ___ Colo. Bulletin 114, p.33.
Currant cane borer.

1907. Adams, San. exitiosa, Ark. Bull.92, p.12.
On peach-tree borer.

1909. Ball and Titus, Utah Hort. Comm. Bien. Rept. 1909-10. p.48.
San. opalescens.

1910. Brunner, Calif. Hort. Comm. Dest. Insects. 1910. p.7.
San. opalescens.

1910. Essig, Calif. Hort. Bull. II, p.191.
Control Syn. tipuliformis.

1911. Moulton, U.S.D.A.Bull. No. 97, p.65.
San. opalescens.

1912. Sanderson, Insect Pests, p.645.
San. opalescens.

1912. Wilson, Bien. Crop Pest Rpt. Oregon I, p.157.
San. opalescens project under investigation.

1912. Cook, Calif. Hort. Bull. I, p.4 & 11.
Western Peach-tree borer.

1912. Cordley, Better Fruit, 1912, p.9.
On opalescens control, etc.

1912. Wilson, Bien. Crop.Pest Rept. p.131, Ore. Vol.I.
Strawberry crown-borer.

1912. Baldwin, Ind. Ent. Rept. 5, p.126.
Currant cane-borer.

1912. Caesar, Ont. Ent. Soc. Rept. 42, p.31.
S. tipuliformis.

1913. Essig, Cal. Hort. Bull.II, p.191.
S. tipuliformis, control, etc.

1913. Essig, Cal. Hort. Bull. II, pp.1-2, 193.
Life history, control etc, San. opalescens.

1913. Essig, Cal. Hort. Bull. II, p.190.
Life history etc. Sesia rutilans.

1914. Slingerland and Crosby, Manual Fruit Insects, p.275.
On peach-tree borer.

1914. O'Kane, Injurious Insects, p.234.
Sesia rutilans.

1914. Slingerland and Crosby, Manual Fruit Insects. p.384.
Sesia rutilans.

1914. Caesar, Ont. Ent. Soc. F. Bull. 222, p.34.
Syn. tipuliformis.

1914. Treherne, Pr. Ent. Soc. B.C. p.27
Currant cane borer.

1915. Brunner, U.S.D.A.Bull. 255, Complete treatise Syn.
novaroensis.

1915. Noren, Oregon Countryman, Vol.7, p.179.
San. opalescens.

1915. Essig, Inj. and Beneficial Insects of Calif. p.427.
Syn. tipuliformis, life history, etc.

1915. Gillette and List. Colo. Bull. 210, p.34.
Syn. tipuliformis.

1915. Somes. Mo. Fruit Bull. 25, p.10.
Currant cane borer.

1915. Brooks, Internat. Cong. Vit.R.1915. p.243.
Grape root borer.

1916. Marcovith, Insect Life, Vol.3, p.10.
Currant cane borer.

1916. Melander and Heald. Wash. Pop.Bull. 100.
Strawberry crown borer.

1916. Baldwin, Ind. Ent. R. 8, p.155.
Syn. tipuliformis.

1916. Caesar, Ont. Ent. Soc. R.46, p.31.
Currant cane borer.

1916. DuPorte, Ont. Ent. Soc. R.46, p;50.
Syn. tipuliformis.

1916. Edmundson, Idaho Bull. 87, p.20.
San. opalescens.

1916. Essig, Cal. Hort. Bull. No.5, p.107-17.
Western peach-tree borer.

1917. King, Ohio Bull. 307, p.409.
San. opalescens.

1917. Sharp, Pacific Rural Press, 93, p.133.
San. opalescens.

1917. Ross, Ont. Ent. Soc. R.47, p.76.
Currant cane borer.

1918. Littler, Jr. Ec. Ent. Vol.XI, p.472.
Syn. tipuliformis.

1918. Ruggles and Graham. Minn. Exp. Sta. Bull.29, p.27.
Currant cane borer.

1918. Brooks, U.S.D.A.Bull.730.
Grape root borer.

1918. Turner, Jr. Agr.Res.14, p.146.
Peach-tree borer.

1918. Graham, Minn. Ent. Cir. 50, p.3.
Syn. tipuliformis.

1918. Quaintance, Farmers Bull. 1908.
Western peach-tree borer.

1918. Taylor, Calif. Bull. 297, p.60.
Peach-tree borer.

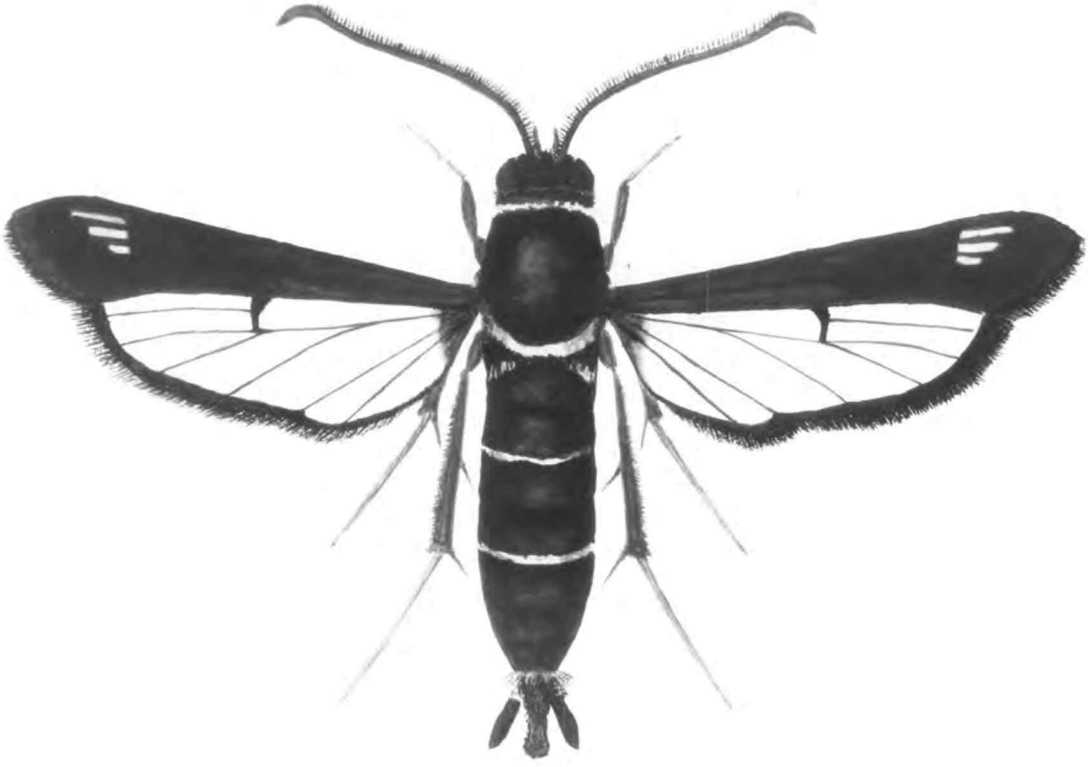
1919. Cody, Orchard and Farm, Vol.31, p.4.
Western peach-tree borer.

1919. Cody, Rur. World and West. Empire, Vol.22, p.17.
San. opalescens.

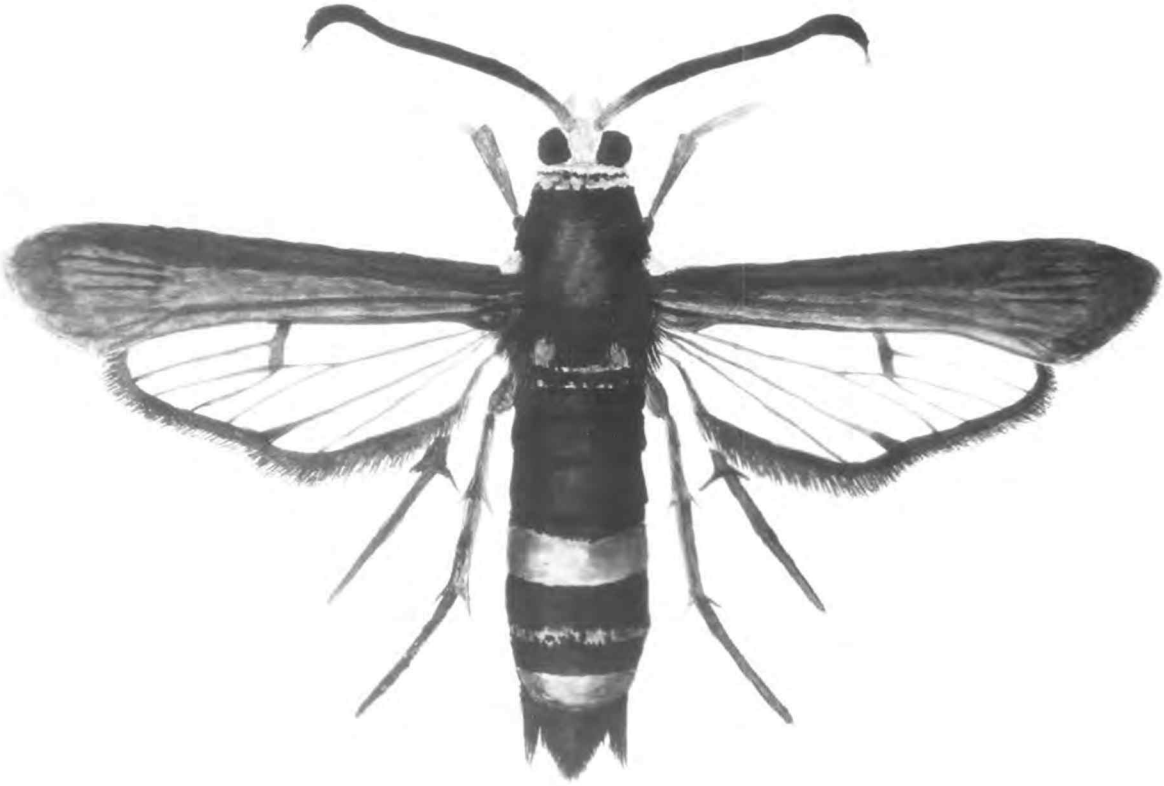
1919. Darrow, U.S.Farmers Bull. 1024.
Syn. tipuliformis.

1919. Severin, S. Dak. R. 10, p.17.
Currant cane borer.

1919. Hedrick, Manual Am. Grape Growers, p.217.
Grape root borer.

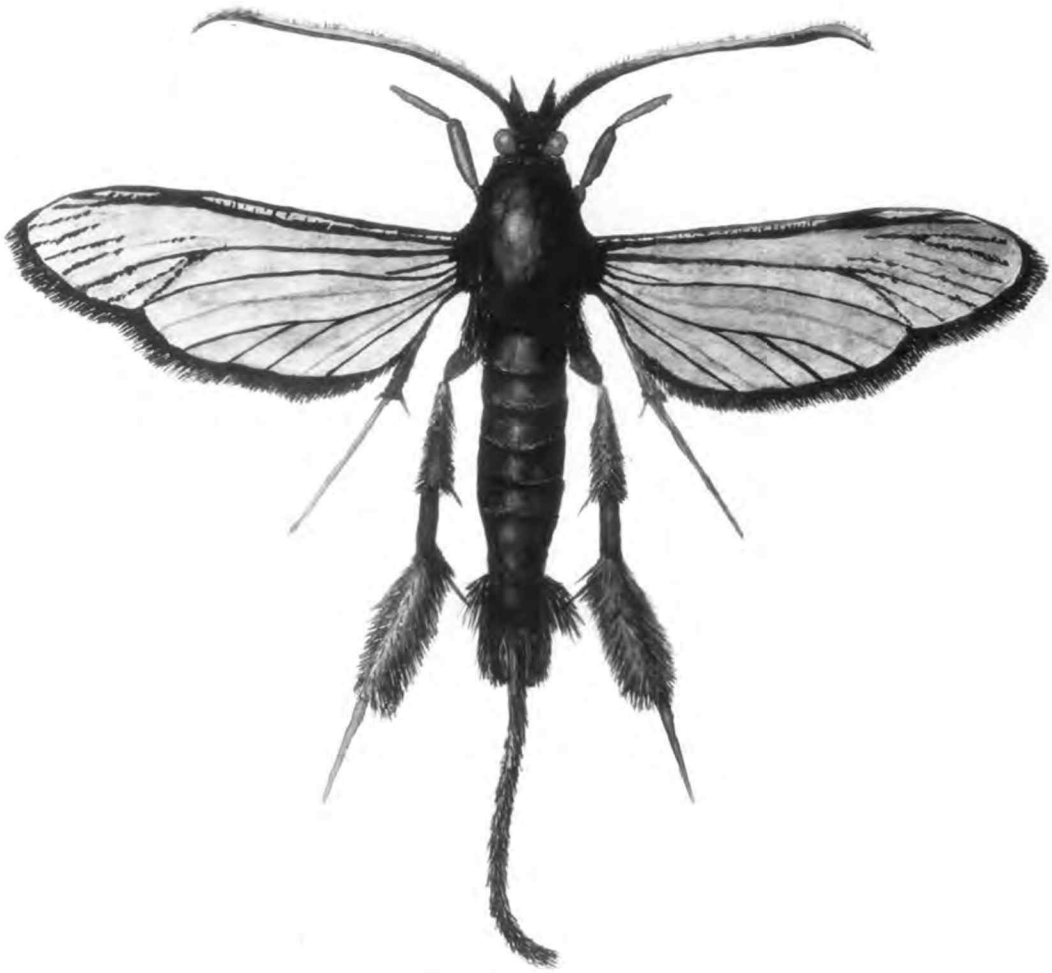


Paranthene perlucida - Male.



Paranthene polistiformis - Female.

Synanthedon americana - Male.



Alcathoe korites - Male.

Sanninoidea opalescens - Male.

Sanninoidea opalescens - Female.