Annotated Bibliography of the Carpenterworm, 
Prionoxystus robiniae 
J.D. Solomon and C.J. Hay
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This bibliography has been prepared for entomologists, foresters, pest control personnel, and others who wish to refer to literature on the carpenterworm, Prionoxystus robiniae Peck (Lepidoptera: Cossidae).

The insect, the larvae of which cause severe economic loss by tunneling in the trunks of hardwood timber trees, was originally described in 1818 and named Cossus robiniae. The generic name was subsequently changed to Xyleutes Harris, then to Xystus Grote, and finally to Prionoxystus Grote. Common names include locust moth, locust cossus, locust carpenter moth, goat moth, carpenter moth, carpenter borer, locust tree borer, ash tree borer, and oak carpenterworm.

The carpenterworm is a native of North America and is widely distributed throughout the United States and southern Canada. In the Eastern and Southern U.S. the oaks are its principal hosts. Here and elsewhere, however, green ash, black locust, elm, maple, willow, cottonwood, and occasionally fruit trees and ornamentals are attacked.

The larvae hatch from eggs laid in crevices on the bark and promptly enter first the inner bark and then the sapwood. The larval stage may be completed within 1 or 2 years in the South, but may continue for 3 or 4 years elsewhere. The adult is a large grey moth. Fully grown larvae may be 12 mm in diameter, and their tunnels in the sapwood cause much loss from degrade when infested trees are sawn into lumber.

Over the years, considerable literature has developed. Early contributions were primarily descriptive, and dealt mostly with systematics and with damage and control in shade trees. Only within the past few decades has the carpenterworm's great importance in hardwood forest stands been recognized.

No previous attempt has been made to compile a complete bibliography, but Munro and Fox (1934) included 48 references in their paper on biology and control. The present bibliography is arranged in alphabetical order by author and is intended to cover all technical literature through 1972. Most annotations summarize the salient information in each publication but for literature that presents only brief or general treatment the annotation consists of a few keywords to characterize the content. Citations from USDA Cooperative Economic Insect Reports are presented in abbreviated form on page 2.

Readers who are beginning a study of the carpenterworm are particularly directed to papers by Hay, Morris, Munro, and Solomon. Older publications deserving attention are those by Burke, Doten, Fetch, Grote, and Packard. Information on specific aspects of the insect may be located through the subject index.

The initial sources of reference were the authors' files and the various forestry and entomological journals. Other important sources were Biological Abstracts, Forestry Abstracts, Review of Applied Entomology, Zoological Record, and Index to the Literature of American Economic Entomology. Citations in specific publications provided additional titles. Though considerable care was taken, there probably are omissions; notification of these will be appreciated.

Some of the references deal with uses of pesticides no longer approved by the U. S. Department of Agriculture. Before any pesticide is applied, its current registration should be checked with responsible State or Federal authorities.

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*Entomologist at the Southern Hardwoods Laboratory, which is maintained at Stoneville, Mississippi, by the Southern Forest Experiment Station, USDA Forest Service, in cooperation with the Mississippi Agricultural and Forestry Experiment Station and the Southern Hardwood Forest Research Group.

**Insect Ecologist, Northeastern Forest Experiment Station, USDA Forest Service, Delaware, Ohio.
<table>
<thead>
<tr>
<th>Year</th>
<th>Vol., issue, and page No.</th>
<th>Hosts</th>
<th>State</th>
<th>Comment</th>
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<tbody>
<tr>
<td>1954</td>
<td>4(9) :179</td>
<td>Turkey oak</td>
<td>Fla.</td>
<td>Death of several trees</td>
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<td></td>
<td>4(21) :434</td>
<td>Oaks</td>
<td>N. Car.</td>
<td>Damaging trees</td>
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<td></td>
<td>4(27) :612</td>
<td>Oaks</td>
<td>Va.</td>
<td>Dead and dying trees, most infested</td>
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<tr>
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<td>4(38) :873</td>
<td>Oaks</td>
<td>Miss. &amp; Va.</td>
<td>Damaging trees</td>
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<td>1956</td>
<td>4(49) :1062</td>
<td>Pecan</td>
<td>Tex.</td>
<td>Light to medium infestation</td>
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<tr>
<td></td>
<td>6(52) :1145</td>
<td>Shelterbelt trees</td>
<td>Mont.</td>
<td>Becoming of economic importance</td>
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<td>1957</td>
<td>7(23) :447</td>
<td>Oaks</td>
<td>Miss.</td>
<td>Damaging trees</td>
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<td>1958</td>
<td>8(6) :98</td>
<td>Pecan</td>
<td>S. Car.</td>
<td>Extremely serious damage</td>
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<td>1959</td>
<td>9(3) :24</td>
<td>Ash, cottonwood, elm boxelder, Chinese elm</td>
<td>Mont.</td>
<td>Attacks noted</td>
</tr>
<tr>
<td></td>
<td>9(24) :511</td>
<td>Pecan</td>
<td>S. Car.</td>
<td>15-20 large holes noted in some trees</td>
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<td></td>
<td>9(34) :794</td>
<td>Elm</td>
<td>Calif.</td>
<td>A local problem</td>
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<td>9(48) :1021</td>
<td>Calif. black oak</td>
<td>Calif.</td>
<td>Severe damage and killing</td>
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<td>1960</td>
<td>10(15) :250</td>
<td>Oak</td>
<td>Calif.</td>
<td>Medium infestation</td>
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<tr>
<td></td>
<td>10(26) :566</td>
<td>Elm</td>
<td>S. Dak.</td>
<td>Attacks noted</td>
</tr>
<tr>
<td></td>
<td>10(25) :813</td>
<td>Elm</td>
<td>Calif.</td>
<td>Medium infestation</td>
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<tr>
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<td>10(45) :1055</td>
<td>Chinese elm</td>
<td>Calif.</td>
<td>Heavy infestation</td>
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<td>11(43) :1004</td>
<td>Shelterbelt trees</td>
<td>Mont.</td>
<td>Severe damage</td>
</tr>
<tr>
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<td>12(7) :82</td>
<td>Pecan</td>
<td>Ala.</td>
<td>Moderate 20A infestation</td>
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<td>12(14) :310</td>
<td>Calif. live oak</td>
<td>Calif.</td>
<td>Locally heavy</td>
</tr>
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<td>1962</td>
<td>12(14) :329</td>
<td>Ash</td>
<td>N. Dak.</td>
<td>Severe infestations</td>
</tr>
<tr>
<td></td>
<td>12(26) :710</td>
<td>N. Dak.</td>
<td>Male moths taken at light trap</td>
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<td>1963</td>
<td>13(3) :29</td>
<td>Coast live oak</td>
<td>Calif.</td>
<td>Increase in infestation during 1962</td>
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<tr>
<td>1964</td>
<td>14(11) :192</td>
<td>Peaches</td>
<td>Calif.</td>
<td>Medium infestation</td>
</tr>
<tr>
<td></td>
<td>14(16) :346</td>
<td>Poplar and oak</td>
<td>N. Dak.</td>
<td>Some damage in shelterbelts</td>
</tr>
<tr>
<td></td>
<td>14(16) :346</td>
<td>Shade trees and ornamentals</td>
<td>Colo.</td>
<td>Noted as a pest</td>
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<td>14(26) :695</td>
<td>Ash</td>
<td>N. Dak.</td>
<td>Attacks noted</td>
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<td></td>
<td>14(31) :870</td>
<td>Cherry</td>
<td>Wash.</td>
<td>Attacking winter-injured trees</td>
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<td>1965</td>
<td>14(31) :889</td>
<td>Oaks</td>
<td>Ind.</td>
<td>Considerable damage</td>
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<tr>
<td></td>
<td>14(35) :1003</td>
<td>Elm</td>
<td>Colo.</td>
<td>Attacks noted</td>
</tr>
<tr>
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<td>15(12) :223</td>
<td>Cherry</td>
<td>Wash.</td>
<td>Damaging winter-injured trees</td>
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<td>15(16) :354</td>
<td>Oaks</td>
<td>Central States</td>
<td>Damage and degrade severe</td>
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<td>15(20) :486</td>
<td>Ash</td>
<td>Calif.</td>
<td>Pupae heavy locally in trunks</td>
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<tr>
<td></td>
<td>15(51) :1325</td>
<td>Boxelder</td>
<td>Calif.</td>
<td>Larvae heavy locally in trunks</td>
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<tr>
<td>1967</td>
<td>17(14) :261-2</td>
<td>Hardwoods</td>
<td>Mo.</td>
<td>Serious log and lumber degrader</td>
</tr>
<tr>
<td></td>
<td>17(16) :311</td>
<td>Cottonwood, walnut, ash Pecan</td>
<td>Mont.</td>
<td>Abundant</td>
</tr>
<tr>
<td></td>
<td>18(13) :246</td>
<td>Deciduous trees</td>
<td>Calif.</td>
<td>Damage noted</td>
</tr>
<tr>
<td>1968</td>
<td>19(15) :229</td>
<td>Shade trees</td>
<td>Mont.</td>
<td>Heavy infestations</td>
</tr>
<tr>
<td></td>
<td>19(26) :476</td>
<td>Elms</td>
<td>Mont.</td>
<td>Destructive pest of deciduous trees</td>
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<tr>
<td></td>
<td>19(36) :706</td>
<td>Willows</td>
<td>Neb.</td>
<td>Increasing number</td>
</tr>
<tr>
<td>1969</td>
<td>19(36) :706</td>
<td>Willow plantings and ornamental trees</td>
<td>Calif.</td>
<td>Severe larval damage</td>
</tr>
<tr>
<td></td>
<td>20(14) :222</td>
<td>Shelterbelt plantings and ornamental trees</td>
<td>Mont.</td>
<td>Heavy damage</td>
</tr>
<tr>
<td>1970</td>
<td>21(16) :284</td>
<td>Hardwoods</td>
<td>Mo.</td>
<td>Major pest</td>
</tr>
<tr>
<td></td>
<td>21(24) :416</td>
<td>Green ash and Siberian elm</td>
<td>S. Dak.</td>
<td>Most destructive borer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Heavy damage</td>
</tr>
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</table>
   The carpenterworm is a serious pest of trees planted for shade, ornamental, and windbreak purposes. Information on hosts, damage, signs of attack, stages, life cycles, prevention, and control.

   In the Midsouth, carpenterworms spend up to 2 years constructing 6-inch long galleries in the trunks of oaks. The female sex pheromone is being investigated as a potential control.

   Biology, damage, and control.

   P. robiniae attacks oak, willow, and locust from California east to New York. Forms of P. robiniae are discussed.

   Biology, damage, and control.

   Specimens vary little in appearance within a locality but show remarkable variation among geographic areas. Three races are described: mixtus, subnigrus, and flavotinctus.

   Two subfamilies of Cossidae, Hyponotinae and Zeuzerinae, are given and P. robiniae is placed in Zeuzerinae. Systematics of the Cossidae are discussed and a key to the genera of the two subfamilies is presented.

   The greatest impact of trunk-boring insects on quality material is among the hardwoods in the eastern half of the country, especially in the Mississippi Valley. Research on controls is urgently needed.

   The carpenterworm has attracted most attention as a pest of shade and ornamental trees, but it also does much damage in forest stands. Briefly describes life stages, biology, hosts, and damage.

   The approved common name of P. robiniae is "carpenterworm."

   Description, hosts.

   Biology, key.

   Description.

   Biology, damage.

   Biology, damage, control.

   Moth emergence, distribution.

   P. robiniae makes large cylindrical galleries in the trunks of ash, elm, oak, maple, and locust. Wounds should be dressed promptly to promote healing and prevent decay.

   Damage, hosts.

   Can be controlled by "cutting out," fumigation of galleries, and wrapping trunks.

   Impact.

   Illustrated description of carpenterworm life stages with notes on life history. Control measures include mechanical methods (such as poking into tunnels with a wire), application of a chemical or spray, and injection of a fumigant into the tunnels.

Distribution.


From 55 to 76 percent of oak sampled had defects caused by borers. The percent of incidence of borer-damaged trees on various sites was as follows: ridge 26, slope 40, cove 32, and lowland or bottom 32.


Exclusive of growth defects, the most common source of hardwood defect was insect borers. Losses from insect-caused defects were least in cove sites, in stands of high basal area, and in trees of high vigor.


The carpenterworm is one of the worst pests of native live oak (Quercus agrifolia) and introduced elm (Ulmus campestris) in California. For protection, placing a "knock down" screen cage around the trunk of shade trees from May through July is suggested.


Insect damage in white oak caused the rejection of 1.3-11.4 percent of the staves and stave blanks cut at three mills in Ohio. Grubs were most detrimental to logs of small diameter.


Systematics, description.


Habits of carpenter moth and leopard moth are compared.


The carpenterworm is not considered a serious forest pest in Florida. Habits, signs of attack, control.


California live oaks, poplars, willows, locusts, and elms are badly damaged. The adult is known in many places as the goat moth, so named because of its odor. Life history, distribution, and control.


Pictorial key.


Biology, damage, distribution, systematics.


Description.


Much of the damage attributed to the locust borer is actually that of the carpenterworm.


Biology, damage, key, control.


Life history, control.


Introduction of carbon bisulphide into the galleries controlled the larvae.


Biology, damage, distribution.


Host.


Causes degrade in both red and white oaks. Galleries start at a wound or an old borer gallery. They may be 1 inch in diameter and are always stained dark brown or black.


A native of this country and very common in willow and wild cottonwoods in Nevada. Information on the appearance of the insect, recognition of damage, biology, and control. Woodpeckers devour the larvae.


Biology.


Systematics. Includes list of the original descriptions of the American forms of Cossidae.


In a mill-yard study in the Georgia Piedmont, 25 to 47 percent of the log ends of several species of oak showed insect-caused defects that were attributed largely to carpenterworms and cerambycid borers.


Key to insect damage.


Discusses the synonymy of several cossid species and states that Cossus plagiatus is a synonym of Prionoxystus robiniae.


P. robinia var. quercus is based largely on the following description: "The whole of the sub-central inner space of the secondaries (edging on the discoidal cell) in the female is semi-transparent orange, similar to that in the male."


Biology.


Hosts.


Biology.


Biology, control.


The carpenterworm produces serious deformities and thus renders trees unsightly. Information on early history of the insect, habits, description, distribution, hosts, and remedial measures.


Biology, damage, control.

56. Felt, E. P. 1942. BORERS OF SHADE AND ORNAMENTAL TREES. Trees 5 (3): 6, 8. The carpenterworm, a serious pest on the West Coast, is credited with killing more oaks than any other insect. Practical control consists of either cutting the borers out or injecting an insecticide into the gallery.


Biology, importance, control.


In Oklahoma, the carpenterworm has been recorded only from Payne County, but is probably distributed throughout the eastern half of the State. The insect and its damage are described and control procedures are given.


Damage, habits.

60. Filmer, R. S. 1945. WHAT ABOUT BORER CONTROL? Home Gard. 6 (3): 91-95.

Symptoms, control.


The locust cossus, Cossus plagiatus, makes large holes in the solid wood of oaks and other trees, admitting air and moisture and causing their decay. The early systematic treatments are discussed and the common name “locust cossus” is proposed. General information on its biology and control are given.


Systematics.


Hosts.


Green ash and several other hosts are damaged. Eggs are laid singly or in masses and hatch in 11-14 days. Birds aid in natural control. Fumigation of the galleries is the most practical control.


Systematics.
66. Fraser, J. P. 1928. DEFECTS IN TIMBER. Timber Trades J. 104: 87-88, 137.
Defines defects referred to in the grading rule book of the National Hardwood Lumber Association.

Tunneling habits.

Tunneling habits, frass, damage.

Carpenterworms were found in the burrows of the locust borer. Habits are briefly described.

There is no satisfactory control for the carpenterworm under plantation conditions.

Borers, primarily the carpenterworm and red oak borer, Enaphalodes rufulus, cause an annual loss of $328,000 in Missouri hardwood timber.

Hosts, importance.

Biology, injury, control.

The insect is a serious pest of South Dakota's shade trees.

Importance, hosts.

Predicts that black locust will be destroyed in Denver and Boulder Counties by P. robiniae. Nurserymen in the infested sections have been forbidden to ship black locust.

An incubation period of 15 days was required for eggs deposited by a female moth captured June 2 at a light in Blacksburg, Virginia.
ERN OAKS AND THEIR CONTROL. 

Hosts, evidence of infestation, description, life history, habits, and natural, preventative, and applied control. The 1970 revision omits the recommended use of DDT and chlordane for control.


About 88 percent of the oak logs sampled at 19 sawmills in Kentucky had internal insect damage, and 73 percent of the oak boards showed borer injury. Amount of damage increased with size of the tree. Borer tunnels were more numerous in butt than in upper logs.

Herbert, F. B. 1919. INSECT PROBLEMS OF WESTERN SHADE TREES. J. Econ. Entomol. 12: 333-337.


The carpenterworm mines in the heart and sapwood of the trunks and larger limbs of coast live oaks and valley oaks, probably causing the death of more oaks than any other insect.


Hosts.


Description.


Damage, distribution.


Description, damage.


Damage.


Life history, habits, damage, hosts, distribution, natural enemies, and control.


Includes notes on biology and control of P. robiniae.


Generic key to the pupae of Cossidae in North America.


Systematics.


Description.


Damage, hosts.


Biology, control.


Biology, importance.


Description.


Entry not seen, taken from Barnes and McDonough (1911). Synonymy.

Kotinsky, J. 1921. INSECTS INJURIOUS TO DECIDUOUS SHADE TREES AND THEIR CONTROL, p. 69-70. USDA Farmers' Bull. 1169.

Although carpenterworms rarely kill trees, they cause unsightly deformities. Information on recognition of the insect, damage, seasonal history, prevention, and control.


Importance.


Habits, hosts, control.


Distribution.


Describes Cossus reticulatus (a new species), C. plagiatus Walker, and C. crepera Harris.
Grub holes are grading defects in factory logs because they limit the length of cuttings. They are less important in construction and local-use logs.

Hosts, systematics.

The carpenterworm and its injury to trees are described and hosts are given. The report is designed to help the fieldman without specialized training in entomology to identify the insects causing tree damage.

Biological, damage, control.

Reared newly hatched carpenterworms to adults on raw potatoes in less than 1 year.

Research program.

Carpenterworm galleries provide nesting sites for leafcutter bees.

Carpenterworms deform the tree, weaken small stems, and degrade lumber. Infestations are heaviest on poor sites and in the weaker trees of the stand.

Measurement of a large number of larvae yielded a coefficient of 0.88 mm by Dyar's method. A total of 14 molts were calculated from these data.

Life history.

Systematics.

Biology, damage, control.

Carpenterworm references.

A study in Missouri revealed that borers of living hardwood trees cause annual losses of nearly $500,000. Sixty percent of the damage was attributed to the carpenterworm.

Distribution.

Biological, hosts, control, importance.

Biology, damage.

Description, hosts, range.

Life stages of the carpenterworm are illustrated, and a table outlines the type of damage, tree species attacked, and economic importance.

Carpenterworms belong to 1 of 2 major groups of trunk-boring insects. Notes on the biology and habits.

In oak logs from Mississippi River bottoms, defects caused by carpenterworms and other trunk-boring insects reduced the value of lumber an average of $22 per M BF. Losses averaged $28 per M for overcup oak butt and upper logs, $19 for all Nuttall oak logs, and $19 for all willow oak logs.
135. Morris, R. C. 1959. INSECTS CAUSE DE-
GRADE IN OZARK OAKS. USDA For. Serv.
South. For. Exp. Stn., South. For. Notes 120, p.
2-3.
Potential values of lumber from Ozark red oaks
were reduced as much as $10 per M BF by degrade
causcd from boarlc attackers on the living trees.

25 (4) : 8.
Biology, damage, and control. Shade trees can be
protected by spraying the trunks in early June
with a residual insecticide.

137. Morris, R. C. 1964. VALUE LOSSES IN
SOUTHERN HARDWOOD LUMBER FROM DE-
GRADE BY INSECTS. USDA For. Serv. Res.
Pap. SO-8, p. South. For. Exp. Stn., New Or-
leans, La.
In mill-scale studies, insect-caused defects in the
trunks of living southern oaks resulted in lumber
degrade and value loss averaging about $20 per M
BF. On this basis, losses would represent a reduc-
tion of $60 million in potential value of the 3 billi-
on board feet of oak lumber sawn annually in the
South.

138. Morris, R. C. 1965. CONTROLLING INSECT
DAMAGE TO SOUTHERN HARDWOOD FORE-
The carpenterworm is the most important pest of oaks in the Midsouth. Insecticides may be used to
protect high-value trees during their final
growth for veneer logs, especially when drought
or other adverse factors make trees susceptible to
attack.

139. Morris, R. C. 1970. WHAT ABOUT HARDWOOD
Work Conf., p. 197-201. USDA For. Serv., State
and Priv. For., Atlanta, Ga.
Importance, research program.

28-29, 148. Entomol. Reprint Specialists, East
Lansing, Mich.
Description and key.

141. Munns, E. N. 1940. A SELECTED BIBLIO-
GRAPHY OF NORTH AMERICAN FORESTRY, p.
References.

142. Munro, J. A. 1981. CARPENTERWORM INJURY TO ASH IN NORTH DAKOTA. J. Econ.
Entomol. 24 : 682-685.
The carpenterworm causes serious injury to green
ash around Fargo. Includes notes on life habits
and control; Arkansas kingbird and the common
kingbird are valuable predators.

143. Munro, J. A., and Fox, A. C. 1933. NOTES ON
BORERS OF TREES AND SHRUBS. N. and S.
Dak. Hortic. 5 (8) : 91-98.
The carpenterworm is a serious borer of ash in
North Dakota.

144. Munro, J. A., and Fox, A. C. 1934. CARPENTER-
WORM BIOLOGY AND CONTROL. N. Dak.
Information on classification, including early de-
scriptions, common names, distribution, and hosts.
Detailed review of life history and control.

145. Munro, J. A., and Riddle, H. W. 1930. INSECT
PESTS OF TREES AND GARDENS, p. 8. N.
Dak. Agric. Exp. Stn., Circ. 42.
Damage and control.

146. Neumoegen, B., and Dyar, H. G. 1894. PRELIM-
INARY REVISION OF THE BOMBYCIDAE
NORTH OF MEXICO. J. N. Y. Entomol. Soc. 2:
160-166.
Systematics.

147. O'Dell, J. H. 1927. INSECT PESTS PREVA-
LENT DURING 1923 AND 1924, p. 61. 15th and
Impact.

148. Osborn, H. 1916. AGRICULTURAL ENTOMOl-
GY, p. 210-211. Lea & Febiger, Phila. and N. Y.
Biology, description.

149. Packard, A. S. 1864. SYNOPSIS OF THE BOM-
BYCIDAE OF THE UNITED STATES. In Proc.
Systematics.

150. Packard, A. S. 1881. INSECTS INJURIOUS TO
FOREST AND SHADE TREES, p. 6-12. U.S.
The locust carpenter moth, Xyleutes robiniae
Harris, is common throughout the United States
and bores large galleries in the trunks of oaks
including pin oak.

151. Packard, A. S. 1890. INSECTS INJURIOUS TO
FOREST AND SHADE TREES, p. 53-58. USDA
From New England southward to Texas, oak
lumber and cordwood is commonly honeycombed
by the large black burrows of the carpenterworm.
Biologie, habits, and control.

152. Peck, W. D. 1818. SOME NOTICE OF THE IN-
SECT WHICH DESTROYS THE LOCUST
This is the original description of the carpenter-
worm. Peck assigns the common name, locust
moth, and scientific name, Cossus robiniae.

153. Peirson, H. B. 1927. MANUAL OF FOREST IN-
SECTS, p. 87. Maine For. Serv. (Augusta) Bull. 5.
Hosts.

154. Petch, C. E., and Maltais, J. B. 1932. THE CARP-
ENTER WORM, (PRIONOXYSTUS ROBI-
NIAE) PECK, AND ITS CONTROL, p. 131-136.
Bionomics and control were investigated in an
infestation of silver maple at Ste. Anne de
Bellevue and St. Laurent, Quebec.

LEPIDOPTERA AND PLANT INFESTING
HYMENOPTERA, p. 132-133. Edwards Brothers,
Detailed larval description.
Carpenterworm females deposit eggs singly or in irregular clusters. The egg measures approximately 2.3 x 1.5 mm. The surface of the chorion is covered with conspicuous irregular indentations.


Describes an artificial diet, container, and procedures for rearing. Carpenterworm is a serious pest of green ash in the prairie region of southeastern Canada. The life cycle is 3 or more years. Moths emerge from early June to early August and deposit 300 or more eggs. Additional information is given on life history and control.


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Biology, control.


Hosts, control.


P. robiniae has been recorded from New Brunswick to interior British Columbia (map shows collection points). Hosts include trembling aspen, black cottonwood, willow, and eastern cottonwood.


Holes, bark pockets, stains, and other blemishes caused by borers and bark scarers greatly lower the value of hardwoods by limiting the number and size of defect-free pieces that can be cut from lumber.


Life history in Missouri, and economic loss.


Describes an artificial diet, container, and procedures for rearing partially grown larvae.


Discusses grub damage to green ash near State College, Mississippi, and gives measurements of galleries and size of trees infested.


A primary hymenopterus parasite, Amersibia prionoxysti, of the carpenterworm is described from Falls Church, Virginia.


Biology, description, control.


Damage and control.


Classifies defects caused by carpenterworms and other insects.


A diet of oak sawdust, agar, water, and nutrients was developed. Adults emerged in 9 to 23 months, with peaks during the 11th and 19th months. Of the larvae, 59 percent pupated, and 88 percent of the pupae produced adults.


Males were sterilized by topical application of tepa at dosages that neither affected their mating vigor nor reduced their longevity.


Individual females deposited up to 1,000 eggs in bark crevices on the tree trunk. Moths that re-

Eggs were planted in bark wounds and caged on host trees or young larvae were started on an artificial diet and then transferred to drilled holes. Survival averaged about 60 percent in the oaks and about 1/3 less in green ash and American elm.


Losses almost perfect regeneration of a mandible is reported. Mandible losses occurred in laboratory cultures when molting larvae were unduly disturbed by other larvae.


Larvae began feeding in the cambium area and then tunnelled 3 inches obliquely upward into the sapwood for about 4 months, when they turned vertically upward for 4.3 inches. Gallery diameters averaged 0.6 in.


Fourteen species of insect borers, including the carpenterworm, were preyed upon by woodpeckers in Mississippi.


Moth emergence usually begins in late April, peaks in late May or early June, and ends during late June or early July. Males emerge mostly during the morning, females almost entirely during the afternoon. Mating and oviposition are discussed in detail.


A sex pheromone was extracted from virgin females and bioassay procedures were developed.


Five traps baited with virgin females captured an average of 270 males (range 38-666). Females were most attractive during the first 2 days. From 20 to 25 percent of the males marked and released 1/4 to 3/4 miles from female-baited traps were recaptured. Seven percent of those released 1 mile from the traps were recaptured.


Woodpeckers significantly reduced populations of several insect borers, including carpenterworms. Predation was greatest during January and February. In a rearing program, 1,424 carpenterworm moths or 20 percent of the total were taken by woodpeckers.


In west-central Mississippi, moth emergence began in April, peaked in late May or early June, and ended in late June or early July. Temperature summation provided a good prediction of seasonal patterns. Moths emerged earliest from trees of small diameter. Emergence rhythms were related to sex and generation time.


A portable, battery-operated light trap placed in hardwood stands of Mississippi captured 10 species of borers. Carpenterworm moths were taken in the greatest numbers, females more frequently than males.


Pupae were trapped in their galleries by spongy mycelium of wood-decay fungi, Irpex mollis, a fast-growing white rot fungus, was the principal species.


The wood was stained around 60 galleries examined in Nuttall oak, American elm, and green ash. Decay was visible around 20 percent of the galleries, mostly in Nuttall oak.


Sporophores were found growing out of carpenterworm tunnels.


204. Wolley Dod, F. H. 1966. PRELIMINARY LIST OF THE MACRO-LEPIDOPTERA OF ALBERTA. Can. Entomol. 38: 266. The carpenterworm was reared from a freshly built cottonwood log building.

205. Wygant, N. D. 1938. THE RELATION OF INSECTS TO SHELTERBELT PLANTATIONS IN THE GREAT PLAINS. J. For. 36: 1011-1018. Borers are the most serious insect problem in shelterbelt trees. The carpenterworm, one of the principal borers of green ash, causes considerable mortality.

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